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September 8, 2017

Mr. Brooks Stanfield, On-Scene Coordinator
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1200 Sixth Avenue, Mail Stop ECL-133
Seattle, Washington 98101

Re: Contract Number: EP-S7-13-07
Technical Direction Document Number: 16-07-0002
Cinnabar Mine Integrated Assessment

Dear Mr. Stanfield:

Enclosed please find the final Integrated Assessment report for the Cinnabar Mine site which is located near Yellow Pine, Idaho.

If you have any questions regarding this submittal, please call Renee Nordeen at (206) 624-9537 or me at (206) 920-1739.

Sincerely,

ECOLOGY AND ENVIRONMENT, INC.

Steven G. Hall
START-IV Removal Team Leader

cc: Ken Marcy, Site Assessment Manager, EPA, Portland, Oregon Mail Stop OOO
Linda Ader, START-IV Site Assessment Team Leader, E & E, Seattle, Washington
Renee Nordeen, START IV Project Manager, E & E, Seattle, Washington

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Cinnabar Mine
Integrated Assessment

Yellow Pine, Idaho

Contract Number EP-S7-13-07
Technical Direction Document Number: 16-07-0002

September 2017

Prepared for:

United States Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Prepared by:

ECOLOGY AND ENVIRONMENT, INC.
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Table of Contents

Section **Page**

1 Introduction 1-1

2 Site Description and Background 2-1
2.1 Site Location 2-1
2.2 Site Description & Background 2-1
2.3 Previous Investigations 2-2

3 Media Sampling Activities 3-1
3.1 Sampling Methodology and Locations 3-2
3.1.1 Surface Soil 3-2
3.1.1.1 Sample Methodology 3-2
3.1.1.2 Sample Locations 3-2
3.1.2 Surface Water 3-2
3.1.2.1 Sampling Methodology 3-2
3.1.2.2 Sample Locations 3-3
3.1.3 Surface Sediment 3-3
3.1.3.1 Sampling Methodology 3-3
3.1.3.2 Sample Locations 3-3
3.2 Analytical Protocol 3-4
3.2.1 Manchester Environmental Laboratory 3-4
3.2.2 ChemTex Laboratories 3-4
3.2.3 ALS Laboratory 3-4

4 Quality Assurance/Quality Control 4-1
4.1 Satisfaction of Data Quality Objectives 4-1
4.2 QA/QC Samples 4-1
4.3 Project Specific Data Quality Objectives 4-2
4.3.1 Precision 4-2
4.3.2 Accuracy 4-2
4.3.3 Completeness 4-2
4.3.4 Representativeness 4-2
4.3.5 Comparability 4-2
4.4 Laboratory QA/QC Parameters 4-3
4.4.1 Holding Times/Temperatures/Sample Containers 4-3
4.4.2 Laboratory Blanks 4-3

Table of Contents (cont.)

Section **Page**

4.4.3 Rinsate Blank 4-3
4.4.4 Serial Dilution Analyses 4-3

5 Removal Site Evaluation 5-1
5.1 Results Reporting Criteria 5-1
5.1.1 Soil Screening Level 5-1
5.1.2 Surface Water Screening Levels 5-2
5.1.3 Sediment Screening Levels 5-3
5.2 Sample Results 5-3
5.2.1 Soil Sample Results 5-3
5.2.1.1 Background Sample 5-3
5.2.1.2 Borrow Source 5-3
5.2.1.3 Tailings Piles 5-3
5.2.2 Surface Water Sample Results 5-4
5.2.2.1 Background and Attribution Samples 5-4
5.2.2.2 Ponded Water Samples 5-4
5.2.2.3 Adit Samples 5-5
5.2.2.4 West Fork Cinnabar Creek Samples 5-5
5.2.2.5 Cinnabar Creek 5-5
5.2.2.6 Sugar Creek 5-5
5.2.2.7 September 2016 Surface Water Sampling 5-6
5.2.3 Sediment Sample Results 5-6
5.2.3.1 Background and Attribution Samples 5-6
5.2.3.2 Ponded Water Sample 5-6
5.2.3.3 Adit Samples 5-6
5.2.3.4 West Fork Cinnabar Creek Samples 5-7
5.2.3.5 Cinnabar Creek Samples 5-7
5.2.3.6 Sugar Creek Samples 5-8

6 Conceptual Site Model 6-1
6.1 Contaminant Sources 6-1
6.1.1 Geology and Mineralization of the Cinnabar Mine 6-1
6.1.2 Mining Operations 6-3
6.1.3 Ore Concentrating and Processing 6-3
6.1.4 Contaminants in Ore Concentrating and Processing Wastes 6-3
6.2 Wind Transport 6-4
6.3 Volatilization and Emission of Mercury 6-4
6.4 Groundwater and Surface Water Transport 6-4
6.4.1 Erosion and Mass Wasting 6-5
6.4.2 Factors and Processes Affecting Mobility of Mercury 6-7
6.4.2.1 Oxidation-Reduction 6-8
6.4.2.2 Adsorption and Desorption 6-8
6.4.2.3 Organic and Inorganic Complexation 6-8
6.4.2.4 Methylation and Demethylation 6-9
6.4.2.5 Colloids and Particulates 6-9

Table of Contents (cont.)

Section **Page**

6.4.3 Factors and Processes Affecting Transport of Mercury in Groundwater ... 6-10
6.4.4 Mercury Species at Cinnabar Mine ... 6-12
6.4.5 Groundwater at Cinnabar Mine ... 6-12
6.4.6 Adit Discharge ... 6-13
6.4.7 Surface Water Transport ... 6-14
6.4.7.1 Bed Load Sediment Transport ... 6-14
6.4.7.2 Surface Water Dissolved Phase Transport ... 6-14
6.4.7.3 Surface Water Particulate Transport ... 6-16
6.5 Methylmercury at Cinnabar Mine ... 6-19
6.6 Summary ... 6-19

7 Conceptual Removal Option Alternatives ... 7-1
7.1 Site Access Considerations ... 7-1
7.2 Alternative 1 – Engineered Soil Media and Vegetative Cover ... 7-2
7.3 Alternative 2 – Selective Grading and Vegetative Buffer Strips ... 7-5
7.4 Alternative 3 – Tailings Consolidation and Stream Relocation ... 7-6
7.5 Alternative 4 – Full-Scale Removal Options ... 7-8

8 Site Inspection, Potential Sources, Surface Water Migration Pathway and Targets ... 8-1
8.1 Analytical Results Evaluation ... 8-1
8.1.1 Results Reporting ... 8-1
8.1.2 Background Samples Analytical Results ... 8-2
8.1.2.1 Background Surface Soil Samples ... 8-2
8.1.2.2 Background and Attribution Surface Water Samples ... 8-2
8.1.2.3 Background and Attribution Sediment Samples ... 8-2
8.2 Potential Sources ... 8-3
8.2.1 Tailings Piles Volumes ... 8-3
8.2.2 Tailings Piles Sample Results ... 8-3
8.2.3 Adits Volumes ... 8-3
8.2.4 Adits Sample Results ... 8-4
8.3 Surface Water Migration Pathway ... 8-4
8.3.1 Overland Route ... 8-4
8.3.2 Drinking Water Targets ... 8-5
8.3.3 Human Food Chain Targets ... 8-5
8.3.4 Environmental Targets ... 8-5
8.3.5 Surface Water Sample Results ... 8-5
8.3.5.1 Ponded Water Sample ... 8-5
8.3.5.2 West Fork Cinnabar Creek Samples ... 8-5
8.3.5.3 Cinnabar Creek Samples ... 8-6
8.3.5.4 Sugar Creek Samples ... 8-6
8.3.5.5 September 2016 Surface Water Samples ... 8-6
8.3.6 Sediment Sample Results ... 8-6
8.3.6.1 Ponded Water Sample ... 8-6
8.3.6.2 West Fork Cinnabar Creek Samples ... 8-6

Table of Contents (cont.)

Section **Page**

8.3.6.3 Cinnabar Creek Samples 8-7
8.3.6.4 Sugar Creek Samples 8-7

9 Summary and Conclusions 9-1
9.1 Sources 9-1
9.1.1 Tailings Piles 9-1
9.1.1.1 Removal Assessment Evaluation 9-2
9.1.1.2 Site Inspection Evaluation 9-2
9.1.2 Adits 9-2
9.1.2.1 Removal Assessment Evaluation 9-2
9.1.2.2 Site Inspection Evaluation 9-2
9.2 Targets 9-2
9.2.1 Ponded Water Area 9-2
9.2.1.1 Removal Assessment Evaluation 9-3
9.2.1.2 Site Inspection Evaluation 9-3
9.2.2 West Fork Cinnabar Creek 9-3
9.2.2.1 Removal Assessment Evaluation 9-3
9.2.2.2 Site Inspection Evaluation 9-3
9.2.3 Cinnabar Creek 9-4
9.2.3.1 Removal Assessment Evaluation 9-4
9.2.3.2 Site Inspection Evaluation 9-4
9.2.4 Sugar Creek 9-4
9.2.4.1 Removal Assessment Evaluation 9-4
9.2.4.2 Site Inspection Evaluation 9-4
9.4 Removal Alternatives 9-5

10 References 10-1

Figures

Tables

LIST OF APPENDICES

A Sample Plan Alteration Form

B Mesocosm Experiment Memorandum

C Photographic Documentation

D Sample Collection Forms

E Data Validation Memoranda and Chain-of-Custody Documentation

List of Tables

Table

2-1 1985 Preliminary Assessment Sample Results

2-2 1991 USFS Sample Results

2-3 1994 Site Inspection Soil Samples Analytical Results Summary

2-4 1994 Site Inspection Sediment Samples Analytical Results Summary

2-5 1996 Time-Critical Removal Action Laboratory Soil/Sediment Sample Results

2-6 1996 Time-Critical Removal Action Laboratory Surface Water Sample Results

2-7 1998 Removal Action XRF Soil Samples

2-8 2011 to 2016 USGS Surface Water Monitoring Station Samples Analytical Results

2-9 2014 EPA Surface Water Samples Analytical Results Summary

2-10 2014 EPA Sediment Samples Analytical Results Summary

2-11 2014 EPA Tailings Pile Samples Analytical Results Summary

2-12 2014 to 2015 USGS Surface Water Samples Analytical Results Summary

2-13 2014 to 2015 USGS Sediment Samples Analytical Results Summary

2-14 2014 to 2015 USGS Tailings and Soil Samples Analytical Results Summary

3-1 Sample and Analytical Summary

3-2 Sample Coding Key

3-3 In-Water Surface Water/Sediment Distances

3-4 Analytical Methods and Reporting Limits

5-1 Soil Screening Levels

List of Tables (cont.)

Table

5-2 Surface Water Screening Levels

5-3 Sediment Screening Levels

5-4 August 2016 Borrow Source Soil Samples Analytical Results Summary

5-5 August 2016 Tailings Pile Surface Soil Samples Analytical Results Summary

5-6 August 2016 Ponded Water Surface Water Sample Analytical Results Summary

5-7 August 2016 Adit Surface Water Samples Analytical Results Summary

5-8 August 2016 West Fork Cinnabar Creek Surface Water Samples Analytical Results Summary

5-9 August 2016 Cinnabar Creek Surface Water Samples Analytical Results Summary

5-10 August 2016 Sugar Creek Surface Water Samples Analytical Results Summary

5-11 September 2016 EPA Surface Water Samples Analytical Results Summary

5-12 August 2016 Ponded Water Sediment Sample Analytical Results Summary

5-13 August 2016 Adit Sediment Samples Analytical Results Summary

5-14 August 2016 West Fork Cinnabar Creek Sediment Samples Analytical Results Summary

5-15 August 2016 Cinnabar Creek Sediment Samples Analytical Results Summary

5-16 August 2016 Sugar Creek Sediment Samples Analytical Results Summary

9-1 Soil Sample Screening Level Summary Table

9-2 Surface Water Sample Screening Level Summary

9-3 Sediment Screening Level Sample Summary

9-4 Summary of Removal Action Alternatives

List of Figures

Figure

2-1 Vicinity Map

2-2 Site Map

2-3 Timeline

2-4 1985 Preliminary Assessment Sample Locations

2-5 1992 Removal Assessment Plan

2-6 1994 Site Inspection Sample Locations

2-7 1996 Surface Water/Sediment Sample Locations

2-8 1998 Sample Locations

2-9 USGS Stream Monitoring Station Locations

2-10 2014 EPA Sample Locations

2-11 2014 USGS Sample Locations

3-1 2016 EPA Sample Locations

5-1 2016 Arsenic Concentrations

5-2 2016 Mercury Concentrations

5-3 2016 Methylmercury Concentrations

6-1 Surface Water and Pore Water Arsenic, Mercury, and Methylmercury EPA August 23-26, 2016

6-2 Bed Sediment Arsenic, Mercury, and Methylmercury EPA August 23-26, 2016

6-3 Surface Water Mercury EPA September 21, 2016

6-4 Surface Water Arsenic, Mercury, Methylmercury, and Sulfate USGS August 18-19, 2014

List of Figures (cont.)

Figure

6-5 Surface Water Arsenic, Mercury, Methylmercury, Iron, and Sulfate USGS July 23-25, 2015

6-6 Surface Water Filtered Arsenic vs. Filtered Total Mercury EPA August 23-26, 2016

6-7 Surface Water Unfiltered Total Mercury vs Filtered Total Mercury and Unfiltered Iron USGS July 23-25, 2015

7-1 Removal Action Alternative 1

7-2 Removal Action Alternative 2

7-3 Removal Action Alternative 3

7-4 Removal Action Alternative 4

8-1 15-Mile Target Distance Limit

List of Abbreviations and Acronyms

Abbreviation/ Acronym	Definition
%Rs	percent recoveries
µg/g	micrograms per gram
µg/L	micrograms per liter
ACM	asbestos containing materials
AET	Apparent Effect Threshold
bgs	below ground surface
BMP	best management practices
BS	blank spike
CCC	criterion continuous exposure for chronic exposure
cfs	cubic feet per second
CLP	Contract Laboratory Program
CMC	criterion maximum concentrations for acute exposure
CRQL	contract required quantitation limit
DOM	dissolved organic matter
DQOs	Data Quality Objectives
E & E	Ecology and Environment, Inc.
EFSFSR	East Fork of South Fork Salmon River
EPA	United States Environmental Protection Agency
FR	USFS Road
IA	Integrated Assessment
IDEQ	Idaho Department of Environmental Quality
J	estimated quantities
LTP	Lower Tailings Pile
MEL	Manchester Environmental Laboratory
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
ng/L	nanograms per liter
ng	nanograms
NPL	National Priorities List
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyls
PEC	Probable Effect Concentration
PPE	Probable Point of Entry
QA/QC	Quality Assurance/Quality Control
R	Rejected sample result
RML	Removal Management Levels
redox	oxidation-reduction

List of Abbreviations and Acronyms (cont.)

Abbreviation/ Acronym	Definition
RPD	Relative Percent Difference
RSE	Removal Site Evaluation
RSL	Region Screening Level
SI	Site Inspection
SIP	Site Inspection Prioritization
SOW	Statement of Work
SPLP	Synthetic Precipitation Leaching Procedure
SQL	Sample Quantitation Limit
SSSP	Site-Specific Sampling Plan
START	Superfund Technical Assessment and Response Team
TAL	Target Analyte List
TDL	Target Distance Limit
TEC	Threshold Effect Concentration
USFS	United States Forest Service
USGS	United States Geological Survey
UTV	Utility terrain vehicles

1 Introduction

Ecology and Environment, Inc. (E&E) was tasked by the United States Environmental Protection Agency (EPA) to provide technical support for completion of an Integrated Assessment (IA) at the Cinnabar Mine Site which is located near Yellow Pine, Idaho. E & E completed the IA activities under Technical Direction Document Number 16-07-0002, which was issued under EPA, Region 10, Superfund Technical Assessment and Response Team (START)-IV Contract number EP-S7-13-07. The purpose of an IA is to combine aspects of a Removal Site Evaluation (RSE) for the EPA Removal Program with a Site Inspection (SI) for the EPA Site Assessment Program, combining field efforts and reporting results within one document. The specific goals for this IA are intended to address the objectives presented below:

- Collect sufficient data to document any eminent threat or potential threat to human health or the environment posed by the site;
- Determine whether there are some potential removal options that would reduce impacts to human health and the environment;
- Collect and analyze samples to characterize the potential sources and determine the potential for off-site migration of contaminants;
- Provide EPA with adequate information to determine whether the site may be eligible for placement on the National Priorities List (NPL).

Completion of this IA included reviewing site information, determining regional characteristics, collecting receptor information within the site's range of influence, executing a sampling plan, and producing this report. This report is organized as follows:

- Executive Summary – A summary of the activities and conclusion of the work performed in the execution of this project;
- Section 1, Introduction – Authority for performance of this work, goals for the project, and summary of the report contents;
- Section 2, Site Description and Background – Locational information for the site, a description of the site, and a summary of previous investigations for the site and surrounding areas;
- Section 3, Media Sampling Activities – A summary of sampling activities including sample location information, a summary of sample collection methodologies; and a summary of analytical protocols applied to the samples;

- Section 4, Quality Assurance/Quality Control (QA/QC) – Summary of the laboratory data;
- Section 5, Removal Site Evaluation – A discussion of RSE criteria and a discussion of sampling results with regards to the removal evaluation criteria;
- Section 6, Conceptual Site Model – A discussion of key aspects regarding the fate and transport of the primary contaminants of concern (arsenic and mercury) at the Cinnabar Mine site and downgradient locations;
- Section 7, Removal Option Alternatives – A discussion of potential removal activities for the site; Section 8, Site Surface Water Migration Pathway and Targets – A discussion of SI reporting criteria, a description of site sources, a discussion of sampling results of site sources, a description of the surface water migration pathway, a description of migration pathways targets within the site's range of influence, and a discussion of target sample results;
- Section 9, Summary and Conclusions – A summary of the investigation and recommendation for the site based on the information gathered during the investigation; and
- Section 10, References – An alphabetical listing of references cited throughout the text.

2 Site Description and Background

This section describes the background of the site including location, description, and previous investigations conducted at the site and surrounding areas.

2.1 Site Location

Site Name:	Cinnabar Mine
CERCLIS Identification Number:	IDD980665160
Latitude:	44.919085
Longitude:	-115.290683
Point of measurement:	Concrete staging pad
Legal Description:	Township 18 North, Range 10 East, Sections 6 and 7
County:	Valley
Congressional District:	1
Site Owner:	J.J. Oberbillig Estate

2.2 Site Description & Background

The Cinnabar Mine is located approximately 15 miles east of Yellow Pine, Idaho on Forest Service Road #374 in Valley County, Idaho (Figure 2-1). The site encompasses approximately 50 acres within the 575 acres of patented claims comprising the Cinnabar Mine. The 575 acres of land are on a mixture of privately owned lands and United States Forest Service (USFS) lands. This IA focuses on the potential sources located on privately owned portions of the site. The parcel boundaries are depicted on Figure 2-2, and while the majority of the site is located on privately owned land, it appears that a small portion of the upper yellow tailings pile and all of the lower tailings are located on land managed by USFS.

The site is located within the Payette National Forest, adjacent to the Frank Church/River of No Return Wilderness Area to the north and east, and the Boise National Forest to the south. Features at the site include five tailings piles (designated as the lowest tan tailings pile, the previously capped and seeded tailings pile [also called the tailings impoundment], three upper red tailings piles, and upper yellow tailings pile), an area of ponded water in the northwest corner of the upper yellow tailings pile, three adits (designated as Adit 1, Adit 2, and Adit 3), an adit pond associated with Adit 2, a capped and seeded landfill, a former mill building, a former dormitory, a former cook house, two concrete pads, and former residential buildings. In addition, the East Fork and West Fork of Cinnabar

Creek run through the site. (Figure 2-2). Two tailings impoundments once existed at the site on USFS land. The lower impoundment failed during high floods in 1965 and the upper impoundment structure, constructed in the 1950s, was approximately 18 feet tall with approximately five to six feet of tailings behind the impoundment (USFS 1996). This impoundment was later filled with tailings (this feature is discussed further in the previous investigations section below).

Water discharges from several mine adits and surface drainages above the site to West Fork Cinnabar Creek. West Fork Cinnabar Creek flows through the tailings piles in a diversion channel which was initially constructed in 1992 and reconstructed during a 1996 EPA Removal Action (discussed further below). West Fork Cinnabar Creek flows into Cinnabar Creek which flows into Sugar Creek below the mine site.

Mercury mining operations began at Cinnabar Mine in 1921 and ceased in 1958. The deposit was discovered in 1902, with subsequent development commencing in 1921 under United Mercury Mines Company (also known as Hermes Mine). Production is reported to have been intermittent prior to 1930. In 1942, the mine was worked by Bonanza Mining, Inc., and then Holly Minerals took over during the 1950s. Mr. J.J. Oberbillig is listed as the president of the mine at the time it was incorporated in 1921 (Mitchell 2000). Historically, the ore processing was conducted on-site. The initial method used was to roast the ore, mercuric sulfide, or cinnabar with oxygen to produce free mercury vapor and sulfuric dioxide gas. The mercury vapor was collected after cooling by flue condensers. Allegedly, this process was uncontrolled; during operations, elemental mercury could be collected from the walls and rain-gutters of the process buildings. A fire in 1956 destroyed the processing mill and the mill was subsequently rebuilt. The new mill processed ore using a method which coupled wet flotation with electro-separation (E & E 1999). A settlement between EPA and the J.J. Oberbillig estate was reached that set aside funds for future cleanup activities at the site.

2.3 Previous Investigations

Numerous investigations by various parties have been conducted at the site. Below is a discussion of the investigations based on available information. A timeline of investigations is presented in Figure 2-3.

In August 1979, EPA conducted a non-sampling inspection of the site and concluded the site did not pose an environmental or public health threat (EPA 1979).

In September 1984, Idaho Department of Health and Welfare's Division of Environment and the Central District Health Department conducted an investigation of the site. The following conditions and sample results were noted (the locations of the samples were not reported and only mercury concentrations were reported):

- **Sodium Carbonate Decahydrate:** Approximately fifty 55-gallon drums were noted between the mill and living quarters. No samples of the contents were collected.
- **Diesel:** A 120,000-gallon tank with approximately 3,000 gallons of product was noted. The location of the tank was not reported. One sample of the material was collected which determined the material to be #2 diesel fuel.
- **Transformers:** Two empty transformers that spilled oily material to the ground as well as another intact transformer were noted. The location of the transformers was not reported. There was no vegetation in the area of the spilled transformers. No samples of the spilled material were collected.
- **Unknown Substances:** Drums with unknown contents were noted inside the mill buildings. Some of drums contained a white substance and some a blue-green material. Samples of the contents were not collected.
- **Tailings Piles:** Samples were collected from the red tailings and the tan tailings. The sample from the red tailings indicated the presence of mercury at 4.8 micrograms per gram (µg/g) and the sample from the tan tailings indicated the presence of mercury at 12.4 µg/g.
- **Creeks:** "Several" surface water samples were collected from the creek; this is assumed to be West Fork Cinnabar Creek. Two surface water samples collected "a few meters above the disturbed area" did not indicate the presence of mercury; a sample collected from the middle of the mine area indicated mercury at 0.8 micrograms per liter (µg/L), and a sample collected from Sugar Creek below the confluence with Cinnabar Creek had a concentration of 0.5 µg/L of mercury. Six sediment samples were also collected from Cinnabar Creek and mercury concentrations ranged from 3.5 µg/g (above the mine) to 99.7 µg/g. Sediment from Sugar Creek indicated a mercury concentration of 18.4 µg/g.

  A mill stack was noted in West Fork Cinnabar Creek. Surface water and sediment samples were collected near the stack. The surface water sample indicated 59 µg/L of mercury and the sediment sample result was 445.7 µg/g.

Based on conditions noted at the site and sampling results, it was recommended the site be given a high priority for cleanup and stabilization of the tailings to prevent additional erosion into the creek. (Clark and Lappin 1984)

In June 1985, based on the recommendations in the September 1984 report, EPA conducted a Preliminary Assessment (PA) at the site (Weston 1985). The objectives of the PA were:

- Determine if polychlorinated biphenyl (PCB)-contaminated materials were present; and
- Further determine the extent of mercury contamination through the collection of soil, creek sediment, surface water, and atmospheric sampling.

Sample locations from EPA's 1985 Preliminary Assessment are presented on Figure 2-4 and sample results are provided in Table 2-1. Based on the sampling results, removal of the stack, diesel oil and storage tank, and transformers was recommended. Additional sampling of Cinnabar Creek and Sugar Creek also was recommended.

In May 1988, the USFS Krassel Ranger District received a notice of an oil spill on the East Fork of the South Fork of the Salmon River (EFSFSR). The lessee, Pioneer Metals, reported the 120,000-gallon tank had a tap removed and a valve opened which resulted in a release of oil into Cinnabar Creek (this is assumed to be West Fork Cinnabar Creek which runs through the site). Pioneer Metals attempted to divert snowmelt to the creek, constructed berms at the creek, placed absorbent material around the tank, and placed oil-saturated dirt on the tailings pile. (Weston 1994)

In 1988, the USFS prepared a macroinvertebrate report to document conditions in West Fork Cinnabar Creek near the site. Eight aquatic macroinvertebrate samples were collected from two stations (Station A and Station B). Station A was located on West Fork Cinnabar Creek downstream of the mine in the area affected by the diesel spill. Station B was located east of the mine as a control station. The report concluded there were severe stress conditions in the ecosystem at Station A. (Weston 1994)

In September 1991, the USFS conducted sampling of the tailings at the site behind an embankment on West Fork Cinnabar Creek. The locations of the samples were not provided other than the description of "behind the embankment." The samples were analyzed for arsenic, lead, mercury, and zinc. Sample results were compared to EPA maximum concentration of contaminants for toxicity characteristic. Sample results and screening levels are provided in Table 2-2. Based on these results and conditions at the site, a time critical removal action was recommended to construct a diversion ditch around the edge of the tailings and impoundment structure and divert West Fork Cinnabar Creek to a "historic diversion channel." The USFS removal action commenced in September 1992, and it appears this work was conducted solely on USFS land. The tailings were saturated approximately eight inches below the surface and the removal action was modified to include the construction of a spillway west of the outlet channel, labeled as "wood box culvert" (Figure 2-5). (USFS 1992; Weston 1994).

In 1993, USFS conducted a PA at the site. No samples were collected as a part of this investigation. The investigation was a review of existing data, a site visit, and an assessment of the surface water migration pathway. The report concluded the site presented an impact on the environment and food chain of the surface water migration pathway and recommended further characterization of the sources at the site.

Also in 1993, Idaho Department of Environmental Quality (IDEQ) prepared a Site Inspection Prioritization (SIP) report for the EPA. SIPs are intended to determine non-sampling data gaps, provide a summary of information that fulfills Hazard

Ranking System needs, and include a summary of the file reviews completed. No conclusions or recommendations were included in this report.

In 1994, EPA conducted a SI at the Cinnabar Mine. A total of 13 samples were collected as part of this investigation. These samples included three tailings samples, one soil sample at the mill building, one soil sample near debris and drums, two background soil samples, and six sediment samples from West Fork Cinnabar Creek including one background sediment sample. The fallen stack was in West Fork Cinnabar Creek, and the sample collected here was a sediment sample. Sample locations are depicted in Figure 2-6. Surface soil sample results are provided in Table 2-3. Sediment sample results are provided in Table 2-4. All samples were analyzed for TAL metals. Samples were compared to background samples and evaluated based on the criteria outlined in Section 6 of this document. Six analytes (arsenic, cadmium, copper, mercury, thallium, and zinc) were detected at significant concentrations with respect to background in the surface soil samples. The majority of the significant concentrations were detected from the mill sample. Three analytes (cobalt, mercury, and thallium) were detected at elevated concentrations with respect to background in the sediment samples. Because cobalt was not likewise detected at significant concentrations in the source samples, cobalt is not attributable to site contamination. There were no recommendation provided in the report.

In August 1996, EPA prepared an Action Memorandum to conduct a time critical removal action at the site. The activities outlined in the Action Memorandum included minimizing the amount of surface runoff from the tailings piles into West Fork Cinnabar Creek; creating a lined “landfill” on-site; removing the stack from West Fork Cinnabar Creek and placing it in the on-site “landfill”; stabilizing the 55-gallon drums of caustic material, cleaning the three large oil/fuel tanks; removing oil/fuel contaminated soils and transporting them off-site for disposal; and removing asbestos-containing materials (ACM) from the on-site boilers and placing them in the on-site “landfill.” In September1996, USFS prepared a Time Critical Action Memorandum for the site giving EPA approval to conduct a removal on the Federally-managed portion of the site in addition to the removal which would also be carried out on the private portion of the site. The activities performed on USFS land include opening the USFS road and covering tailings after re-routing West Fork Cinnabar Creek into the old diversion. (EPA 1996; USFS 1996)

This time critical removal action was conducted in September and October 1996. The following is a brief description of the removal activities conducted:

- **On-Site Landfill:** A landfill was constructed northwest of the tailings pile. The dimensions of the landfill were 60 feet long by 30 feet wide. The landfill contains two sections of retort, PCB-contaminated transformer carcasses and debris, ACM, spent personal protective equipment, and mercury-contaminated soil.
- **Retort Removal and Temporary Cap:** Two sections of retort used in the processing of mercury were partially buried in West Fork Cinnabar Creek. The sections of retort were removed, the open ends of each section were

capped, and these were placed in the on-site landfill. Upon removal of the retort sections, it was noted elemental mercury had been released to the creek as a result of water flowing through the sections of the retort. Approximately 5 to 10 cubic yards of contaminated sediments were removed from the creek. The sediments were placed on a tarp and allowed to dewater. Afterwards, the sediments were mixed with concrete, transferred to 55-gallon drums, and placed in the on-site landfill.

- **Asbestos-containing Materials:** ACM had previously been identified in the laboratory hood in the mill building, in a boiler in the cookhouse, and another boiler located in a partially demolished metal building south of the cookhouse. The ACM associated with the metal building boiler was bagged and placed in the on-site landfill. The other two locations were not addressed as the building were deemed unsafe to enter.
- **Oil Tanks and Contaminated Soil:** Four fuel tanks were noted at the site (designated as Tanks 1 through 4). Tanks 1 through 3 were located on a concrete pad and Tank 4 was located between the metal building and the cookhouse. Tank 1 was noted to be leaking product to soils at the base of the concrete pad as a result of numerous bullet holes around the valve. The tanks were drained, cleaned, and rendered unusable. Approximately 40 cubic yards of oil-contaminated soil were excavated beneath the concrete and pad of Tank 1 and staged for off-site disposal.
- **Drums and Containers:** Approximately 50 drums of soda ash were located in the southwest area of the site and in the mill building. The contents of the drums were staged with the oil-contaminated soil for off-site disposal. The empty drums were placed in the on-site landfill.
- **PCB Transformers and Debris:** Two transformers, their parts, and associated debris were removed and placed in the on-site landfill.
- **Reconstruction of Diversion Channel:** The USFS had attempted to return West Fork Cinnabar Creek and other surface water to a historical diversion channel around the lower tailings pile (LTP) in 1992. This attempt was unsuccessful as their machinery repeatedly became stuck in the slurry in the LTP. The original diversion had been implemented by the mining company in the 1950s to keep water out of the LTP impoundment. Reportedly, during a flood in the 1960s the creek eroded the bank of the diversion channel thereby allowing the creek to return to a natural drainage pathway through the LTP. The reconstruction of the diversion channel was conducted in four phases:
    - **Phase I:** This phase consisted of funneling the majority of site surface water and runoff through the creek blowout and through the sediment impoundment created to reduce the amount of suspended materials impacting downstream water quality; removal of debris from the old diversion channel and excavation of a 7-food wide channel bottom to the correct grade to create the appropriate drainage; and transportation and stockpiling of large rock from a nearby quarry to be used in armoring the sides of the diversion channel.
    - **Phase II:** This phase consisted of armoring the sloped sides and bottom of the diversion channel with the large rock; grading and

excavation of shelves on the sloped sides of the channel to control erosion; transportation and stockpiling of small rock from a nearby quarry and placement in the bottom of the diversion channel to act as rip rap and thereby minimize suspended sediments in the creek water; and installation of a large sediment impoundment (a depression in the channel lined with geotextile material and large rocks to act as a sediment trap) midway between the blowout and the bottom of the diversion channel.

- **Phase III:** In this phase, an earthen dam with an underflow dam was constructed above the blowout, and water from West Fork Cinnabar Creek was diverted around the blowout to the newly constructed diversion channel while blowout repairs were made. The repairs to the blowout included: removing the temporary sediment impoundment below the blowout; keying rock into the bottom of the blowout so that the banks north and south of the blowout were tied in; transporting clean soil from another area of the site and packing it around the base rocks followed by a geotextile cover, more rock, and more soil; and building up the blowout area bank to the level and grade of the north and south banks, followed by additional armoring with large rocks consistent with the lower diversion channel.
- **Phase IV:** This phase included removal of the earthen and underflow dam above the blowout, final grading of the slopes, installation of erosion control measures above the diversion channels, and removal of the temporary rock road for disposal in the LTP.

- **Lower Tailings Pile Stabilization:** As noted above, the USFS was not able to conduct work on the LTP because of site conditions. The USFS was successful in constructing a spillway in the LTP impoundment berm. The spillway was constructed in order to reduce the pressure on the LTP impoundment from water accumulation behind the berm. Over the years, the creek traversed the LTP causing extensive erosion of the LTP cap and carved a deep gully through the tailings in the central area thereby mobilizing sediment to the lower watershed.

  Upon completion of the diversion channel and sufficient drying of the LTP, grading and stabilization efforts commenced. Live trees and debris were removed from the southeast slope of the LTP as clean surface soil was bulldozed into two stockpiles at the base of the slope. The clean soil was used to regrade the LTP, thereby removing some of the exposed tailings berms above the LTP grade. All tailings above the grade were needed in order to fill in the central drainage area eroded by the creek. Additional fill material (from the west slope of the diversion channel) had to be imported to complete the filling and grading activities. The eroded channel in front of the box culvert was filled with rock and not sealed which would allow infiltrating water to pass under the berm. Geotextile material was installed over the newly graded tailings prior to laying of the cap. Across the center of the LTP, running southwest to northeast, a

slightly depressed surface water drainage feature was installed and overlain with a second layer of geotextile material. Medium-sized rock was used to line the edges of this drainage area followed by small rock rip rap being placed directly in the drainage channel on top of the geotextile. Finally, USFS personnel spread seed and hay over the LTP. Rocks, trees, and debris were placed across the seeded areas.

During the removal action, a total of 84 samples, including 13 soil samples, nine sediment samples, four product samples, three tailings samples, five water samples, 13 mixed soil/tailings samples, and 37 mixed sediment/tailings samples, were collected. Some samples were analyzed in the field, some samples were analyzed at an off-site fixed laboratory, and some samples were analyzed both in the field and at an off-site fixed laboratory for PCBs and/or priority pollutant metals. Soil and sediment sample results are provided in Table 2-5 (only those samples submitted for off-site fixed laboratory analysis are included in this table and PCB results are not included because no PCBs were detected above the instrument detection limit) and surface water sample results are provided in Table 2-6. These samples were not compared to any regulatory criteria nor a background in the report. Antimony, arsenic, beryllium, chromium, copper, lead, mercury, nickel, thallium, and zinc were detected above the method detection limit in the soil/tailings/sediment samples. Antimony, arsenic, mercury, thallium, and zinc were detected above the method detection limit in the surface water samples. Locations of the surface water/sediment samples are provided on Figure 2-7. The samples were utilized to reflect contaminant conditions at the conclusion of the removal. The removal action was deemed as successful; however, it was noted there were still concerns at the site with regards to contamination left on site and not addressed due to safety concerns. (E & E 1996)

In July 1998, EPA amended the scope of work of the existing Action Memorandum. The amendment was to address additional mercury contamination in soil below and adjacent to West Fork Cinnabar Creek and address oil-contaminated soil. Another time critical removal action was conducted at the site from July 1998 through August 1998. The following is a brief discussion of the activities that occurred during the removal:

- **On-Site Landfill:** A new landfill was constructed adjacent and to the north of the landfill that was constructed during the 1996 time critical removal action. The dimensions of the new landfill were similar to the 1996 landfill.
- **Mercury-Contaminated Soil:** Mercury-contaminated soil associated with the retorts that were removed from West Fork Cinnabar Creek during the 1996 time critical removal action required capping. These soils were capped in place. Sediment traps were placed in the creek upgradient and downgradient of the mercury-contaminated soil area. A sump pump was utilized to divert the creek water from above the contaminated area. Following the excavation of the original area of contamination, additional elemental mercury was observed in the excavated area. Excavation and removal continued until elemental mercury was no longer observed in the excavation. The removed soils were mixed with cement prior to placement

in the on-site landfill. No information regarding the amount of excavated material was included in the report.

- **Oil-Contaminated Soil:** A very wet area with an oil sheen was observed in puddled standing water; however, nearby vegetation did not appear to be stressed. Five test pits were excavated during the removal to assist in gauging the amount of oil and the rate of migration. After 24 hours, only one of the pits contained any oil product. Given the apparent stability of the oil in this location and the difficulty in extracting it from an area that was so saturated, no removal actions occurred in this area. The test pits were refilled and the area was revegetated.
- **Stabilization of the Tailings Piles:** The upper three tailings piles were heavily eroded and portions were migrating into the West Fork Cinnabar Creek. The slope of the piles was reduced to 3:1 which resulted in each pile covering more area; however, it also reduced the chance of the creek further eroding the piles during flood and/or high water events. A French drain (consisting of rip-rap and a geotextile liner) was installed in West Fork Cinnabar Creek to avoid entrainment of sediments into the creek during the removal. Once the piles were regraded, woody debris was scattered on their surfaces to assist in preventing further erosion and aid in stabilization of the piles until they could be planted and vegetation sprouted. The piles were seeded with a native grass seed mixture.
- **Signage and Access Restriction:** Signs were posted at various locations around the site to inform visitors of the potential contamination at the site. Waterbars (which would inhibit vehicular traffic to the site) were installed on USFS Road #374 during demobilization to restrict recreational access to the site. Finally, the temporary road/bridge on Sugar Creek was removed during demobilization.

During this removal action, a total of 22 samples (19 soil samples and three tailings samples) were collected. The locations of the samples are presented in Figure 2-8. All samples were analyzed in the field with a field-portable x-ray fluorescence (XRF) analyzer for mercury and arsenic. No samples were submitted for off-site fixed laboratory analysis because the removal action was driven by visible beads of mercury. Sample results are provided in Table 2-7. Mercury concentrations ranged from 24 mg/kg to 169 mg/kg. Arsenic concentrations ranged from 92 mg/kg to 180 mg/kg.

The removal was deemed to have been effective at reducing the risk of public exposure to on-site hazards and in reducing the risk of significant continuing releases of hazardous material to the environment. (E & E 1998)

In August 2003, the USFS performed a time-critical removal action at the USFS owned portion of the site. The objectives of the removal action were to:

- Remove the remaining tailings along West Fork Cinnabar Creek, and
- Regrade the tailings within the LTP impoundments in order for surface water flow to be directed away from the tailings.

These objectives were met by sloping the tailings to a 3:1 grade and placing rip rap along the stream to prevent erosion from high flows. The tailings were also

covered with a geotextile liner and a minimum of 18 inches of topsoil, seed, and mulch.

In August 2004, EPA returned to the site to regrade the upper red tailing pile and place seed mixture on the pile to reduce the risk of erosion of the tailings into West Fork Cinnabar Creek. No samples were collected as part of this work. (E & E 2014)

In 2011, the United States Geological Survey (USGS) began sampling water quality stations in the EFSFSR watershed several miles downstream of the mine. The locations of the monitoring stations are provided on Figure 2-9. The samples were analyzed for unfiltered and filtered metals and field parameters including temperature, pH, and specific conductivity. Results of this sampling are provided in Table 2-8. The samples were compared to fresh water criterion maximum concentrations for acute exposure (i.e., CMC) and criterion continuous exposure for chronic exposure (i.e., CCC) for the protection of aquatic life (see Section 5.1.2). Filtered arsenic and lead were not detected above the CMC or the CCC in any of the samples collected. Filtered mercury was detected above the CCC at the Sugar Creek location in 11 of the samples collected. Filtered mercury was not detected above either the CMC or CCC in any of the other locations (USGS 2014a, 2014b, 2014c, 2014d, 2014e). Based in part on the elevated mercury concentration detected in the surface water sample from Sugar Creek above the confluence with the EFSFSR, concern was expressed that contamination may be migrating from the tailings piles at Cinnabar Mine and impacting surface water and sediments in Cinnabar Creek, Sugar Creek, and the EFSFSR.

Based on the concerns expressed in the previous study, EPA conducted a removal assessment in August 2014. During the assessment a total of 29 samples (13 surface water, 11 sediment, and five surface soil) were collected. Sample locations are depicted on Figure 2-10. The surface water samples were submitted to an off-site fixed laboratory for analysis of unfiltered and filtered arsenic, lead, and mercury by EPA Contract Laboratory Method (CLP) Statement of Work (SOW) ISM01.3 and hardness by Method SM 2340B. The sediment samples were submitted for analysis of total arsenic, lead, and mercury by CLP SOW ISM01.3. The surface soil samples were submitted to an off-site fixed laboratory for analysis of synthetic precipitation leaching procedure (SPLP) arsenic, lead, and mercury by EPA Method 1312 (SPLP extraction), 200.2 (metals digestion), and EPA Method 200.8 (metals analysis). (E & E 2014)

The surface water sample results and the SPLP results for the surface soil samples were compared to the fresh water CMC and CCC for the protection of aquatic life. The sediment samples were compared to consensus-based sediment quality guidelines as developed by McDonald et. al. (2000) using both the threshold effect concentrations (TEC) and probable effect concentrations (PEC). In addition, the surface water and sediment samples were evaluated as outlined in Section 6 of this document. (E & E 2014)

Surface water samples results are provided in Table 2-9. In five of the unfiltered samples, total mercury exceeded the CCC of 0.012 µg/L (Etheridge 2015). Sample results indicate the presence of unfiltered and filtered arsenic in samples from Cinnabar Creek and Adit 1, unfiltered lead in one sample from Cinnabar Creek and Adit 1, and unfiltered mercury in Adit 1 at elevated concentrations with respect to background concentrations. (E & E 2014)

Sediment sample results are provided on Table 2-10. Sample results indicate the presence of arsenic at concentrations that exceed the TEC and PEC in all of the samples collected including both background samples. The results also indicate the presence of mercury in sediment at concentrations that exceed the TEC and PEC in all samples except the background sediment sample. Lead was not detected above either screening level in any of the sediment samples collected. In addition, arsenic was detected at elevated concentrations in one sample from Cinnabar Creek and mercury was detected in two samples from Cinnabar Creek at elevated concentrations with respect to background concentrations. (E & E 2014)

The SPLP results for the surface soil samples (Table 2-11) indicate the presence of arsenic and mercury at concentrations that exceed the CCC and CMC in three of the four sample locations. The SPLP results also indicate the presence of mercury at concentrations that exceeds the CCC in the fourth sample. (E & E 2014)

Concurrent with the removal assessment in August 2014, USGS representatives collected surface water and sediment samples from streams, adits, and an area of ponded water. Additional samples were collected in June and July 2015. Sample locations are depicted on Figure 2-11. Sample results are presented in Tables 2-12 (surface water), 2-13 (sediment), and 2-14 (surface soil). Surface water samples were compared to CMCs and CCCs. Sediment samples were compared to recommended sediment quality guidelines for sediment quality standards and cleanup screening levels (Avocet 2011) and consensus-based TECs (MacDonald et al. 2000), and tailings and soil samples were compared to EPA Removal Management Levels (RMLs) and EPA Regional Screening Levels (RSLs). In addition, the surface water and sediment samples were also evaluated as outlined in Section 6 of this report. (Holloway et al. 2016)

Surface water sample results (Table 2-12) indicate the presence of filtered mercury at concentrations that exceed the CCC in nine of the samples collected including in the background sample collected upstream of the mine. In addition, mercury, methylmercury, arsenic and arsenic III were detected at elevated concentrations with respect to background concentrations.

Sediment sample results (Table 2-13) indicate the presence of mercury at concentrations that exceed the least conservative (i.e., highest) screening level in 11 of the 13 samples collected. Arsenic was detected at concentrations that exceeded the most conservative (i.e., lowest) screening level in 10 of the 13 samples and two of these concentrations also exceeded the least conservative (i.e.,

highest) screening level. In addition, arsenic, mercury, and methylmercury were detected at elevated concentrations with respect to background concentrations.

Soil sample results (Table 2-14) indicate the presence of mercury at concentrations that exceed both screening levels in all five of the samples collected. Arsenic was detected at concentrations that exceeded most conservative (i.e., lowest) screening level in all five samples and the least conservative (i.e., highest) screening level in three of the samples.

3 Media Sampling Activities

A Site-Specific Sampling Plan (SSSP) for the Cinnabar Mine IA was developed by START prior to field sampling (E & E 2016). The SSSP describes the sampling strategy, sampling methodology, and analytical parameters used to investigate the site. With few exceptions, the IA field activities were conducted in accordance with the SSSP. Deviations from the SSSP are described, when applicable, in this section and in the sampling location discussions in Section 5, 6, and 7. Sample Plan Alteration Forms are provided in Appendix A.

The primary IA sampling event was conducted from August 22, 2016 through August 26, 2016 by EPA and START with the assistance of the USCG. EPA conducted additional site sampling on September 12, and EPA also collected samples for a mesocosm study on October 5, 17, 24 and November 9. A total of 155 samples were collected. The samples consisted of:

- **August Sampling:** 108 samples – 41 soil/sediment, 26 surface water, 26 dissolved surface water, 13 porewater, and 2 blanks;
- **September Sampling:** 15 samples – 1 soil, 6 surface water, 6 dissolved surface water, and 2 blanks; and
- **Mesocosm Study:** 32 samples – 6 soil, 25 water, 1 blank.

The sample collection methods and results for EPA's porewater samples and mesocosm study are discussed in a report by an EPA member of the Environmental Services Unit, in Appendix B.

Sample types and methods of collection are described below. A list of all samples collected for laboratory analysis under this IA is contained in Table 3-1. Sample locations are provided on Figure 3-1. Samples collected as part of this IA were submitted for off-site fixed laboratory analysis for unfiltered and filtered Target Analyte List (TAL) metals, methylmercury, filtered mercury and methylmercury, filtered total organic carbon (TOC), filtered sulfide, grain size, low level total mercury, sulfate, and agronomics. One sample was analyzed for PCBs. Photographic documentation of the IA field activities are provided in Appendix C.

Alphanumeric identification numbers applied by START to each sample location (e.g. CC01SW) are used in the report as the sample location identifiers. Table 3-2 summarizes the sample coding system used for formulating sample numbers.

3.1 Sampling Methodology and Locations

Grass, leaves, other vegetative material, rocks, and other debris unsuitable for analysis were removed from samples as much as possible prior to being placed into sample containers. Samples were stored on ice, in coolers, and continuously maintained under custody. Sampling methods for each sample types are described below. Sample information including sample locations, sample date and time, and sampler were collected on hand-held devices. Sample collection forms are provided in Appendix D.

3.1.1 Surface Soil

3.1.1.1 Sample Methodology

Surface soil (0 to 6 inches below ground surface [bgs]) grab samples were collected using dedicated plastic scoops. Collected material was placed in a dedicated plastic bowl, thoroughly homogenized, and placed into a pre-labeled sample containers.

3.1.1.2 Sample Locations

A total of 16 surface soil samples, including one background sample, were collected for the IA. Sample BG01SS was collected upgradient of the site from an area anticipated to not be influenced by mining and milling activities. A total of six samples (BS01SS through BS05SS) were collected from a potential borrow source area in the western portion of the site. A total of nine samples (TP01SS through TP09SS) were collected from the tailings piles; of these samples three were collected from the yellow tailings (TP01, TP04, and TP05) and six were collected from the red tailings (TP02, TP03, TP06, TP07, TP08, and TP09). One sample, RT01SS, was collected from soil near the former mill building. Finally, one sample, OS01SS, was collected from an area where oily soil was noted; this sample was only submitted for PCB analysis.

3.1.2 Surface Water

3.1.2.1 Sampling Methodology

Surface water grab samples were collected either by hand-dipping the sample container into the water or through dedicated Teflon-lined tubing using a peristaltic pump. Samples requiring preservation were preserved at the end of each sampling day.

As a part of the field sampling for this IA, a subset of the surface water samples were field-filtered with dedicated 0.45 micron filters at the sampling location. The results for surface water samples collected with 0.45 micrometer filters, which are commonly referred to as “dissolved” phase concentrations, will be described as “filtered” in this report. The results of unfiltered surface water samples, which are commonly referred to as “total” concentrations and which include the “dissolved” fractions as well as particulates that are too large to pass through the filter, will be referred to as “unfiltered” in this report.

At co-located surface water/sediment locations, the surface water samples were collected prior to collection of the sediment samples. Samples were collected

from downstream to upstream to avoid potential cross-contamination of downstream sample locations.

3.1.2.2 Sample Locations

A total of 63 surface water samples (32 unfiltered and 31 filtered) were collected during the IA from on-site adits, an area of pooled water on-site, West Fork Cinnabar Creek, Cinnabar Creek, and Sugar Creek. Surface water samples were collected from the three on-site adits (AD01SW through AD03SW and AD01SWD through AD03SWD). Samples AD01SW/AD01SWD were collected from Adit 1 located north of the former mill building. Samples AD02SW/AD02SWD were collected from Adit 2 adjacent to an on-site pond. Samples AD03SW/AD03SWD were collected from Adit 3 located on the southwest portion of the site behind a pile of metal debris. Sample AD04SW was collected from a seep in an area of oily water. Two samples (WT01SW and WT01SWD) were collected from an area of ponded water on the northwest corner of the upper yellow tailings pile. Twenty-two samples (WF01SW through WF07SW and WF01SWD through WF07SWD, including sample replicates at some locations) were collected from West Fork Cinnabar Creek. Ten samples (CC01SW through CC05SW and CC01SWD through CC05SWD) were collected from Cinnabar Creek. Twelve samples (SC01SW through SC05SW and SC01SWD through SC05SWD, including duplicates at the SC01SW/SC01SWD location) were collected from Sugar Creek. Two attribution samples (UT01SWQ and UT01SWD) were collected from an unnamed tributary to Sugar Creek to determine the potential for surface water and/or sediment contributing to contamination concentrations downstream in Sugar Creek. Finally, a total of six background samples (BG01SW through BG03SW and BG01SWD through BG03SWD) were collected. Location BG01 was from an unnamed stream upgradient of the mine site, location BG03 was upgradient of the confluence of West Fork Cinnabar Creek and Cinnabar Creek, and location BG02 was upgradient of the confluence with Cinnabar Creek and Sugar Creek. The in-water distances between sample locations is provided in Table 3-3.

3.1.3 Surface Sediment

3.1.3.1 Sampling Methodology

Surface sediment samples (0 to 4 centimeters) were collected using dedicated scoops. Collected material was thoroughly homogenized in dedicated plastic bowls. The sample material was decanted of as much water as possible prior to placement into pre-labeled sample containers. At co-located surface water/sediment locations, the surface water samples were collected prior to collection of the sediment samples. Samples were collected from downstream to upstream to avoid potential cross-contamination of downstream sample locations.

3.1.3.2 Sample Locations

A total of 26 sediment samples were collected. The majority were co-located with the surface water sample locations. Additional sediment samples were collected for the mesocosm experiment. See Table 3-3 for distances between sediment sample locations.

3.2 Analytical Protocol

All samples collected during this IA were submitted to off-site fixed laboratories for analysis. The following samples were submitted to the EPA's Manchester Environmental Laboratory (MEL), a CLP laboratory, and/or a subcontract laboratory for analysis. Analytical methods and reporting limits are provided in Table 3-4. Chain-of-Custody documentation is provided in Appendix E.

3.2.1 Manchester Environmental Laboratory

Samples for the following analyses were submitted to MEL:

- **Filtered low level mercury (water):** 26 samples.
- **Filtered mercury plus methylmercury (water):** 14 samples.
- **Filtered organic carbon (water):** 39 samples.
- **Filtered sulfate (water):** 39 samples.
- **Low level total mercury plus methylmercury (water):** 39 samples.
- **Total organic carbon (sediment):** 25 samples.

3.2.2 ChemTex Laboratories

Samples for the following analyses were submitted to ChemTex, a CLP laboratory:

- **Unfiltered TAL metals plus hardness (water):** 27 samples.
- **Filtered TAL metals plus hardness (water):** 13 samples.
- **TAL metals (surface soil and sediment) including mercury:** 41 samples.

3.2.3 ALS Laboratory

Samples for the following analyses were submitted to ALS Laboratories, a START subcontracted laboratory:

- **Filtered sulfide (water):** 25 samples.
- **Grain size (sediment):** 25 samples.
- **Methylmercury (surface soil/sediment):** 47 samples.

4 Quality Assurance/Quality Control

QA/QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware and reagents. Specific QC requirements for laboratory analyses are incorporated in the *Contract Laboratory Program Statement of Work for Inorganic Analyses* (EPA 2015). These QC requirements or equivalent requirements found in the analytical methods were followed for analytical work on the project. This section describes the QA/QC measures taken for the project and provides an evaluation of the usability of data presented in this report.

Data from the START-subcontracted laboratories were reviewed by a START chemist. Data qualifiers and labels were applied as necessary according to the following guidance:

- EPA (2009) *Guidance for Labeling Externally Validated Laboratory Data for Superfund Use.*
- EPA (2016b) *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*.

In the absence of other QC guidance, method- and/or SOP-specific QC limits were also utilized to apply qualifiers to the data.

4.1 Satisfaction of Data Quality Objectives

The following EPA (EPA 2000) guidance document was used to establish data quality objectives (DQOs) for this project:

- *Guidance for the Data Quality Objectives Process* (EPA QA/G-4), EPA/600/R-96/055.

EPA determined that definitive data without error and bias determination would be used for the sampling and analyses conducted during the field activities. The data quality achieved during the field work produced sufficient data that met the DQOs stated in the SSSP (E & E 2016). A detailed discussion of accomplished project objectives is presented in the following sections.

4.2 QA/QC Samples

Trip blank QA samples were not required for this project. Trip blanks are only required for volatile organic compound analysis. A rinsate blank sample was collected for all samples collected using nondedicated sampling equipment. QC samples included matrix spike/matrix spike duplicate (MS/MSD) and/or blank

spike (BS) samples at a rate of one MS/MSD and/or BS per 20 samples per matrix.

4.3 Project Specific Data Quality Objectives

The laboratory data were reviewed to ensure that DQOs for the project were met. The following describes the laboratories' and/or field team's abilities to meet project DQOs for precision, accuracy and completeness and the field team's ability to meet project DQOs for representativeness and comparability. The laboratories and the field team were able to meet DQOs for the project.

4.3.1 Precision

Precision measures the reproducibility of the sampling and analytical methodology. Laboratory and field precision is defined as the relative percent difference (RPD) between duplicate sample analyses. The laboratory duplicate samples or MS/MSD samples measure the precision of the analytical method. The RPD values were reviewed for all commercial laboratory samples. No sample results were qualified based on precision outliers; therefore the project DQO for precision was met.

4.3.2 Accuracy

Accuracy indicates the conformity of the measurements to fact. Laboratory accuracy is defined as the MS/MSD/BS percent recoveries (%Rs) for all laboratory analyses. The %R values were reviewed for all MS/MSD/BS analyses. A total of 22 sample results (approximately 1.2 % of the data) were qualified as estimated quantities (J) based on MS/MSD/BS outliers; therefore the project DQO for accuracy of 90% was met.

4.3.3 Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). All laboratory data were reviewed for data validation and usability. No sample results were rejected (R); therefore the project DQO for completeness of 90% was met.

4.3.4 Representativeness

Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point or environmental condition. The number and selection of samples were determined in the field to account accurately for site variations and sample matrices. The DQO for representativeness was met.

4.3.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Data produced for this site followed applicable field sampling techniques and specific analytical methodology. The DQO for comparability was met.

4.4 Laboratory QA/QC Parameters

The laboratory data also were reviewed for holding times/temperatures/sample containers, laboratory blank samples, rinsate blank sample, and serial dilution analyses. These QA/QC parameters are summarized below.

4.4.1 Holding Times/Temperatures/Sample Containers

All sample temperatures and containers were acceptable. A total of 14 sample results (approximately 0.7% of the data) were qualified as estimated quantities (J) based on holding time outliers.

4.4.2 Laboratory Blanks

All laboratory blanks met the frequency criteria. The following inorganic potential contaminants of concern were detected in the laboratory blanks:

Antimony, mercury, silver, thallium, methylmercury, manganese, selenium.

See the data validation memoranda for results qualified based on blank contamination.

4.4.3 Rinsate Blank

The rinsate blank met the frequency criteria. The following inorganic potential contaminant of concern was detected in the rinsate blank:

Low level total mercury.

The low level total mercury result for sample 16384151 was less than five times the rinsate blank result and was qualified as not detected (U) by the secondary data reviewer.

4.4.4 Serial Dilution Analyses

Serial dilution analyses met the frequency and percent difference criteria.

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5 Removal Site Evaluation

5.1 Results Reporting Criteria

Analytical results reported in the summary tables show all analytes detected above the laboratory detection limits in bold type. For the RSE portion of this IA, the sample results have been compared to risk-based screening levels to help evaluate whether the site poses an increased risk to human health or the environment. Descriptions of the screening levels used for the RSE are provided below, and analytes that exceed screening levels are highlighted in the tables.

For the Site Inspection portion of the IA, the sample results were also compared to background concentrations, as described in Section 7. The comparison of sample results to background concentrations is useful in assessing overall site conditions and in particular determining the contribution of contamination from site sources.

The analytical summary tables present all detected compounds, but only those detected analytes that exceed screening levels are discussed in the report text.

In some cases, analytical results required qualification. For the purposes of discussion, qualifiers are not included in the results discussion. Please see the analytical data tables or data validation memoranda in Appendix E for information regarding qualifiers. Based on EPA Region 10 policy, the results for common earth crust elements (aluminum, calcium, iron, magnesium, potassium, and sodium), which are included in the TAL metals analyte list, are not discussed or evaluated as part of this investigation. In addition, the sediment samples were analyzed for grain size analysis. This information is used by the Site Assessment Program for determining whether the background sample matrix is similar to the release sample matrix. Grain size comparison discussions are provided in Section 7.

The following is a brief description of the applicability of the various screening levels that will be considered for evaluation of the sampling results. The screening levels, by matrix, are provided in Tables 5-1 through 5-3.

5.1.1 Soil Screening Level

Soil screening levels are provided in Table 5-1.

The EPA RMLs are chemical-specific concentrations for individual contaminants in soil and groundwater that may be used to support the decision for EPA to undertake a removal action. They are not necessarily health protective concentrations for chronic exposure, and exceedance of an RML by itself does not imply that adverse health effects will occur. RMLs help identify areas, contaminants, and conditions where a removal action may be appropriate. RMLs are not de facto cleanup standards and should not be used as such. Sites where contaminant concentrations fall below RMLs are not necessarily "clean" and further action or study may be warranted under the Superfund program, and sites with contaminant concentrations above the RMLs may not necessarily warrant a removal action dependent upon such factors as background concentrations, the use of site-specific exposure scenarios, or other program considerations. Soil sample results for the site have been compared to the RMLs for residential soil. (EPA 2016c)

The EPA RSLs are used as guidelines at cleanup sites to determine whether levels of contamination found at a site may warrant further investigation or site cleanup. RSLs are more conservative risk-based values for individual analytes than RMLs. The RSLs are considered to be protective for humans (including sensitive populations) over a lifetime; however, RSLs are not always applicable to a particular site and do not address non-human health endpoints, such as ecological impacts. The RSLs are calculated without specific information, but they may be re-calculated using site-specific data. The RSLs are used for site "screening" and can be used as initial cleanup goals, if applicable. RSLs are not de facto cleanup standards and should not be applied as such. Their role in site screening is to help identify areas, contaminants, and conditions that require further federal attention at a particular site. They are useful tools for identifying initial cleanup goals at a site. Soil sample results for the site have been compared to the RSLs for ingestion, dermal contact, and inhalation in soil. (EPA 2016d)

The IDEQ has developed IDTLs to assess the level of contamination at sites. These levels are human-health risk-based concentrations. The levels reported are not site-specific; however, site-specific concentrations may be generated. IDTLs are not enforceable (DEQ 2004). Although these criteria are provided in Table 5-1, they are not being used in the evaluation of sample results.

5.1.2 Surface Water Screening Levels

Aquatic life criteria for toxic chemicals are the highest concentration of specific pollutants or parameters in water that are not expected to pose a significant risk to the majority of species in a given environment or a narrative description of the desired conditions of a water body being "free from" certain negative conditions (EPA 2016a).

Surface water screening levels are provided in Table 5-2. For this RSE, the sample results were compared to fresh water criterion maximum concentrations for acute exposure (i.e., CMC) and criterion continuous exposure for chronic exposure (i.e., CCC) for the protection of aquatic life values from the State of Idaho Water Quality Criteria for Aquatic Life (IDAPA 58.01.02). For total

mercury, the freshwater CMC value of 1.4 µg/L from EPA (EPA 2016a) and the CCC value of 0.012 µg/L from the 2004 Idaho Water Quality Standards (IDAPA 58.01.02) have been used for the filtered fraction. No CMC or CCC values have been established for methylmercury.

5.1.3 Sediment Screening Levels

Sediment screening levels are presented in Table 5-3.

Sediment quality guidelines have been developed by MacDonald et al. (2000). These guidelines have calculated threshold effect concentrations which provide a basis for predicting the absence of sediment toxicity and probable effect concentrations and for assessing sediment quality conditions in freshwater ecosystems.

In cooperation with various Regional Sediment Evaluation Teams, Avocet Consulting updated sediment screening levels for Washington, Oregon, and Idaho. These values updated freshwater Apparent Effects Thresholds (AETs) that were more reliable similar to those created for marine AETs. (Avocet 2011)

5.2 Sample Results

Arsenic, mercury, and methylmercury concentrations for surface water, surface soil, and sediment are depicted in Figures 5-1 through 5-3.

5.2.1 Soil Sample Results

5.2.1.1 Background Sample

Background soil sample results are provided in Tables 5-4 and 5-5. Sample results indicate the presence of arsenic at a concentration that exceeds the RSL, which is the more conservative (i.e., lower) screening level.

5.2.1.2 Borrow Source

The results for samples collected from a potential on-site borrow source are provided in Table 5-4. Sample results indicate the presence of antimony, arsenic, mercury, and thallium at concentrations that exceeded at least one screening level. Antimony was detected at concentrations that exceeded the RSL (i.e., the lower and therefore more conservative) screening level in all five of the samples collected. Arsenic was detected at concentrations that exceeded both the RSL and RML in all five of the samples collected. Arsenic concentrations ranged from 194 mg/kg to 399 mg/kg and were approximately three times higher than the RML of 68 mg/kg. Mercury exceeded the RSL in all five samples and the RML in four of the samples. Of these four samples, the concentrations ranged from 285 mg/kg to 664 mg/kg and were at least nine times higher than the RML. Thallium was detected at concentrations that exceeded the RSL in all five samples and the RML in two.

5.2.1.3 Tailings Piles

Tailings pile sample results are provided in Table 5-5. Sample results indicate the presence of antimony, arsenic, cobalt, mercury, and thallium at concentrations

that exceeded at least one screening level. Antimony was detected at concentrations that exceeded the RSL in five of the nine samples collected from the tailings piles and in the one sample collected from the former mill building. Arsenic was detected at concentrations that exceeded the RML in all samples collected from the yellow tailings pile, red tailings pile, and the former mill building. Arsenic concentrations ranged from 396 mg/kg to 2,440 mg/kg, with concentrations in all samples at least five times higher than the RML, and up to 20 times higher in two samples. Cobalt was detected at a concentration that exceeded the RSL in one sample collected from the yellow tailings pile. Mercury exceeded the RSL in all of the samples collected from the tailings piles and former mill and also exceeded the RML in seven samples (three samples from the yellow tailings pile, three samples from the red tailings pile, and the one sample from the former mill building). Of the samples detected above the RML for mercury (33 mg/kg), mercury concentrations ranged from 51.1 mg/kg to 975 mg/kg, which is almost 30 times the RML. Thallium was detected above the RSL in all 10 of the tailings / mill building samples and above RML in nine of the 10 samples.

5.2.2 Surface Water Sample Results

The surface water sample results, including hardness, unfiltered metals, and filtered metals, are summarized in Tables 5-6 through 5-11. The following subsections of the report discuss the results as compared to the surface water screening levels (CCCs and CMCs). Note that the comparison of the results to screening levels focuses on the filtered fraction, because the screening levels for the detected metals apply to the dissolved fraction.

Also, note that total mercury was included with the unfiltered metals analyses, but the results for all samples were below the standard method reporting limits, and therefore the results are not included on Tables 5-6 through 5-11. In the filtered samples, "low-level" total mercury analyses were performed with lower reporting levels, and those results are included in the tables with the methylmercury results.

5.2.2.1 Background and Attribution Samples

Background and attribution surface water sample results are provided in Tables 5-6 through 5-11. Copper was one of the metals detected in both the unfiltered and filtered background samples, with concentrations ranging from 6.3 µg/L to 6.7 µg/L (unfiltered) and from 6.4 µg/L to 7.1 µg/L (filtered).

Copper exceeded the hardness-calculated CCC in three of the filtered background and attribution samples and exceeded the hardness-calculated CMC in one. In addition, total mercury was detected above the CCC in one filtered background sample.

5.2.2.2 Ponded Water Samples

Ponded water surface water sample results are provided in Table 5-6. Arsenic was detected at a concentrations of 229 µg/L (unfiltered) and 193 µg/L (filtered). Arsenic was also detected at a concentration of 659 µg/L in the unfiltered seep sample (no filtered sample was collected). Copper was detected at concentrations of 6.9 µg/L (unfiltered) and 7.4 µg/L (filtered).

Arsenic and total mercury were present in the filtered ponded water sample at concentrations that exceeded the CCC value, but below the CMC value, for each compound.

5.2.2.3 Adit Samples

Adit surface water sample results are provided in Table 5-7. Arsenic concentrations ranged from 32.4 µg/L to 43.3 µg/L (unfiltered) and 26 µg/L to 48 (filtered). None of the filtered samples exceeded the CCC or CMC for arsenic.

Copper concentrations ranged from 6.2 µg/L to 6.8 µg/L (unfiltered) and 6.4 µg/L to 6.5 µg/L (filtered). In the filtered samples copper and exceeded the CCC but not the CMC in two of the three adit samples.

Total mercury was detected above the CCC but not the CMC in all three of the filtered adit water samples, with concentrations ranging from 35.1 nanograms per liter (ng/L) to 68.9 ng/L.

5.2.2.4 West Fork Cinnabar Creek Samples

West Fork Cinnabar Creek surface water samples results are provided in Table 5-8. Arsenic was detected at concentrations ranging from 6.3 µg/L to 28.7 µg/L (unfiltered) and 6.9 µg/L to 27.6 µg/L (filtered). Copper was detected in all seven samples, with concentrations ranging from 6.4 µg/L to 6.8 µg/L (unfiltered) and 6.1 µg/L to 7.0 µg/L (filtered). None of the filtered arsenic or copper results exceeded the CCC or CMC.

In the five filtered samples analyzed for total mercury, concentrations ranged from 70.5 µg/L to 97.9 µg/L, all of which exceeded the CCC but not the CMC.

5.2.2.5 Cinnabar Creek

Cinnabar Creek surface water sample results are provided in Table 5-9. Arsenic concentrations ranged from 9.4 µg/L to 15.2 µg/L (unfiltered) and 10 µg/L to 13 µg/L (filtered), and copper ranged from 6.4 µg/L to 6.8 µg/L in both the unfiltered and filtered samples. None of the filtered arsenic or copper results exceeded the CCC or CMC.

The sample results also indicate the presence of total mercury at concentrations that exceed the CCC but not the CMC in all samples collected from Cinnabar Creek, with concentrations ranging from 26.9 ng/L to 39 ng/L.

5.2.2.6 Sugar Creek

Sugar Creek surface water sample results are provided in Table 5-10. Arsenic concentrations ranged from 3.7 µg/L to 13.3 µg/L (unfiltered) and 3.3 µg/L to 13.8 (filtered), and none of the filtered results exceeded the CCC or CMC.

Copper was detected at concentrations that ranged from 6.4 µg/L to 6.6 µg/L (unfiltered) and 6.4 µg/L to 6.7 µg/L (filtered). Two of the filtered samples exceeded the CCC but not the CMC.

In the filtered samples submitted for low-level analysis, total mercury concentrations ranged from 7.93 µg/L to 11 ng/L, with none exceeding the CCC or CMC.

5.2.2.7 September 2016 Surface Water Sampling

The results for surface water samples collected by EPA in September 2016 are provided in Table 5-11. Unfiltered mercury concentrations in samples collected from the West Fork Cinnabar Creek ranged from 143 µg/L to 320 ng/L, and filtered mercury ranged from 39.4 µg/L to 43.7 ng/L. All four filtered samples from the West Fork Cinnabar Creek exceeded the CCC of 12 ng/L. In the sample collected from Sugar Creek, unfiltered mercury was 25.7 ng/L and filtered mercury was 7.43 ng/L.

Methylmercury concentrations all samples were low, with a maximum unfiltered concentration of 0.114 ng/L and a maximum filtered concentration of 0.107 ng/L, both of which were collected from Sugar Creek.

5.2.3 Sediment Sample Results

The analytical results of the sediment samples, including TAL metals, methylmercury, TOC, and grain size, are presented in Tables 5-12 through 5-16. Additional discussion of the metals results with respect to the screening levels are presented in the following subsections.

5.2.3.1 Background and Attribution Samples

Background and attribution sediment sample results are provided in Tables 5-12 through 5-16. The results indicate that antimony, arsenic, and nickel exceeded at least one screening level in at least one of the background/attribution samples. Mercury exceeded the least conservative (i.e., highest) screening level in two of the background samples and the attribution sample.

5.2.3.2 Ponded Water Sample

Ponded water sediment sample results are provided in Table 5-12. Arsenic was detected at a concentration of 1,570 mg/kg, and mercury was detected at a concentration of 491 mg/kg, both of which exceeded all of the respective sediment screening levels. Antimony and cadmium were also detected at concentrations that exceeded all of their screening levels, and nickel was detected at a concentration that exceeded two of the screening levels.

5.2.3.3 Adit Samples

Adit sediment sample results are provided in Table 5-13. Sample results indicate the presence of antimony, arsenic, cadmium, copper, mercury, and nickel at concentrations that exceed at least one of the screening levels. Antimony was detected at concentrations that exceeded all of its screening levels in two of the samples and at concentrations that exceeded the most conservative screening level in one sample. Arsenic was detected at concentrations that exceeded all of its screening levels in all three samples at up to 20 times the highest screening level. Arsenic concentrations ranged from 158 mg/kg to 2,440 mg/kg. Cadmium was

detected at concentrations that exceeded the most conservative screening level in all three of the samples and one sample also exceeded the least conservative screening level. Copper and nickel were detected at concentrations that exceeded at least one screening level in one sample each. Finally, mercury was detected at concentrations that exceeded all of the screening levels in all of the samples. Mercury concentrations ranged from 206 mg/kg to 1,600 mg/kg and the concentration in the sediment sample collected from Adit 2 were three orders of magnitude greater than the highest screening level.

5.2.3.4 West Fork Cinnabar Creek Samples

West Fork Cinnabar Creek sediment sample results are provided in Table 5-14. Sample results indicate the presence of antimony, arsenic, cadmium, lead, mercury, and nickel at concentrations that exceeded at least one screening level in the West Fork Cinnabar Creek sediment samples. Antimony was detected at concentrations that exceeded the most conservative (i.e., lowest) screening level and the least conservative (i.e., highest) screening level in all seven of the sediment samples. Arsenic was detected at concentrations that exceeded the most conservative screening level in all seven of the samples collected and at concentrations that exceeded the least conservative screening level in six of the samples. Arsenic concentrations that exceeded both the most conservative and least conservative screening levels ranged from 152 mg/kg to 245 mg/kg. Cadmium was detected at concentrations the exceeded the most conservative screening level in six of the samples collected. Lead was detected at a concentration that exceeded the most conservative screening level in one sample. Mercury was detected at concentrations that exceeded all of its screening levels in all of the samples collected at concentrations at least 10 times higher than the least conservative screening level. Mercury concentrations ranged from 6.8 mg/kg to 131 mg/kg. Finally, nickel was detected at a concentration that exceeded the most conservative screening level in two samples, one of which also exceeded the least conservative screening level.

5.2.3.5 Cinnabar Creek Samples

Cinnabar Creek sediment sample results are provided in Table 5-15. Sample results indicate the presence of antimony, arsenic, cadmium, mercury, and nickel at concentrations that exceeded at least one screening level. Antimony was detected at concentrations that exceeded the most conservative (i.e., lowest) screening level in all of the samples and also at concentrations that exceeded the least conservative (i.e. highest) screening level in two of the samples. Arsenic and cadmium were detected at concentrations that exceeded the most conservative screening level in all of the samples and at a concentration that exceeded the least conservative screening level in one sample each. Mercury was detected at concentrations that exceeded all its screening levels in all of the samples, at concentrations at least five times the highest screening level. Mercury concentrations ranged from 3.9 mg/kg to 468 mg/kg. Finally, nickel was detected at concentrations that exceeded the most conservative screening level in the two most upstream samples.

5.2.3.6 Sugar Creek Samples

Sugar Creek sediment sample results are provided in Table 5-16. Sample results indicate the presence of antimony, arsenic, cadmium, and mercury at concentrations that exceed at least one of the screening levels. Antimony and arsenic were detected at concentrations that exceeded the most conservative (i.e., lowest) screening level in all five of the samples, with arsenic concentrations ranging from 20.1 mg/kg to 64.1 mg/kg. Cadmium was detected at a concentration that exceeded the most conservative screening level in one sample. Finally, mercury was detected at concentrations that exceeded all of its screening levels at concentrations at least ten times higher than the highest screening level. Mercury concentrations ranged from 8.8 mg/kg to 128 mg/kg.

6 Conceptual Site Model

This section discusses key aspects regarding the fate and transport of the primary contaminants of concern, arsenic and mercury, at the Cinnabar Mine site and downgradient locations. Information pertaining to the concentrations and extent of these and other contaminants in site sources and environmental media is presented in Sections 2 and 5.2.

6.1 Contaminant Sources

The primary sources of contaminants addressed in the Cinnabar Mine IA are drainage from collapsed adits and various tailings piles, including red tailings (calcines) and yellow and tan tailings (flotation tailings). Other contaminant sources have been the subject of previous removal actions and reports. Information on the geology, mineralization, mining operations, and ore concentration and thermal processing at the Cinnabar Mine that is germane to characterization of these sources is summarized below.

6.1.1 Geology and Mineralization of the Cinnabar Mine

The geology of the region and the Cinnabar Mine area is detailed in Schrader and Ross (1926), Currier (1935), Worthen (1943a; 1943b), and Mitchell (2000).

The regional geology as described by Mitchell (2000) follows. The area is underlain by granitic rocks of the Idaho batholith and by metamorphosed sedimentary rocks that are part of a large roof pendant. The Idaho batholith in this area is composed of medium-grained biotite granodiorite and coarse-grained muscovite-biotite granite. Regionally, the metasedimentary rocks are folded into a large, tight, northwest-plunging, overturned syncline and have been metamorphosed to the amphibolite facies. Intrusion of the granitic plutons of the Idaho batholith locally altered the carbonate metasedimentary rocks to skarn zones. The older rocks are intruded by dikes of various compositions associated with the Challis Volcanics.

Mitchell (2000) described the mineralization in the area as follows. The mines in the Stibnite area, located to the west of the Cinnabar Mine, are low-grade disseminated gold deposits with local concentrations of antimony, silver, and tungsten. The orebodies are located along the Meadow Creek shear zone and related structures. The gold, antimony, and tungsten deposits formed from hydrothermal fluids which rose through the shear zone. All three types of deposits may be cogenetic. The deposits are localized by changes in the strike or dip of the

main fault zone, which strikes generally north-south, and by the intersection of subsidiary northeast-trending faults within the main fault zone. Breccia zones at the base of thrust sheets cap the Yellow Pine and West End deposits. Mineralization occurred in several pulses, accompanied by hydrothermal alteration of the host rocks. Pyrite (iron sulfide, FeS_2), arsenopyrite (iron-arsenic sulfide, FeAsS), and gold were deposited first, accompanied by sodium- and potassium-metasomatism and sericitization of the wall rocks. The gold values are carried by the pyrite and arsenopyrite. Considerable movement along the Meadow Creek shear zone is believed to have taken place between the deposition of the gold and the later phases of mineralization.

Fine-grained tungsten minerals, dominantly scheelite, formed after the gold. Antimony-silver mineralization overlaps the late phase of tungsten mineralization. Stibnite (antimony sulfide, Sb_2S_3) occurs as disseminations, microveinlets, stockworks, massive lenses, small quartz-stibnite veins that fill fissures, and euhedral crystals coating late fractures. Silicification overlapped the end of the stibnite crystallization. Sericitization, accompanied by mercury mineralization, was the final ore-forming event in the area. The mercury mineralization was targeted at the Cinnabar Mine (also referred to as the Hermes Mine) and the Fern Mines (located south of the Cinnabar Mine). The mercury deposits are zoned vertically with respect to the paleosurface. The mercury deposits formed at or near to the surface, and the scheelite and stibnite formed at somewhat lower levels. (Mitchell 2000)

More detailed information on mineralization of the mercury deposits that include the Cinnabar Mine as described by Schrader and Ross (1926) is presented below:

> "Most of the quicksilver ore is in limestone that has undergone igneous metamorphism and subsequent silicification, but cinnabar has also been noted in unsilicified limestone. The silicified limestone that accompanies the typical ore is composed largely of a fine-grained aggregate of quartz grains, frequently termed jasperoid, with sericite filling cracks and forming small irregular masses that apparently replace the quartz. The aplitic rocks in the T tunnel of the Hermes mine, however, were sericitized but not silicified. Pyrite grains, some of which have a tendency to crystal form, are scantily distributed and appear to have been produced later than both the quartz and the sericite. Cinnabar in small, irregular grains and in thin coatings on some of the pyrite grains was the latest mineral to form during the original mineralization. Some of it is in narrow seams in fractured jasperoid. In places such seams are so abundant as to indicate marked brecciation prior to the deposition of the cinnabar."

Currier (1935) notes that "cinnabar is the only prominent sulphide mineral in the deposits, but in places a small amount of pyrite and a very little stibnite occur with the cinnabar, indicating a possible genetic connection between the mercury deposits and some or all of the antimony deposits in the area."

6.1.2 Mining Operations

Mining operations during various phases of mining at the Cinnabar Mine are described in Schrader and Ross (1926), Currier (1935), Worthen (1943a; 1943b), and Mitchell (2000). Mining was performed underground, with three adits connecting the underground mine workings to the surface facilities. Worthen (1943b) notes that water was encountered widely in the mine workings and needed to be actively managed.

6.1.3 Ore Concentrating and Processing

In general, processing of mercury ore is a relatively straightforward process, usually involving roasting of the ore to thermally decompose the mercury compounds present in the ore and collecting the resulting elemental mercury in a condensing system. At some mercury mines, beneficiation of the ore has been practiced. At the Cinnabar Mine, roasting of cinnabar ore was conducted with rotary furnaces until 1956. After 1956, the ore was milled and cinnabar was concentrated using flotation and electro-separation. Thermal ore processing practices as of 1943 are described in Worthen (1943b).

Thermal processing of the ore resulted in calcines, which presently appear to be located at the “red tailings” piles at the Cinnabar Mine. The red color of the calcines is likely due to the presence of compounds of oxidized iron, at least some of which originated from the pyrite noted to be locally associated with the cinnabar mineralization (Schrader and Ross 1926; Currier 1935). The flotation tailings appear to be currently located in the tailings impoundment, tan tailings pile, and upper yellow tailings pile area.

6.1.4 Contaminants in Ore Concentrating and Processing Wastes

Based on available historical information on geology and mineralogy, the only native mercury species documented at the Cinnabar Mine is cinnabar (HgS). Cinnabar is expected be present in ore, waste rock, and areas of the site with naturally occurring mercury mineralization. Elemental mercury was produced on site by thermal processing of the cinnabar ore. Elemental mercury has been identified in contaminated soils at the site during previous investigations and removal activities. It is possible that some residual cinnabar that was not broken down by thermal processing could be present in the calcines, and some residual cinnabar not recovered by flotation could be present in the flotation (tan and yellow) tailings.

Site-specific information regarding other forms of mercury that may be present in the calcines is not available. In general, other forms of mercury are more commonly formed in furnaces, such as were used at the Cinnabar Mine, than in retorts, used to thermally process mercury ore at other mines, because furnaces internally heat the ores, mixing exhaust gases from the fuel with mercury vapor. In general, extended X-ray adsorption fine structure (EXAFS) spectroscopy studies of mercury mine wastes indicate that the mercury species likely to form during the thermal processing of mercury ores include mercury sulfides (e.g., metacinnabar [m-HgS], mercuic oxide (HgO), mercury chlorides (e.g., $HgCl_2$), corderoite ($Hg_3S_2Cl_2$), and schuetteite ($HgSO_4$-H_20), all of which are more soluble

than cinnabar and may represent an important source of soluble mercury at mercury mine sites with furnaces(Rytuba 2002; Lowry et al. 2004).

Arsenopyrite is the dominant form of arsenic in the stibnite and arsenical-gold deposits mined at the Meadow Creek and Yellow Pine mines (e.g., Mitchell 2000). However, information on the forms of arsenic occurring in the zone of mercury mineralization targeted by the Cinnabar Mine is lacking.

Calcines, or red tailings, and flotation tailings were sampled as part of the 1996 time-critical removal action, 1998 removal action, 2014 removal assessment, and the IA. Concentrations of total arsenic and mercury are presented in Tables 2-5, 2-7, and 5-5.

6.2 Wind Transport

Contaminants contained in or adsorbed to calcines, flotation tailings, and contaminated soil can be transported both within a site and offsite as windblown particles. The potential for aeolian (wind) transport of contaminated particles is dependent on snow cover, vegetative cover, soil moisture, and grain size distribution of the soil exposed to wind action. No field studies were performed during the IA or previous investigations to evaluate wind transport of contaminants.

6.3 Volatilization and Emission of Mercury

A potential pathway for release of mercury from both naturally enriched areas and anthropogenic sources, including mercury-contaminated sites, is emission to the atmosphere. In general, forms of mercury that may be volatilized and emitted include elemental mercury (Hg(0)), dimethylmercury ($(CH_3)_2Hg$), and mercury (II) as mercuric chloride ($HgCl_2$), mercuric bromide ($HgBr_2$), or mercuric (II) hydroxide ($Hg(OH)_2$) (ATSDR 1999; Nacht et al. 2004). At the Cinnabar Mine, it is expected that the vast majority of mercury that may be subject to volatilization would be in the form of elemental mercury, Hg(0). No field studies were performed during the IA to evaluate volatilization and emission of mercury.

6.4 Groundwater and Surface Water Transport

Transport of contaminants in groundwater and surface water is occurring at the Cinnabar Mine. Surface water transport includes bed load sediment transport, suspended particulate transport, and dissolved phase transport. Migration of particulates occurs as a result of erosion and entrainment of soil and sediment particles. Particulate transport also may occur in groundwater. Factors and processes that may be influencing these transport mechanisms are generally discussed in the sections below. Interpretations of the IA results and previous investigations pertaining to these factors and processes also are discussed below.

Leaching is the process by which inorganic elements are released from the solid phase into the aqueous phase by dissolution and desorption processes. Leaching of inorganics from contaminant sources is occurring at the Cinnabar Mine site. Leaching of inorganic elements from naturally mineralized bedrock and soil also

is occurring. Leached contaminants are being transported in groundwater and surface water.

In general, the potential for leaching of inorganic elements is related to the solubility of the various forms of the element, the amount of water percolating through the materials containing the elements, pH and oxidation-reduction (redox) potential, tendencies of various species of the elements to form complexes and adsorb to solids materials, and microbiological activity. Generally, such water may include precipitation and snowmelt and other sources of groundwater (e.g., infiltrated surface water or underflow). The amounts and rates of water percolating through the materials depend on the flow paths and other site-specific hydrologic conditions. The flow pathways of both groundwater and surface water determine the chemical, physical, and biological environments in which leaching and mobilization of inorganic elements may occur.

The amounts of inorganic elements leached to groundwater are controlled primarily by the amounts of the elements present; rate of release; hydrologic factors such as dispersion, advection, and dilution; and geochemical processes such as interrelated processes of redox, adsorption-desorption, and precipitation/dissolution; and aqueous speciation.

Specific factors controlling release and migration of inorganic elements in sulfide minerals include presence and flux of water and oxygen, which are required for oxidation reactions that dissolve sulfide minerals. These factors are controlled by hydrogeologic/hydrologic factors such as diffusion of oxygen, flow of oxygenated groundwater, and fluctuation of the water table. Other factors associated with oxidation of sulfide minerals are ferric iron; bacteria that catalyze the oxidation reactions; heat generated from the exothermic oxidation reactions; mineralogy of the sulfides and the materials in which oxidation is occurring; and acid neutralization reactions.

6.4.1 Erosion and Mass Wasting

Erosion includes the physical processes by which moving surface water transports solid materials, such as surface water runoff and stream erosion. In general, mass wasting is the downslope movement of soil and rock under the influence of gravity; it includes creep, slides, debris flows, slumps, rock flows, rockfalls, and block glides.

Surface runoff, also known as overland flow, is the flow of water that occurs when stormwater, meltwater, or other sources flows over the ground surface rather than infiltrating into the subsurface. Such conditions may occur when the soil is saturated to full capacity, when rain falls at a rate exceeding the rate that the soil can absorb it, or because of low-permeability soils or other materials at the surface or at a shallow depths. Runoff is a primary agent in soil erosion by water, and includes splash erosion, sheet erosion, rill erosion, and gully erosion. Runoff also may include erosion of the soil beneath the snowpack during snowmelt when meltwater percolates downward through the snowpack and erodes soil particles at the soil surface.

Stream erosion occurs with water flow in a channel. Initially, stream erosion is usually predominantly downward and headward, resulting in steep banks and head cuts. After a base level is reached, the stream erosion typically becomes dominated by lateral erosion. Stream erosion is greatest during times of high discharge, when more and faster-moving water is available to carry a larger sediment load. Erosion is accomplished by not only the moving water, but by suspended abrasive particles and larger bed load particles (e.g., pebbles, cobbles, and boulders).

Generally, the potential for transport by erosion is dependent on the slope of the erosional surface; the surface area of exposed materials subjected to erosion; the size, shape, and density of the grains; the cohesiveness of the material; and the frequency and magnitude of precipitation and runoff events.

Etheridge (2015) describes the physical elements associated with erosion in the USGS study area (Etheridge 2015), which includes the Cinnabar Mine area, as follows:

> "The study area includes 42.9 mi^2 of steep mountain terrain ranging from 5,930 to 9,310 ft in elevation. Seventy-one percent of the study area slopes at a gradient greater than 30 percent (USGS 2012), resulting in occasional mass wasting and substantial surface erosion during periods of rainfall and snowmelt runoff. Mean annual precipitation is 31 in., falling mostly as snow between October and April. Peak snowmelt and streamflow typically occur between May and July and low flows occur from September to January (Kuzis 1997)."

Based on historical photographs, the tailings piles at the Cinnabar Mine have previously had steep slopes and exhibited clear evidence of surface runoff, including formation of rills. The tailings also exhibited undercutting by stream erosion. Erosion by downcutting in the stream channel also may have occurred where the tailings had been previously been disposed of or deposited into the stream channel at rates exceeding the capability of the stream to transport the material downstream.

Previous removal actions have included relocating tailings and armoring stream channels to reduce erosion by undercutting and stream erosion. Removal actions also have included regrading, including reducing of slopes, and attempts to establish vegetation to reduce surface runoff. Review of the IA photographs did not reveal obvious visual indications of undercutting of banks or downcutting in the areas of the tailings. The review of IA photographs also reveals that vegetation has not been fully established on the tailings. The IA photographs did not reveal obvious visual indications of rilling of the exposed tailings. However, the presence of lag gravel at the tailings surface, contrasting with the comparatively fine-grained nature of the underlying material, was observed widely in IA tailings sample locations. This suggests that finer materials have been removed by erosion

since the previous removal actions, possibly including erosion by wind, stormwater runoff, and/or snowmelt.

Tailings that have historically entered West Fork Cinnabar Creek by mass wasting and erosion have been subject to surface water transport downstream of the site within West Fork Cinnabar Creek, Cinnabar Creek, Sugar Creek, and further downstream, as evidenced by bed sediment sample results (see Section 6.4.7.1 below). It is not known how much of the present bed sediment distribution in West Fork Cinnabar Creek and downstream creeks is due to historical mass wasting and erosion of tailings and ongoing downstream transport versus possible continued addition of tailings to the creek at the site.

In addition to bed sediment, erosion results in suspended particulate transport. Suspended sediment transport is discussed in Section 6.4.7.1.

6.4.2 Factors and Processes Affecting Mobility of Mercury

This section summarizes general information on the mobility of mercury in the environment. Those factors and processes thought to be pertinent to groundwater and surface water transport at the Cinnabar Mine site are discussed in Sections 6.4.5 through 6.4.7.

In general, mercury concentrations in mine drainage vary widely. This is caused by several factors. The most import factors are the solubility of the mercury phases with which the mine drainage interacts and the amount and adsorption capacity of the particulate phases present.

Mercury speciation is also an important variable in assessing the potential environmental impact on water quality and toxicity to biota. The mercury species present in mine drainage are strongly affected by chemical processes that occur when mine drainage reacts with mine wastes and surface waters. Adsorption of mercury and methylmercury onto iron oxyhydroxide and aluminum phases is an important process that controls the concentration of mercury species in streams impacted by mercury mine drainage. As a result, most of the mercury species present in streams impacted by mine drainage are present in the particulate phases and the concentrations of dissolved mercury species are relatively low (Rytuba 2000).

Redox, precipitation-dissolution, aqueous complexation, and adsorption and desorption reactions strongly influence the fate and transport of mercury in the environment. Biogeochemical reactions also are of great importance to the fate and transport of mercury. Methylation of mercury results in the formation of methylmercury, which is significantly more toxic than inorganic forms of mercury. Numerous studies on these subjects have been published. Except as noted, the information presented below is adapted from one recent literature review of such studies presented by Barringer et al. (2013). Additional general information and results of site-specific studies pertaining to methylation and other aspects of fate and transport of mercury are presented in an EPA's methylation study report, provided in Appendix B.

6.4.2.1 Oxidation-Reduction

Mercury exists in the environment in three stable oxidation states: Hg(0), Hg(I), and Hg(II). The mercury oxidation states and the various chemical forms that exist for each oxidation state vary in their toxicity as well as their solubility, their tendency to form complexes and adsorb, and their availability for microbial processes. As such, redox reactions have a profound influence on mercury concentrations and mobility in groundwater. Both abiotic and biotic (primarily microbial) processes can drive mercury redox transformations.

6.4.2.2 Adsorption and Desorption

Iron geochemistry is intimately associated with mercury geochemistry. Studies show that Hg(II) (as an Hg-Cl complex) sorbs to pyrite (FeS_2) under anaerobic conditions, and Hg(II) sorbs to iron oxides at pH >5.5. Evidence from field studies, including some at mine sites, suggests that sorption of mercury to iron hydroxides serves to reduce the mobility of mercury in the aqueous environment. Formation of aqueous and solid-phase sulfides appears to control Hg(II) concentrations in tailings-contaminated sediments at some mines.

6.4.2.3 Organic and Inorganic Complexation

Mercury (Hg(II)) can be present as $Hg(OH)_2$, $HgCl_2$, and other minor hydroxide (OH^-) and chloride (Cl^-) complexes, as well as in complexes with various organic anions, depending on pH, redox potential, chloride concentrations, and concentrations of dissolved organic matter (DOM). It has been observed that where DOM is absent or present in low concentrations in fresh waters, mercury could be present as hydroxide and chloride complexes. At low to moderate pH and moderate to high chloride concentrations, chloride complexes would be most likely. In the presence of dissolved sulfide, mercury sulfide species may form.

Mercury tends to form strong complexes with S^{2-} and, in DOM, Hg(II) binds preferentially to sulfur-containing functional groups such as thiols.

In environments under anoxic conditions, mercury can form complexes such as dissolved HgS, HgS_2^{2-}, $Hg(SH)_2$, $HgSH^+$, HgOHSH, and HgClSH. Although metals typically bind to acid sites (carboxyls, phenols, ammonium, alcohols, and thiols), in organic matter Hg(II) binds preferentially to thiols and other reduced sulfur groups, forming strong covalent-like bonds. These sulfur-bearing groups are found in moderate abundance in organic matter in soils, in some surface water, and in wastewater. When the mercury/DOM ratio is high (e.g., greater than 10,000 nanograms (ng) mercury to 1 milligram of DOM), mercury also binds to the more abundant but less Hg-selective oxygen functional groups (i.e., carboxyl). Binding of Hg(II) with DOM is less strong at low pH than at high pH because the extent of protonation of functional groups serving as Hg(II) ligands on DOM increases as pH decreases. It has been shown that, due to the affinity of Hg(II) for thiol groups on DOM, DOM can dissolve cinnabar, inhibiting or preventing precipitation of metacinnabar and aggregation of HgS nanoparticles.

6.4.2.4 Methylation and Demethylation

An important transformation of inorganic mercury that affects the mobility and toxicity of mercury is methylation to methylmercury (including monomethylmercury or dimethylmercury) in soil, sediment, and waters. Methylmercury, a form of Hg(II), is the most common form of organic mercury and is soluble, mobile, and quickly enters the aquatic food chain. Methylmercury is substantially more toxic than other forms of mercury and is accumulated to a greater extent in biological tissue than are inorganic forms of mercury (ATSDR 1999). The processes of methylation are complex and not fully understood. Factors understood to affect methylation of mercury are total mercury concentrations; organic matter content; acid-volatile sulfide in sediment; and pH, dissolved organic carbon, and dissolved sulfate in water. Methylation of Hg(II) in soils and surface-water occurs under anoxic conditions by dissimilatory sulfate-reducing bacteria. Dissimilatory iron-reducing bacteria also are able to methylate Hg(II). Populations of both types of bacteria have been found to coexist in stream-bottom sediments.

At low sulfate (SO_4^{2-}) concentrations, the methylating activity of sulfate-reducing bacteria is stimulated, but at high sulfate concentrations the methylating activity may be inhibited because precipitated sulfides may incorporate the mercury. However, the mercury in aqueous HgS complexes, which may form in the presence of dissolved sulfide, was found to be bioavailable to the methylating bacteria.

High concentrations of DOM and salinity also were shown to inhibit Hg(II) methylation because the Hg was complexed into forms that were not bioavailable to the methylating bacteria. Although DOM can inhibit mercury bioavailability by complexing the mercury, DOM can also prevent HgS nanoparticles from aggregating, thereby leaving the HgS nanoparticles bioavailable.

Mercury demethylation also occurs in stream and lake sediments. In sediment experiments, demethylation of methylmercury was shown to be carried out by sulfidogenic and methanogenic bacteria, which are obligate anaerobes. One study showed that, although the mercury methylation process was inhibited by low pH (4.4) conditions, demethylation of methylmercury did not appear to be similarly affected for the pH range 4.4 to 8; however, inhibition of demethylation occurred at pH < 4.4.

6.4.2.5 Colloids and Particulates

Formation of colloids in groundwater and surface water may provide a means of either immobilizing or facilitating transport for various contaminants, including mercury. Variations in the mineralogy and porewater chemistry in mine tailings can significantly influence the extent of colloid release, influencing the potential for particulate-facilitated mercury transport. Distinguishing between particulate (colloidal) and dissolved mercury in water is important because the speciation can affect bioavailability and methylation potential.

Sorption of Hg(II) onto stable and immobile aquifer solids can limit concentration and mobility of mercury in groundwater. On the other hand, if the Hg(II) binds to colloids under conditions where the colloids are stable and mobile, concentrations and mobility of Hg(II) in groundwater can increase. Because of their large surface area relative to their volume, small particles and colloids can provide many sorption sites for strongly sorbing contaminants whose mobility would otherwise be minimal through soils and groundwater. Movement of such colloids can be triggered by chemical or physical disturbance of soils and sediments.

Colloids can be formed by clay minerals; oxides and hydroxides of iron, aluminum, and manganese; silica; humic and fulvic acids; carbonates; phosphates; and bacteria and viruses. Colloids are found in surface water, soil, sediment porewaters, and groundwater. Changes in pH and redox reactions can cause dissolution or precipitation reactions that can form or release colloidal particles.

6.4.3 Factors and Processes Affecting Transport of Mercury in Groundwater

This section summarizes general information on factors and processes affecting transport of mercury in groundwater. Those factors and processes thought to be pertinent to groundwater transport at the Cinnabar Mine site are discussed in Sections 6.4.5 through 6.4.7.

In general, inorganic elements can migrate directly into groundwater from sources that lie within the saturated zone or by leaching from overlying source materials. Transport and concentrations of contaminants in groundwater are governed by the processes of advection, hydrodynamic dispersion (including mechanical dispersion and molecular diffusion), adsorption/desorption, precipitation and dissolution, and recharge. Leaching and migration of inorganic elements in groundwater is affected by groundwater flow pathways and the geochemical conditions present at any given time and at any given location along those pathways.

Release and migration of inorganics in sulfide minerals are controlled by the presence and flux of water and oxygen; ferric iron; bacteria that catalyze the oxidation reactions; heat generated from the exothermic oxidation reactions; mineralogy of the sulfides and the materials in which the oxidation is occurring; and acid neutralization reactions.

In general, many trace inorganics are strongly adsorbed onto surfaces of minerals and organic compounds in soils and sediments, limiting their mobility in the environment. The strong adsorptive capabilities of secondary clay minerals, hydrous iron, aluminum and manganese oxides, and humic material have been well demonstrated, and may be responsible for retardation of transport of trace metals in groundwater.

Rytuba (2000) describes interactions of mine drainage and calcines commonly seen at mercury mines as follows. Mercury concentrations increase substantially in mine drainage as the water flows through and reacts with calcines and waste

rock. Mine drainage dissolves the more soluble mercury phases present in the waste rock and calcines, in which the mercury is commonly present in relatively soluble phases such as mercury sulfates and oxy-chlorides that were formed during thermal processing. As the mine drainage mixes with oxygenated stream waters, dissolved iron (II) becomes oxidized to iron (III) and forms an iron oxyhydroxide precipitate. The iron oxyhydroxide effectively adsorbs mercury as well as methylmercury. As a result of this adsorption, the relative proportions of the dissolved forms of both these mercury species decreases downstream and the mercury species are transported primarily in the particulate phase. If the stream flow is slow, the iron oxyhydroxide commonly accumulates on the surface of the streambed as a floc (commonly referred to as yellowboy). Mercury and methylmercury adsorption onto iron oxyhydroxide substrate is an important process that controls the concentration of mercury species in streams impacted by mercury mine drainage.

In general, filtered samples (0.45 micrometer pore size filter) of mine drainage always have lower concentrations of mercury indicating that a significant portion of the mercury present is adsorbed onto particulate phases and colloids (Rytuba 2000). Colloids have been variously defined as particles with diameters less than 10 micrometers (Puls et al. 1991) and as particles usually less than 1 micrometer in one dimension (Kretchmaar and Schafer 2005) that generally are sufficiently small so as to pass the 0.45 micrometer pore-size filters commonly used to collect filtered water samples. Colloids can be composed of both organic and inorganic materials. In addition to having a high surface area per mass and volume, colloidal particles consisting of dissolved organic carbon, clay minerals, and iron oxides also are highly reactive sorbents for a variety of contaminants, including inorganic elements. Migration of inorganic elements in groundwater may be significantly affected by the formation of and adsorption of trace inorganics onto colloids. As with other aquifer solids, if the colloidal particles are immobile, the colloids will serve to inhibit the migration of inorganics that adsorb to the colloids. On the other hand, if the colloids are mobile in groundwater, they could facilitate transport of the inorganics rather than inhibit it.

Multiple factors control the formation and mobilization of colloids in groundwater and surface water. Large changes in aqueous geochemistry can result in supersaturated conditions in which inorganic colloidal species are formed. Decreases in pH or changes in redox conditions can cause the dissolution of soil materials or geologic matrix cementing agents, promoting the release of colloidal particles. Decreases in the ionic strength of an aqueous phase can enhance stability of colloids and promote their transport. Studies have shown that particles with diameters greater than 1 micrometer may actually move faster in groundwater than the average groundwater flow velocity in porous media due to effects such as size exclusion from smaller pore spaces. The significance of colloidal mobility as a transport mechanism ultimately depends on the presence of sufficient quantities of reactive particles in groundwater (e.g., Puls et al. 1991).

6.4.4 Mercury Species at Cinnabar Mine

The native mercury at the Cinnabar Mine site is in the form of cinnabar (HgS), which is expected to be present in in flotation tailings, naturally mineralized bedrock and soil, and to a lesser degree, in calcines. Cinnabar is minimally soluble under most environmental conditions. Site-specific information regarding other forms of mercury that may be present in the calcines is not available. As noted above, thermal processing of mercury ore resulted in vapor phase and liquid elemental mercury (Hg(0)).

No other information on the mercury species at the Cinnabar Mine is available. In general, thermal processing in furnaces commonly results in secondary forms of mercury, including chloride and sulfate species that are significantly more soluble than cinnabar.

Samples of flotation tailings (yellow tailings) and calcines (red tailings) were collected for SPLP analysis in 2014. SPLP arsenic and mercury results are summarized in Table 2-11. Total mercury and arsenic concentrations are typically higher in the flotation tailings than the calcines, but the SPLP arsenic and mercury concentrations are generally higher for the calcines than the yellow tailings, suggesting that the forms of arsenic and mercury present in the calcines are more readily soluble, at least under slightly acidic conditions simulated by the SPLP test. This observation is generally consistent with information regarding the solubility of mercury species expected to be formed during roasting of cinnabar ore in furnaces (discussed above).

6.4.5 Groundwater at Cinnabar Mine

Information on groundwater and hydrogeology at the Cinnabar Mine is limited. No soil borings or monitoring wells have been installed at the site to assess subsurface soil, bedrock, or hydrologic conditions. The groundwater flow pathways at the Cinnabar Mine have not been characterized. Groundwater emerges into the underground mine workings and eventually discharges as surface water from the adits. As noted above, it is likely that at least some of the adit discharge occurs as underflow (groundwater) in the unconsolidated materials in the West Fork Cinnabar Creek valley. Such underflow and groundwater derived from infiltration of precipitation and snowmelt and groundwater migrating laterally through the unconsolidated materials from other sources is expected to flow through native alluvium in the valley and locally emerge as surface water at gaining reaches of West Fork Cinnabar Creek and other surface water features (e.g., seeps/springs). It is likely that at least some of the groundwater that emerges as surface water has contacted and been impacted by mine wastes, including calcines and flotation tailings.

In general, leached contaminants enter groundwater directly where/when groundwater immerses source materials (e.g., calcines, flotation tailings, waste rock, and contaminated soil), and by leaching and downward transport toward groundwater where groundwater level is beneath the source materials. Leaching of inorganic elements from naturally mineralized bedrock and soil and migration via groundwater and surface water also is occurring

In general, in settings where groundwater is discharging to a surface waterbody (i.e. gaining conditions), groundwater contributes to chemical loading of the surface water body by advective groundwater flow. As noted above, gaining conditions are suspected to occur in West Fork Cinnabar Creek at least locally at times in the area of the Cinnabar Mine. This is supported by results of porewater sampling performed as part of the EPA methylation study (Appendix B). Porewater samples were collected using Macro-Rizon samplers (Rhizosphere Research Products) outfitted with 0.15 micrometer filters. Porewater filtered total mercury concentrations are presented graphically in Figure 6-1. The EPA porewater study identified a relatively strong correlation between collocated porewater and surface water filtered total mercury concentrations, and concluded that shallow groundwater flow may be an important source of filtered total mercury in the stream during low flow conditions. Those results and other results and observations presented in this section support that conclusion.

Locally gaining conditions are supported by another important observation of the EPA porewater results. The filtered total mercury concentration of the porewater sample at the WF05 location (816 ng/L) is an order of magnitude greater than that of the collocated surface water sample (97.9 ng/L), which is the highest filtered total mercury concentration observed in the stream surface water samples during the IA. The large difference in filtered total mercury concentrations is likely explained by dilution of groundwater by surface water within the hyporheic zone – the zone where groundwater and surface water are mixed in shallow stream bed sediments.

It should be noted that, in general, various interrelated physical and biogeochemical processes can be active in the transition zone between groundwater and surface water, including redox-driven sorption reactions, microbial and plant uptake, and mixing with overlying surface water. These processes can create strong vertical solute concentration gradients over short distances and considerably alter the chemical character of groundwater that discharges into the surface water. In many cases, processes active near the groundwater/surface water interface will decrease or attenuate dissolved chemical concentrations as groundwater approaches the point of discharge. In view of these general processes and the processes known to influence transport of mercury in groundwater (see Section 6.4.3), the porewater sample results are likely representative of hyporheic zone conditions, and may be significantly lower than groundwater concentrations.

6.4.6 Adit Discharge

Each of the three adits (Adits 1, 2, and 3) at the Cinnabar Mine discharges to the surface. Adit discharge reflects impacts of groundwater flow through mineralized rock and underground mine workings. As noted in Section 6.1.2, groundwater entering the mine required active management during mine operations. Based on available information on the configuration of the underground workings, with the adits at a structurally low position, it is expected that groundwater will continue to enter the mine and discharge to the surface through the adits. Flow rates of the

adits at the times of IA sampling were visually estimated to be low. The adits portals are collapsed, and it is likely that some adit discharge occurs as underflow (i.e., groundwater) through unconsolidated soil materials near and downgradient of the collapsed portals. Adit discharge also contributes directly to surface water flow in West Fork Cinnabar Creek and, likely, indirectly to stream flow via groundwater.

Contaminants are present in samples of surface water discharging from Adits 1, 2, and 3. Sample results are presented in Tables 2-12 and 5-7. Adit discharge is discussed further in Section 6.4.7.

6.4.7 Surface Water Transport

In general, surface water transport processes include transport of dissolved and suspended particulate phase materials and bed load transport. Surface water transport of contaminants generally entails the physical movement of dissolved or suspended particulate phase chemicals with the flow direction of surface water systems. Materials transported as suspended load may be deposited at locations downstream under low energy conditions. These general processes are discussed below.

6.4.7.1 Bed Load Sediment Transport

In general, sediment bed load transport is the process by which solid materials are moved downstream by moving water—including movement by rolling, sliding, and saltation—and deposited in a downstream location. Bed load transport is primarily dependent on sediment grain size and shape, flow velocity, and stream bed morphology. At the Cinnabar Mine, bed load transport of contaminants has historically occurred as evidenced by the presence of site contaminants in stream bed sediment samples collected as part of the IA (see Tables 5-14 through 5-16) and previous investigations (e.g., see Table 2-10 and 2-13). Concentrations of total arsenic and mercury and methylmercury in IA samples of stream bed, background, adit, and ponded area sediment are presented graphically in Figure 6-2. Sediment samples in Figure 6-2 are arrayed generally from upstream (left) to downstream (right), with samples collected from features not immediately on the stream channel (adits and area of ponded sediment) or from background/attribution locations positioned on the figure at locations where drainage from the features is expected to enter the stream channel. It is likely that downstream transport of contaminated bed load sediment will continue to occur, consisting at a minimum of contaminated sediment already present in the stream bed or banks at any locations potentially subject to scour. Should any tailings or other mine waste or contaminated soil be eroded into the channel and settle out as bed load, those materials also would be subject to downstream migration. Potential ongoing and future erosion and mass wasting are discussed in Section 6.4.1.

6.4.7.2 Surface Water Dissolved Phase Transport

In general, dissolved phase chemicals enter surface water by influx of groundwater under gaining flow conditions and by dissolution and/or desorption of chemicals from rock and mineral particles in contact with the surface water,

including bed and suspended sediment. The magnitude of surface water dissolved transport is generally dependent on groundwater influx and tendency of contaminants to dissolve or desorb from the bed or suspended sediments.

IA (August and September 2016) and USGS (Etheridge 2015 and Holloway et al. 2016) surface water sampling results are interpreted to indicate that transport of contaminants in the dissolved phase in surface water is occurring presently at the Cinnabar Mine site and downstream water bodies. Concentrations in filtered surface water samples of selected parameters, including arsenic (total), mercury (total), and methylmercury, are presented graphically in Figures 6-1 (IA August 2016), 6-3 (IA September 2016), 6-4 (USGS August 2014), and 6-5 USGS (July 2015). In each figure, locations of samples of creek, background, adit, and the ponded area are arrayed generally from upstream (left) to downstream (right), with samples collected from features not immediately on the stream channel (adits and area of ponded sediment) or from background/attribution locations positioned on the figure at locations where drainage from the features is expected to enter the stream channel.

As shown in Figures 6-1 and 6-3 through 6-5, for any given sampling event, West Fork Cinnabar Creek surface water exhibited the highest filtered total mercury and arsenic concentrations within the area of the tailings (including calcines and yellow/tan flotation tailings). The concentrations generally decreased with distance downstream within West Fork Cinnabar Creek, Cinnabar Creek, and Sugar Creek, likely due to dilution.

The highest sampling density within the immediate mine area for any given synoptic surface water sampling event was achieved as part of the August 2016 IA sampling event, in which samples were collected from near the downstream end of the calcines (station WF05), near the downstream end of the yellow tailings (station WF04), and near the northeastern end of the tailings impoundment. The sample location from station WF05 contained the highest concentration of filtered total mercury (97.9 ng/L). Similarly, the sample from WF05 collected during the September 2016 IA sampling event exhibited the highest filtered total mercury concentration (43.7 ng/L) of the four samples collected. As discussed in Section 6.4.5, the porewater sample collected from WF05 also contained the highest filtered total mercury concentration (816 ng/L). These results collectively suggest that the calcines are a significant source of the filtered total mercury loading to the creek, at least during low flow periods. This conclusion is further supported by general information on the nature of mercury in calcines (see Section 6.1.4) and SPLP results (see Section 6.4.4).

Surface water sampling performed during the IA and USGS stream monitoring activities (Etheridge 2015 and Holloway et al. 2016) employed the use of 0.45 micrometer filters to collect filtered samples. Concentrations in samples collected with 0.45 micometer filters are commonly referred to as “dissolved” concentrations. As noted in Section 6.4.5, the EPA porewater sampling (see Appendix B and Section 6.4.5) employed Macro-Rhizon samplers with 0.15

micrometer filters to sample the "dissolved" fraction concentrations presented herein and in Appendix B.

Total concentrations of arsenic were generally similar to the dissolved concentrations at each sample location for each sampling event. This is interpreted to indicate that transport of arsenic in the surface water is dominated by dissolved phase transport, and that the source of the arsenic is groundwater. In creek surface water samples, filtered total mercury concentrations are strongly correlated to filtered arsenic concentrations (e.g., $R^2 = 0.82$, $p < 0.00001$ for the August IA samples; see Figure 6-6), further suggesting that groundwater is an important source of the filtered ("dissolved") mercury loading to the stream.

6.4.7.3 Surface Water Particulate Transport

In general, suspended phase transport of particulates depends primarily on flow velocity and turbulence, grain size and shape, and grain density. Temporal changes in the flow, particularly flow velocity, strongly influence whether particulate materials at a given location are subject to erosion or deposition at a given time. Materials that are deposited under one set of physical and chemical conditions may be subject to subsequent entrainment and transport under another set of conditions.

As noted above, surface water sampling performed during the IA and USGS stream monitoring activities (Etheridge 2015; Holloway et al. 2016) employed 0.45 micrometer filters, and porewater sampling employed 0.15 micrometer filters to unfiltered samples. Concentrations in samples collected with 0.45 micometer filters are commonly referred to as "dissolved" phase concentrations. Concentrations in unfiltered samples are often referred to as "total" concentrations, which include the "dissolved" fractions as well as particulates that are too large to pass through the filter. In this report, the term total is used to refer to as the total recoverable concentrations, as opposed to concentrations of various species, such as methylmercury or arsenic (III), that represent a fraction of the total recoverable concentrations.

IA and USGS (Etheridge 2015 and Holloway et al. 2016) surface water sampling results indicate that transport of contaminants as particulates in surface water is occurring presently at the Cinnabar Mine site and downstream water bodies. Available results of unfiltered surface water concentration of selected parameters, including arsenic (total) and mercury (total), and iron (total) are presented graphically in Figures 6-1 (IA August 2016), 6-3 (IA September 2016), and 6-5 USGS (July 2015). In each figure, locations of samples of creek, background, adit, and the ponded area are arrayed generally from upstream (left) to downstream (right), with samples collected from features not immediately on the stream channel (adits and area of ponded sediment) or from background/attribution locations positioned on the figure at locations where drainage from the features is expected to enter the stream channel.

As shown in Figures 6-1 and 6-3 through 6-5, for any given sampling event, West Fork Cinnabar Creek surface water exhibited the highest unfiltered total mercury

and arsenic concentrations within the area of the tailings (including calcines and yellow/tan flotation tailings). The concentrations generally decreased with distance downstream within West Fork Cinnabar Creek, Cinnabar Creek, and Sugar Creek, likely due to dilution.

In general, suspended particulates in surface water represented by unfiltered sample concentrations include any suspended particles that are too large to pass through the filter. Such particles may include eroded soil particles and sediment particles that become re-suspended and entrained during periods of higher flow. Such particles also may include particles formed by chemical precipitation in the water (e.g., iron oxyhydroxides) such as described in Sections 6.4.2, 6.4.3, and 6.4.5.

Although iron concentrations are generally low at the Cinnabar Mine site, pyrite was observed during mining and some iron oxyhydroxide precipitate (yellowboy) has been observed locally during the IA at Adit 2 (photo 32, Appendix C), Adit 3 (photos 33 and 34, Appendix C), and "seep area" (identified as location AD04 in Figure 3-1), all of which drain into West Fork Cinnabar Creek.

Limited available unfiltered total iron surface water results (USGS July 2015 sampling) are presented graphically in Figure 6-5. The form(s) of total iron present in these samples is not known, but it is possible that at least some is in the form of iron oxyhydroxide. Samples from locations expected to possibly contain iron oxyhydroxide derived from the Cinnabar Mine drainage are limited to samples from five locations V (Adit 2), W and G (near WF03), C (near CC01), S (near SC03), and Q (between SC01 and SC02). Concentrations of unfiltered total iron and unfiltered total mercury are highest at location W and G, the nearest location downstream of the tailings (calcines and flotation tailings), and generally decrease with distance downstream until reaching location Q, which exhibits a nearly two-fold increase in unfiltered total mercury and six-fold increase in unfiltered total iron. The reason(s) for the increase at downstream location Q is not clear. Paired results of unfiltered total iron and unfiltered total mercury were compared. When the sample from location Q is excluded from the regression, there is a significant positive correlation ($R^2 = 0.99$, $p = 0.005$) between unfiltered total mercury and unfiltered total iron in stream samples (see Figure 6-7), suggesting that mercury may be adsorbed onto the iron-containing particles.

Limited paired filtered and unfiltered total mercury sample results collected by USGS in July 2015 from the same five locations expected to possibly contain iron oxyhydroxide derived from the Cinnabar Mine were evaluated. When the four sample pairs (excluding the sample from downstream location Q) are evaluated, concentrations of filtered and unfiltered total mercury appear to be possibly correlated ($R^2 = 0.74$) although not significantly ($p = 0.14$; see Figure 6-7). This possible correlation, in conjunction with the strong correlation between filtered total mercury and filtered total arsenic (see Section 6.4.7.2 and Figure 6-6), suggests that much of the total unfiltered mercury in the stream samples was derived from groundwater. For the four selected sample pairs, the ratios of unfiltered to filtered total mercury range from 2.8 to 5.6 and average 4.2. In other

words, for those samples, the percent of all mercury in the samples represented by the filtered fraction range from 15 to 26 percent, and average 20 percent.

Although only four paired filtered and unfiltered total mercury samples were collected during the September 2016 IA surface water sampling, a similar trend is evident (see Figure 6-3), with an average of approximately 19 percent of the total mercury present in the filtered fraction.

The above observations, in conjunction with other site data presented in this section and commonly observed behavior of mercury at mine sites (see Section 6.4.3), suggest that much of the unfiltered total mercury in the IA and July 2015 USGS stream samples is adsorbed onto iron-containing particles (possibly iron oxyhydroxide). If such leaching and migration from groundwater to surface water was occurring at these times, mercury-bearing particulates could potentially have formed and migrated in groundwater, the groundwater/surface water mixing zone, or after emerging into surface water. For those times, if the unfiltered total mercury results represent loading predominantly by groundwater, then the total mercury loading from groundwater estimated based on the filtered total mercury results would be underestimated by a factor of approximately five.

Results of USGS surface water monitoring (Etheridge 2015) at Site 5 (USGS stream gaging station 13311450 – Sugar Creek near Stibnite, Idaho) indicate significant total mercury loading, most of which is likely attributable to Cinnabar Mine. Selected sample and stream gaging results are provided in Table 2-8. Based on those results, most of the total mercury loading occurs during periods of high discharge (as measured at USGS stream gaging station 13311450 – Sugar Creek near Stibnite, Idaho) during spring snowmelt. Based on a positive correlation between streamflow and concentrations of suspended sediment (based on weight percentage of particles less than 62.5 micrometers), unfiltered aluminum, and unfiltered total mercury in surface water samples collected at Site 5, total mercury loading is attributed (Etheridge 2015) predominantly to surface runoff and stream channel erosion. These results are influenced by samples representing a summer rainfall event (August 14, 2014 sample), and two samples collected during snowmelt – a peak of record streamflow (May 25, 2014 sample) and a peak snowmelt runoff sample (May 14, 2013 sample). Stream discharge on the day of the August 14, 2014 summer rainfall event was 18.6 cfs, and 194 and 185 cfs during the May 2014 and May 2013 snowmelt events, respectively. By comparison, the Sugar Creek discharge rates ranged from 11.6 to 13.8 cfs during the July 23-25, 2015 stream sampling, and was 8.14 cfs during the September 21, 2016 IA sampling.

For the USGS surface water monitoring at Site 5 (Etheridge 2015), the ratio of unfiltered to filtered total mercury in samples corresponding to the peak of record streamflow (May 25, 2014) and a peak snowmelt runoff sample (May 14, 2013) are 90.3 and 87.1, respectively. The ratio for the samples collected on the day of the summer rainfall event (August 14, 2014) and two samples collected during snowmelt is 217. Stream discharge on the other days of sampling range from 5.8 to 133 cfs. Ratios of unfiltered to filtered total mercury for available sample pairs

collected on these other days range from 1.5 to 43. For those sample pairs collected on days when stream discharge was greater than 50 cfs, the ratios range from 5.6 to 43 and average 16. For those sample pairs collected on days when stream discharge was less than 50 cfs (excluding the summer rainfall event on August 14, 2014), ratios of unfiltered to filtered total mercury are generally lower, ranging from 1.5 to 9.1, with all but the highest value less than or equal to 6.1, and with an average of 4.1. These ratios of unfiltered to filtered total mercury are similar to those observed for paired unfiltered and filtered total mercury samples collected from West Fork Cinnabar Creek, described above for the September low stream discharge IA and USGS July 2015 sampling events. This observation suggests the possibility that much of the mercury at Site 5 during periods when stream discharge is less than 50 cfs may be similar in nature to the mercury in West Fork Cinnabar Creek during the periods of low flow sampled during the IA and July 2015 USGS sampling.

Loading of such suspected groundwater-derived mercury likely also occurs during periods of higher discharge; however, such groundwater inputs would be expected to be masked by the comparatively much larger particulate loading by erosion.

6.5 Methylmercury at Cinnabar Mine

Selected IA samples were analyzed directly for methylmercury. IA results are presented for tailings (Table 5-5), ponded surface water (Table 5-6), adit surface water (Table 5-7), surface water from West Fork Cinnabar Creek (Table 5-8), Cinnabar Creek (Table 5-9), Sugar Creek (Table 5-10), and sediment from the ponded area (Table 5-12), adit portal areas (Table 5-13), West Fork Cinnabar Creek (Table 5-14), Cinnabar Creek (Table 5-15), and Sugar Creek (Table 5-16).

Methylmercury trends and results of studies assessing methylation potential are addressed in detail in EPA's methylation study. Results are presented in a report provided in Appendix B. In general, concentrations of methylmercury in site samples are fairly low.

Selected results of samples collected as part of that study, specifically including results of porewater sampling to assess current conditions at the Cinnabar Mine, are incorporated into this Section.

6.6 Summary

The main conclusions regarding the fate and transport of arsenic and mercury at the Cinnabar Mine site and downgradient locations are as follows:

- Mining and ore processing operations at the Cinnabar Mine have resulted in accumulations of calcines and flotation tailings at the mine. The chemical forms of mercury in these waste types are not known, but likely include cinnabar, particularly in the flotation tailings, and more soluble forms of mercury, particularly in the calcines.
- Calcines and tailings have been historically subject to erosion, and, although previous removal actions (including regrading and attempts to

establish a vegetative cover) have been implemented to reduce erosion, erosion by stormwater and snowmelt likely remains an important mechanism to transport mercury into West Fork Cinnabar Creek and downstream waterbodies. The chemical form(s) of mercury in such erosion-derived particulates is not known.

- Although no investigations have directly evaluated groundwater conditions at the Cinnabar Mine, it is likely that groundwater, including adit discharge underflow and groundwater resulting from infiltration of precipitation, snowmelt, and surface water, flows through calcines and flotation tailings and leaches mercury, arsenic, and other inorganic elements from the mine wastes. Emergence of such impacted groundwater into surface water is readily apparent in results of filtered total mercury surface water and sediment porewater samples.
- Available surface water data (Holloway et al. 2016) and general observations about mercury fate and transport at other mercury mine sites collectively suggest that some of the total mercury detected in unfiltered surface water samples is associated with iron-bearing particulates, possibly including iron oxyhydroxide.
- Although available supporting data are limited, an apparent correlation between unfiltered and filtered total mercury concentrations in surface water collected during the IA and by USGS (Holloway et al. 2016), in conjunction with the strong correlation between filtered total mercury and filtered total arsenic and other site-specific observations, suggests that much of the total unfiltered mercury in the stream samples was derived from groundwater influx into the stream at the times of sampling. It is not clear whether such mercury-bearing particulates may have formed in groundwater, the groundwater/surface water mixing zone, or after emerging into surface water. To the extent that such groundwater-derived loading of mercury particulates in surface water may be occurring, the degree of groundwater-derived mercury loading to surface water would be underestimated if unfiltered total mercury concentrations are assumed to represent erosion-derived loading and estimates of groundwater-derived mercury loading are based solely on filtered total mercury concentrations. Based on ratios between unfiltered and filtered total mercury concentrations in surface water, such particulate-associated mercury comprises approximately 80 percent of all mercury loading during periods of generally low stream discharge.

7 Conceptual Removal Action Alternatives

This section identifies a range of conceptual removal action alternatives that may be employed to reduce mercury and arsenic impacts on surface water and sediment at the Cinnabar Mine site in order to decrease the potential for uptake by aquatic biota. Specific removal action objectives are not established at this time due to the uncertainties associated with contaminant transport mechanisms that are described in Section 6. However, this section presents four removal alternatives that provide a general guide for future actions to be considered as the conceptual site model is refined. This section also includes a discussion on site access issues that limit the feasibility of several alternatives. The following four removal alternatives are presented:

- Alternative 1 (A1): Engineered Soil Media and Vegetative Cover
- Alternative 2 (A2): Selective Grading and Vegetative Buffer Strips
- Alternative 3 (A3): Tailings Consolidation and Stream Relocation
- Alternative 4 (A4): Full-Scale Removal Options

7.1 Site Access Considerations

Access to the site is via one of two roads. The shortest route originating from the entrance of the Stibnite Mine at the intersection of Forest Service Road 412 and Forest Service Road 374 follows Sugar Creek northeast for approximately 2.5 miles on Forest Service Road 374 before turning south along Cinnabar Creek for another 2.5 miles. This section of road is currently gated and closed at the downstream end near the Stibnite Mine and at the upstream end at the Cinnabar Mine. The road, which includes a primitive crossing of Sugar Creek (ford), is constricted in width along both Sugar Creek and Cinnabar Creek because of erosion. Based on pictures of the pinch points provided by the Nez Perce Tribe, it is estimated that the road may not allow passage of vehicles greater than 6 feet in width. Significant road improvements would be required in order to access Cinnabar Mine from this route. It should be noted that the USFS has closed this road at the intersection with the Stibnite Mine road and installed a gate; therefore, permission to use this route will require completion of the USFS permitting process. In addition, based on previous EPA removal actions at the site, it is likely the USFS would require the closure of this access road at the completion of removal activities. The construction and removal of an access road to the mine could significantly increase the time and cost to the project, particularly if the enhanced road is required to be deconstructed and/or reclaimed. An additional

concern with rebuilding of this access road is potential negative impacts to fish habitat in Sugar Creek.

Sugar Creek provides critical habitat for the federal-listed threatened bull trout and steelhead, and Cinnabar Creek is critical habitat for bull trout. Because of the site's altitude, work would likely be conducted late in the summer, which coincides with typical spawning times in both creeks. This restricts the ability to cross Sugar Creek with motorized vehicles unless a temporary bridge is placed at the ford. It is assumed that the consultation process with natural resource trustees would be significant if road building along the Sugar Creek route were required.

The second route to the site travels approximately 3 miles south along Forest Service Road 412 toward the Stibnite Airport and then turns east on Forest Service Road 375 along the EFSFSR before turning north on a primitive road up Fern Creek. This primitive road winds over a ridge at approximately 8,600 feet above sea level and drops down to the Cinnabar Mine site after several steep switchbacks. Road conditions are presumed to be in better shape than the Sugar Creek route; however, it is approximately twice as long and contains several tight switchbacks that could limit the mobilization of heavy machinery. Utility terrain vehicles (UTVs) required 3-point turns on some of the switchbacks during the 2016 field assessment.

In general, access to the site for equipment, materials, and personnel will be a critical element of a potential removal action and will need to be further evaluated during the planning and design phase of any selected removal action. Some of the options considered below could be performed with smaller vehicles such as UTVs with small trailers, which would require fewer road improvements. As the scale of the removal options increase, the need for larger pieces of earth moving equipment increases, which would require more significant road improvements. Depending on the scope, significant road improvements could involve a lengthy planning and coordination period followed by extensive road construction, bridge installation, and/or road deconstruction. The costs for road improvement planning and construction could be relatively higher and therefore less feasible for a smaller-scale, lower cost removal option, but these costs may be relatively lower and therefore more feasible for a larger-scale, higher cost removal option.

7.2 Alternative 1 – Engineered Soil Media and Vegetative Cover

There are many types of erosion and sediment control best management practices (BMPs) for controlling surface water runoff; however, most require some level of maintenance that is not practicable at this remote site. Therefore, permanent, post-construction BMPs that prevent the contaminants from migrating from the tailings piles to surface water are recommended. Typically, these include slope protection controls such as grading, mulching, and seeding to minimize erosion. Significant grading or moving of piles would require the use of heavy machinery and is therefore deemed less feasible due to road access limitations and overall remoteness of the site. However, a vegetative cover can be established through the

application of an engineered soil media, which would not require heavy machinery and therefore would not require significant road improvements.

A successful vegetative cover requires adequate organic matter, nutrient levels, and biological activity that are typically provided in topsoil. Agronomic testing of the tailings indicate that the material is largely void of these essential nutrients and organic matter. Therefore, simply adding fertilizer and seed mix to the tailings will not likely produce or sustain a vegetative cover. Additionally, the borrow source that was identified at the site contains elevated concentrations of metals (Section 5.2.1) that make it unsuitable as a potential cover soil. Due to a lack of local topsoil borrow material and access limitations at the site, it is deemed impractical to import and apply topsoil on top of the tailings for vegetation growth. An alternative to importing topsoil is to apply an engineered soil media to the tailings prior to seeding. Engineered soils contain combinations of wood fibers, biopolymers, biochar, and other constituents that promote microbial activity that is essential for permanent vegetative cover, and it can be applied hydraulically with small-scale equipment. A slow release fertilizer and design seed mix is added to the engineered soil media and applied to the tailings using a hydroseeder, which could be mobilized to the site using a UTV without significant road improvements. A flexible growth medium is then applied in the same fashion on top of the engineered soil that combines chemical and mechanical bonding techniques to hold the growth medium in place and promote accelerated germination. A growth medium that provides up to 18 months of erosion control for seed to germinate and establish root structure is recommended.

A bench scale test is currently being performed on samples of the yellow tailings in a research greenhouse using an engineered soil, fertilizers, and a flexible growth medium. The study is intended to provide an indication of the level of success this alternative may have under ideal environmental conditions and to evaluate if the tailings material poses a toxicity issue to the plants due to elevated metals concentrations. Preliminary results of the study indicate that the native grass species did not sustain growth after the first leaf stage (week 3) following germination, and many species died or went dormant. However, a rogue tall fescue, known as KY-31 (*lolium arundinaceum*), performed very well throughout the 14-week trial. As a result, a second trial has been initiated using only the tall fescue seed to verify the likelihood of success using this plant species. As of week seven of this trial, the tall fescue had germinated and appeared to be thriving. A specialist at the Idaho NRCS field office in Emmett, Idaho, indicated that a seed mix consisting of tall fescue, intermediate wheatgrass, and a legume such as clover would be acceptable for erosion control at the site, given that the native grasses did not survive.

Results of the bench scale test will be provided under separate cover following completion of the second trial. If the tall fescue proves to grow successfully under ideal bench-scale conditions, it may be beneficial to plant a small test plot on the tailings during future field investigations in order to evaluate its effectiveness under actual site conditions.

The 1998 EPA removal action included seeding and mulching the tailings piles with a native grass seed mix that was not successful. It has been reported that a nutrient fertilizer was applied to the tailings, but details and specifications of the amendments are unknown. Assuming the amendment contained adequate organic matter and nutrients, it is possible that the reason the 1998 revegetation effort did not succeed is simply due to a toxicity effect occurring to native grass species.

Advantages:

- Cost-effective source control for tailings runoff;
- Reduces runoff and infiltration volumes through evapotranspiration;
- Reduces runoff velocities and erosion potential;
- Avoids the need to import and spread topsoil;
- No maintenance required; and
- Does not involve the mobilization and use of heavy machinery, although a small trailer-mounted hydroseeder will be required.

Disadvantages:

- Does not address potential contaminant migration pathways occurring in the subsurface;
- Even if the bench scale testing provides encouraging results under ideal conditions, the feasibility of this option under normal site conditions contains some uncertainty;
- A vegetative cover could provide a source of dissolved organic carbon infiltrating through the mine tailings, which may increase the potential for dissolved inorganic mercury mobilization and mercury methylation.
- Wildlife may damage the plantings;
- Possible uptake of metals in plants that may be consumed by wildlife, although it should be noted that mercury does not tend to enter plant roots for most species; and
- Requires a local source of water to operate hydroseeder.

Cost Estimate:

Costs associated with this option include the application of an engineered soil media, fertilizers, seed, and flexible growth media to the tailings, all of which can be purchased in 50-pound bags that can be transported to the site using UTVs or all-terrain vehicles. Based on delineations using Google Earth, the total area to be treated is approximately 4.5 acres of tailings, although the total area may be reduced to focus on slopes adjacent to the stream. Initial unit material estimates for engineered soil media and seeding include about 540 pounds per acre of fertilizer, 3,330 pounds per acre engineered soil media, 2,870 pounds per acre flexible growth media, and 234 pounds per acre of seed mix, resulting in roughly 9.5 tons of material to be transported.

It is assumed that the only equipment required for mobilization is a 300-gallon, trailer-mounted hydroseeder that can be towed behind a UTV, and that no road improvements are necessary. The road contains very tight turns that may require the trailer to be un-hitched while the UTV completes the turn. It is assumed that the trailer is light enough for a 4-man crew to safely walk the trailer around the

turn; however, the pump and tank may need to be removed and reconnected in order to complete some of the turns.

The cost for this option is estimated to be $144,000. This cost assumes the availability of a water source from West Fork Cinnabar Creek or one of the flowing adits. The cost does not include engineering design, oversight, or maintenance costs. A conceptual layout of this alternative is shown in Figure 7-1.

7.3 Alternative 2 – Selective Grading and Vegetative Buffer Strips

A gently sloping vegetated area between the tailings piles and the stream would act to filter runoff before it reaches the stream. The Idaho BMP Manual (Idaho 2005) recommends a minimum width of 20 feet for vegetative buffer strips. Therefore, in areas where tailings contain a steep slope down to the stream banks, it will be necessary to pull those tailings away from the stream as much as possible and reduce the slopes where feasible. Tall, dense grasses mixed with willows and alder provide good traps for filtering runoff. Willows also may provide phytostabilization of mercury compounds in the root zone (Wang 2004). Temporary erosion control measures such as filter socks may be required until the vegetative cover is established. Once established, vegetative buffer strips generally do not require maintenance. However, without a vegetative cover on the tailings, the buffer strips will eventually be overwhelmed with tailings deposition and cease to provide any benefit. Therefore, this option includes the actions outlined in Alternative 1, Engineered Soil Media and Vegetative Cover.

Runoff from tailings piles can also be reduced by roughening the slopes of the tailings prior to application of engineered soil media and plantings. This would be accomplished by creating horizontal grooves, furrows, and depressions along the face of steep slopes using a tracked dozer or excavator, which would be required in order to construct the vegetative and sand filter strips. The ponded area that is located on the yellow tailings, as shown in Figure 2-2, would also be removed under this alternative. This may be accomplished by grading and filling the depression that forms the ponded area and routing surface water to quickly drain to the West Fork Cinnabar Creek without ponding.

Sand filters, such as were constructed at the Stibnite Mine, were also considered under this alternative. Research indicates that the sand filters at the Stibnite Mine have reduced arsenic contamination in Meadow Creek adjacent to mine tailings (Dovick et. al. 2015). However, based on the 2016 field assessment, it does not appear that a suitable source of clean, course sand is available at the site. Therefore, it is assumed that sand would need to be transported to the site, which would require major road improvements that would significantly increase costs as well as impact water quality along Sugar and West Fork Cinnabar Creeks. As a result, sand filters are not deemed feasible as a part of this alternative.

<u>Advantages:</u>

- Filters tailings from runoff before it reaches the creek;

- Willows have the potential to provide shade, which may improve stream temperatures in West Fork Cinnabar Creek. A USGS report (Etheridge 2015) noted that the Sugar Creek station exceeded the Maximum Daily Average Temperature for spawning salmonids 47% of the time. As Cinnabar Creek drains to Sugar Creek, elevated temperatures may also be present in Cinnabar Creek;
- Reduces the volume of stormwater entering the stream via evapotranspiration;
- Vegetation such as willow trees would provide a permanent feature that would not require maintenance;
- Slope roughening will reduce runoff volumes and velocities to limit erosion from the tailings into the creek, trap sediments, and aid in establishing vegetation; and
- Reduces methylmercury production from the ponded area on the tailings.

Disadvantages:

- Does not address potential contaminant migration pathways occurring in the subsurface;
- Requires mobilization of earth-moving machinery and possible road improvements;
- Vegetative buffer strips are only effective if constructed in conjunction with revegetation (i.e., source control) efforts on the tailings piles. Without a vegetative cover on the tailings, the filters would eventually become overwhelmed with tailings deposition and would require maintenance to avoid failure; and
- Short-term impacts may occur as a result of working with machinery near the stream, which requires the use of construction BMPs such as filter socks.

Cost Estimate:

This alternative assumes that road maintenance is necessary, and that compact excavators and dozers can be mobilized to the site via the Fern Creek route. Costs associated with this option include removing approximately 700 cubic yards of tailings from the streambanks and spreading on top of the piles away from the slopes. Included in this alternative is removal of the ponded area located on top of the yellow tailings, willow planting along the streambanks, and complete vegetation of the piles as outlined in Alternative A. The cost for this option is estimated to be $262,000. This cost assumes the availability of a water source from West Fork Cinnabar Creek or one of the flowing adits. It is assumed that maintenance would not be required following the completion of this alternative. Figure 7-2 presents a conceptual layout of the work outlined in this alternative.

7.4 Alternative 3 – Tailings Consolidation and Stream Relocation

This removal option involves consolidating the separate tailings piles into one location to isolate the tailings from the stream. This alternative reduces the overall

surface area of tailings that contributes runoff to the stream, thereby reducing the volume of tailings that are transported off-site via runoff. For instance, red tailings located on the west side of West Fork Cinnabar Creek could be relocated and combined with the red and yellow tailings on the east side of the creek. In addition, once the tailings have been consolidated, the creek may be relocated further away from the consolidated piles, creating more surface area to construct vegetative filter strips. Furthermore, analytical results indicate that the red tailings contain lower concentrations of metals than the yellow tailings (Table 2-11 and Table 5-5). Therefore, the red tailings can be used to isolate the yellow tailings from surface water runoff, although the red tailings (calcines) may contain a more soluble form of mercury as described in Section 6.1.4 and 6.4.4. Alternatively, the borrow source material may also be placed on top of the consolidated tailings, although these soils contain concentrations of heavy metals above screening levels (Section 5.2.1.2) that may exclude them for use as a clean cover material.

Heavy machinery would be needed to excavate and relocate the tailings under this alternative, which would require significant road and access improvements. It is assumed that this alternative would utilize the Sugar Creek road in order to mobilize heavy machinery and haul trucks to the site. In order to use the Sugar Creek route, it is assumed that a temporary bridge must be constructed at the Sugar Creek ford, as well as across West Fork Cinnabar Creek through the tailings at the mine site. Other road improvements may be required along the route, including road widening and shoulder stabilization along steep slopes.

It is estimated that approximately 25,000 cubic yards of tailings and 550 linear feet of creek would need to be relocated under this alternative. In addition, water flowing from Adit 1 would be rerouted to the south so that it would discharge into the West Fork Cinnabar Creek near the confluence with the East Fork Cinnabar Creek. After earthwork activities are complete, the site would be vegetated in accordance with Alternatives 1 and 2. A conceptual layout of the work outlined for this alternative is shown in Figure 7-3.

Advantages:

- Reduces the surface area of tailings that is subject to stormwater runoff;
- Minimizes the volume of tailings transported to the stream via stormwater runoff;
- Reduces the volume of stormwater runoff from tailings via evapotranspiration; and
- Creates larger riparian buffer to filter runoff before reaching the stream.

Disadvantages:

- Does not address potential contaminant migration pathways occurring in the subsurface;
- Short term water quality and fish habitat impacts may result from repairing/constructing access roads and excavating near the stream; and
- High costs.

Cost Estimate:

This cost estimate was based on relocation of 25,000 cubic yards of tailings and 550 feet of stream. It is assumed that five days of haul road maintenance will be required along Sugar and West Fork Cinnabar Creeks, including construction of a temporary bridge across Sugar Creek and a temporary bridge across West Fork Cinnabar Creek at the mine site. The total cost is estimated to be $1,047,000 for this alternative.

7.5 Alternative 4 – Full-Scale Removal Options

In order to control the potential contaminant migration pathways, the source material must be isolated from hydrologic conditions. This is typically accomplished by excavating the contaminated tailings and placing them in an engineered repository or landfill that eliminates or controls contaminant transport mechanisms. This section includes a discussion of three potential options for future consideration at the site, including an on-site repository, a "high and dry" repository, and off-site disposal at the Stibnite Mine. Figure 7-4 displays a conceptual layout of the three options discussed in this section.

An on-site repository involves removal and consolidation of the tailings piles for disposal in an engineered repository located at the mine site. This option minimizes transportation costs associated with hauling the tailings long distances for disposal. However, siting a repository at the mine site has inherent design limitations, namely that it lies in a basin that is subject to several surface water drainages and groundwater sources as evidenced by the East Fork and West Fork Cinnabar Creeks (and tributaries), the three flowing mine adits, and the large seep originating from the former cook house building area (sample location AD04). Since these sources have not been fully characterized, there are uncertainties surrounding the feasibility of siting, designing, and constructing an on-site repository. During the August 2016 field reconnaissance, the area southwest of Adit 3 was identified as a potential borrow source and repository location because it is upgradient of the adits and the confluence of the East and West Fork Cinnabar Creeks. This area is confined laterally by steep slopes to the south and west, and by surface water drainage from West Fork Cinnabar Creek and a chute that drains the cliffs in the southwest corner of the basin. Given the lateral constraints and uncertainties associated with depth to groundwater, this area may be limited in volume capacity to dispose of all of the contaminated material on site. Another concern with this repository location is that the existing surface soil, which was identified as a potential borrow source for capping, contains elevated metals that exclude it for use as a clean cover material.

A second option under this alternative involves removing the tailings from the mine site and disposing them in a repository located in an area up and out of the basin (i.e., "high and dry"). For example, one such potential location is situated approximately 700 feet above the site on the ridge flanking the western portion of the mine. This ridge may be accessible via an existing road that travels up the mountain, beginning near the former dormitory building. The condition of this road is unknown and would need to be evaluated for suitability and/or improvements. A small east-west trending ridgeline below the radio towers may

provide a suitable repository location. Repository construction would require excavating the top of the ridge for tailings placement, and using the overburden to cover the tailings. A geotechnical evaluation would likely be required to assess the stability of subsurface soils and adjacent slopes, which could involve mobilizing a drill rig to the repository location.

A third option under this alternative consists of hauling the tailings off-site for disposal at the Stibnite Mine. This option requires discussion and agreements with the mine owner and operator, Midas Gold Corporation. Disposal options may include re-processing the tailings and/or placement in an approved disposal facility located at the Stibnite Mine.

Under each of these options, heavy machinery would be needed to complete the removal actions, which would require significant road and access improvements as outlined under Alternative 3 (Section 7.4). Restoration activities would also be required after the material is removed from the site, including, but not limited to, re-grading the site, stream bypass and reconstruction, and re-vegetation. It should be noted that this alternative does not address contaminant loadings that are contributed from the adits.

Advantages:

- Complete removal of contaminant source materials at the site.

Disadvantages:

- May require landowner agreements;
- Short term water quality and fish habitat impacts may result from repairing/constructing access roads and excavating near the stream; and
- High costs.

Cost Estimate:

Developing a cost estimate for a full scale removal is difficult due to the uncertainties and limitations associated with the options discussed in this section. A rough cost estimate is provided for the “high and dry” repository option assuming that an on-site repository is deemed infeasible and the necessary agreements are not reached with Midas Gold. This cost estimate is largely influenced by the volume of material that requires disposal, which is currently unknown. Based on approximations of surface area, side slopes, and assumed depths of the various tailings piles, this cost estimate assumes that 60,000 cubic yards of material requires disposal. The estimate also assumes that restoration and grading will be required for 1,000 linear feet of stream, and that 10 days of haul road maintenance will be required along Sugar Creek, Cinnabar Creek, and the road accessing the repository site. The total cost for this alternative is estimated to be $2,604,000.

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8 Site Inspection, Potential Sources, Surface Water Migration Pathway and Targets

This section discusses IA analytical evaluation criteria, potential sources associated with the site, surface water migration pathway and potential targets within the site's range of influence (Figure 7-1). At the direction of the EPA Task Monitor, the ground water migration, soil exposure, and air migration pathway have not been included due to a lack of possible receptors for these pathways, as well as the site's remote location. Sample location descriptions are discussed in Section 3. Sample locations are depicted on Figure 3-1.

8.1 Analytical Results Evaluation

Analytical results reported in the summary tables show all analytes detected above the laboratory detection limits in bold type. Analytical results indicating significant/elevated concentrations of contaminants with respect to background concentrations are shown underlined and in bold type. For the purposes of this investigation, significant/elevated concentrations of source/target samples include those concentrations that are:

- Equal to or greater than the sample's Contract Required Quantitation Limit (CRQL) or the Sample Quantitation Limit (SQL) when a non-CLP laboratory was used; and
- Equal to or greater than the background sample's CRQL or SQL when the background concentration was below detection limits; or
- At least three times greater than the background concentration when the background concentration equals or exceeds the detection limits.

8.1.1 Results Reporting

The analytical summary tables present all detected compounds, but only those detected analytes at potential sources and targets meeting the significant/elevated concentration criteria are discussed in the report text. All detected concentrations are discussed for the background samples.

In some cases, analytical results required qualification. For the purposes of discussion, qualifiers are not included in the results discussion. Please see the analytical data tables or data validation memoranda in Appendix E for information regarding qualifiers. Based on EPA, Region 10 policy, the common

earth crust elements (aluminum, calcium, iron, magnesium, potassium, and sodium) are not discussed or evaluated as part of this investigation.

Arsenic, mercury, and methylmercury concentrations are depicted on Figures 5-1 through 5-3.

8.1.2 Background Samples Analytical Results

8.1.2.1 Background Surface Soil Samples

Background surface soil sample results are provided in Table 5-5. Sample locations are discussed in Section 3.1.1 above. Sample results indicate the presence of antimony, arsenic, barium, cadmium, chromium, cobalt, copper, manganese, and mercury, nickel, vanadium, and zinc.

8.1.2.2 Background and Attribution Surface Water Samples

Background and attribution surface water sample results are provided in Tables 5-6 through 5-11. Sample locations are discussed in Section 3.1.2 above. Sample results indicate the presence of unfiltered and filtered copper in samples BG02SW/BG02SWD and BG04SW/BG04SWD; the presence of unfiltered and filtered arsenic and unfiltered and filtered copper in samples UT01SW/UT01SWD; and the presence of unfiltered and filtered copper samples BG03SW/BG03SWD and filtered total mercury in BG03SWD. The attribution sample (as outlined above in Section 3) is used to determine whether tributary streams (possibly containing other sources of contamination outside of the Cinnabar Mine sources) are contributing to contamination in water bodies downstream of Cinnabar Mine. Concentrations in the attribution sample were consistent with concentrations from the upstream and downstream Sugar Creek samples, indicating there is not likely an additional source of contamination from this waterbody.

8.1.2.3 Background and Attribution Sediment Samples

Three background (BG02SD, BG03SD, and BG04SD) and one attribution (UT01SD) samples were collected as part of this investigation. Five TAL metals (barium, chromium, lead, manganese, and zinc) were detected in sample BG02SD. Thirteen TAL metals (arsenic, barium, beryllium, chromium, cobalt, copper, lead, manganese, mercury, nickel, thallium, vanadium, and zinc) and methylmercury were detected in sample BG03SD. Fourteen TAL metals (antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, thallium, vanadium, and zinc) and methylmercury were detected in sample BG04SD. Eleven TAL metals (antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, vanadium, and zinc) and methylmercury were detected in sample UT01SD. Grain size analysis was also conducted on all of the sediment samples collected. Grain size for background and release samples generally contained less than 25% fines; however, there were a few outliers. Those outliers are discussed below in the release samples where applicable. Fines are considered to be the total percentage of silt and clays in the sample. The grain size between background and release samples appears to be comparable.

8.2 Potential Sources

The site contains multiple tailings piles and adits. Of these, the upper red and upper yellow piles were evaluated as part of this IA as were Adits 1, 2, and 3 as described in Section 2 above.

8.2.1 Tailings Piles Volumes

Based on aerial photography, the surface area of the upper red and upper yellow tailings piles are estimated to be 171,114.9 square feet as follows:

- Upper Red Tailings pile: 124,618.2 square feet and
- Upper Yellow tailings pile: 46,496.7 square feet.

Based on topography and visual observations the depth of the piles is estimated to be 20 feet. Based on this information, the volumes of the tailings piles are estimated as follows:

- **Upper Red Tailings Pile:** 124,618.2 x 20 feet = 2,492,364 / 27 to convert to cubic yards = 92,309.77
- **Upper Yellow tailings pile:** 46,496.7 x 20 feet = 929,934 / 27 to convert to cubic yards = 34,442.

8.2.2 Tailings Piles Sample Results

Tailings pile sample results are provided in Table 5-5. Sample locations are discussed in Section 3.1.1 above. Sample results from the samples collected from the yellow tailings pile indicate the presence of antimony, arsenic, beryllium, cadmium, mercury, methylmercury, thallium and zinc at significant concentrations with respect to background concentrations. Sample results from the samples collected from the red tailings piles indicate the presence of antimony, arsenic, beryllium, cadmium, mercury, thallium and zinc at significant concentrations with respect to background concentrations. Finally, sample results of the tailings collected near the former mill building indicate the presence of antimony, arsenic, cadmium, lead, mercury, thallium and zinc at significant concentrations with respect to background concentrations.

8.2.3 Adits Volumes

The flow rates of the Adits 1, 2, and 3 are not reported nor have they been documented during previous investigations. The first documentation of water flowing from the adits is the 1996 Removal Report. As a conservative measure, the volume of flow for each adit is estimated to be 0.1 cubic feet per second (cfs). The estimated flow rate for one day for each adit is calculated to be 320 cubic feet as follows:

- 0.1 cfs x 60 seconds per minute = 6 cubic feet per minute
- 6 cubic feet per minute x 60 minutes per hour = 360 cubic feet per hour
- 360 cubic feet per hour x 24 hours per day = 8,640 cubic feet per day; or 320 cubic yards per day (i.e., 8,600 cubic feet / 27 cubic feet per cubic yard).

8.2.4 Adits Sample Results

Sample results for Adits 1, 2, and 3 are presented in Tables 5-7 (surface water) and 5-13 (sediment). Adit 1 is located to the southeast of the upper red tailings piles. Surface water sample results indicate the presence of unfiltered and filtered arsenic and filtered total mercury at significant concentrations with respect to background concentrations. Sediment sample results indicate the presence of arsenic, beryllium, cadmium, cobalt, manganese, mercury, methylmercury, selenium, thallium, and zinc at significant concentrations with respect to background concentrations. The grain size analysis for this sample indicated a high presence (54.69%) of silt.

Adit 2 is located south of the site. Surface water sample results indicate the presence of unfiltered and filtered arsenic at significant concentrations with respect to background concentrations. Sediment sample results indicate the presence of antimony, cobalt, and mercury at significant concentrations with respect to background concentrations.

Adit 3 is located in the southwest of the site behind a pile of rubble. Surface water sample results indicate the presence of unfiltered and filtered) arsenic and dissolved (i.e., filtered) methylmercury at significant concentrations with respect to background concentrations. Although methylmercury was detected at a significant concentration with respect to the background concentration, the detected concentration of 0.129 ng/L is below the national average of methylmercury in streams of 0.19 ng/L. Sediment sample results indicate the presence of antimony, arsenic, cadmium, cobalt, lead, mercury, and zinc at significant concentrations with respect to background concentrations.

8.3 Surface Water Migration Pathway

The surface water migration pathway Target Distance Limit (TDL) begins at the probable point of entry (PPE) of surface water runoff from the site sources to a surface water body and extends downstream for 15 miles. Figure 7-1 depicts the surface water TDL for the Cinnabar Mine.

The two-year 24-hour rainfall event for the site is 2.4 inches (NOAA 1973). The average annual precipitation in Stibnite, Idaho (which is located approximately 2 miles from the site) is 31.14 inches (WRCC 2016). Soil survey data is not available for the area of the site; however, based on description of the soil samples collected at the site, soils consist of sandy silt. Flood maps are not available for the area near the site; however, there are numerous reports of localized flooding events at the site.

8.3.1 Overland Route

Multiple PPEs are present at the site. PPE 1 is the entire area where tailings are in direct contact with West Fork Cinnabar Creek. PPE 2 is where flow from Adit 1 enters West Fork Cinnabar Creek. PPE 3 is where flow from Adit 2 enters West Fork Cinnabar Creek. Finally, PPE 4 is where flow from Adit 3 enters West Fork Cinnabar Creek.

West Fork Cinnabar Creek flows through the tailings piles at the site for approximately 0.5 mile to the confluence with Cinnabar Creek. From the most downstream PPE, this creek flows for approximately 2.1 miles to the confluence with Sugar Creek. Sugar Creek flows for approximately 2.7 miles to the confluence with EFSFSR. The TDL concludes approximately 9.7 miles downstream in EFSFSR. Surface water flow rates are not available for West Fork Cinnabar Creek or Cinnabar Creek. Based on field observations, the flow rates for both these creeks are estimated to be less than 10 cfs. Average stream flow rates on Sugar Creek from 2012 to 2016 ranged from 20.1 to 25.6 cfs (USGS 2017a). Average stream flow rates for EFSFSR from 2012 to 2016 ranged from 30.7 to 42.4 cfs (USGS 2017b).

8.3.2 Drinking Water Targets

Surface water is not used as a drinking water source within the TDL.

8.3.3 Human Food Chain Targets

Fish catch data are not provided for any of the surface water bodies within the TDL. Sport fishing occurs on Sugar Creek and EFSFSR within the 15-mile TDL. The types of fish sought is not recorded nor are these streams included within Idaho Department of Fish and Game fishing regulations; therefore, it is assumed that species sought in these creeks include steelhead and salmon (IDFG 2017). It is estimated that at least 1 pound of fish is caught for human consumption from both of these surface water bodies within the 15-mile TDL.

8.3.4 Environmental Targets

Cinnabar Creek provides critical habitat for the Federal-listed threatened bull trout (*Salvelinus confluentus*) and Sugar Creek provides critical habitat for the Federal-listed threatened bull trout (*Salvelinus confluentus*) and the Federal-listed threatened Steelhead (*Oncorhynchus mykiss*). The EFSFSR provides habitat for the Federal-listed threatened Snake River Spring and Summer Chinook salmon (*Oncorhynchus tshawytscha*). The Payette National Forest, the Frank Church/River of No Return Wilderness Area, and the Boise National Forest are all within the TDL. There is no wetland frontage within the TDL.

8.3.5 Surface Water Sample Results

8.3.5.1 Ponded Water Sample

Ponded water sample results are provided in Table 5-6. Sample locations are discussed in Section 3.1.2 above. Sample results indicate the presence of unfiltered and filtered arsenic, unfiltered and filtered manganese, filtered) total mercury, and unfiltered methylmercury at elevated concentrations with respect to background concentrations.

8.3.5.2 West Fork Cinnabar Creek Samples

West Fork Cinnabar Creek surface water sample results are provided in Table 5-8. Sample locations are discussed in Section 3.1.2 above. Sample results indicate the presence of unfiltered and filtered arsenic at elevated concentrations with respect to background concentrations in six of seven samples collected. Total mercury

was detected at elevated concentrations in the filtered fraction with respect to background concentrations in all samples for which the analysis was conducted. Finally, methylmercury was detected in the filtered fraction at elevated concentrations with respect to background concentrations in three of the five samples for which the analysis was conducted.

8.3.5.3 Cinnabar Creek Samples

Cinnabar Creek surface water sample results are provided in Table 5-9. Sample locations are discussed in Section 3.1.2 above. Sample results indicate the presence of unfiltered and filtered arsenic and filtered methylmercury at elevated concentrations with respect to background concentrations.

8.3.5.4 Sugar Creek Samples

Sugar Creek surface water sample results are provided in Table 5-10. Sample locations are discussed in Section 3.1.2 above. Sample results indicate the presence of total mercury and methylmercury at elevated concentrations with respect to background concentrations in the filtered fractions of samples collected from Sugar Creek. The most downstream sample from which elevated concentrations were detected is located approximately 4.3 miles downstream from the most upstream sample on West Fork Cinnabar Creek.

8.3.5.5 September 2016 Surface Water Samples

Surface water sample results for samples collected by EPA in September 2016 are provided in Table 5-11. Sample locations are discussed in Section 3.1.2 above. The background location established for West Fork Cinnabar Creek was not collected during the September EPA sampling event; therefore, these samples are not evaluated. Sample results indicate the presence of unfiltered and filtered total mercury at elevated concentrations with respect to background concentrations in the sample collected from Sugar Creek.

8.3.6 Sediment Sample Results

8.3.6.1 Ponded Water Sample

Ponded water sediment sample results are provided in Table 5-12. Sample locations are discussed in Section 3.1.3 above. Sample results indicate the presence of antimony, arsenic, beryllium, cadmium, cobalt, lead, mercury, nickel, thallium, and zinc at elevated concentrations with respect to background concentrations. The grain size analysis for this sample indicated a high presence (68.28%) of silt.

8.3.6.2 West Fork Cinnabar Creek Samples

West Fork Cinnabar Creek sediment sample results are provided in Table 5-14. Sample locations are discussed in Section 3.1.3 above. Sample results indicate the presence of antimony, barium, cadmium, cobalt, lead, manganese, mercury, nickel, and thallium at elevated concentrations with respect to background concentrations in one or more samples. Notably, antimony and cobalt were present at elevated concentrations in six of these seven samples, and mercury was present at elevated concentrations in five of these seven samples.

8.3.6.3 Cinnabar Creek Samples

Cinnabar Creek sediment sample results are provided in Table 5-15. Sample locations are discussed in Section 3.1.3 above. Sample results indicate the presence of antimony, cadmium, and mercury at elevated concentrations with respect to background concentrations. Antimony and cadmium were present at elevated concentrations in all five samples and mercury was present at elevated concentrations in four of these five samples.

8.3.6.4 Sugar Creek Samples

Sugar Creek sediment sample results are provided in Table 5-16. Sample locations are discussed in Section 3.1.3 above. Sample results indicate the presence of antimony, cobalt, mercury, and nickel at elevated concentrations with respect to background concentrations. Mercury was detected at elevated concentrations in the three samples collected closest to Cinnabar Mine.

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9 Summary and Conclusions

The Cinnabar Mine site is a former mercury mine and mill located 15 miles east of Yellow Pine, Idaho. The former mine is located on both private lands and lands administered by the USFS. The site is located within the Payette National Forest adjacent to the Frank Church/River of No Return Wilderness and the Boise National Forest. Mining activities began at the site in 1921 and ceased in 1958. Cinnabar Mine has been the source of numerous historical investigations and time-critical removal actions; however, contamination remains at the site and continues to impact West Fork Cinnabar Creek, Cinnabar Creek, and Sugar Creek.

The IA field event, that is the subject of this report, was conducted from August 22, 2016 through August 26, 2016 with additional sampling conducted on September 12 by EPA and collection of mesocosm study samples collected on October 5, 17, 24 and November 9. A total of 155 samples were collected to assist in determining if any eminent threat or potential threat to human health or the environment posed by the site and to provide EPA with adequate information to determine whether the site is eligible for placement on the NPL.

Tables 9-1 (soil), 9-2 (surface water), and 9-3 (sediment) present summaries of the removal screening level comparisons for arsenic, total mercury, and methylmercury.

9.1 Sources

9.1.1 Tailings Piles

Numerous tailings piles are present at the site including the previously capped and seeded tailings pile, the lowest tan tailings pile, the upper red tailings piles, and the upper yellow tailings piles. The lowest tan tailings pile and previously capped and seeded tailings pile were not evaluated as part of this IA because they are located on lands managed by the USFS. Samples were collected from the upper red tailings piles and the upper yellow tailings piles. A total of nine samples were collected from the tailings pile and one sample was collected near the former mill building. The surface area of the tailings piles are estimated to be 131,383 square feet. Based on the sample results, the tailings piles are a source of contamination at the site.

9.1.1.1 Removal Assessment Evaluation

Sample results for the tailings piles indicate the presence of antimony, arsenic, cobalt, mercury, and thallium at concentrations that exceeded screening levels, with arsenic, mercury and thallium above screening levels in all of the tailings piles samples.

9.1.1.2 Site Inspection Evaluation

Sample results indicate the presence of antimony, arsenic, beryllium, cadmium, lead, mercury, thallium, zinc, and methylmercury at significant concentrations with respect to background concentrations in one or more tailings piles. Of these analytes, antimony, arsenic, cadmium, mercury, and thallium were present at significant concentrations in every tailings pile sample.

9.1.2 Adits

Three flowing adits are known to be present at the site. All three adits were flowing during the field sampling event. Co-located unfiltered and filtered surface water/sediment samples were collected from each of the adits. The total volume of water discharged per day from the adits was estimated to be 6,463 gallons per day. Based on the sample results, the adits are a source of contamination at the site.

9.1.2.1 Removal Assessment Evaluation

Surface water sample results indicate the presence of filtered mercury at concentrations that exceed screening levels in all three adit samples, and copper at concentrations that exceeded the screening levels in Adits 2 and 3. Sediment sample results indicate the presence of antimony, arsenic, cadmium, and mercury at concentrations that exceeded the screening levels in all three of the sediment samples, and copper and nickel exceeded screening levels in one sample each. Many of the exceedences were at least an order of magnitude greater than the analyte-specific screening level.

9.1.2.2 Site Inspection Evaluation

Surface water sample results indicate the presence of unfiltered and filtered arsenic in all three of the samples at significant concentrations with respect to background concentrations. Total mercury (at Adit 1) and methylmercury (at Adit 3) were detected in the filtered fraction at significant concentrations with respect to background concentrations. Sediment sample results indicate the presence of antimony, arsenic, beryllium, cadmium, cobalt, lead, manganese, mercury, methylmercury, selenium, thallium, and zinc at significant concentrations with respect to background concentrations in one or more samples. Only cobalt and mercury were detected at significant concentrations in all three of the adit samples.

9.2 Targets

9.2.1 Ponded Water Area

An area of ponded water is located in the northeast corner of the previously graded and seeded tailings piles. The ponded water area supports tadpoles and

vegetation. One co-located unfiltered and filtered surface water/sediment sample set was collected from the edge of the ponded water.

9.2.1.1 Removal Assessment Evaluation

Surface water sample results indicate the presence of filtered arsenic and mercury at concentrations that exceeded screening levels. Sediment sample results indicate the presence of antimony, arsenic, cadmium, mercury, nickel, and zinc at concentrations that exceeded screening levels.

9.2.1.2 Site Inspection Evaluation

Surface water sample results indicate the presence of unfiltered and filtered arsenic, unfiltered and filtered manganese, and filtered mercury and methylmercury at elevated concentrations. Sediment sample results indicate the presence of antimony, arsenic, beryllium, cadmium, cobalt, lead, mercury, nickel, thallium, and zinc at elevated concentrations.

9.2.2 West Fork Cinnabar Creek

West Fork Cinnabar Creek flows through the upper red and upper yellow tailings piles through the site to the confluence with Cinnabar Creek. Based on the sample results discussed below, contamination appears to be migrating from site sources to West Fork Cinnabar Creek.

9.2.2.1 Removal Assessment Evaluation

Surface water sample results indicate the presence of filtered total mercury above the screening level all five samples analyzed for mercury. Sediment sample results indicate the presence of antimony, arsenic, and mercury at concentrations that exceeded screening levels in all seven of the sediment samples; cadmium at concentrations that exceeded screening levels in six of the sediment samples; and nickel and lead at concentrations that exceeded the screening levels in two and one of the sediment samples, respectively. Antimony, arsenic, and mercury were detected at concentrations that exceeded screening levels by at least an order of magnitude.

9.2.2.2 Site Inspection Evaluation

Surface water sample results indicate the presence of unfiltered and filtered arsenic at elevated concentrations in all samples collected. Total mercury was detected at elevated concentrations in the dissolved fraction of all samples for which the analysis was conducted. Finally, methylmercury was detected at elevated concentrations in the dissolved fraction of three of the five samples for which the analysis was conducted. Sediment sample results indicate the presence of antimony, barium, cadmium, cobalt, lead, manganese, mercury, nickel, and thallium at elevated concentrations in one or more samples. Notably, antimony and cobalt were present at elevated concentrations in six of these seven samples, and mercury was present at elevated concentrations in five of these seven samples.

9.2.3 Cinnabar Creek

Cinnabar Creek provides critical habitat for the Federal-listed threatened bull trout (*Salvelinus confluentus*). Cinnabar Creek flows into Sugar Creek. Based on the sample results discussed below, contamination from site sources appear to be migrating and impacting Cinnabar Creek.

9.2.3.1 Removal Assessment Evaluation

Surface water sample results indicate the presence of filtered total mercury above the screening level in all five samples collected from Cinnabar Creek. Sediment sample results indicate the presence of antimony, arsenic, cadmium, and mercury at concentrations that exceeded screening levels in all of the samples, and nickel was detected at concentrations that exceeded the screening levels in two of the five samples collected. Antimony and mercury were detected in some of the samples at concentrations that exceeded screening levels by at least an order of magnitude.

9.2.3.2 Site Inspection Evaluation

Surface water sample results indicate the presence of unfiltered and filtered arsenic and filtered methylmercury at elevated concentrations. Sediment sample results indicate the presence of antimony, cadmium, and mercury at elevated concentrations. Antimony and cadmium were present at elevated concentrations in all five samples and mercury was present at elevated concentrations in four of the samples.

9.2.4 Sugar Creek

Sugar Creek provides critical habitat for the Federal-listed threatened bull trout (*Salvelinus confluentus*) and the Federal-listed threatened Steelhead (*Oncorhynchus mykiss*). Sugar Creek flows into the EFSFSR which provides habitat for the Federal-listed threatened Snake River Spring and Summer Chinook salmon (*Oncorhynchus tshawytscha*). Finally, Sugar Creek and EFSFSR are within the Payette National Forest, the Frank Church/River of No Return Wilderness Area, and the Boise National Forest. Based on the sample results, contamination from the site is migrating to downstream targets.

9.2.4.1 Removal Assessment Evaluation

Surface water sample results indicate the presence of filtered copper at concentrations that exceeded screening levels in two of the samples collected. Sediment sample results indicate the presence of antimony, arsenic, and mercury at concentrations that exceeded screening levels in all of the samples and cadmium at a concentration that exceeded a screening level in one sample. Antimony and mercury were detected at concentrations that exceeded screening levels by at least an order of magnitude.

9.2.4.2 Site Inspection Evaluation

Sample results indicate the presence of mercury and methylmercury at elevated concentrations in the dissolved fraction of samples collected from Sugar Creek. The most downstream sample from which elevated concentrations were detected is located approximately 4.3 miles downstream from the most upstream sample on

West Fork Cinnabar Creek. Sediment sample results indicate the presence of antimony, cobalt, mercury, and nickel at elevated concentrations with respect to background concentrations. Mercury was detected at elevated concentrations in the two samples collected closest to Cinnabar Mine.

9.3 Conceptual Site Model

The results of this IA and other recent sampling events were reviewed in an attempt to develop the understanding of the fate and transport of arsenic and mercury at the Cinnabar Mine site and downgradient locations. A detailed summary of this review, including current conclusions and uncertainties, is provided in Section 6.

9.4 Removal Alternatives

Samples were collected from a potential on-site borrow source, and the results indicate the presence of antimony, arsenic, mercury, and thallium at concentrations that exceeded screening levels in all of the borrow source samples. Arsenic and mercury concentrations were at least an order of magnitude in excess of the screening levels. Arsenic concentrations ranged from 194 mg/kg to 399 mg/kg and mercury concentrations ranged from 29.8 mg/kg to 664 mg/kg. Based on these sample results, it is assumed this may not be an acceptable source of cover material for the contaminated tailings piles.

Three potential removal alternatives were evaluated as part of this IA. A summary of the alternatives including advantages, disadvantages, and estimated costs are provided in Table 9-4.

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Figures

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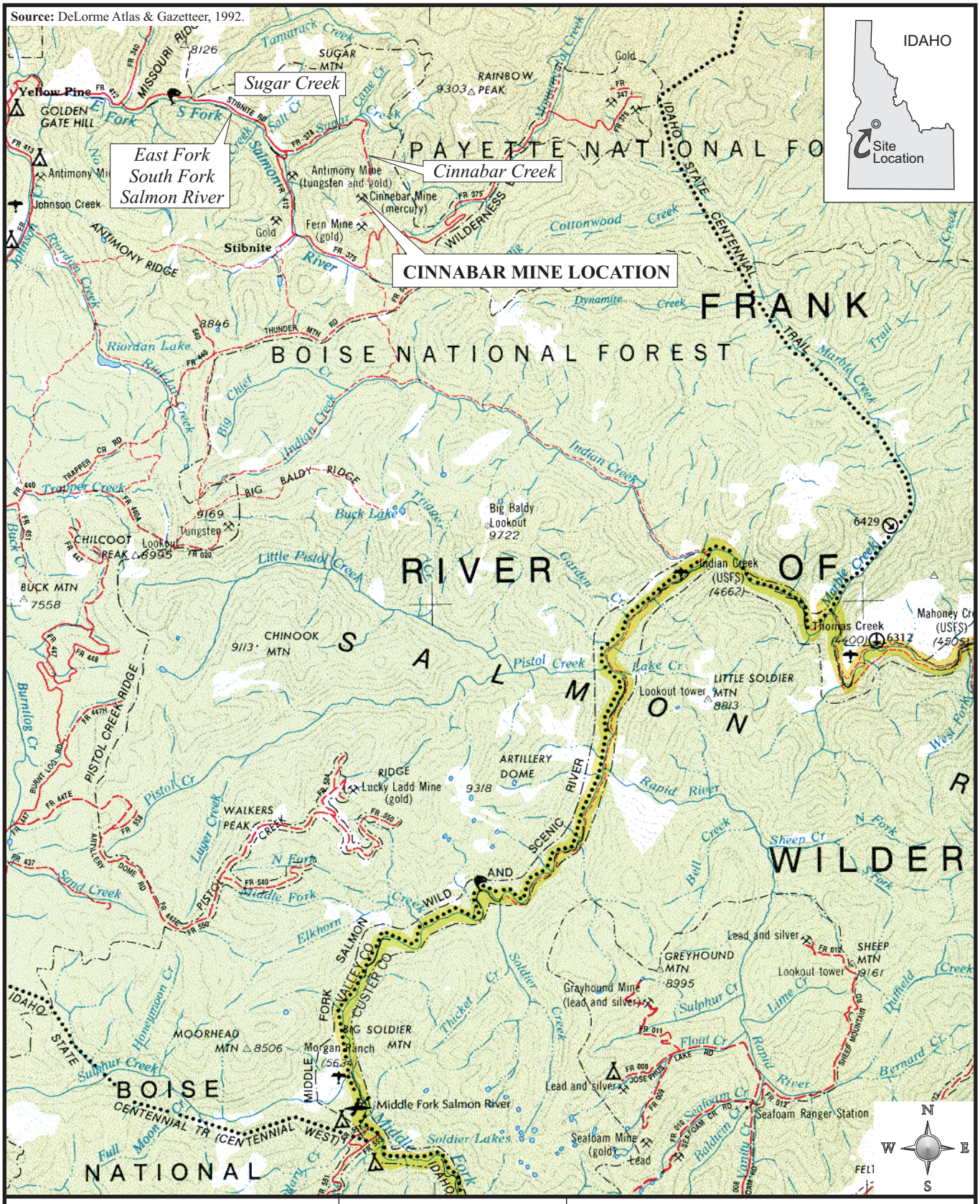

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Seattle, Washington

CINNABAR MINE SITE
Yellow Pine, Idaho

Figure 2-1

SITE VICINITY MAP

0 1.5 3
Approximate Scale in Miles

Date: 11-27-16

Drawn by: AES

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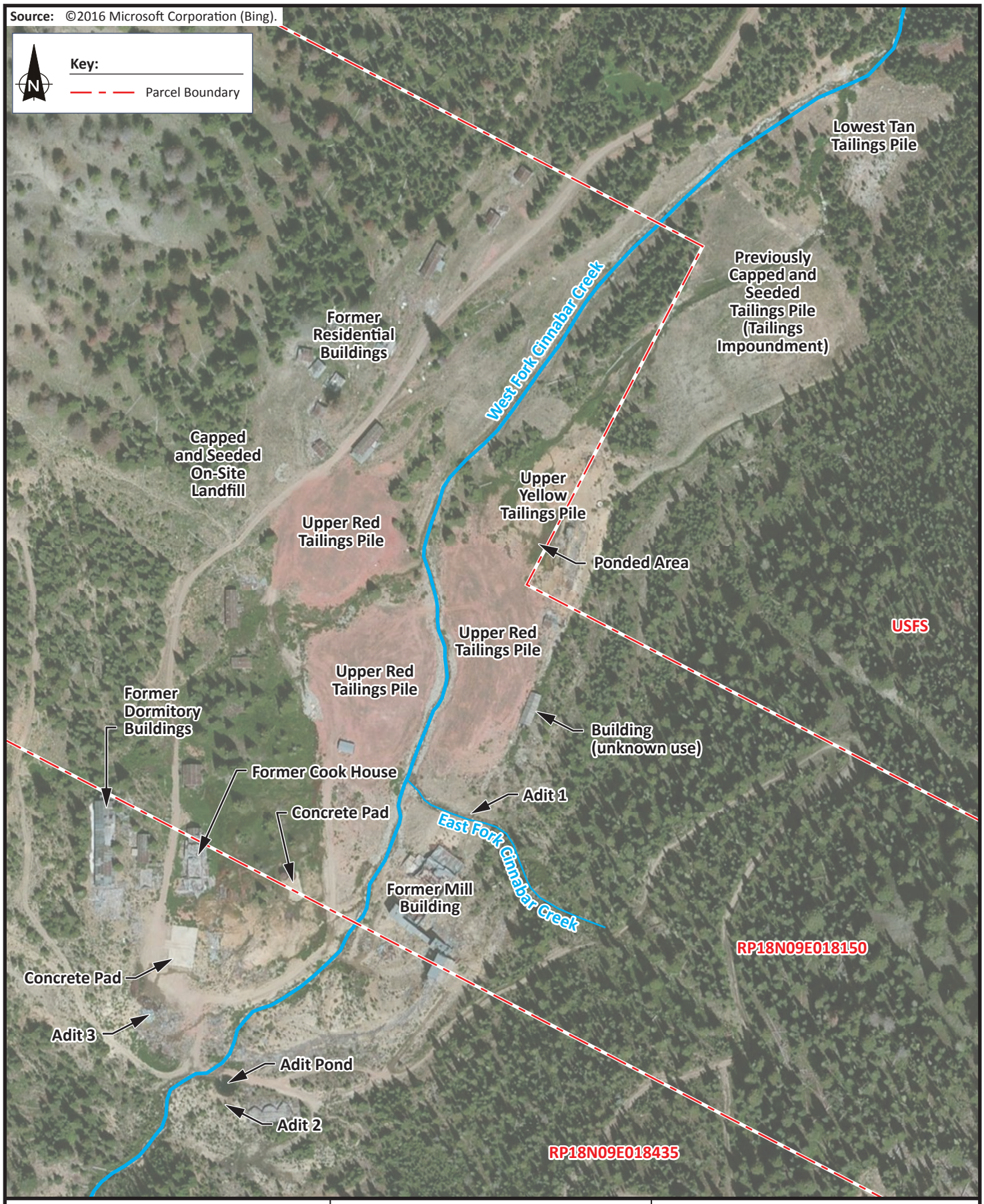

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CINNABAR MINE SITE
Yellow Pine, Idaho

0 100 200
Approximate Scale in Feet

Figure 2-2
SITE MAP

Date: 7/20/17
Drawn by: AES
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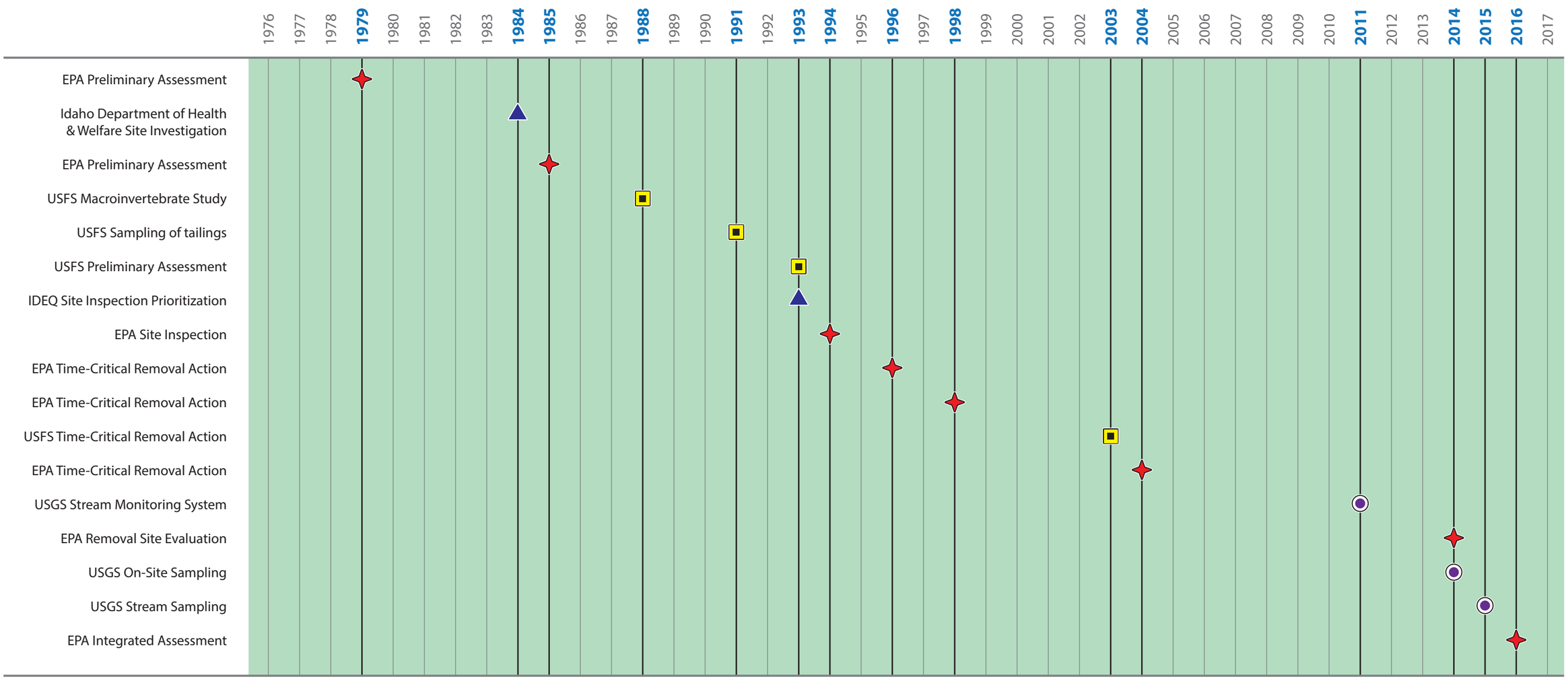

Key:

- United States Environmental Protection Agency
- State of Idaho
- United States Forest Service
- United States Geologic Survey

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CINNABAR MINE SITE
Yellow Pine, Idaho

Figure 2-3
TIMELINE

Date:	Drawn by:	
6/20/17	AES	10:START-IV\14070008\fig 2-3

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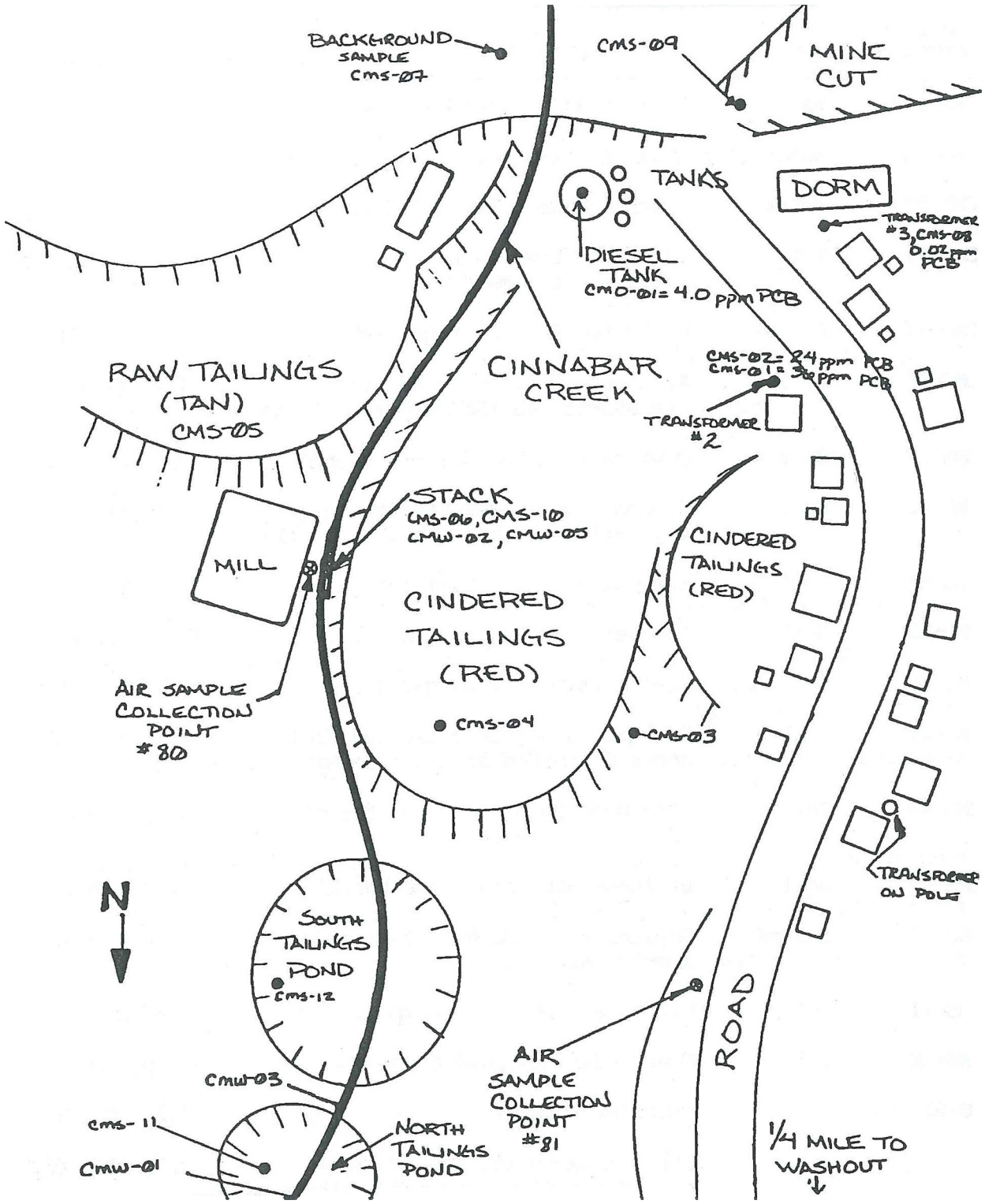

Source: Weston, Preliminary Site Assessment, June 26, 1985.

Note: Figure is not to scale.

ecology and environment, inc. Global Environmental Specialists Seattle, Washington	CINNABAR MINE SITE Yellow Pine, Idaho	Figure 2-4 1985 PRELIMINARY ASSESSMENT SAMPLE LOCATION MAP		
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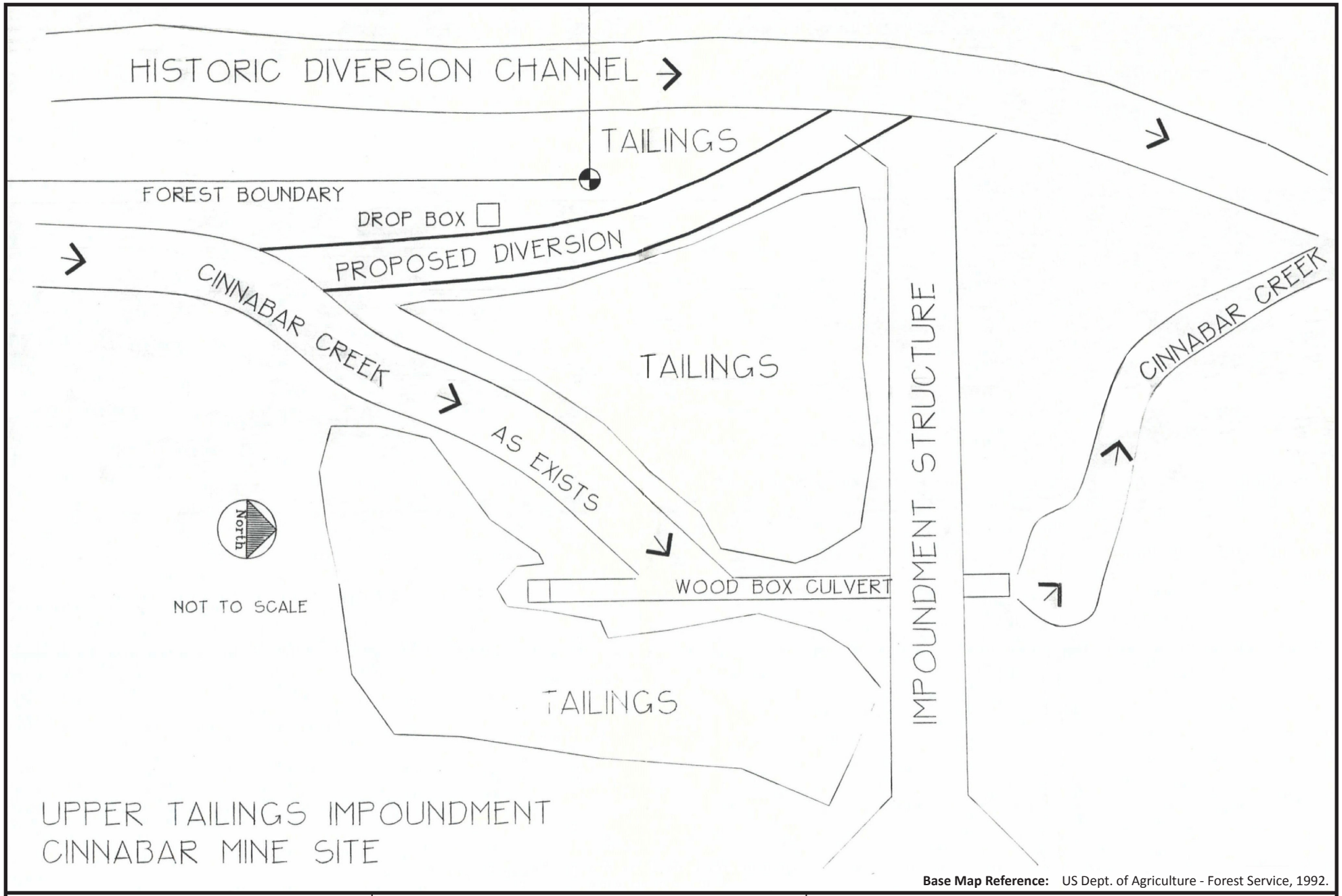

Base Map Reference: US Dept. of Agriculture - Forest Service, 1992.

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CINNABAR MINE SITE
Yellow Pine, Idaho

Figure 2-5
1992 REMOVAL ACTION PLAN

Date:	Drawn by:	
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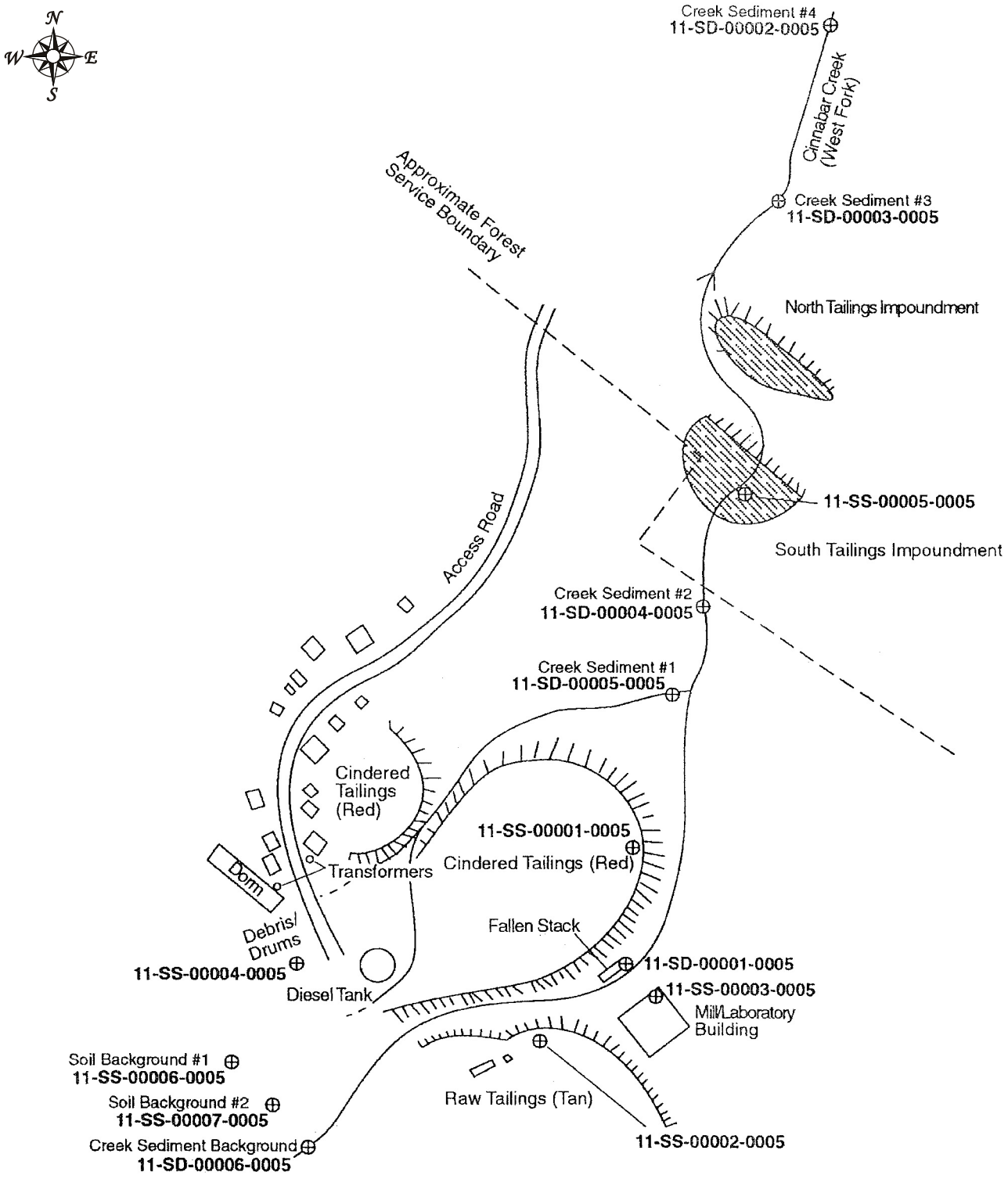
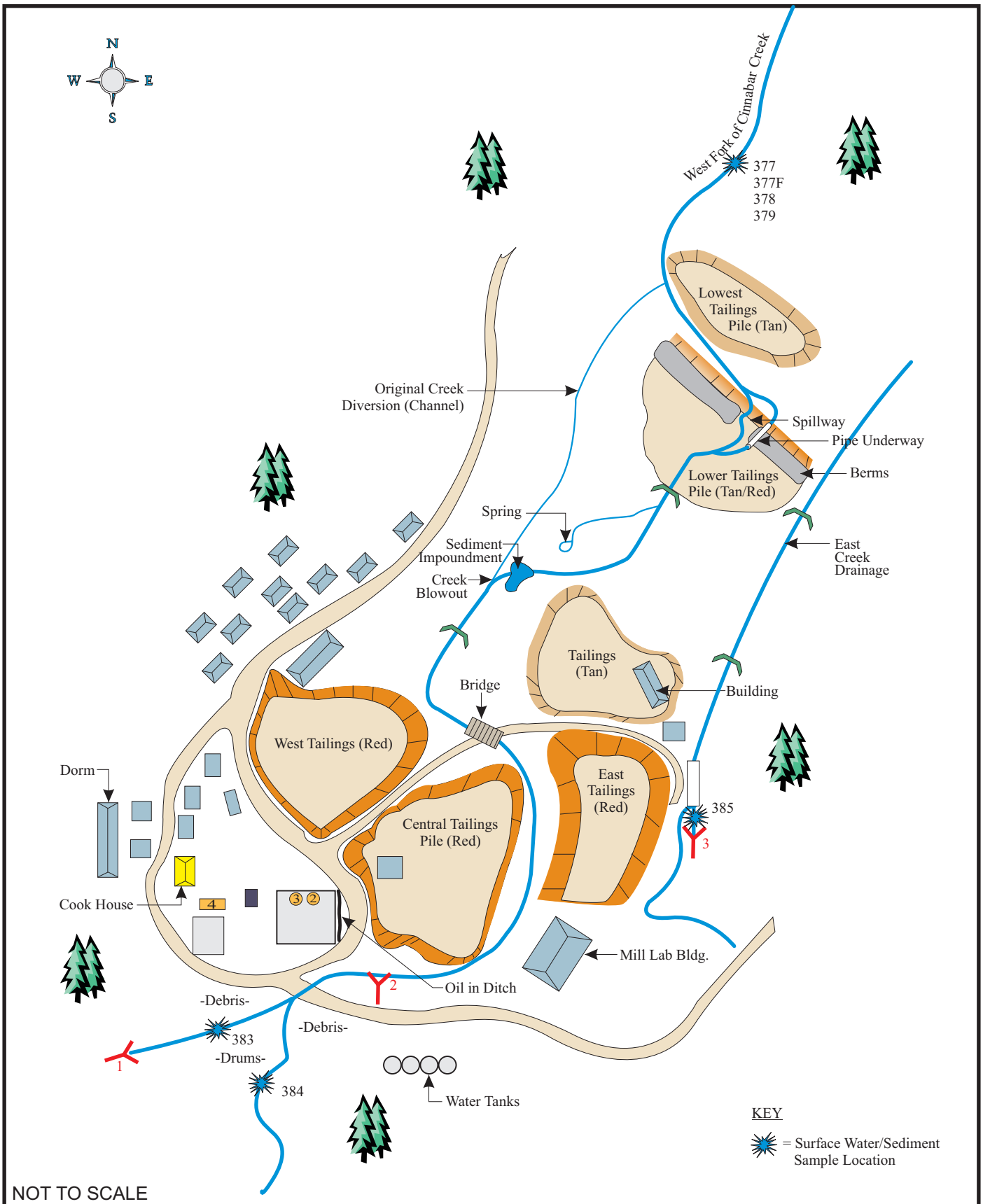


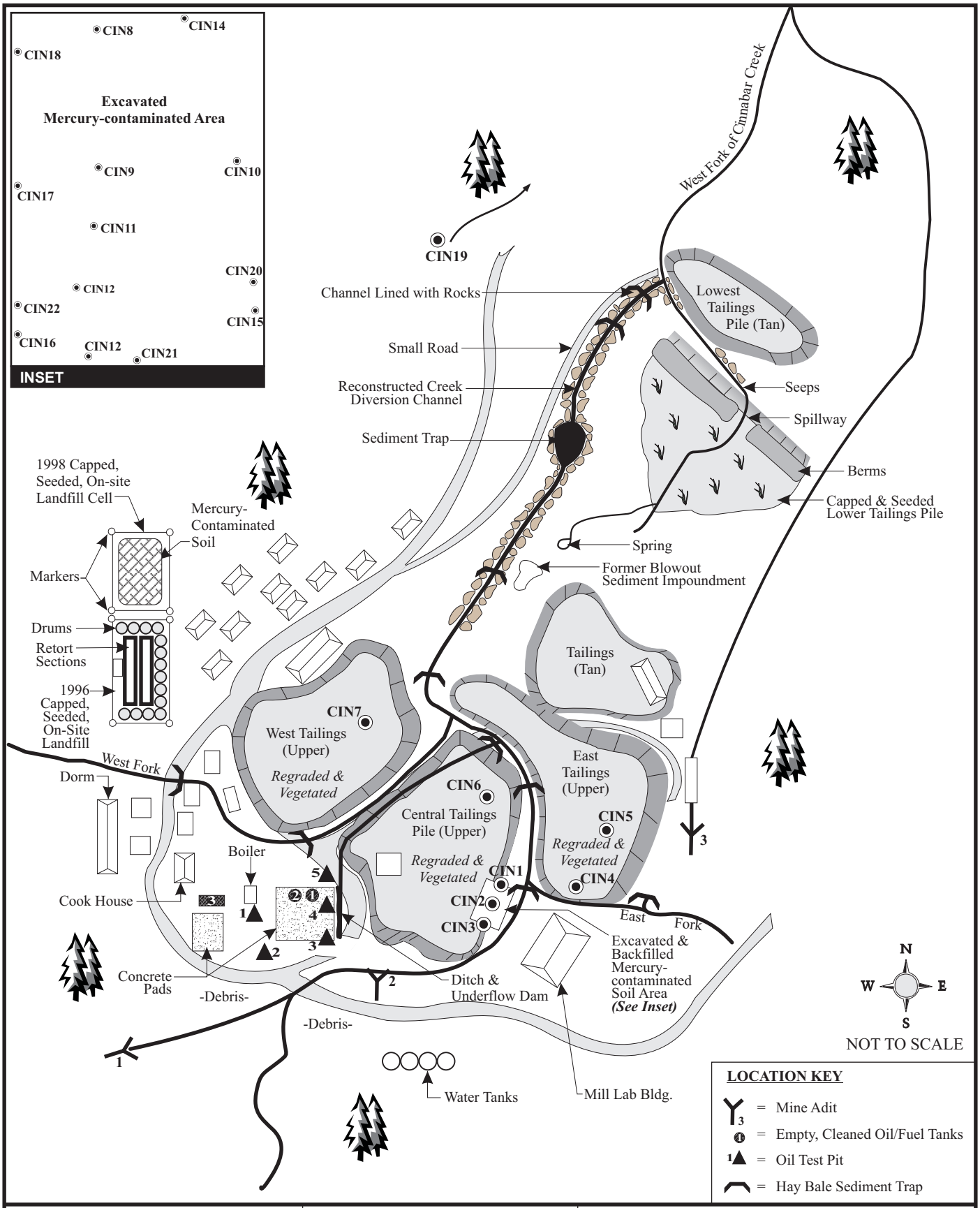
Source: Weston, Site Inspection Report, September 1994.

Note: Figure is not to scale.

ecology and environment, inc. Global Environmental Specialists Seattle, Washington	CINNABAR MINE SITE Yellow Pine, Idaho	Figure 2-6 1994 SITE INSPECTION SAMPLE LOCATION MAP		
		Date: 2/15/17	Drawn by: AES	10:START-IV\14070008\fig 2-6



ecology and environment, inc. Global Environmental Specialists Seattle, Washington	CINNABAR MINE SITE Yellow Pine, Idaho	Figure 2-7 1996 SURFACE WATER/SEDIMENT SAMPLE LOCATIONS		
	Source: E&E 1996.	Date: 3-6-17	Drawn by:	10:START-IV\14070008\fig 2-7



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Global Environmental Specialists
Seattle, Washington

CINNABAR MINE SITE
Yellow Pine, Idaho

Figure 2-8
1998 SAMPLE LOCATION MAP

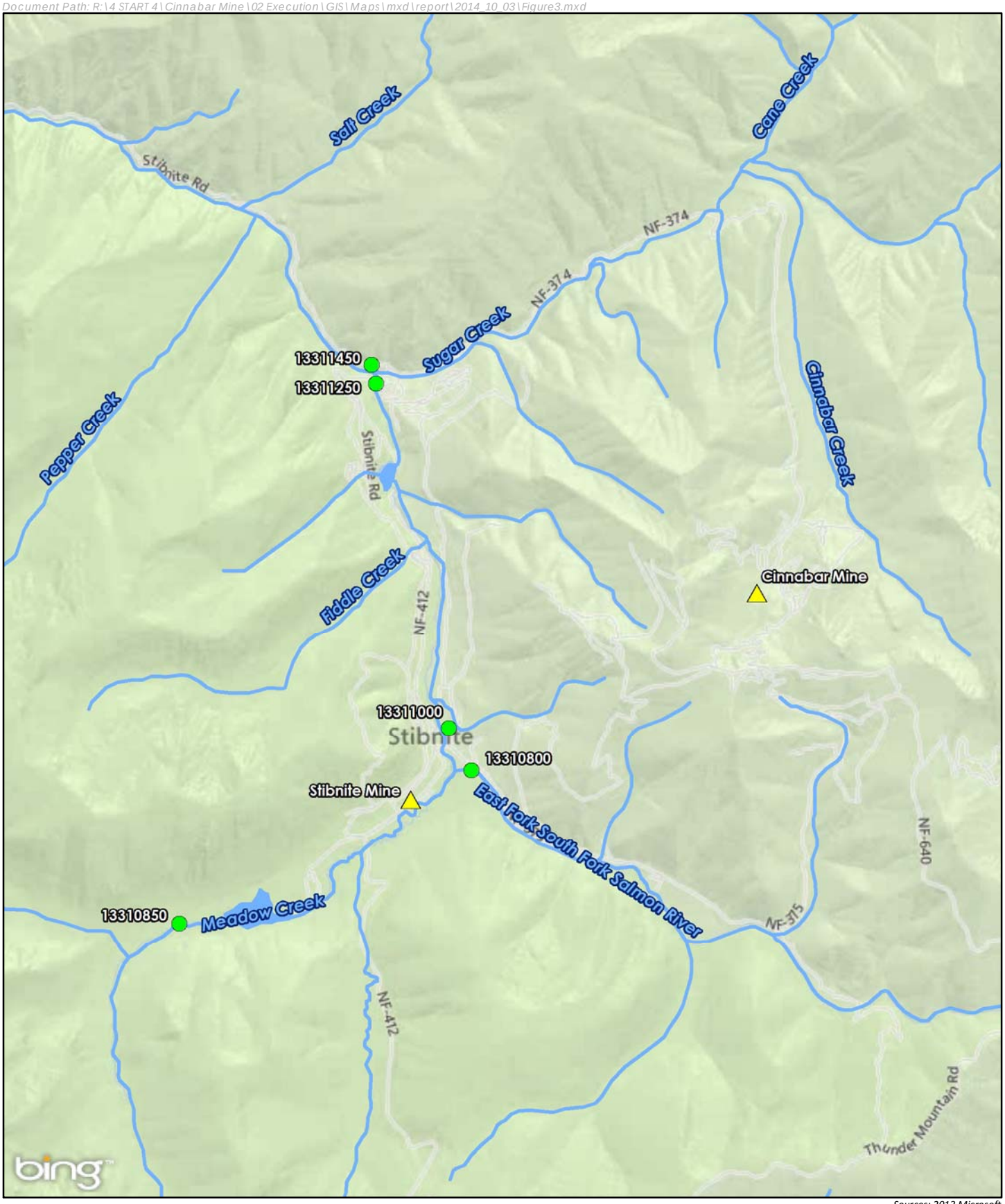
Source: E&E 1996.

Date: 3-6-17

Drawn by:

10:START-IV\14070008\fig 2-8

Document Path: R:\4 START 4\Cinnabar Mine\02 Execution\GIS\Maps\mxd\report\2014_10_03\Figure3.mxd



Sources: 2013 Microsoft

USGS Sample Locations
Mines

Figure 2-9
USGS Stream Monitoring Station Locations
Cinnabar Mine
Yellow Pine, Idaho

0 0.25 0.5 1 Miles

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R:\4 START 4\Cinnabar Mine\02 Execution\GIS\Maps\mxd\report\2014_10_03\Figure6.mxd

Imagery Source: 2014 Microsoft Bing

Sample Locations (Aug 2014)

Figure **2-10**
2014 EPA Sample Locations
Cinnabar Mine
Yellow Pine, Idaho

0 500 1,000 2,000 Feet

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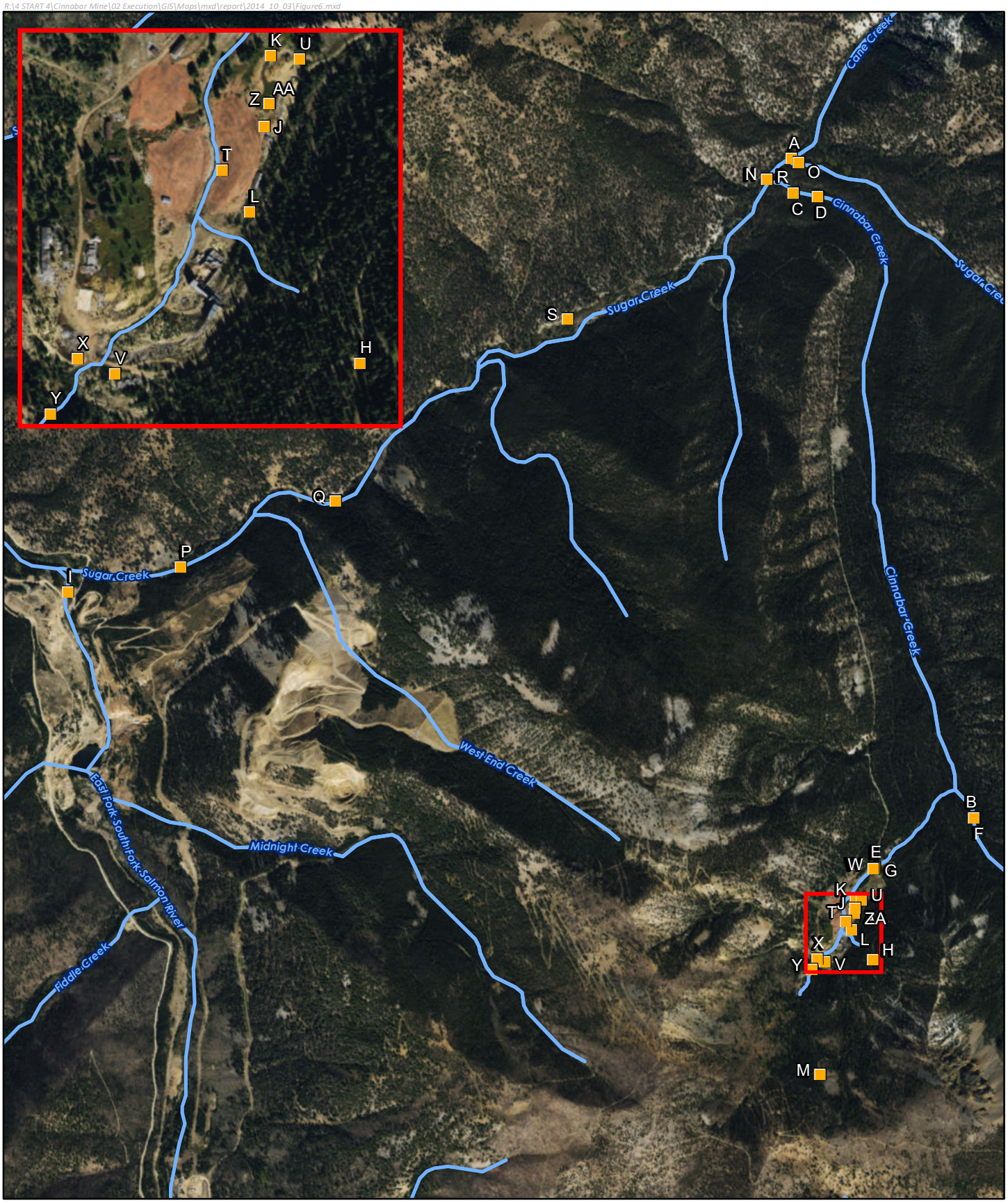
Global Environmental Specialists

R:\4 START 4\Cinnabar Mine\02 Execution\GIS\Maps\mxd\report\2014_10_03\Figure6.mxd



USGS Sample Locations

Figure 2-11
2014 USGS Sample Locations
Cinnabar Mine
Yellow Pine, Idaho

N
0 500 1,000 2,000 Feet

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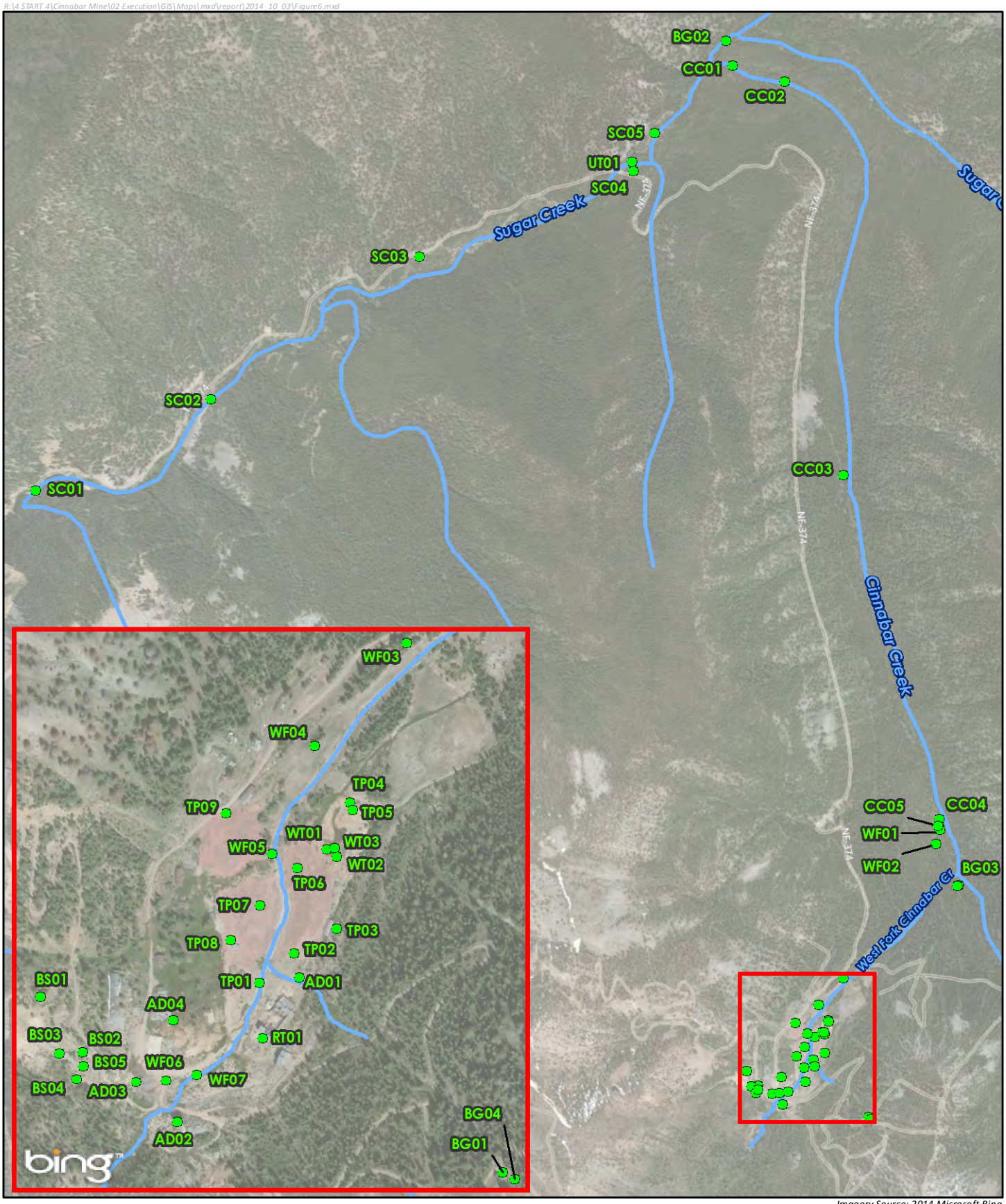
R:\4 START 4\Cinnabar Mine\02 Execution\GIS\Maps\mxd\report\2014_10_03\Figure6.mxd



Imagery Source: 2014 Microsoft Bing

● 2016 Sample Locations	Figure 3-1 2016 Sample Locations Cinnabar Mine Yellow Pine, Idaho	N 0 500 1,000 2,000 Feet ecology and environment, inc. Global Specialists in the Environment

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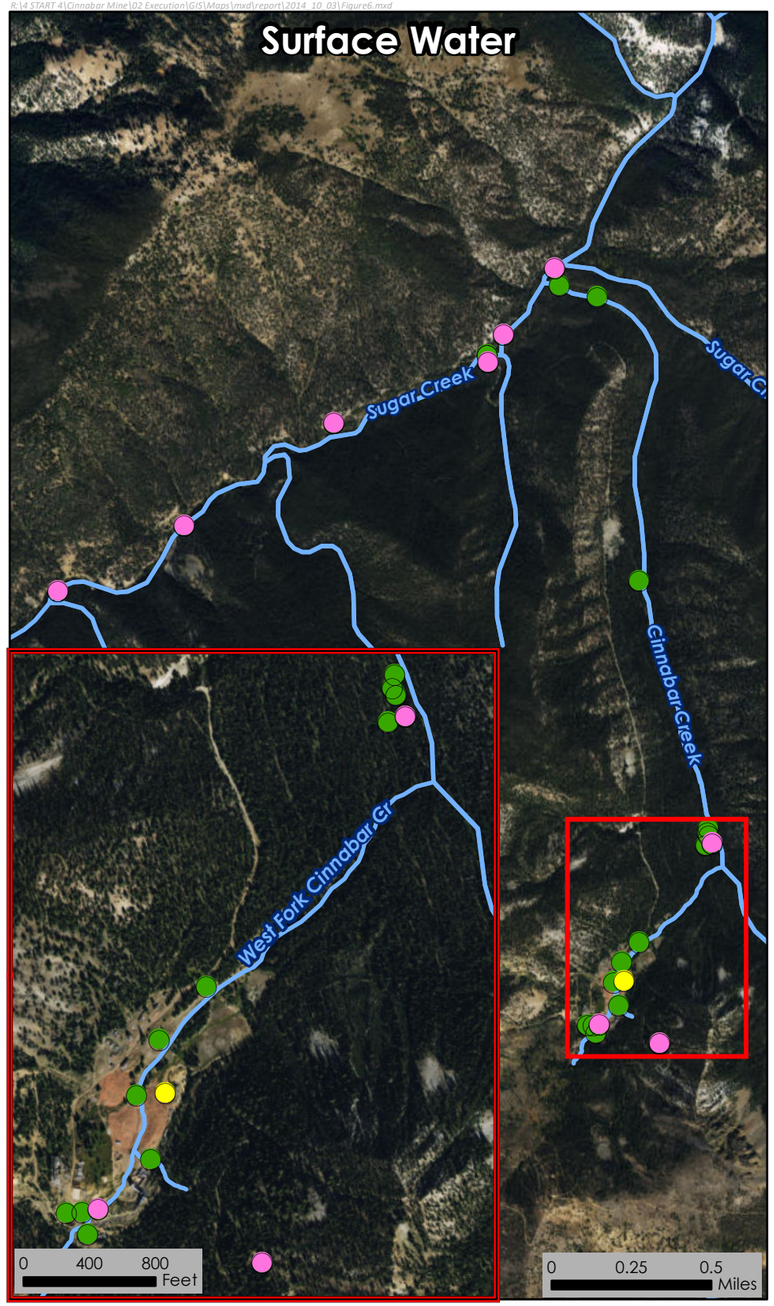
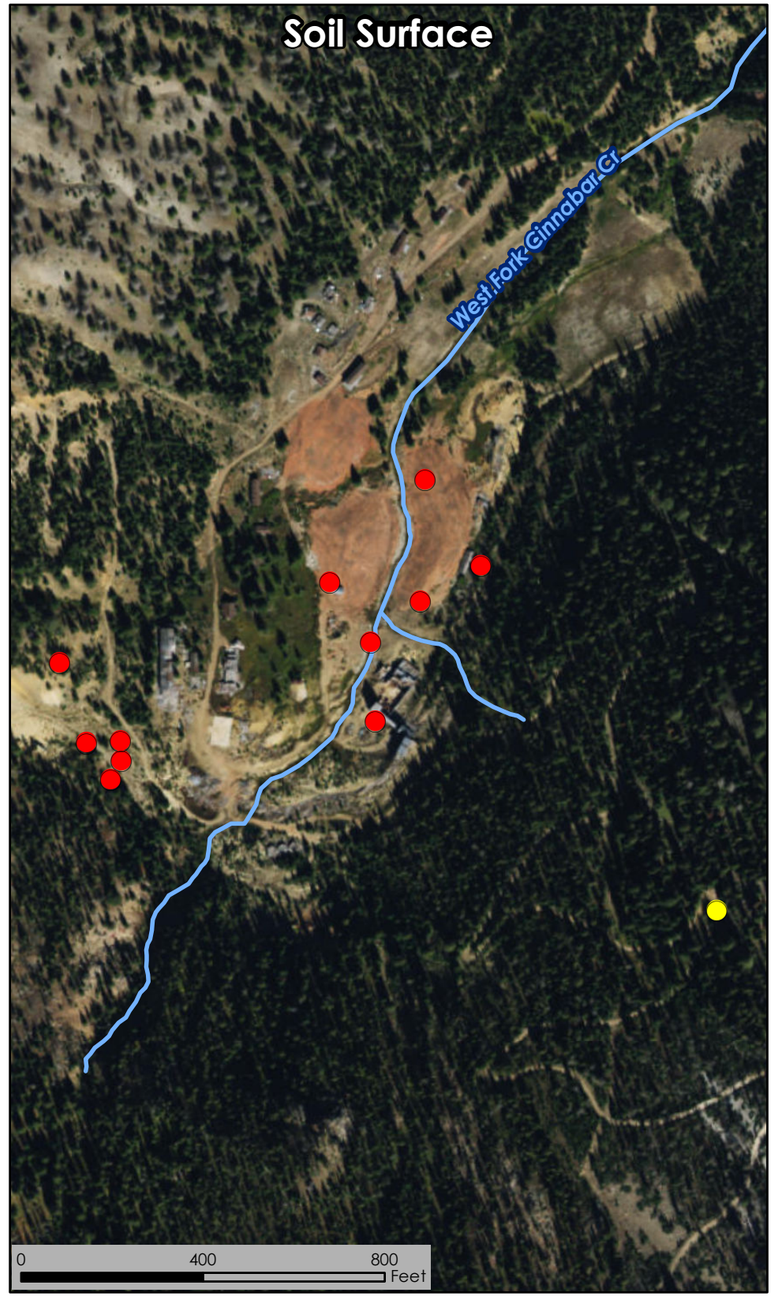
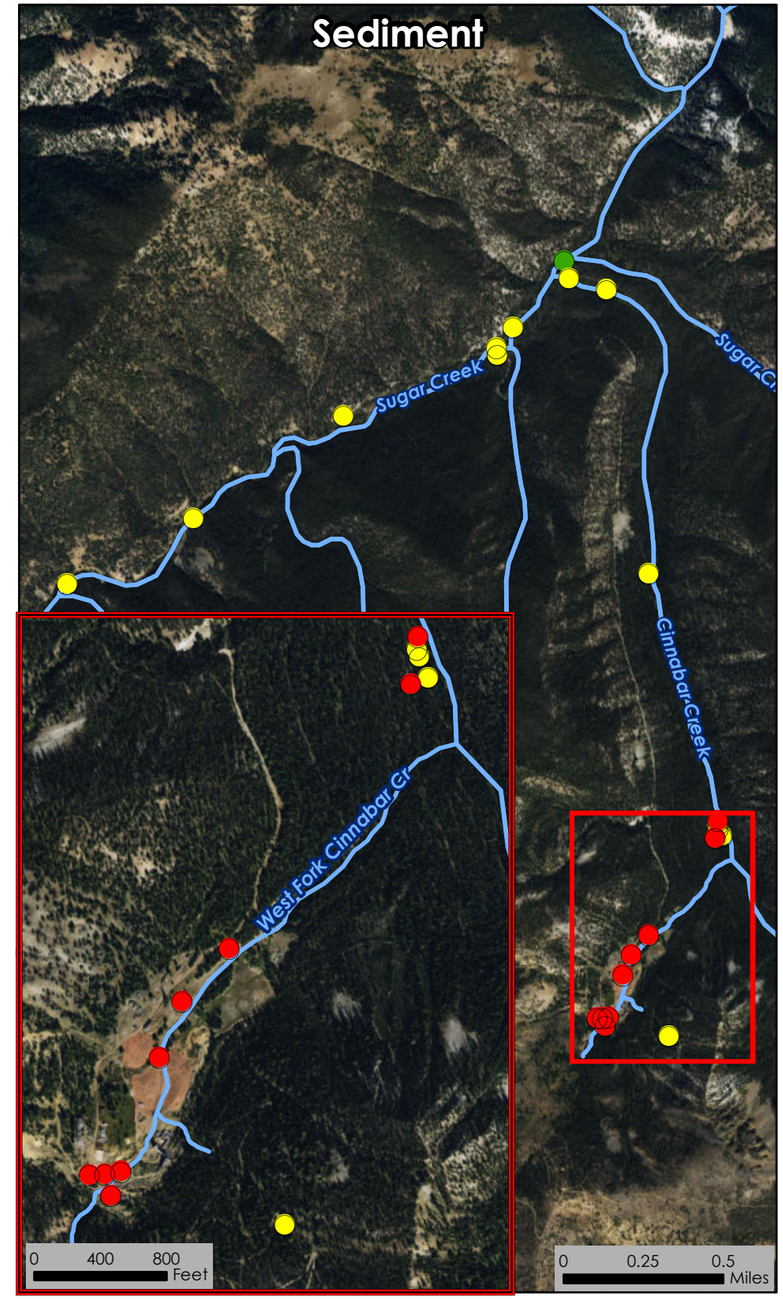
R:\4 START 4\Cinnabar Mine\02 Execution\GIS\Maps\mxd\report\2014_10_03\Figure6.mxd







Filtered Surface Water Screening Criteria = 150 ug/L	Soil Surface Screening Criteria = 0.68 mg/kg	Sediment Screening Criteria = 9.79 mg/kg
<149	<0.67	<9.78
150 - 339	0.68-67	9.79-119
>340	>68	>120
Not Detected	Not Detected	Not Detected

Figure 5-1
Arsenic Sampling Results (2016)
Cinnabar Mine
Yellow Pine, Idaho

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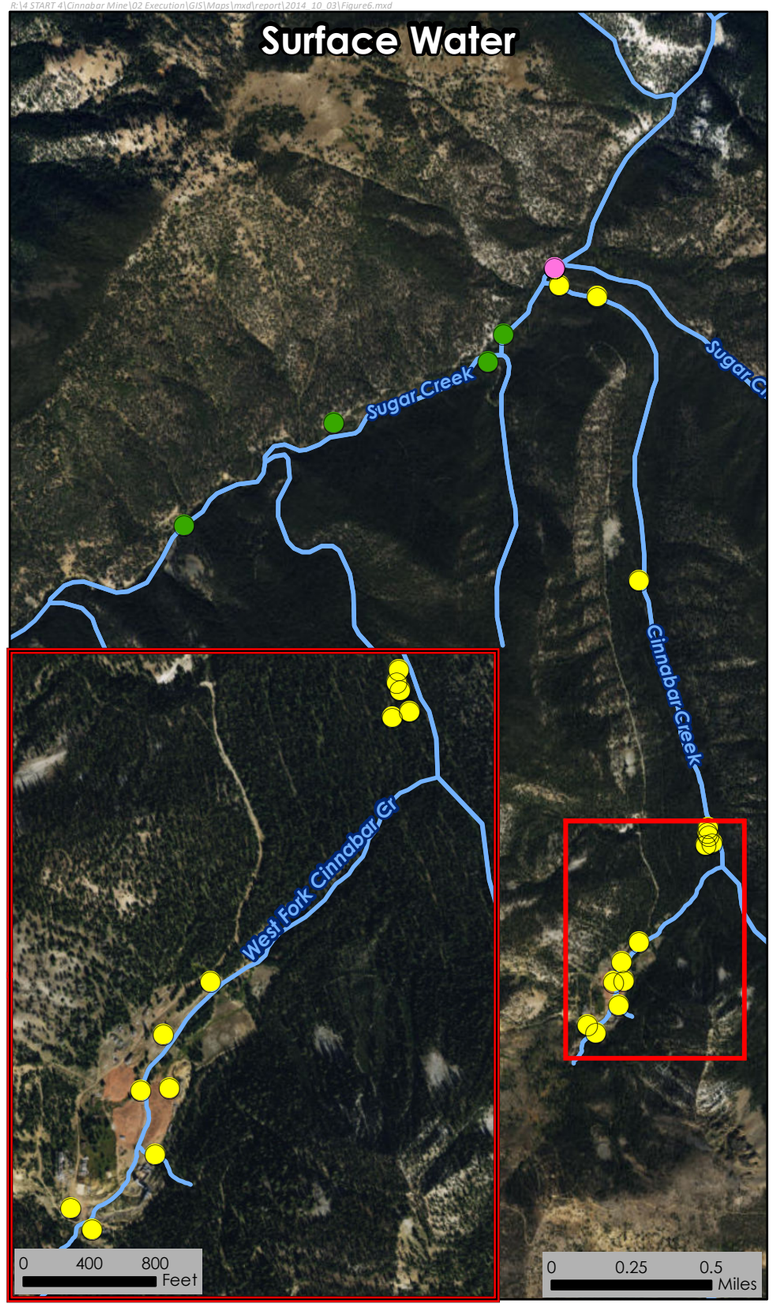
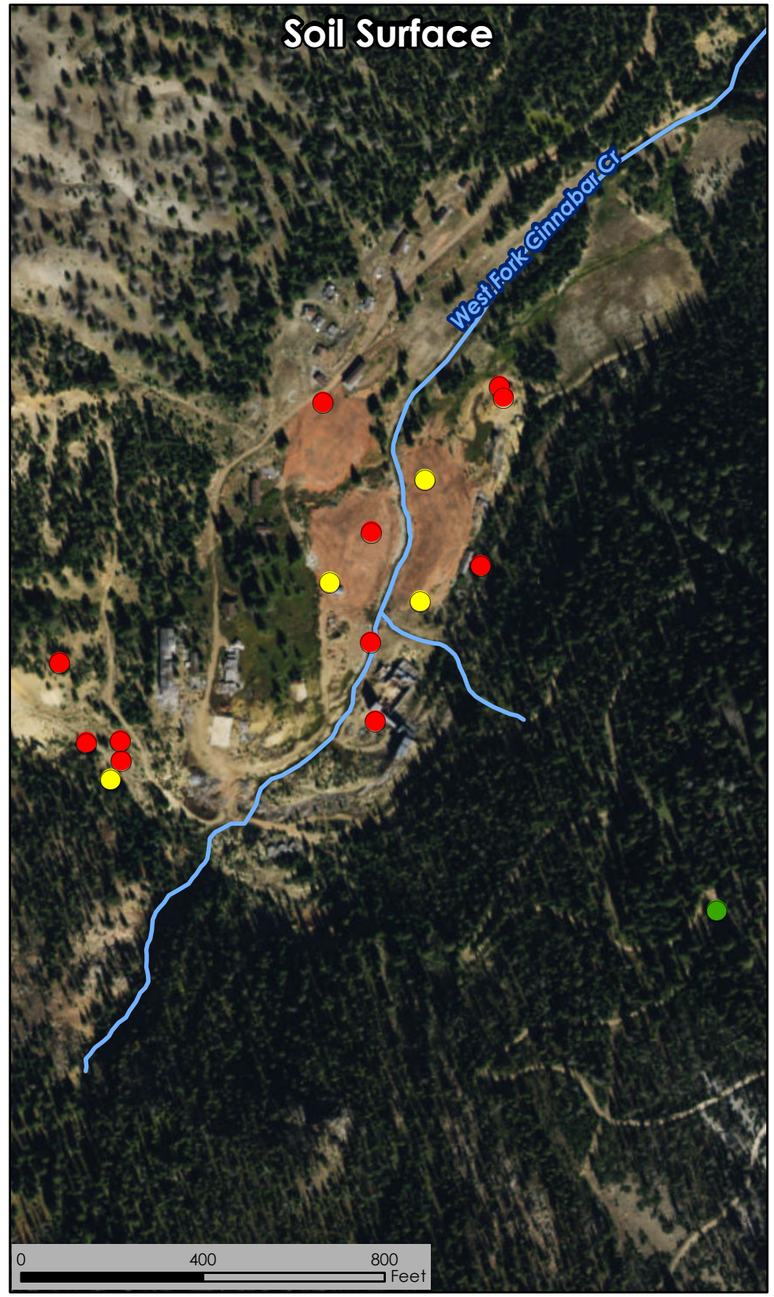
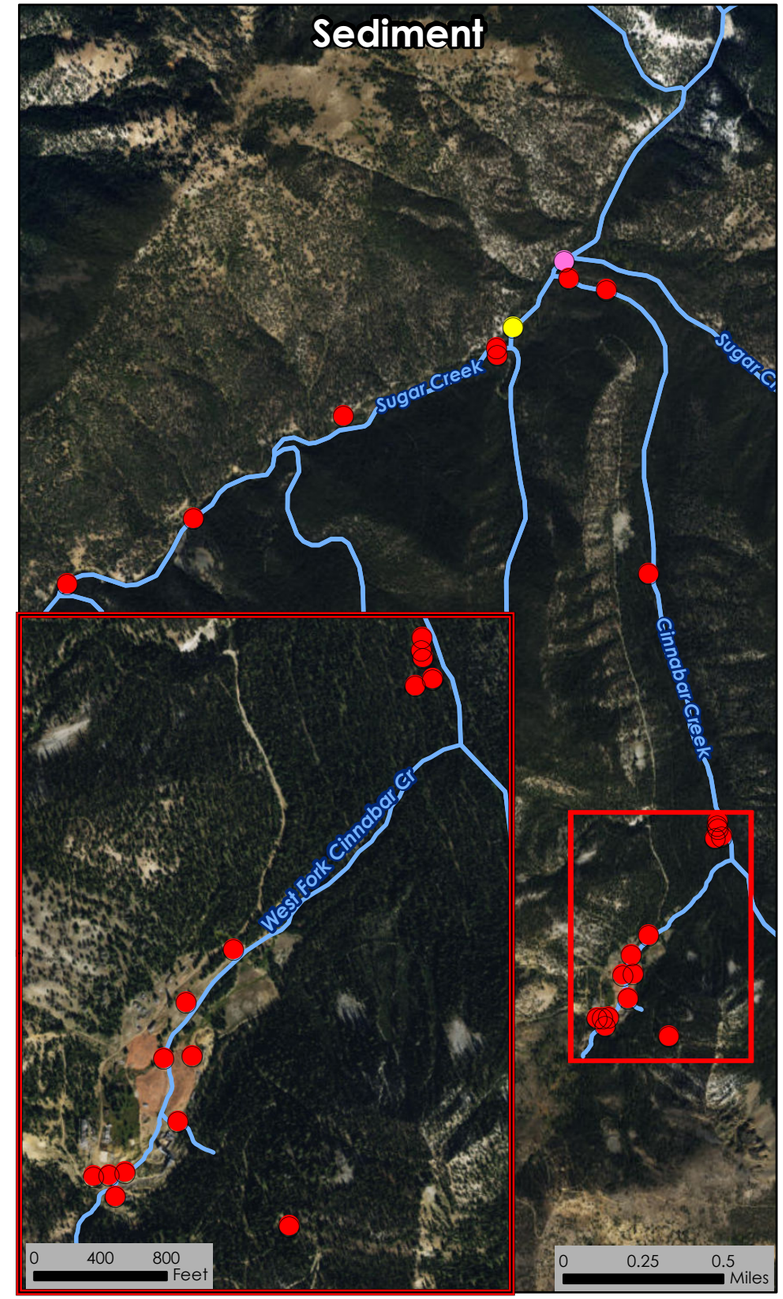
Global Specialists in the Environment

N

R:\4 START 4\Cinnabar Mine\02 Execution\GIS\Maps\mxd\report\2014_10_03\Figure6.mxd







Filtered Surface Water Screening Criteria = 12 ng/L	Soil Surface Screening Criteria = 11 mg/kg	Sediment Screening Criteria = 0.18 mg/kg
<11	<10	<0.17
12-1399	11-32	0.18-0.65
>1400	>33	>0.66
Not Detected	Not Detected	Not Detected

Figure 5-2
Mercury Sampling Results (2016)
Cinnabar Mine
Yellow Pine, Idaho

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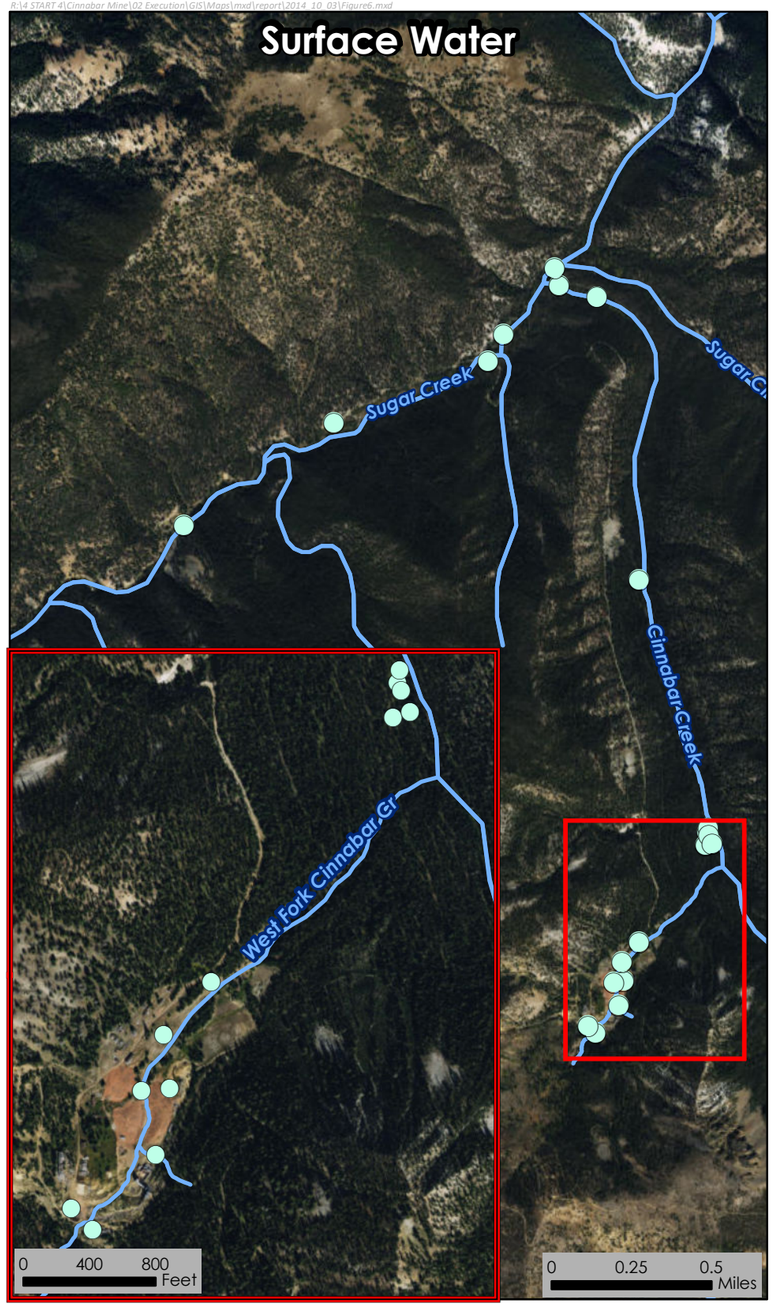
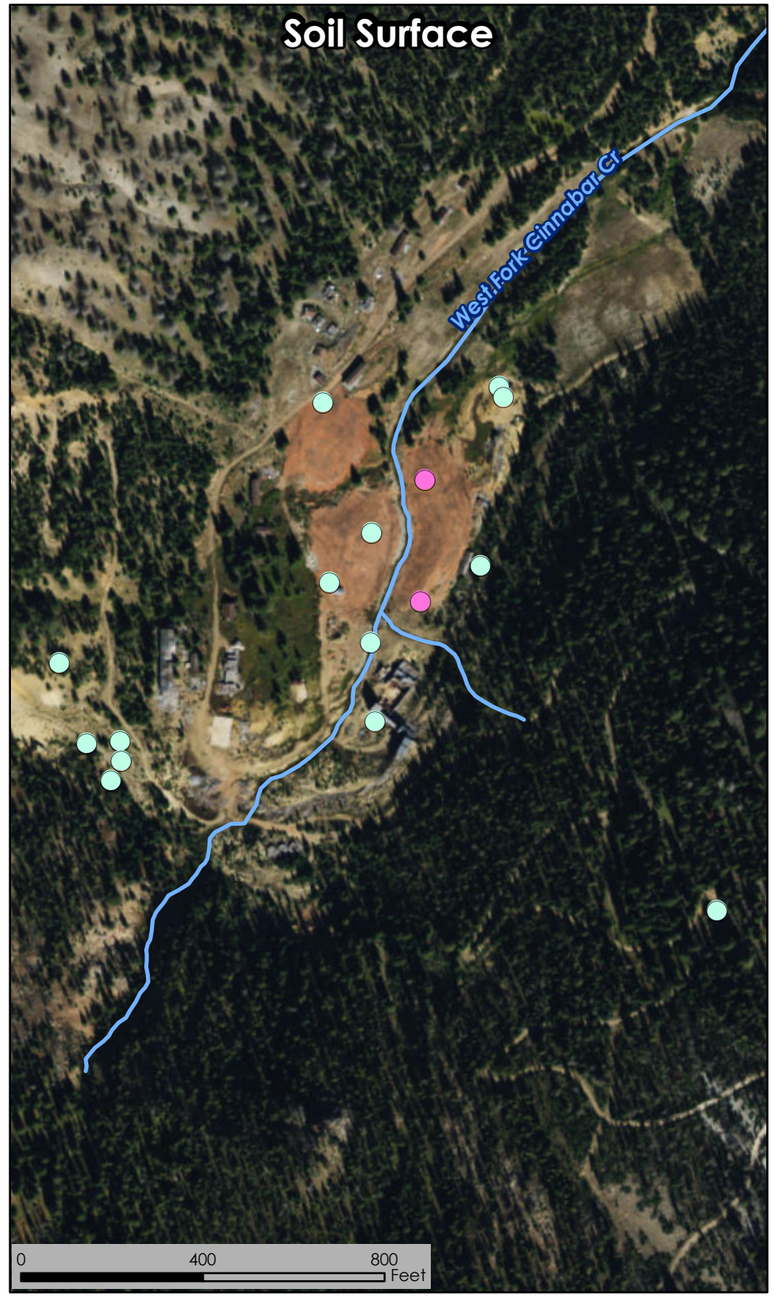
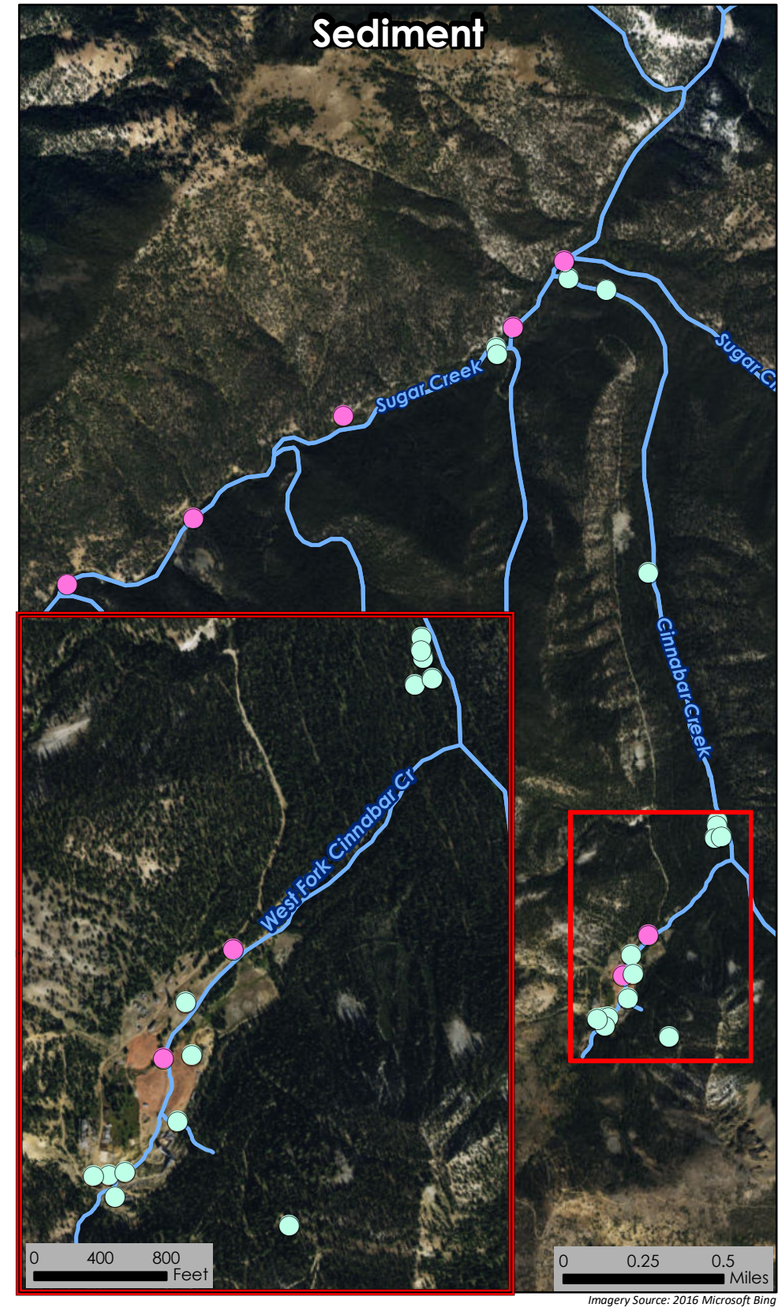
N

R:\4 START 4\Cinnabar Mine\02 Execution\GIS\Maps\mxd\report\2014_10_03\Figure6.mxd







Imagery Source: 2016 Microsoft Bing

Sample Location
No applicable screening levels available

Not Detected

Figure 5-3
Methyl Mercury Sampling Results (2016)
Cinnabar Mine
Yellow Pine, Idaho

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Global Specialists in the Environment

N

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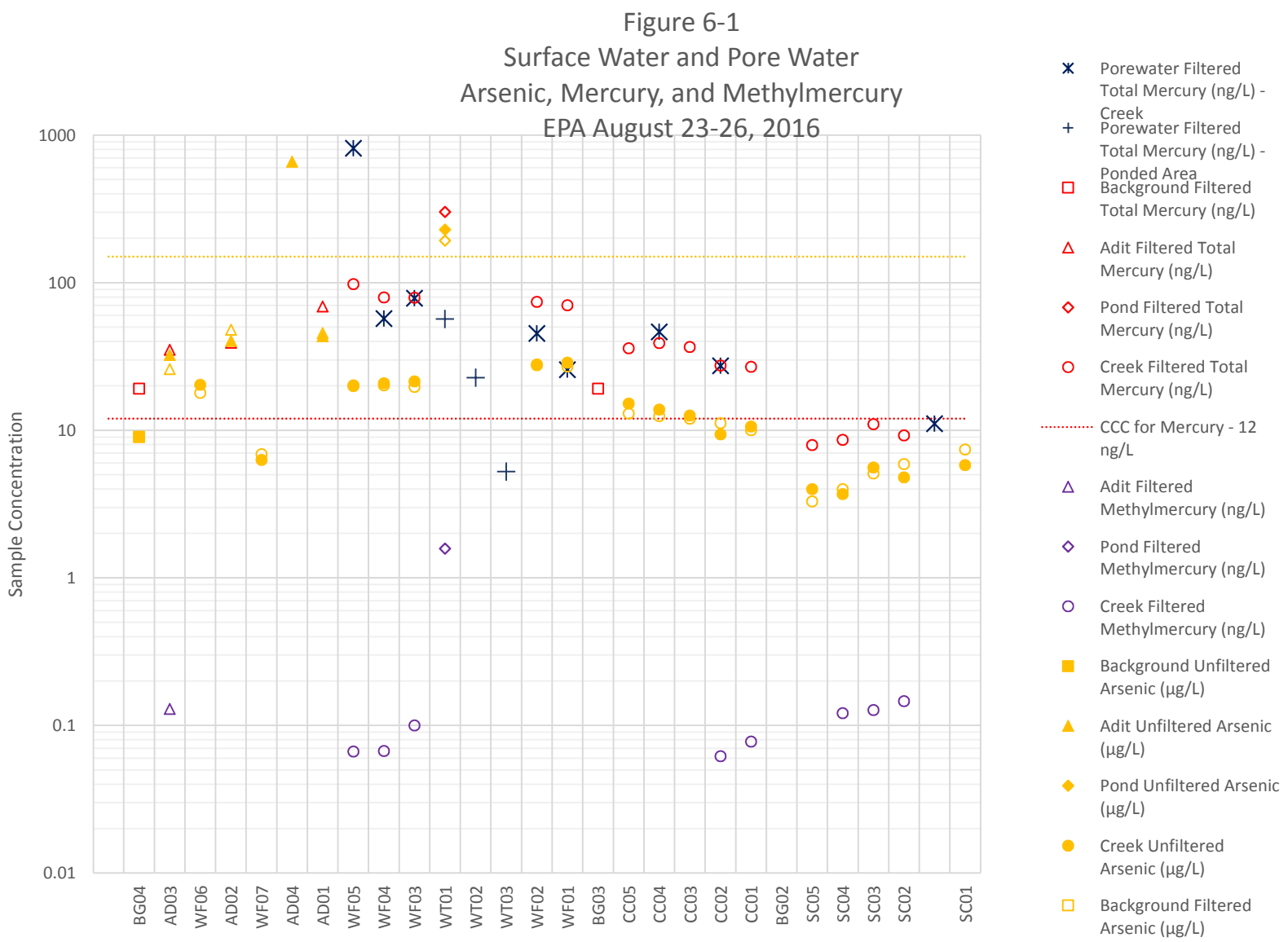


Figure 6-1
Surface Water and Pore Water
Arsenic, Mercury, and Methylmercury
EPA August 23-26, 2016
Sample Concentration
1000
100
10
1
0.1
0.01
BG04
AD03
WF06
AD02
WF07
AD04
AD01
WF05
WF04
WF03
WT01
WT02
WT03
WF02
WF01
BG03
CC05
CC04
CC03
CC02
CC01
BG02
SC05
SC04
SC03
SC02
SC01
Porewater Filtered Total Mercury (ng/L) - Creek
Porewater Filtered Total Mercury (ng/L) - Ponded Area
Background Filtered Total Mercury (ng/L)
Adit Filtered Total Mercury (ng/L)
Pond Filtered Total Mercury (ng/L)
Creek Filtered Total Mercury (ng/L)
CCC for Mercury - 12 ng/L
Adit Filtered Methylmercury (ng/L)
Pond Filtered Methylmercury (ng/L)
Creek Filtered Methylmercury (ng/L)
Background Unfiltered Arsenic (µg/L)
Adit Unfiltered Arsenic (µg/L)
Pond Unfiltered Arsenic (µg/L)
Creek Unfiltered Arsenic (µg/L)
Background Filtered Arsenic (µg/L)

Figure 6-2
Bed Sediment
Arsenic, Mercury, and Methylmercury
EPA August 23-26, 2016

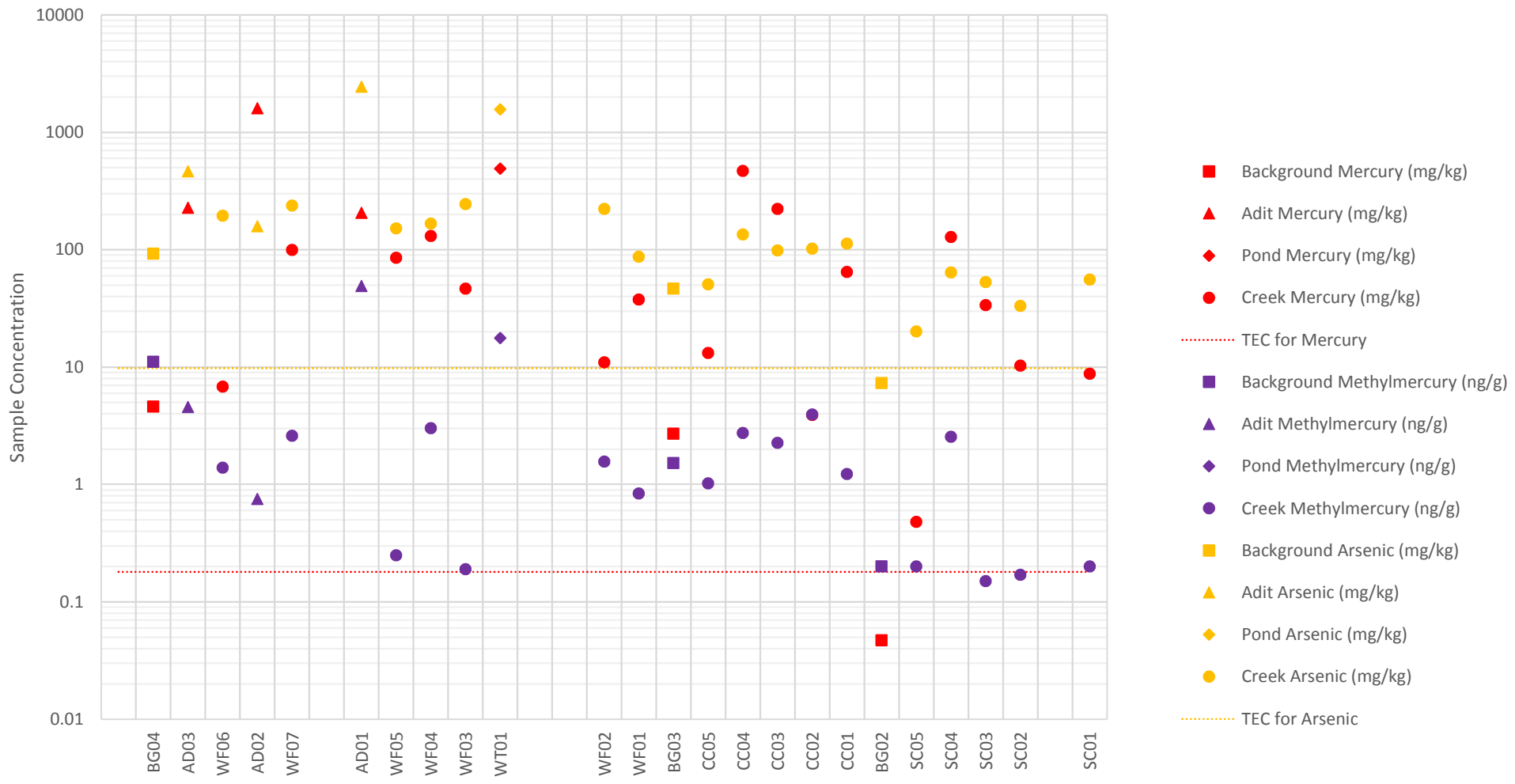


Figure 6-3
Surface Water
Mercury
EPA September 21, 2016

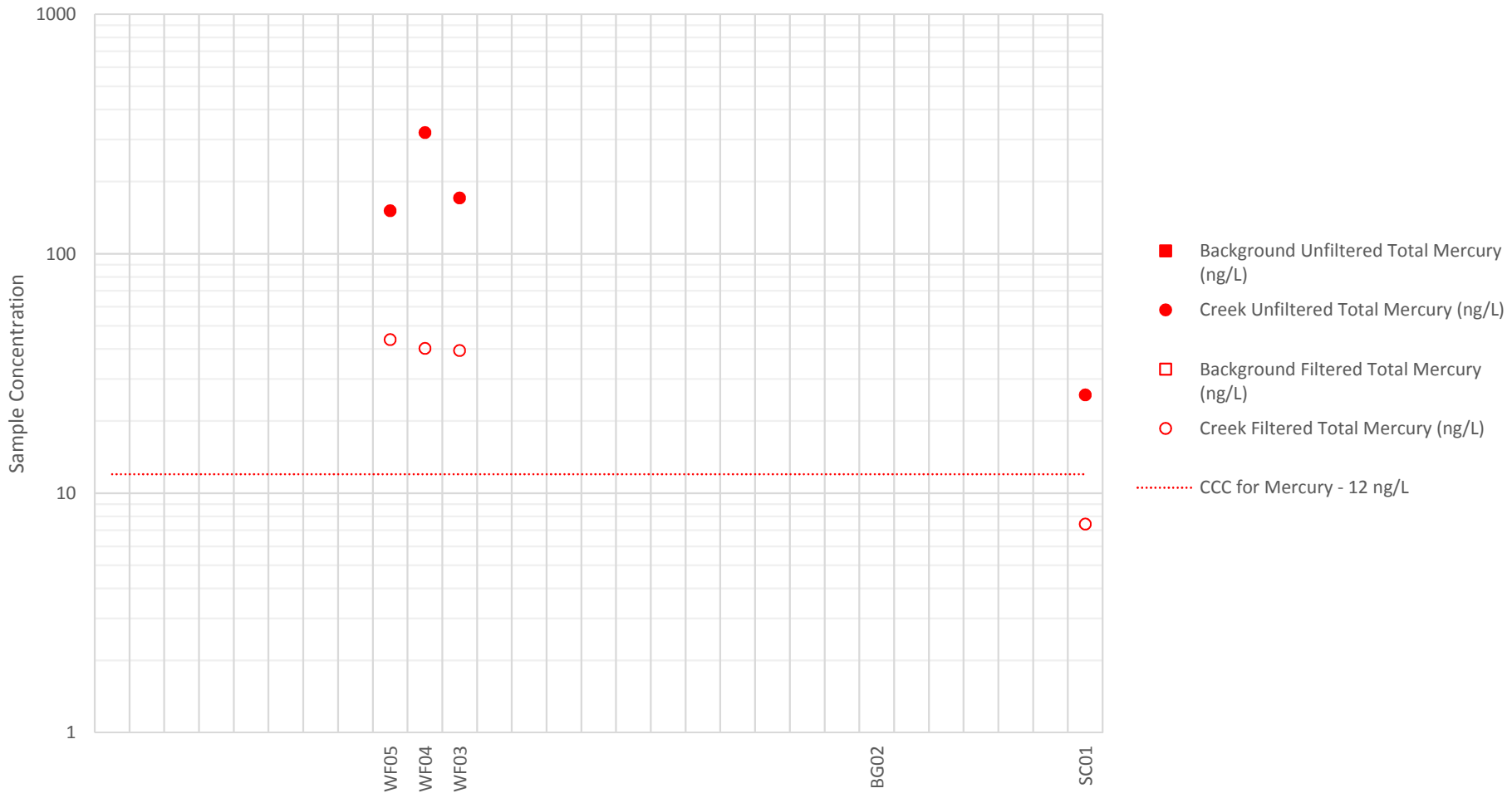
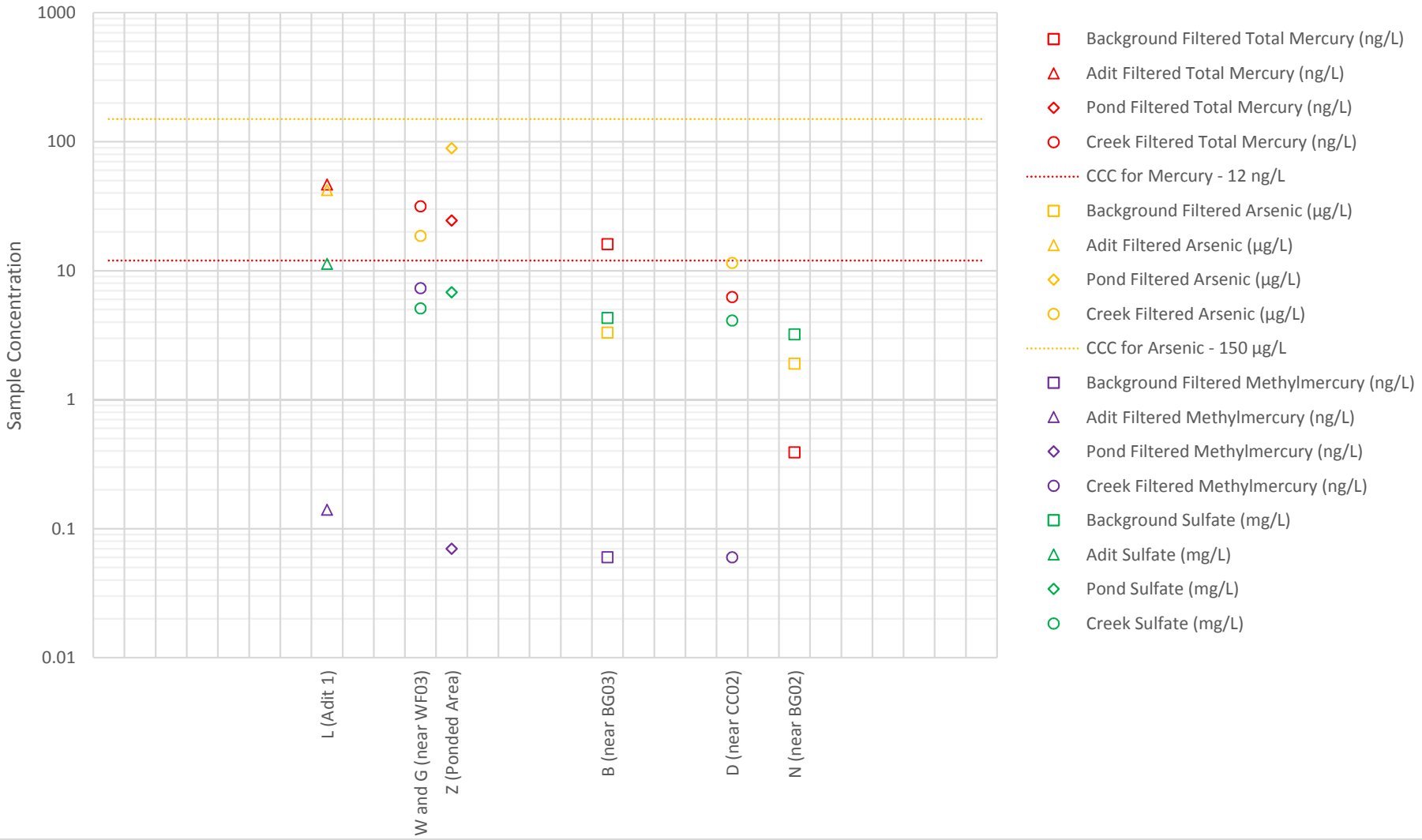


Figure 6-4
Surface Water
Arsenic, Mercury, Methylmercury, and Sulfate
USGS August 18-19, 2014



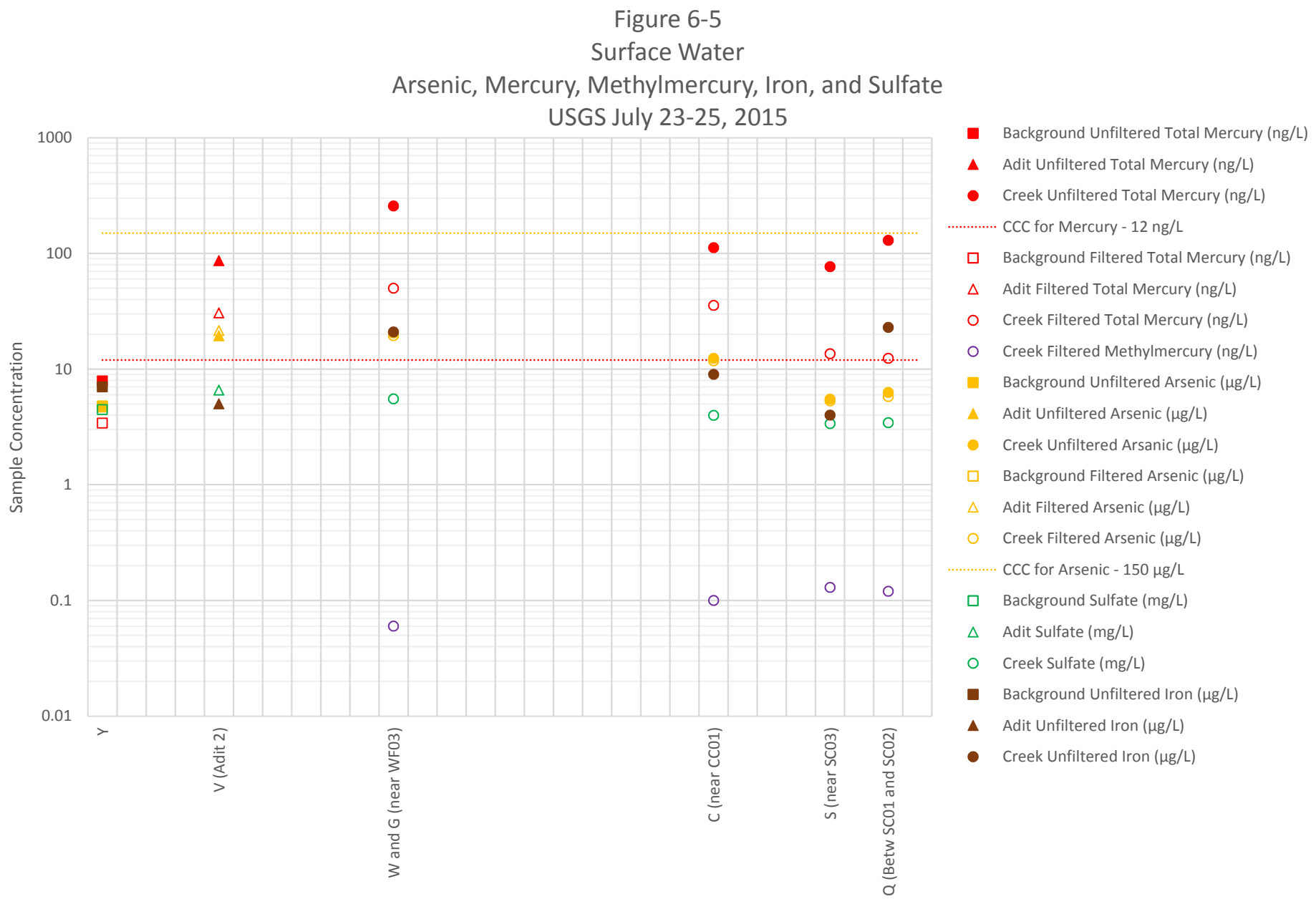


Figure 6-5
Surface Water
Arsenic, Mercury, Methylmercury, Iron, and Sulfate
USGS July 23-25, 2015
Sample Concentration
1000
100
10
1
0.1
0.01
Y
V (Adit 2)
W and G (near WF03)
C (near CC01)
S (near SC03)
Q (Betw SC01 and SC02)
Background Unfiltered Total Mercury (ng/L)
Adit Unfiltered Total Mercury (ng/L)
Creek Unfiltered Total Mercury (ng/L)
CCC for Mercury - 12 ng/L
Background Filtered Total Mercury (ng/L)
Adit Filtered Total Mercury (ng/L)
Creek Filtered Total Mercury (ng/L)
Creek Filtered Methylmercury (ng/L)
Background Unfiltered Arsenic (µg/L)
Adit Unfiltered Arsenic (µg/L)
Creek Unfiltered Arsanic (µg/L)
Background Filtered Arsenic (µg/L)
Adit Filtered Arsenic (µg/L)
Creek Filtered Arsenic (µg/L)
CCC for Arsenic - 150 µg/L
Background Sulfate (mg/L)
Adit Sulfate (mg/L)
Creek Sulfate (mg/L)
Background Unfiltered Iron (µg/L)
Adit Unfiltered Iron (µg/L)
Creek Unfiltered Iron (µg/L)

Figure 6-6
Surface Water Filtered Arsenic vs. Filtered Total Mercury
EPA August 23-26, 2016

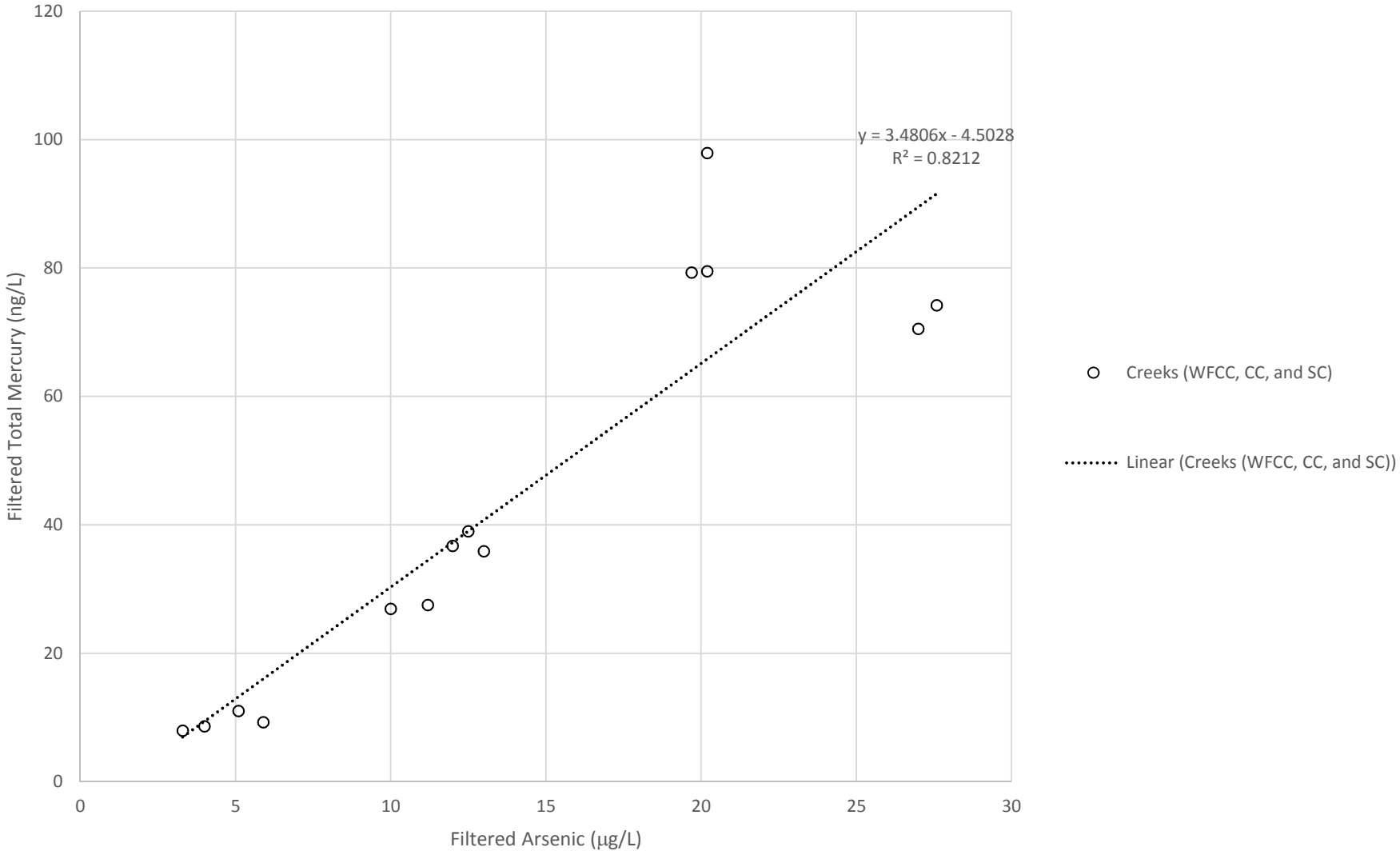
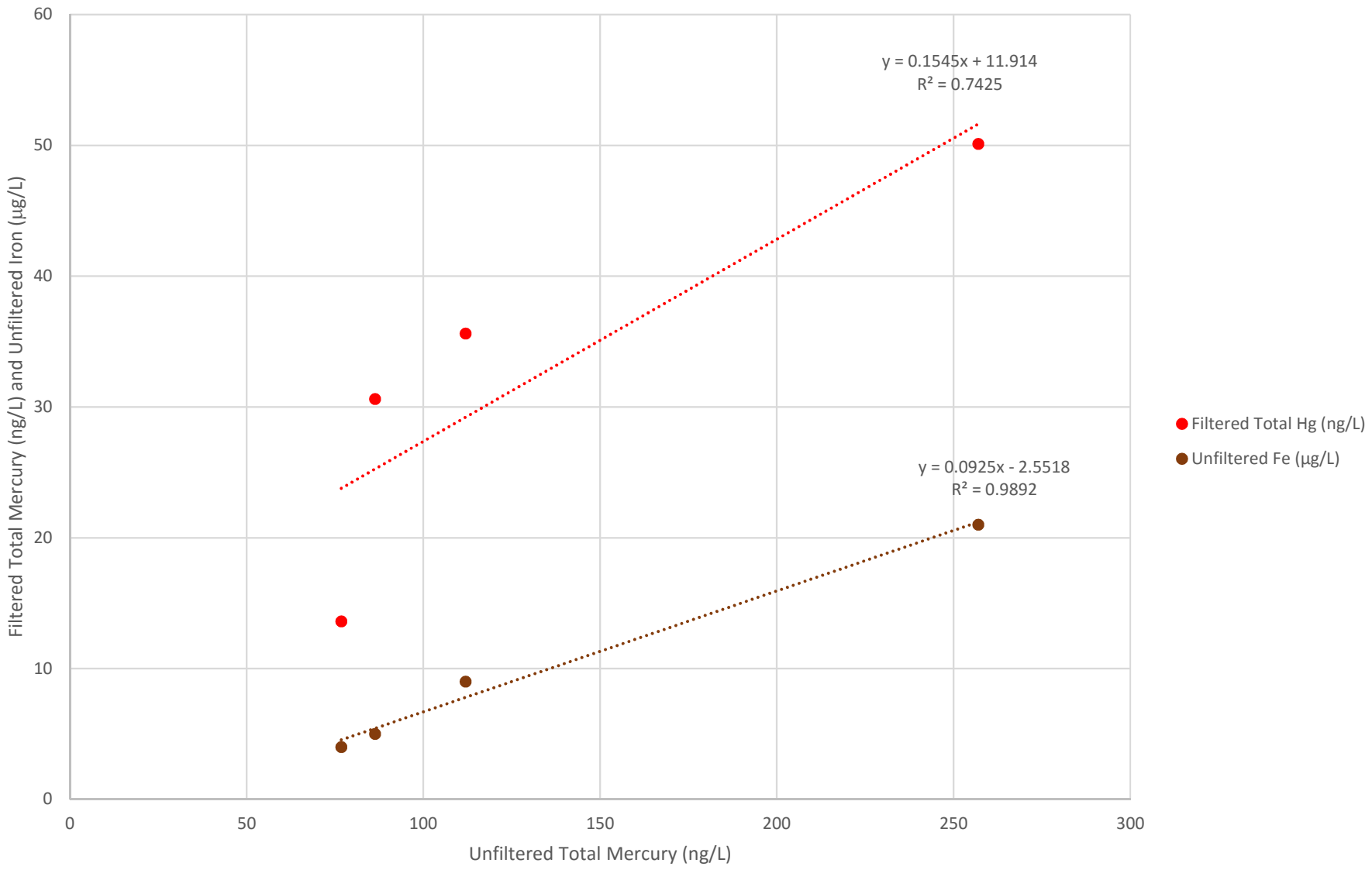


Figure 6-7
Surface Water Unfiltered Total Mercury vs. Filtered Total Mercury and Unfiltered Iron
USGS July 23-25, 2015



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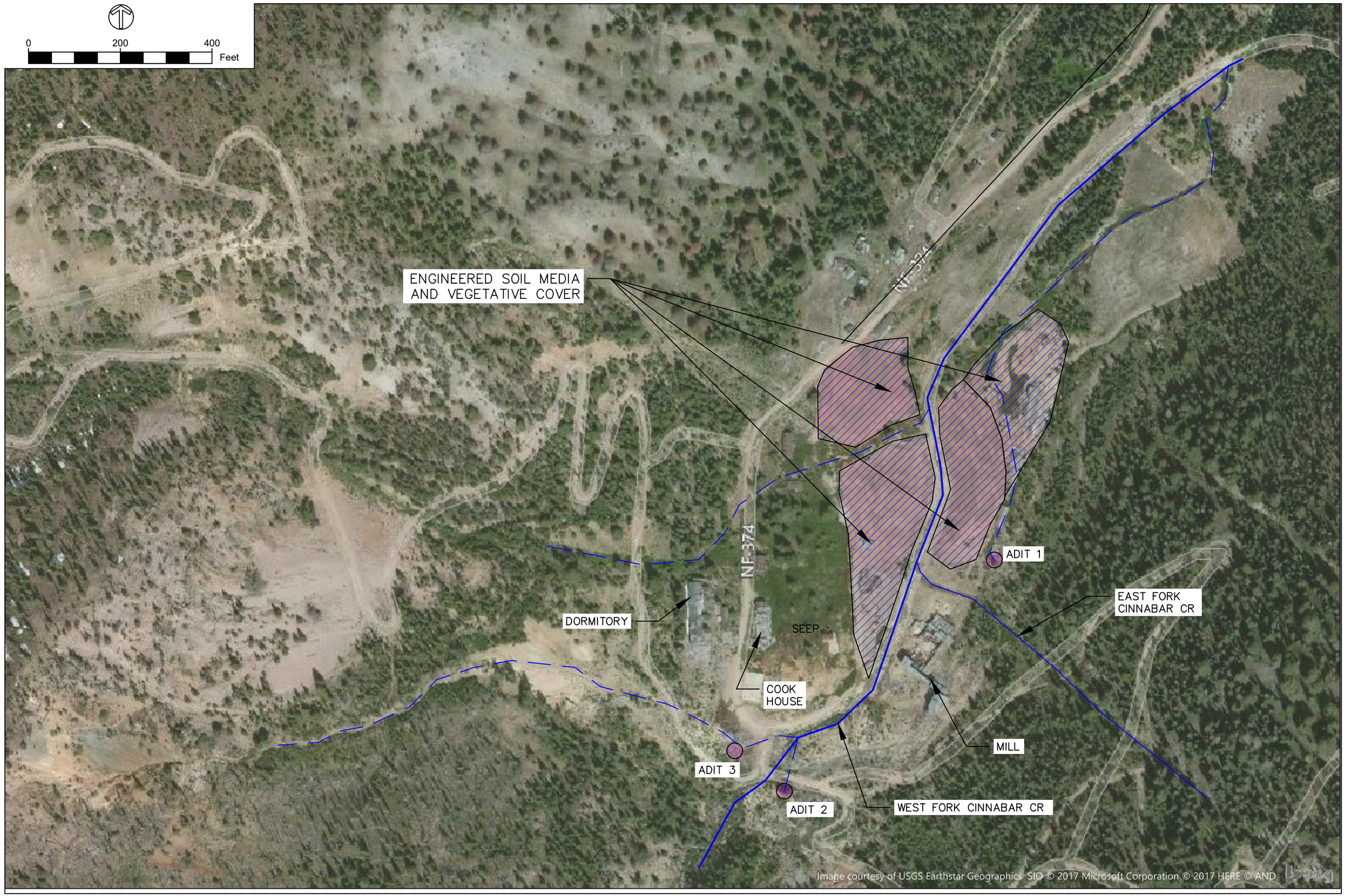


SIZE B
IF SHEET IS LESS THAN 11"X17" IT IS REDUCED PRINT– SCALE REDUCED ACCORDINGLY
ONE INCH

Symbol	Description	Date	Approved
A			

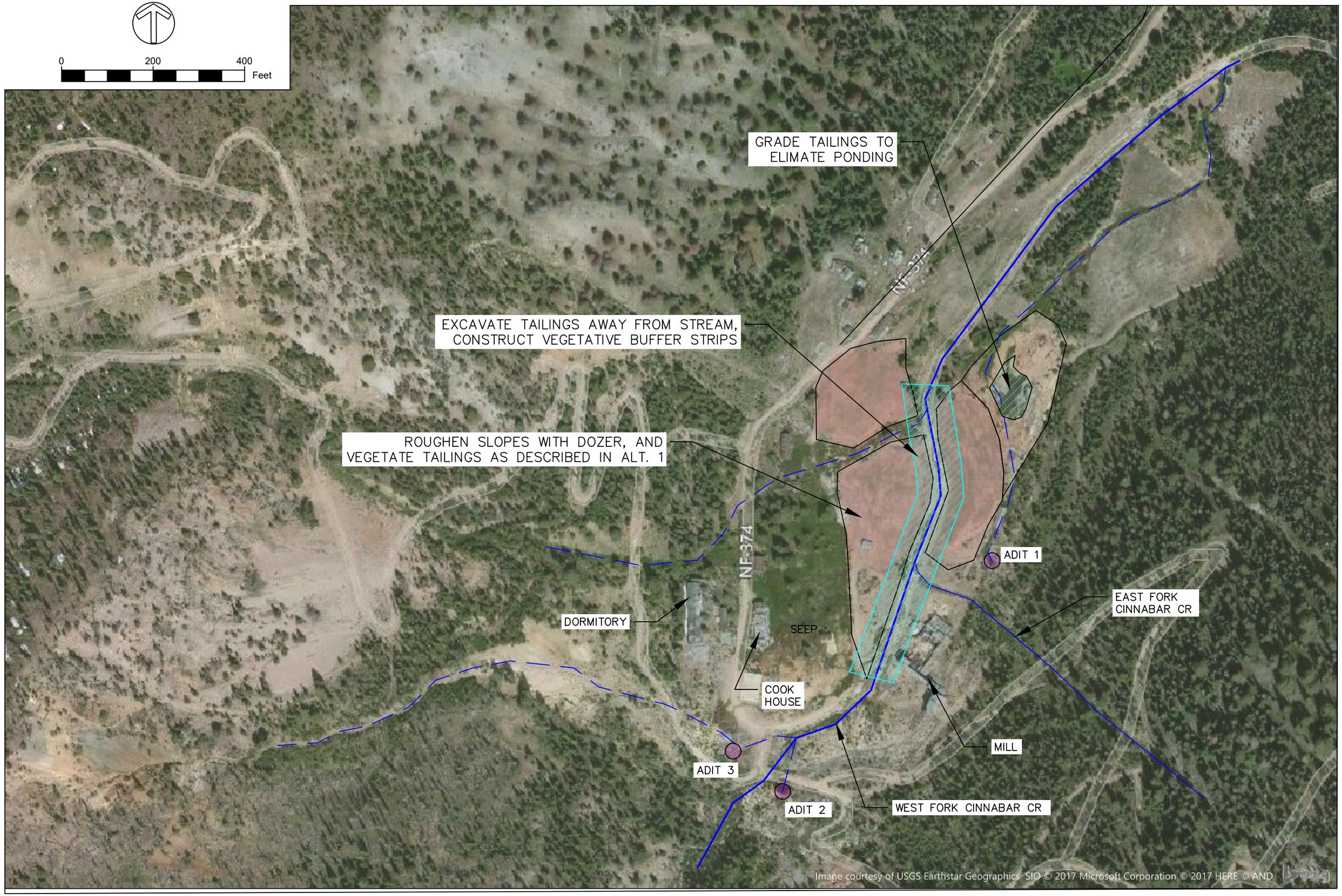
Designed by: T.CHATRIAND
Drawn by: TJC
Spec No.:
Reviewed by: --
Approved by: --
Date: 6/28/17
TDD No. 16-07-0002
PAN No.
File name:
Plot date:
Dwg scale: AS SHOWN

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700
Seattle, Washington 98104
(206) 624-9537

VALLEY COUNTY IDAHO
CINNABAR MINE SITE
YELLOW PINE, IDAHO

REMOVAL ACTION ALTERNATIVE 1

FIGURE number:
7-1



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IF SHEET IS LESS THAN 11"X17" IT IS REDUCED PRINT– SCALE REDUCED ACCORDINGLY
ONE INCH

Symbol	Description	Date	Approved
A			

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Drawn by: TJC
Reviewed by: --
Approved by: --
Spec No.:
Date: 6/28/17
TDD No. 16-07-0002
PAN No.
File name:
Plot date:
Dwg scale: AS SHOWN

ecology and environment, inc.
Global Environmental Specialists
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Seattle, Washington 98104
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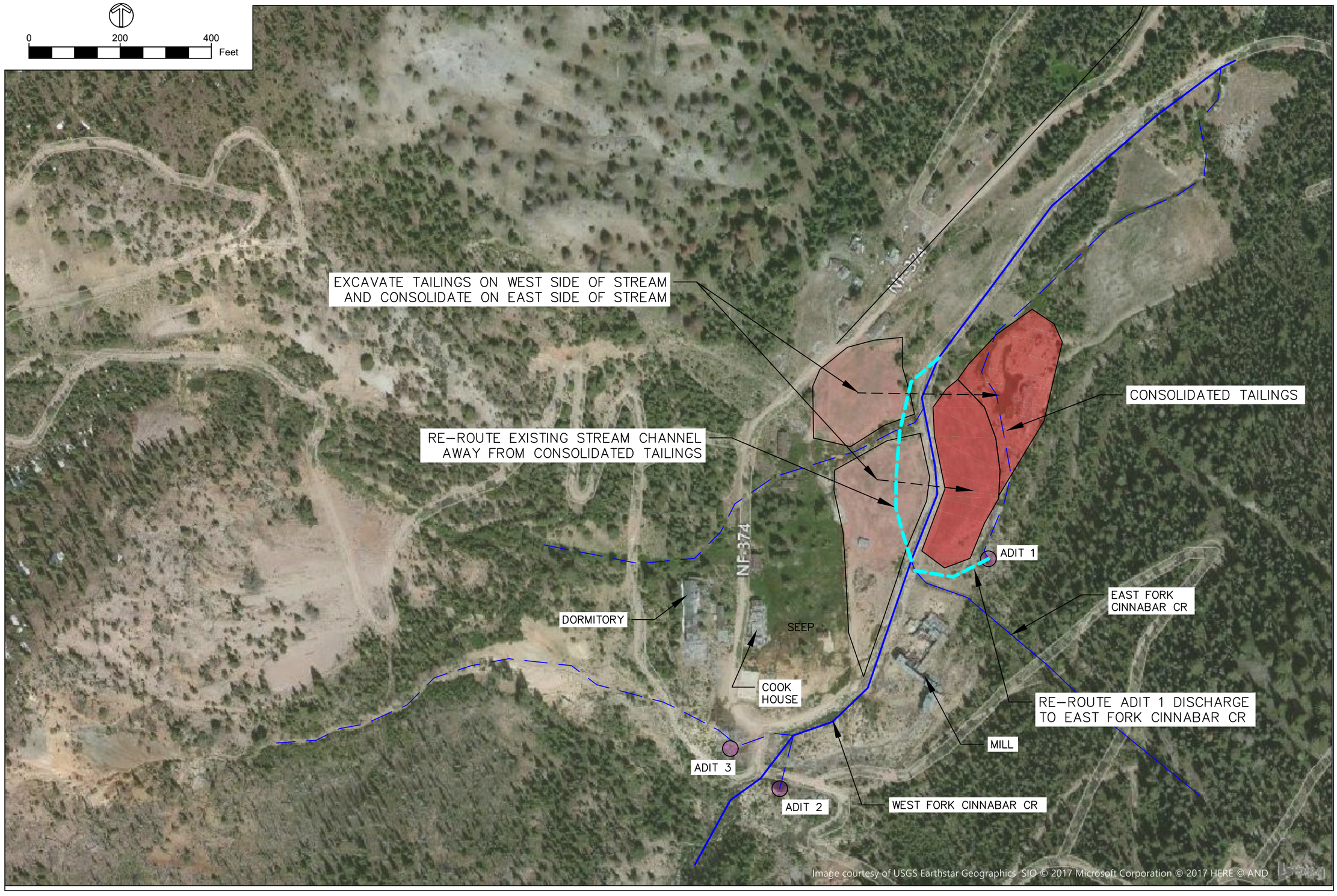
VALLEY COUNTY IDAHO
CINNABAR MINE SITE
YELLOW PINE, IDAHO
REMOVAL ACTION ALTERNATIVE 2

FIGURE number:
7-2



SIZE B
IF SHEET IS LESS THAN 11"X17" IT IS REDUCED PRINT– SCALE REDUCED ACCORDINGLY
ONE INCH

Symbol	Description	Date	Approved
A			

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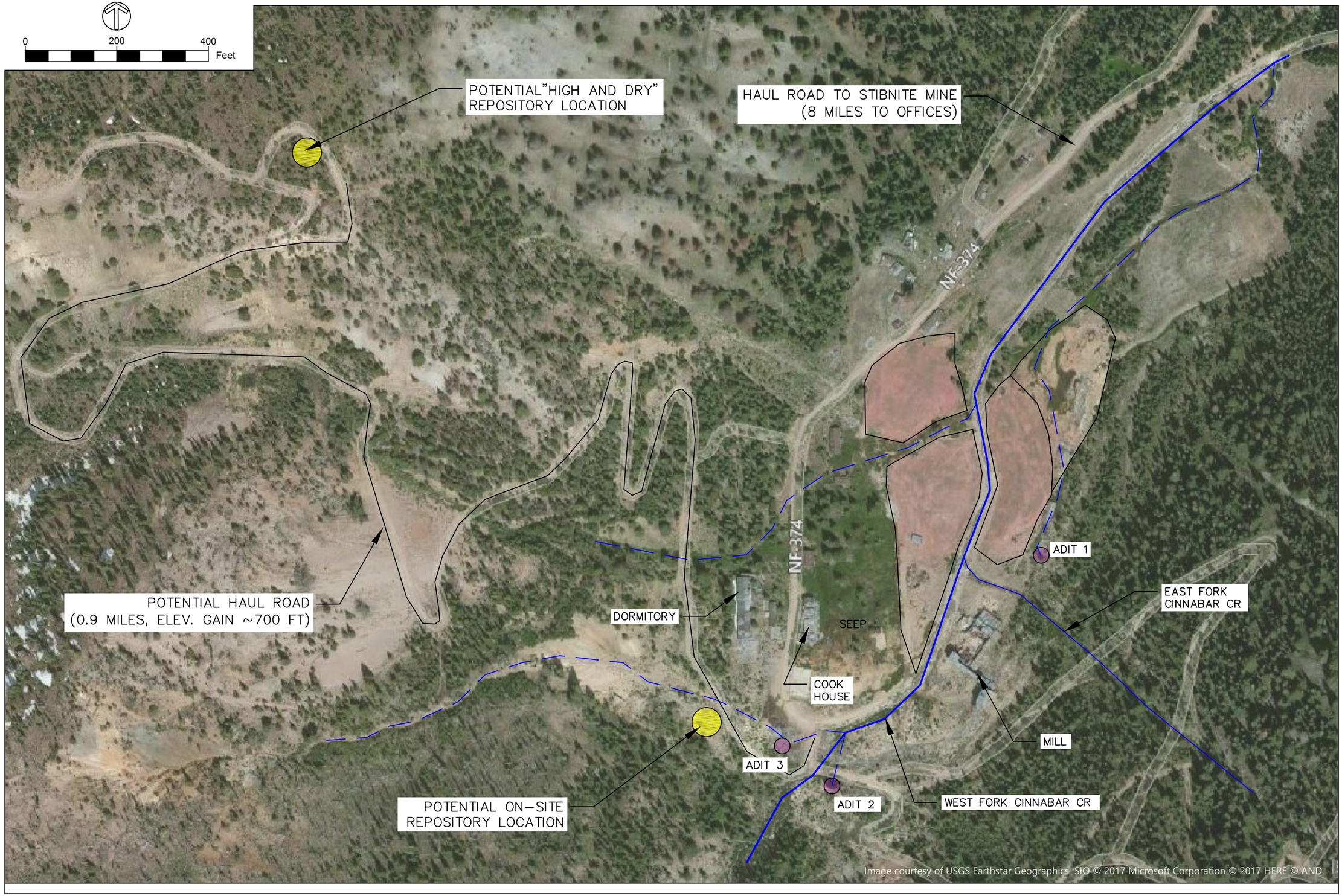
Drawn by: TJC
Reviewed by: --
Approved by: --
Spec No.:
Date: 6/28/17
TDD No. 16-07-0002
PAN No.
File name:
Plot date:
Dwg scale: AS SHOWN

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700
Seattle, Washington 98104
(206) 624-9537

VALLEY COUNTY IDAHO
CINNABAR MINE SITE
YELLOW PINE, IDAHO
REMOVAL ACTION ALTERNATIVE 3

FIGURE number:
7-3



SIZE B
IF SHEET IS LESS THAN 11"X17" IT IS REDUCED PRINT– SCALE REDUCED ACCORDINGLY
ONE INCH

Symbol	Description	Date	Approved
A			

Designed by: --
Drawn by: TJC
Spec No.:
Reviewed by: --
Approved by: --
Date: 6/28/17
TDD No. 16-07-0002
PAN No.
File name:
Plot date:
Dwg scale: AS SHOWN

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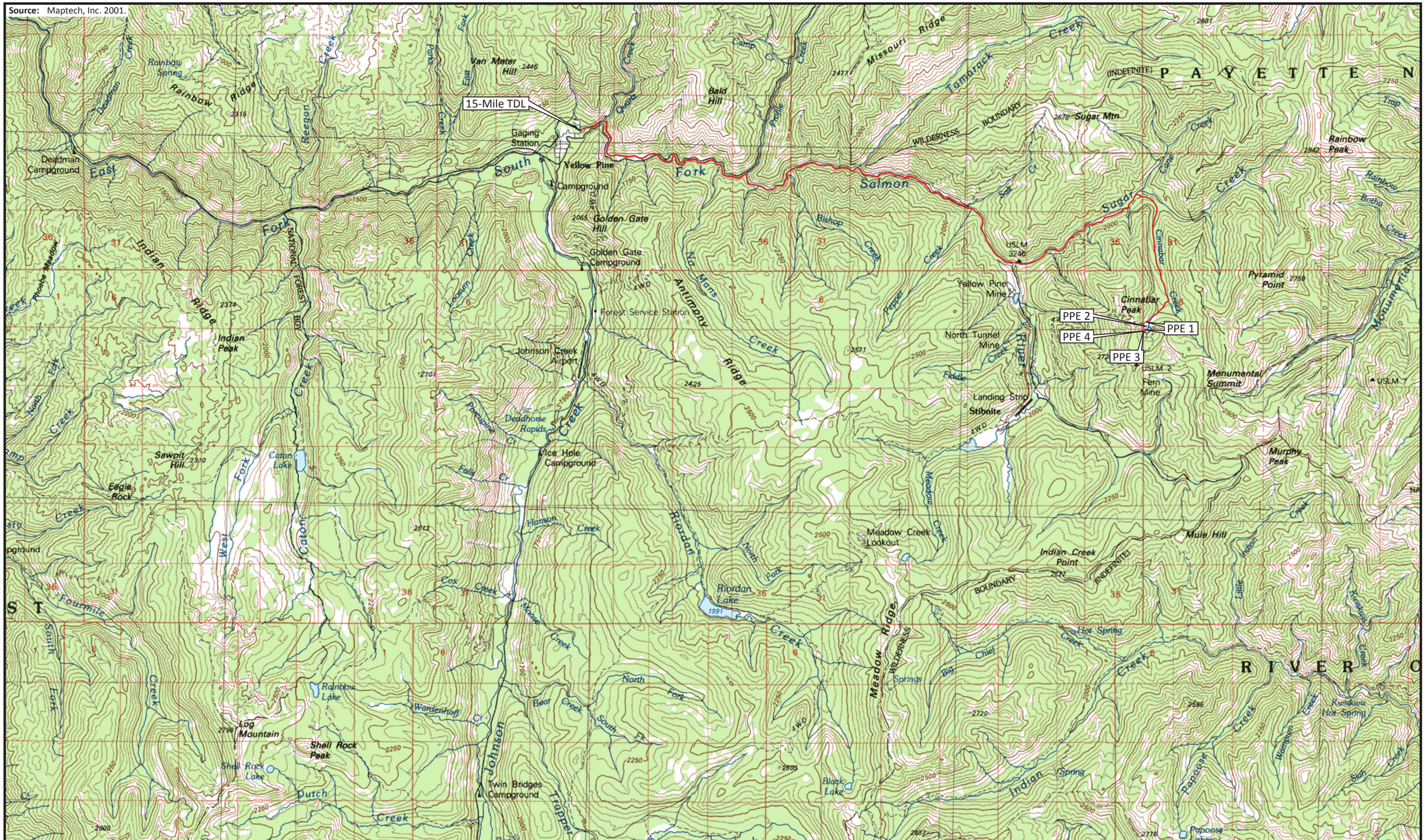
Global Environmental Specialists
720 Third Avenue, Suite 1700
Seattle, Washington 98104
(206) 624-9537

VALLEY COUNTY IDAHO
CINNABAR MINE SITE
YELLOW PINE, IDAHO
REMOVAL ACTION ALTERNATIVE 4

FIGURE number:
7-4

Source: Maptech, Inc. 2001.



ecology and environment, inc.
Global Environmental Specialists
Seattle, Washington

0 .75 1.5
Approximate Scale in Miles

CINNABAR MINE SITE
Yellow Pine, Idaho

Figure 8-1
15-MILE TDL MAP

Date:	Drawn by:	
7/20/17	AES	10:START-IV\14070008\fig 8-1

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Tables

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Table 2-1 1985 Preliminary Assessment Sample Results

Sample Number	Sample Matrix	Sample Location	Sample Results	Analytical Parameter
CMS-07	Soil	Background	**15.0** ppm	Mercury
CMS-04	Soil	Red tailings composite	**10.0** ppm	Mercury
CMS-03	Soil	Edge of vegetation and red tailings pile	**11.0** ppm	Mercury
CMS-05	Soil	Tan tailings composite	**81.0** ppm	Mercury
CMS-09	Soil	Drainage area near adit	**400** ppm	Mercury
CMS-12	Soil	Composite south tailings pond	**400** ppm	Mercury
CMS-11	Soil	Composite north tailings pond	**1000** ppm	Mercury
CMW-01	Water	North tailings pond effluent	<0.001 ppm	Mercury
CMW-03	Water	South tailings pond effluent	<0.001 ppm	Mercury
CMW-02	Water	Effluent from stack	**4.9** ppm	Mercury
CMW-05	Water	Effluent from stack (duplicate of CMW-02)	**8.3** ppm	Mercury
CMS-06	Sediment	West Fork Cinnabar from stack	**1200** ppm	Mercury
CMS-10	Sediment	Duplicate CMS-06	**2300** ppm	Mercury
80	Air	Near mill	<0.5 total micrograms	Mercury
81	Air	Command post	<0.5 total micrograms	Mercury
CMS-08	Soil	Beneath Transformer #3	**0.2** ppm	PCB
CMO-01	Product	Storage tank	**4.0** ppm	PCB
CMS-01	Soil	Beneath Transformer #2	**36.0** ppm	PCB
CMS-02	Soil	Duplicate of CMS-01	**24.0** ppm	PCB

Source: Weston 1985.

Note: Bold type indicates the sample result is above the MDL.

Key:

MDL = Method Detection Limit.
PCB = Polychlorinated biphenyls.
ppm = parts per million.

Table 2-2 **1991 USFS Sample Results**

Analyte (ppm)	EPA Maximum concentration of contaminants for toxicity	Sample		
		1	2	3
Mercury	0.2	**200**	**180**	**60**
Lead	5.0	**3.3**	**19**	**34.4**
Arsenic	5.0	**189**	**181**	**229**

Source: USFS 1992.

Note: Bold type indicates the sample result is above the MDL.

Highlighted cells indicate the sample result exceeds the EPA maximum concentration of contaminants for toxicity characteristics.

Key:

MDL = Method Detection Limit.

ppm = parts per million.

Table 2-3 1994 Site Inspection Soil Samples Analytical Results Summary

EPA Sample ID	94294011	94294012	94294010	94294005	94294009	94294008	94294006
CLP Sample ID	MJM246	MJM250	MJM251	MJM241	MJM240	MJM244	MJM245
Station Location	11-SS-00006-0005	11-SS-00007-0005	11-SS-00005-005	11-SS-00001-0005	11-SS-00004-0005	11-SS-00003-1005	11-SS-00002-0005
Description	Background		South Tailings Impoundment	Red Tailings Pile	Drum Area	Mill	Tan Tailings Pile
Target Analyte List Metals (mg/kg)							
Aluminum	**14000**	**2750**	**8430**	**11800**	**8540**	**5510**	**2310**
Antimony	**39.6 J**	**46.4 J**	**27.4 J**	**38.5 J**	**14.5 J**	**9.8 J**	**34.5 J**
Arsenic	**226 J**	**40.0 J**	**471 J**	**1210 J**	**84.2 J**	**108 J**	**472 J**
Barium	**58.3**	**33.7**	**68.4**	**75.8**	**37.3**	**93.7**	**55.3**
Beryllium	**0.96**	**0.25**	**0.68**	**1.2**	**0.48**	**0.33**	**0.81**
Cadmium	0.15 U	0.20 U	0.14 U	0.18 U	0.19 U	**0.56**	0.17 U
Calcium	**6530 J**	**4650 J**	**18900 J**	4340 J	**2620 J**	**112000 J**	**709 J**
Chromium	**26.6**	**3.3**	**10.6**	**10.6**	**7.4**	**28.2**	**4.0**
Cobalt	**13.7**	**1.9**	**6.8**	**11.1**	**3.8**	**2.4**	**5.9**
Copper	**15.6**	**5.4**	**15.1**	**14.6**	**5.5**	**48.6**	**17.5**
Iron	**17800**	**3560**	**12000**	**12000**	**5610**	**9460**	**9750**
Lead	**7.7**	**4.6**	**4.7**	**8.3**	**10.5**	**18.9**	**6.1**
Magnesium	**6760**	**901**	**5490**	**2160**	**1480**	**2630**	**249**
Manganese	**601 J**	**277 J**	**331 J**	**232 J**	**132 J**	**185 J**	**253 J**
Mercury	**26.7**	**44.6**	**98.6**	**8.9**	**35.5**	**1770**	**110**
Nickel	**21.6**	**2.8**	**12.0**	**19.4**	**5.9**	**4.9**	**15.7**
Potassium	**3100 J**	**478 J**	**1890 J**	**3070 J**	**1730 J**	**1150 J**	**524 J**
Selenium	0.30 U	**0.54**	0.28 U	0.35 U	0.39 U	0.40 U	0.34 U
Silver	0.15 U	0.20 U	0.14 U	0.18 U	0.19 U	0.20 U	0.17 U
Sodium	361 UJ	139 UJ	120 UJ	**129**	**4540**	**1990**	86.8 UJ
Thallium	**2.4**	**0.54 J**	**8.2**	**9.8**	**3.2**	**0.92 J**	**6.3**
Vanadium	**22.0**	**5.4**	**10.4**	**12.6**	**5.0**	**12.0**	**6.8**
Zinc	**21.8**	**17.6**	**27.6**	**35.7**	**19.3**	**319**	**33.7**

Source: Weston 1994.

Note: Bold type indicates the sample result is above the CRDL.
Underline type indicates the sample result is significant as defined in Section 7.

Key:

CLP = Contract Laboratory Program.
CRDL = EPA Contract Required Detection Limits.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met.
mg/kg = milligrams per kilogram.
U = Analyzed but not detected.

Table 2-4 1994 Site Inspection Sediment Samples Analytical Results Summary

EPA Sample ID	94294014	94294013	94294015	94294016	94294017	94294018	94294019
CLP Sample ID	MJM243	MJM242	MJM252	MJM255	MJM247	MJM253	MJM248
Station Location	11-SD-00006-005	11-SD-00001-005	11-SD-00002-0005	11-SD-00005-1005	11-SD-00003-0005	11-SD-00004-0005	11-SD-00005-0005
		Creek Sediment					
Description	Background	Fallen Stack in West Fork Cinnabar Creek	#4 300 Feet Below Rip Rap	Duplicate of #4	#3 150 Feet below Rip Rap	#2 50 Feet Below Creek Confluence	#1 150 Feet Above Creek Confluence
Target Analyte List Metals (mg/kg)							
Aluminum	**24300**	**12400**	**5790**	**11000**	**4500**	**26700**	**3070**
Antimony	**34.9 J**	**31.3 J**	**16.7 J**	**23.7 J**	**18.1 J**	**21.5 J**	**27.9 J**
Arsenic	**250 J**	**761.J**	**220 J**	**369 J**	**191 J**	**350 J**	**326 J**
Barium	**132**	**74.4**	**33.4**	**71.4**	**23.8**	**109**	**23.1**
Beryllium	**1.8**	**0.9**	**0.74**	**2.3**	**0.6**	**2.6**	**0.46**
Cadmium	0.44 U	0.17 U	0.19 U	0.26 U	0.17 U	0.27 U	0.17 U
Calcium	**24300 J**	**13000 J**	**114400 J**	**16900 J**	**32800 J**	**407100 J**	**10600 J**
Chromium	**38.8**	**19.1**	**7.1**	**15.2**	**4.3**	**31.2**	**4.0**
Cobalt	**12.7**	**9.6**	**8.5**	**31.9**	**6.6**	**50.8**	**1.9**
Copper	**39.6**	**29.6**	**11.2**	**25.1**	**4.5**	**27.0**	**6.6**
Iron	**29800**	**21000**	**7270**	**13700**	**5830**	**23000**	**7680**
Lead	**6.9**	**7.0**	2.3 UJ	**5.1**	**2.6**	**6.9**	**3.6**
Magnesium	**21700**	**9610**	**3440**	**8600**	**1740**	**27800**	**3890**
Manganese	**3380 J**	**622 J**	**266 J**	**630 J**	**161 J**	**1510 J**	**96.1 J**
Mercury	**7.3**	**410**	**35.2**	**91.3**	**18.0**	**69.6**	**9.58**
Nickel	**37.7**	**24.2**	**11.3**	**32.6**	**9.4**	**49.3**	**5.1**
Potassium	**2970 J**	**2890 J**	**1090 J**	**1770 J**	**979 J**	**3880 J**	**784 J**
Selenium	**1.1**	0.33 U	0.39 U	0.53 U	0.34 U	0.53 U	0.33 U
Silver	0.44 U	0.17 U	0.19 U	0.26 U	0.17 U	0.27 U	0.17 U
Sodium	**480**	**184**	149 UJ	211 UJ	115 UJ	275 UJ	137 UJ
Thallium	**0.97 J**	**6.0**	**4.5**	**8.4**	**4.1**	**8.6**	**10.7**
Vanadium	**33.5**	**19.3**	**7.0**	**14.7**	**5.0**	**32.0**	**5.1**
Zinc	**53.7**	**68.3**	**30.6**	**100**	**23.7**	**94.4**	**18.3**

Source: Weston 1994.

Note: Bold type indicates the sample result is above the CRDL.
Underline type indicates the sample result is significant as defined in Section 7.

Key:

CLP = Contract Laboratory Program.
CRDL = EPA Contract Required Detection Limits.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met.
mg/kg = milligrams per kilogram.
U = Analyzed but not detected.

Table 2-5 1996 Time Critical Removal Action Laboratory Soil/Sediment Sample Results

Sample ID	96090322	96090326	96090330	96090342	96090362	96090374	96090378	96090390	960909394	96090397
Sample Matrix	Sediment	Tailings	Tailings	Soil	Sediment/ Tailings	Soil/ Tailings	Sediment	Sediment/ Tailings	Sediment/ Tailings	Sediment/Soil
Sample Location	North End of Retort Adjacent to West Fork Cinnabar Creek	Tan Tailings Pile	East Red Tailings Pile	Native Soil	Former Retort Area	Impoundment Berm Northeast Corner of Lower Tailings Pile	West Fork Cinnabar Creek	Test Pit 1	Test Pit 2	Test Pit 2
Target Analyte List Metals (mg/kg)										
Antimony	**44.6 J**	**111 J**	**1010 J**	**3.9 J**	**106 J**	**70.2 J**	**57.8 J**	**48.2 J**	**81.0 J**	**59.2 J**
Arsenic	**267**	**2540**	**1150**	**41.5**	**496**	**247**	**420**	**335**	**543**	**234**
Beryllium	**0.69**	**1.0**	**0.84**	1.4 U	0.61 U	0.24 U	1.3 U	0.65 U	0.46 U	0.91 U
Cadmium	0.22 U	0.21 U	0.19 U	0.17 U	0.29 U	0.15 U	0.21 U	0.22 U	0.22 U	0.24 U
Chromium	**19.2 J**	**3.4 J**	**5.5 J**	34.5 J	**10.4 J**	**4.3 J**	**24.1 J**	**14.9**	**5.5**	**25.2**
Copper	**36.2 J**	10.2 UJ	7.5 UJ	**14.9**	**25.2**	**13.5**	**18.3**	**14.6 J**	**10.2 J**	**14.2 J**
Lead	**4.6 J**	**4.4 J**	**6.7 J**	**10.8**	**85.3**	**3.3**	**6.9**	**28.2**	**8.6**	**7.5**
Mercury	**423 J**	**1120 J**	**16.9 J**	**4.5 J**	**890 J**	**366 J**	**99.2 J**	**1130 J**	**9270 J**	**19.7 J**
Nickel	**17.7 J**	**24.9 J**	**15.6 J**	**18.7**	**11.6**	**4.6**	**23.2**	**13.2**	**8.4**	**13.9**
Selenium	2.8 U	2.7 U	2.3 U	2.6 U	2.4 U	2.3 U	3.3 U	2.7 U	2.7 U	3.0 U
Silver	0.81 UJ	0.78 UJ	0.69 U	0.79 UJ	0.72 UJ	0.68 UJ	0.99 UJ	0.80 UJ	1.0 UJ	0.86 UJ
Thallium	**1.9**	**41.4**	**7.9**	0.74 U	**4.7**	**3.9**	**8.7**	**2.7**	**5.2**	**1.1**
Zinc	**45.9 J**	**53.10 J**	**35.3 J**	**62.3 J**	**396 J**	**13.6 J**	**64.4 J**	**26.8 J**	**27.3 J**	**32.2 J**

Source: E & E 1996.

Note: Bold type indicates the sample results is above the MDL.

Key:

ID = Identification.

J = The associated numerical value is an estimated quantity because the reported concentrations were less than the contract required detection limits or because quality control criteria limits were not met.

MDL = Method Detection Limit.

mg/kg = milligrams per kilogram.

U = The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

Table 2-6 1996 Time Critical Removal Action Laboratory Surface Water Sample Results

Sample ID	96090377U	96090377F	96090379	96090383	96090384	96090385
Sample Location	West Fork Cinnabar Creek (Unfiltered)	West Fork Cinnabar Creek (Filtered)	Duplicate of 96090377 (Unfiltered)	Adit 1	West Fork Cinnabar Creek	Adit 3
Target Analyte List Metals (µg/L)						
Antimony	**8.4 J**	**4.2 J**	**4.0 J**	**4.6 J**	**2.6 J**	**1.8 J**
Arsenic	**72.0**	**34.4**	**35.6**	**21.4**	**2.3**	**12.7**
Beryllium	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Cadmium	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Chromium	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
Copper	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U
Lead	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
Mercury	**1.4 J**	**0.43 J**	**1.3 J**	**0.26 J**	0.14 U	0.14 U
Nickel	17.1 U	17.1 U	17.1 U	17.1 U	17.1 U	17.1 U
Selenium	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Silver	7.3 U	7.3 U	7.3 U	7.3 U	7.3 U	7.3 U
Thallium	**0.25**	0.16 U	0.16 U	0.16 U	0.16 U	**0.47**
Zinc	5.1 U	5.1 U	5.1 U	**52.9**	5.1 U	**5.2**

Source: E & E 1996.

Note: Bold type indicates the sample results is above the MDL.

Key:

µg/L = micrograms per liter.
ID = Identification.
J = The associated numerical value is an estimated quantity because the reported concentrations were less than the contract required detection limits or because quality control criteria limits were not met.
MDL = Method Detection Limit.
U = The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

Table 2-7 1998 Removal Action XRF Soil Sample Results

Sample Number	Sample Matrix	Mercury in Soil mg/kg	Arsenic in Soil mg/kg
CIN 1	Soil	166	NR
CIN 2	Soil	78	NR
CIN 3	Soil	84	NR
CIN 4	Soil	118	NR
CIN 5	Tailings	24	NR
CIN 6	Tailings	104	NR
CIN 7	Tailings	169	NR
CIN 8	Soil	94	159
CIN 9	Soil	136	180
CIN 10	Soil	68	148
CIN 11	Soil	105	131
CIN 12	Soil	43	146
CIN 13	Soil	116	129
CIN 14	Soil	96	92
CIN 15	Soil	77	144
CIN 16	Soil	153	156
CIN 17	Soil	48	161
CIN 18	Soil	34	133

Source: E & E 1998.

Key:

mg/kg = milligrams per kilogram.

NR = Analysis for this element was not run on this sample.

Table 2-8 2011 to 2016 USGS Surface Water Monitoring Stations Samples Analytical Results

Station Number	Sample Date	Temp (˚C)	Specific Conductance (µS/cm @ 25˚C)	pH (standard units)	Arsenic (µg/L)		Lead [a] (µg/L)		Mercury (µg/L)	
					Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
CMC					340	NA	65	NA	1.4	NA
CCC					150	NA	2.5	NA	0.012	NA
13310850 - Meadow Creek (Background)	9/20/2011	5.8	74	7.8	**1.4**	**1.7**	**0.016**	**0.06**	< 0.005	< 0.005
	9/22/2011	5	75	6.9	**1.27**	**1.3**	**0.011**	**0.01**	NP	NP
	10/17/2011	4.1	63	8.1	**1.3**	**1.5**	**0.077**	**0.19**	< 0.005	< 0.005
	12/14/2011	0.1	72	7.8	**1.4**	**1.4**	**0.041**	**0.05**	NP	NP
	5/17/2012	3.2	34	7.2	**0.88**	**1.7**	**0.027**	**0.2**	NP	NP
	6/13/2012	6.8	37	7.4	**0.85**	**1.2**	**0.036**	**0.12**	NP	< 0.005
	8/29/2012	6.7	77	7.6	**1.5**	**1.5**	**0.064**	**0.07**	NP	NP
	11/6/2012	4	64	7.7	**1.2**	**1.2**	NP	< 0.04	NP	NP
	3/27/2013	0.2	67	7.6	**1.3**	**1.2**	< 0.025	< 0.04	NP	NP
	5/8/2013	3.9	39	7.5	**0.81**	**1.4**	**0.052**	0.27	NP	NP
	5/14/2013	2.2	32	7.3	**0.77**	**1.8**	**0.029**	0.37	< 0.005	< 0.005
	5/30/2013	2.5	42	7.9	**0.79**	**0.81**	**0.037**	< 0.04	NP	NP
	6/25/2013	7.1	46	7.9	**0.82**	**0.98**	< 0.025	< 0.04	NP	NP
	4/24/2014	2	50	7.5	**0.91**	**1.1**	**0.074**	**0.1**	NP	NP
	5/15/2014	3.7	42	7.6	**0.82**	**1.6**	< 0.04	**0.21**	< 0.005	< 0.005
	5/18/2014	2.6	36	7.4	**0.61**	**0.98**	< 0.04	< 0.11	NP	NP
	5/23/2014	3.1	31	7.4	**0.84**	**4**	< 0.04	**0.88**	< 0.005	**0.014**
	6/10/2014	6.8	36	7.6	**0.78**	**0.98**	< 0.04	**0.04**	NP	NP
	6/24/2014	9.9	40	7.6	**0.83**	**0.85**	< 0.04	< 0.04	NP	NP
	8/12/2014	10.4	71	7.8	**1.2**	**1.5**	NP	< 0.04	NP	NP
	9/30/2014	6.6	74	7.7	**1.2**	**1.3**	NP	< 0.04	< 0.005	< 0.005
	3/18/2015	1.2	45	7.3	**0.87**	**1**	0.045	**0.05**	< 0.005	< 0.005
	5/6/2015	2.1	36	7.2	**0.76**	**1**	< 0.04	**0.06**	< 0.005	0.01
	5/19/2015	3.8	39	7.2	**0.81**	**0.73**	< 0.04	**0.06**	< 0.005	< 0.005
	6/10/2015	7.4	44	7.1	**0.8**	**1**	**0.105**	< 0.04	< 0.005	< 0.005
	8/25/2015	NP	NP	NP	**1.4**	**1.7**	< 0.04	< 0.04	< 0.005	< 0.005
	9/29/2015	NP	NP	NP	**1.4**	**1.6**	< 0.04	< 0.04	< 0.005	< 0.005
	2/23/2016	0	73	7.6	**1.3**	**1.5**	< 0.04	< 0.04	< 0.005	< 0.005
	3/29/2016	NP	NP	NP	**1.1**	**1.1**	< 0.04	< 0.04	< 0.005	< 0.005
	5/10/2016	2.6	35	7.4	**0.69**	**0.99**	< 0.04	**0.05**	< 0.005	< 0.005
	6/14/2016	5.7	42	7.5	**0.78**	**0.7**	< 0.04	< 0.04	< 0.005	< 0.005
	8/9/2016	7.4	73	7.6	**1.2**	**1.4**	0.03	**0.02**	< 0.005	< 0.005
	10/4/2016	3.5	82	7	**1.3**	**1.3**	0.021	< 0.02	< 0.005	< 0.005
	3/14/2017	2	67	6.1	**1.1**	**11.3**	< 0.02	**0.03**	< 0.005	< 0.005

Table 2-8 2011 to 2016 USGS Surface Water Monitoring Stations Samples Analytical Results

Station Number	Sample Date	Temp (˚C)	Specific Conductance (µS/cm @ 25˚C)	pH (standard units)	Arsenic (µg/L)		Lead [a] (µg/L)		Mercury (µg/L)	
					Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
CMC					340	NA	65	NA	1.4	NA
CCC					150	NA	2.5	NA	0.012	NA
13310800 - EFSFSR above Meadow Creek	9/19/2011	8.4	78	8.1	**12.4**	**11.8**	**0.025**	**0.04**	< 0.005	< 0.005
	10/17/2011	4.2	75	8.3	**10.9**	**10.2**	**0.051**	< 0.4	< 0.005	< 0.005
	12/14/2011	0.3	77	8.7	**12.2**	**11.9**	< 0.025	< 0.04	NP	NP
	5/17/2012	3.9	36	7.5	**4.8**	**6.4**	**0.05**	**1.94**	NP	NP
	6/13/2012	5.6	44	7.4	**5.3**	**5.3**	**0.105**	**0.17**	NP	**0.008**
	8/28/2012	8.6	76	7.7	**12.5**	**11.9**	**0.043**	< 0.04	NP	NP
	11/6/2012	2.6	73	7.7	**11.1**	**9.9**	**0.038**	< 0.04	NP	NP
	3/26/2013	0.1	76	8.4	**12.8**	**11.6**	< 0.025	< 0.04	NP	NP
	5/7/2013	4.6	50	7.6	**8.2**	**8.5**	**0.069**	**0.1**	NP	NP
	5/14/2013	3	35	7.5	**4.6**	**6.5**	**0.041**	**0.27**	**0.007**	**0.04**
	5/30/2013	4.1	47	7.8	**5.7**	**5.2**	< 0.025	< 0.04	NP	NP
	6/25/2013	7.5	56	8	**6.8**	**7.3**	< 0.025	< 0.04	NP	NP
	4/24/2014	1.7	64	7.8	**11.6**	**10.9**	< 0.04	**0.05**	NP	NP
	5/15/2014	4.6	53	7.8	**9**	**9.5**	< 0.04	**0.07**	**0.006**	**0.014**
	5/18/2014	3.4	53	7.8	**6.9**	**7.6**	< 0.04	**0.12**	NP	NP
	5/23/2014	5.9	40	7.5	**5.7**	**8.2**	< 0.04	**0.34**	**0.006**	**0.051**
	6/10/2014	8.9	44	7.8	**5**	**5.6**	< 0.04	**0.06**	NP	NP
	6/24/2014	9.7	55	7.8	**7.3**	**7.1**	< 0.04	< 0.04	NP	NP
	8/12/2014	11	73	8	**10.3**	**11.1**	NP	< 0.04	NP	NP
	9/30/2014	6.7	77	7.9	**10.6**	**11.5**	< 0.04	< 0.04	< 0.005	**0.006**
	3/18/2015	2.3	61	7.7	**9.8**	**10.6**	**0.105**	**0.06**	**0.01**	**0.014**
	5/5/2015	6.1	43	7.5	**5.1**	**6.5**	< 0.04	**0.12**	**0.005**	**0.032**
	5/19/2015	5	43	7.6	**4.6**	**4.5**	< 0.04	< 0.04	**0.005**	**0.009**
	6/9/2015	9.8	56	7.7	**6.6**	**6.6**	**0.08**	**0.05**	< 0.005	**0.01**
	8/25/2015	NP	NP	NP	**11.3**	**12.1**	< 0.04	< 0.04	< 0.005	**0.006**
	9/29/2015	NP	NP	NP	**11.6**	**11.9**	< 0.04	< 0.04	< 0.005	**0.006**
	2/23/2016	0.1	83	7.8	**12.3**	**13.4**	< 0.04	**0.04**	**0.005**	**0.008**
	3/29/2016	NP	NP	NP	**12.3**	**12**	< 0.04	< 0.04	< 0.005	< 0.005
	5/10/2016	3.5	41	7.6	**4.9**	**5.5**	< 0.04	**0.08**	**0.008**	**0.022**
	6/14/2016	5.8	52	7.7	**6.2**	**6**	< 0.04	< 0.04	< 0.005	**0.007**
	8/9/2016	9.1	74	7.9	**11**	**12.3**	< 0.02	**0.02**	< 0.005	**0.005**
	10/4/2016	4	80	7.7	**11.8**	**12.5**	< 0.02	**0.02**	< 0.005	**0.007**
	3/14/2017	2.6	75	6.7	NP	NP	NP	NP	NP	NP

Table 2-8 2011 to 2016 USGS Surface Water Monitoring Stations Samples Analytical Results

Station Number	Sample Date	Temp (˚C)	Specific Conductance (µS/cm @ 25˚C)	pH (standard units)	Arsenic (µg/L)		Lead [a] (µg/L)		Mercury (µg/L)	
					Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
CMC					340	NA	65	NA	1.4	NA
CCC					150	NA	2.5	NA	0.012	NA
13311000 - EFSFSR at Stibnite	9/20/2011	10.5	63	7.9	**32.6**	**32.4**	**0.021**	< 0.04	< 0.005	< 0.005
	9/22/2011	7	81	7.9	**31.2**	**31**	**0.008**	**0.017**	NP	NP
	10/18/2011	1.4	89	7.8	**23.2**	**22.3**	**0.057**	**0.11**	< 0.005	< 0.005
	12/14/2011	0.1	95	8.2	**25.2**	**23.7**	**0.025**	**0.18**	NP	NP
	5/18/2012	4.4	45	7.6	**15.5**	**15.9**	**0.034**	**0.15**	NP	**0.019**
	6/13/2012	8	46	7.6	**12.7**	**13**	**0.027**	**0.11**	NP	**0.007**
	8/28/2012	13.3	94	7.9	**33.1**	**32.9**	**0.026**	**0.06**	NP	NP
	11/7/2012	3.4	88	7.7	**21.1**	**20.9**	< 0.025	< 0.04	< 0.005	< 0.005
	3/26/2013	0.8	96	7.9	**34.9**	**28.8**	NP	< 0.04	NP	NP
	5/7/2013	5.6	53	7.9	**17.5**	**38.3**	**0.061**	**4.21**	< 0.005	**0.071**
	5/14/2013	5.6	38	NP	**11.1**	**13.4**	**0.044**	**0.31**	< 0.005	**0.019**
	5/30/2013	5.7	52	7.8	**15.3**	**13.9**	**0.026**	< 0.04	< 0.005	< 0.005
	6/25/2013	8.2	62	7.9	**15.7**	**17.4**	**0.032**	< 0.04	< 0.005	< 0.005
	8/13/2013	NP	93	8	**29.5**	**31**	< 0.025	**0.06**	NP	NP
	10/22/2013	NP	NP	NP	**24.3**	**25.4**	< 0.04	< 0.04	NP	NP
	4/25/2014	1.6	84	7.5	**46.9**	**44.9**	< 0.04	**0.05**	NP	NP
	5/16/2014	2.5	56	7.6	**24.9**	**26.2**	< 0.04	**0.25**	**0.005**	**0.017**
	5/19/2014	2.4	52	7.9	**19.8**	**19.9**	< 0.04	**0.15**	< 0.005	**0.037**
	5/24/2014	6.8	40	7.6	**13**	**17.9**	**0.079**	**0.6**	< 0.005	**0.04**
	6/11/2014	4.1	45	7.6	**12.7**	**12.7**	< 0.04	**0.07**	NP	NP
	6/25/2014	7.3	59	7.7	**18.2**	**17**	NP	< 0.04	NP	NP
	8/13/2014	10.9	90	7.9	**29.7**	**33.3**	NP	< 0.04	NP	NP
	9/30/2014	7.8	95	7.8	**27.4**	**30.7**	**0.041**	< 0.04	< 0.005	< 0.005
	3/18/2015	4	78	7.7	**31.3**	**37**	**0.046**	**0.08**	**0.006**	**0.011**
	5/6/2015	4	46	7.5	**9.8**	**13.3**	**0.067**	**0.1**	< 0.005	**0.013**
	5/19/2015	6.7	47	7.6	**10.1**	**11**	< 0.04	**0.13**	< 0.005	**0.007**
	6/10/2015	8.9	59	7.5	**12.8**	**13.3**	**0.175**	**0.04**	< 0.005	**0.005**
	8/25/2015	NP	NP	NP	**32.4**	**34.4**	< 0.04	< 0.04	< 0.005	**0.007**
	9/29/2015	NP	NP	NP	**28.1**	**30**	< 0.04	**0.2**	< 0.005	**0.005**
	2/24/2016	0	108	7.6	**23.7**	**26.2**	< 0.04	**0.06**	< 0.005	< 0.005
	3/30/2016	NP	NP	NP	**37.7**	**40.3**	< 0.04	< 0.04	< 0.005	< 0.005
	5/11/2016	1.9	47	7.5	**16.3**	**16.9**	< 0.04	**0.1**	**0.006**	**0.01**
	6/15/2016	5.1	55	7.6	**13.5**	**14.4**	< 0.04	**0.05**	< 0.005	< 0.005
	8/10/2016	5.8	92	7.3	**24.5**	**27.9**	**0.04**	**0.02**	< 0.005	< 0.005
	10/4/2016	5	98	7.7	**26.4**	**30.2**	**0.022**	**0.04**	< 0.005	**0.006**
	4/11/2017	0.1	96	7.2	NP	NP	NP	NP	< 0.005	**0.304**

Table 2-8 2011 to 2016 USGS Surface Water Monitoring Stations Samples Analytical Results

Station Number	Sample Date	Temp (˚C)	Specific Conductance (µS/cm @ 25˚C)	pH (standard units)	Arsenic (µg/L)		Lead [a] (µg/L)		Mercury (µg/L)	
					Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
CMC					340	NA	65	NA	1.4	NA
CCC					150	NA	2.5	NA	0.012	NA
13311250 - EFSFSR above Sugar Creek	9/21/2011	8	113	8.1	**69.6**	**72**	< 0.015	**0.05**	< 0.005	< 0.005
	9/22/2011	NP	109	8	**77.9**	**77.9**	**0.025**	**0.03**	NP	NP
	10/18/2011	4.4	100	8	**51.9**	**54**	**0.043**	NP	< 0.005	**0.009**
	12/15/2011	0.1	118	7.9	**66.9**	**62.9**	**0.044**	< 0.04	NP	NP
	5/18/2012	4.9	48	7.7	**22.4**	**26.5**	**0.03**	**0.15**	NP	**0.015**
	6/14/2012	4.5	52	7.4	**21.8**	**22.4**	**0.081**	**0.21**	< 0.005	**0.006**
	8/29/2012	12.4	113	8	**84.7**	**70.8**	NP	< 0.04	< 0.005	< 0.005
	11/7/2012	4	102	7.9	**57.2**	**55.7**	< 0.025	**0.05**	< 0.005	< 0.005
	3/27/2013	1.4	115	8.1	**65.5**	**69.6**	< 0.025	< 0.04	< 0.005	< 0.005
	5/8/2013	3.1	61	8.1	**28.7**	**35.6**	**0.085**	**0.25**	< 0.005	**0.017**
	5/14/2013	6.5	43	7.3	**17.4**	**24.4**	**0.036**	**0.47**	< 0.005	**0.037**
	5/30/2013	5.3	58	7.9	**27.5**	**25.7**	< 0.025	< 0.04	< 0.005	< 0.005
	6/26/2013	7.8	69	8	**31.7**	**34.4**	< 0.025	**0.05**	< 0.005	< 0.005
	10/22/2013	NP	NP	NP	**63.2**	**66.2**	NP	**0.08**	NP	NP
	4/25/2014	2.6	105	7.7	**71.5**	**69.6**	< 0.04	**0.06**	NP	NP
	5/16/2014	3.8	66	7.7	**40**	**40.3**	< 0.04	**0.14**	**0.006**	**0.013**
	5/19/2014	4.4	58	7.8	**33.1**	**32.1**	< 0.04	**0.11**	< 0.005	**0.011**
	5/24/2014	6.8	46	7.7	**23.3**	**30.5**	**0.059**	**0.33**	**0.005**	**0.023**
	6/11/2014	5.5	51	7.7	**23.9**	**24.6**	< 0.04	**0.05**	NP	NP
	6/25/2014	5.5	51	7.7	**34.5**	**39**	NP	**0.05**	NP	NP
	8/13/2014	12.9	107	8.1	**91.2**	**110**	**0.051**	**0.1**	NP	NP
	10/1/2014	7.4	116	7.9	**108**	**150**	**0.043**	**0.13**	< 0.005	**0.005**
	3/19/2015	1.2	97	7.6	**56.4**	**65.2**	**0.047**	**0.08**	**0.007**	**0.01**
	5/6/2015	4	50	7.5	**24.3**	**29.2**	< 0.04	**0.08**	< 0.005	**0.011**
	5/20/2015	4.9	50	7.4	**23.7**	**23.8**	< 0.04	**0.05**	< 0.005	< 0.005
	6/10/2015	10.1	65	7.7	**35**	**39.1**	**0.053**	< 0.04	< 0.005	< 0.005
	8/24/2015	NP	NP	NP	**98.1**	**128**	< 0.04	**0.14**	< 0.005	< 0.005
	9/30/2015	NP	NP	NP	**102**	**124**	< 0.04	< 0.04	< 0.005	< 0.005
	2/24/2016	1.2	126	8.1	**86.4**	**109**	< 0.04	**0.04**	< 0.005	< 0.005
	3/30/2016	NP	NP	NP	**91.4**	**110**	< 0.04	< 0.04	< 0.005	< 0.005
	5/11/2016	3.2	54	7.5	**28.2**	**30.6**	< 0.04	**0.09**	**0.007**	**0.009**
	6/15/2016	6.6	63	7.7	**34.2**	**35.4**	< 0.04	**0.04**	< 0.005	< 0.005
	8/10/2016	12.4	110	8	**94.5**	**113**	**0.04**	**0.06**	< 0.005	< 0.005
	10/5/2016	5.4	120	7.8	**93.5**	**114**	< 0.02	**0.03**	< 0.005	**0.006**
	4/11/2017	2	113	8	NP	NP	NP	NP	< 0.005	**0.009**

Table 2-8 2011 to 2016 USGS Surface Water Monitoring Stations Samples Analytical Results

Station Number	Sample Date	Temp (˚C)	Specific Conductance (µS/cm @ 25˚C)	pH (standard units)	Arsenic (µg/L)		Lead [a] (µg/L)		Mercury (µg/L)	
					Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
CMC					340	NA	65	NA	1.4	NA
CCC					150	NA	2.5	NA	0.012	NA
1311450 - Sugar Creek near Stibnite	9/21/2011	7.2	138	8.2	**19.2**	**22.5**	< 0.015	**3.61**	**0.005**	**0.017**
	10/18/2011	2.8	134	8.2	**20.5**	**20.4**	**0.026**	< 0.04	**0.008**	**0.012**
	12/15/2011	0.4	144	8.6	**31.1**	**32.7**	**0.04**	< 0.04	NP	NP
	5/18/2012	6	64	7.8	**7.4**	**9.2**	**0.063**	**0.34**	NP	**0.76**
	6/14/2012	4.9	77	7.9	**7.7**	**8**	**0.06**	**0.13**	**0.012**	**0.1**
	8/29/2012	11.8	137	8.3	**19.1**	**20.7**	< 0.025	< 0.04	**0.007**	**0.02**
	11/7/2012	4.7	135	8.2	**17.7**	**18.6**	< 0.025	< 0.04	**0.008**	**0.041**
	3/27/2013	1.7	126	8.3	**17.9**	**22.1**	< 0.025	< 0.04	< 0.005	**0.016**
	5/8/2013	6	66	7.9	**7.8**	**9.2**	**0.087**	**0.23**	**0.012**	**0.294**
	5/14/2013	6.9	55	7.7	**8.4**	**35.1**	**0.099**	**2.6**	**0.302**	**26.3**
	5/31/2013	3.1	85	8.1	**8.2**	**7.6**	< 0.025	< 0.04	**0.008**	**0.095**
	6/26/2013	6.8	95	8.2	**7.8**	**8.3**	**0.027**	< 0.04	**0.01**	**0.036**
	10/22/2013	NP	NP	NP	**11.6**	**12.8**	< 0.04	< 0.04	NP	NP
	4/25/2014	3.6	104	8	**12.7**	**13.6**	< 0.04	**0.13**	**0.01**	**0.045**
	5/16/2014	4.7	77	7.9	**7.8**	**10.6**	**0.1**	**0.49**	**0.032**	**0.642**
	5/19/2014	5	72	7.9	**8.2**	**10.2**	**0.048**	**0.32**	**0.016**	**0.682**
	5/25/2014	3.6	61	7.6	**7**	**14.9**	**0.091**	**1.08**	**0.031**	**2.8**
	6/11/2014	6.8	70	7.9	**6.6**	**7.9**	< 0.04	**0.1**	**0.011**	**0.146**
	6/25/2014	8.8	82	8	**7.8**	**7.6**	< 0.04	< 0.04	**0.01**	**0.056**
	8/14/2014	8.8	117	8	**10.4**	**14.2**	< 0.04	**0.15**	**0.019**	**4.13**
	10/1/2014	5.4	139	8.2	**12.9**	**14.1**	**0.049**	< 0.04	**0.008**	**0.024**
	3/19/2015	1.5	98	7.7	**10.1**	**11.5**	**0.088**	**0.17**	**0.012**	**0.073**
	5/6/2015	5	68	7.8	**7.1**	**8.8**	**0.057**	**0.16**	< 0.005	**0.359**
	5/20/2015	5.2	71	7.7	**7.2**	**7**	< 0.04	**0.05**	**0.013**	**0.186**
	6/10/2015	11.5	NP	NP	**7.4**	**7.4**	< 0.04	< 0.04	**0.014**	**0.063**
	8/26/2015	NP	NP	NP	**15.2**	**15.9**	< 0.04	< 0.04	**0.009**	**0.082**
	9/30/2015	NP	NP	NP	**15.6**	**16.6**	< 0.04	< 0.04	**0.007**	**0.031**
	2/24/2016	-0.1	143	7.8	**17.8**	**19.2**	< 0.04	< 0.04	**0.01**	**0.02**
	3/31/2016	NP	NP	NP	**13.8**	**14.4**	< 0.04	**0.04**	**0.01**	**0.036**
	5/11/2016	7.4	80	7.6	**7.9**	**10.1**	< 0.04	**0.16**	**0.017**	**0.232**
	6/15/2016	5.8	86	7.9	**7.7**	**8.1**	< 0.04	**0.07**	**0.01**	**0.085**
	8/10/2016	12.7	136	8.2	**14.3**	**15.2**	< 0.02	**0.02**	**0.008**	**0.032**
	10/5/2016	3.8	144	7.9	**15.4**	**16.5**	< 0.02	< 0.02	**0.006**	**0.027**

Source: USGS 2017a, 2017b, 2017c, 2017d, 2017e

Note: Bold type indicates sample results are greater than the MDL.

[a] The lead criteria is hardness dependent. A hardness of 100 µg/L is assumed for all the samples displayed on this table.

Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.

Key:

< = Less than.
° C = degrees Celsius.
µg/L = micrograms per liter.
µS/cm = micro Siemens per centimeter.
CCC = Criterion Continuous Concentration
CMC = Criterion Maximum Concentration.
EFSFSR = East Fork South Fork Salmon River.
MDL = Method Detection Limits.
NA = Not applicable.
NP = The data for this parameter was not provided.
Temp = Temperature.

Table 2-9 2014 EPA Surface Water Samples Analytical Results Summary

EPA Unfiltered Metals Sampled ID			14334303	14334333	14334336	14334300	14334306	14334312	14334315	14334318	14334323	14334326	14334309	14334331	14334321
EPA Unfiltered Metals Sample ID			14334304	14334334	14334337	14334301	14334307	14334313	14334316	14334319	14334324	14334327	14334310	14334332	14334322
Unfiltered Metals CLP Sample ID			MJGXC2	MJGXE2	MJGXE4	MJGXC0	MJGXC4	MJGXC8	MJGXD0	MJGXD2	MJGXD6	MJGXD8	MJGXC6	MJGXE0	MJGXD4
Filtered Metals CLP Sample ID	Water Quality Criteria - Aquatic Life		MJGXC3	MJGXE3	MJGXE5	MJGXC1	MJGXC5	MJGXC9	MJGXD1	MJGXD3	MJGXD7	MJGXD9	MJGXC7	MJGXE1	MJGXD5
Station Location			BG01SW	BG02SW	BG02SW[a]	CC01SW	CC02SW	CC03SW	CC04SW	CC05SW	CC06SW	CC07SW	SC01SW	AD01SW	CP01SW
Description	CMC	CCC	Background			Cinnabar Creek							Sugar Creek	Adit 1*	Adit Pond
Hardness (mg/L)															
Hardness	NA	NA	**34.9**	**50**	**51**	**66.4**	**71.3**	**35.5**	**57.4**	**57.6**	**61.7**	**70.5**	**39.5**	**82**	**91.7**
Unfiltered Metals (µg/L)															
Arsenic	NA	NA	10.0 U	7.9 JQ	7.9 JQ	**11.4**	**11.6**	4.3 JQ	**12.9**	9.8 JQ	**15.2**	**18.0**	3.5 JQ	**38.1**	**18.1**
Calcium	NA	NA	**12200**	**12400**	**12600**	**20900**	**22500**	**10300**	**17200**	**17800**	**17100**	**19300**	**13200**	**19500**	**25800**
Lead	NA	NA	1.0 U	1.0 U	1.0 U	**1.1**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**3.9**
Magnesium	NA	NA	1080 JQ	4640 JQ	4750 JQ	3420 JQ	3650 JQ	2350 JQ	3520 JQ	3180 JQ	4650 JQ	**5400**	1600 JQ	**8060**	**6610**
Mercury	NA	NA	0.20 U	0.20 U	0.20 U	0.20 U	0.2 U	0.20 U	0.061 JQ	0.20 U	0.10 JQ	0.11 JQ	0.20 U	0.15 JQ	**0.36**
Filtered (0.45 micrometer) Metals (µg/L)															
Arsenic	340	150	2.8 JQ	6.7 JQ	6.8 JQ	9.6 JQ	**10.5**	3.3 JQ	**13.6**	**14.8**	**18.7**	**17.9**	4.7 JQ	**42.4**	**16.4**
Lead	20.2 - 58.8 [b]	0.79 - 2.29 [c]	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Mercury	1.4	0.012	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U

Source: E & E 2014.

Notes: Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample result is elevated as defined in Section 7.
*For the 2014 investigation this adit was identified as Adit 1; however, for the 2016 investigation, the adit was renumbered as Adit 2.

[a] Duplicate Sample

[b] The freshwater criterion for lead is expressed as a function of the hardness for the respective sample. The criterion was calculated using the following equation: CMC (dissolved) = exp{mA [ln(hardness)]+ bA} (CF). The parameters used are specified in Appendix B-Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent (EPA 2009) and Idaho Water Quality Standards Subsection 210.c.ii (IDAPA 58.01.02).

[c] The freshwater criterion for lead is expressed as a function of the hardness for the respective sample. The criterion was calculated using the following equation: CCC (dissolved) = exp{mC [ln (hardness)]+ bC} (CF) . The parameters used are specified in Appendix B-Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent (EPA 2009) and Idaho Water Quality Standards Subsection 210.c.ii (IDAPA 58.01.02).

Key:

µg/L = micrograms per liter.
CCC = Criterion continuous concentration.
CLP = Contract Laboratory Program.
CMC = Criterion maximum concentration.
CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency
ID = Identification
J = The associated numerical value is an estimated quantity.
mg/L = milligrams per liter.
Q = Detected concentration is below the contract required quantitation limit but is above the method detection limit.
U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

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Table 2-10 2014 EPA Sediment Samples Analytical Results Summary

EPA Sample ID	Avocet SQS		MacDonald Consensus-Based TEC	14334305	14334335	14334338	14334302	14334308	14334314	14334317	14334320	14334325	14334328	14334311
CLP Sample ID				MJGXB0	MJGXB8	MJGXB9	MJGXE6	MJGXB1	MJGXB3	MJGXB4	MJGXB5	MJGXB6	MJGXB7	MJGXB2
Station Location				BG01SD	BG02SD	BG02SD[(a)]	CC01SD	CC02SD	CC03SD	CC04SD	CC05SD	CC06SD	CC07SD	SC01SD
Description	SL1	SL2		Background			Cinnabar Creek							Sugar Creek
Total Metals (mg/kg)														
Arsenic	14	120	9.79	**10.5**	**102**	**113**	**113**	**188**	**90.2**	**217**	**262**	**207**	**520**	**49.7**
Lead	360	>1300	35.8	**7.2 JH**	**5.4 JH**	**4.9 JH**	**1.7 JH**	**2.1 JH**	**6.7 JH**	**4.6 JH**	**6.5 JH**	**7.0 JH**	**6.7 JH**	**7.8 JH**
Mercury	0.66	0.8	0.18	0.015 JQ	**18.3 JK**	**10.6 JK**	**20.4 JK**	**12.4 JK**	**4.3 JK**	**152 JK**	**80.1 JK**	**12.1 JK**	**54.4 JK**	**3.5 JK**

Source: E & E 2014.

Note: Bold type indicates the sample result is above the Contract Required Quantitation Limit.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result exceeds the least conservative (i.e., highest) screening level.
Underline type indicates the sample result is elevated as defined in Section 7.
(a) Duplicate Sample

Key:

CLP = Contract Laboratory Program.
EPA = United States Environmental Protection Agency.
H = High bias.
ID = Identification.
J = The associated value is an estimated quantity.
K = Unknown bias.
mg/kg = milligrams per kilogram.
Q = Detected concentration is below the Contract Required Quantitation Limit but is above the Method Detection Limit.
TEC = Threshold effect concentration.

Table 2-11 2014 EPA Tailings Pile Samples Analytical Results Summary

EPA Sample ID Station Location Description		Water Quality Criteria - Aquatic Life		14334329 YT01SS	14334330 YT02	14334339 RT01	14334340 RT01[(a)]	14334341 RT02
		CMC	CCC	Yellow Tailings		Red Tailings		
Synthetic Precipitation Leaching Procedure (µg/L)								
Arsenic		340	150	**7.20**	**342**	**691**	**696**	**1630**
Lead		65	2.5	**0.28 JH**	0.050 U	**0.20 JH**	**0.42 JH**	**0.23 JH**
Mercury		1.4	0.012	**2.02**	0.050 U	**3.96**	**6.21**	**1.16**

Source: E & E 2014.

Note: Bold type indicates the sample result is above the Contract Required Quantitation Limit.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result exceeds the least conservative (i.e., highest) screening level.
(a) Duplicate Sample
Lead criteria is hardness dependent. A hardness value of 100 is assumed for these samples.

Key:
CCC = Criterion continuous exposure.
CLP = Contract Laboratory Program.
CMC = Criterion maximum concentration.
EPA = United States Environmental Protection Agency
ID = Identification
J = The identification of the analyte is acceptable; however, the reported value is an estimate.
H = High bias.
U = The analyte was not detected at or above the reported value. The associated value is either the sample quantitation limit or the sample detection limit.

Table 2-12 2014 to 2015 USGS Filtered Surface Water Sample Analytical Results

Location	Sample Date	Mercury ng/L	Methylmercury ng/L	Arsenic mg/L	Arsenic III mg/L	Lead mg/L
Water Quality Criteria-Aquatic Life CMC		**1400**	**NA**	**0.34**	**NA**	**0.065**
Water Quality Criteria-Aquatic Life CCC		**12**	**NA**	**0.15**	**NA**	**0.0025**
Cinnabar Creek above Cinnabar mine site - Background	8/18/2014	**16**	**0.06**	**0.0033**	0.0003 U	0.01 U
West Fork Cinnabar headwater - Background	6/26/2015	NP	NP	**0.0053**	**0.0009**	0.01 U
West tributary to Cinnabar Creek above mine site - Background	7/25/2015	**3.41**	0.04 U	**0.0047**	0.0005 U	0.01 U
East tributary to Cinnabar Creek above mine site - Background	7/25/2015	**7.5**	0.04 U	0.0092	0.0005 U	0.01 U
Spring #1 above Cinnabar mine site	6/26/2015	NP	NP	**0.0035**	0.0005 U	0.01 U
Upper mine adit; Cinnabar site	7/25/2015	**30.6**	0.04 U	**0.0215**	**0.0009**	0.01 U
Lower mine adit at Cinnabar mine site	8/19/2014	**46.5**	**0.14**	**0.0421**	**0.0008**	0.01 U
Wetland on Cinnabar tailings	8/19/2014	**24.5**	**0.07**	**0.089**	**0.0215**	0.01 U
W Fork Cinnabar Creek below Cinnabar mine site	8/19/2014	**31.5**	**7.3**	**0.0186**	**0.0083**	0.01 U
Cinnabar Creek immediately below mine site	7/25/2015	**50.1**	**0.06**	**0.0195**	**0.0009**	0.01 U
Cinnabar Creek above Sugar Creek	8/18/2014	**6.25**	**0.06**	**0.0115**	0.0003 U	0.01 U
Cinnabar Creek above confluence with Sugar Creek	7/23/2015	**35.6**	**0.1**	**0.0118**	**0.0007**	0.01 U
Sugar Creek above confluence with Cane Creek - Attribution	7/23/2015	**3.11**	0.04 U	**0.0016**	0.0005 U	0.01 U
Cane Creek above confluence with Sugar Creek - Attribution	7/23/2015	**2.92**	0.04 U	**0.0023**	0.0005 U	0.01 U
Sugar Creek above Cinnabar Creek	8/18/2014	**0.39**	0.04 U	**0.0019**	0.0003 U	0.01 U
Sugar Creek below road crossing	7/24/2015	**13.6**	**0.13**	**0.0053**	**0.0005**	0.01 U
Sugar Creek below road crossing	7/24/2015	NP	NP	**0.0055**	**0.0006**	0.01 U
Sugar Creek above West End Creek	7/24/2015	**12.4**	**0.12**	**0.0058**	**0.0007**	0.01 U
Sugar Creek above USGS 1331450	6/28/2015	**9.38**	**0.38**	**0.01**	0.0005 U	0.01 U
EFSF Salmon above Sugar Creek	6/28/2015	**3**	**0.05**	**0.0641**	**0.0132**	0.01 U

Source: Holloway et al, 2016

Notes: Bold type indicates the sample result is above the MDL.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Underline type indicates the sample result is elevated as defined in Section 7.

Key:

CCC = Criterion Continuous Concentration.
CMC = Criterion Maximum Concentration.
MDL = Method Detection Limit.
mg/L = milligrams per liter.
NA = Not applicable. There is no screening criteria for this analyte from this source.
NP = No value was reported.
ng/L = nanograms per liter.
U = The analyte was not present in this sample at or above the reported value.

Table 2-13 2014 to 2015 USGS Sediment Samples Analytical Results Summary

Site Name	Sample Date	Methylmercury ppb	Mercury ppm	Arsenic ppm	Lead ppm
Avocet SQS - SL1		**NA**	**0.66**	**14**	**360**
Avocet SQS - SL2		**NA**	**0.8**	**120**	**>1300**
MacDonald Consensus-Based TEC		**NA**	**0.18**	**9.79**	**35.8**
Cinnabar Creek East Fork - Background	8/18/2014	**7.57**	**102**	**6.3**	**9.49**
Spring #1 above Cinnabar mine site - Background	6/26/2015	NP	**4.62**	**29**	**11.1**
East tributary to Cinnabar Creek above mine site - Background	7/25/2015	**2.1**	**1.74**	**38**	**2.52**
Wetland sediment (pool)	8/19/2014	**26**	**813**	**849**	**23.7**
Cinnabar Creek below mine site.	7/25/2015	**1.19**	**14.7**	**69.1**	**9.65**
Cinnabar Creek below mine site	8/19/2014	**2.98**	**169**	**137**	**7.64**
Cinnabar Creek above sugar Creek	8/18/2014	**4.33**	**160**	**96.9**	**5.54**
Cinnabar Creek above confluence with Sugar Creek	7/23/2015	**8.21**	**149**	**103**	**5.92**
Sugar Creek above confluence with Cane Creek - Attribution	7/23/2015	0.17 U	**0.02**	**8.8**	**15.6**
Cane Creek above confluence with Sugar Creek - Attribution	7/23/2015	0.17 U	**0.07**	**10.5**	**11.7**
Sugar Creek below Cinnabar Creek	8/18/2014	**0.17**	**11.7**	**0.22**	**12.6**
Sugar Creek below road crossing	7/24/2015	**0.51**	**11.5**	**37.7**	**9.56**
Sugar Creek above West End Creek	7/24/2015	**0.55**	**9.65**	**26.7**	**9.75**

Source: Holloway et al, 2016

Notes: Bold type indicates the sample result is above the MDL.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result exceeds the least conservative (i.e., highest) screening level.
Underline type indicates the sample result is elevated as defined in Section 7.

Key:

MDL = Method Detection Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
NP = No result was reported.
ppb = parts per billion
ppm = parts per million
SQS = Sediment Quality Standards.
TEC = Threshold Effect Concentration
U = The analyte was not present in this sample at or above the reported value.

Table 2-14 2014 USGS Tailings and Soil Samples Analytical Results Summary

Site Name	Sample Date	Methylmercury ppb	Mercury ppm	Arsenic ppm	Lead ppm
EPA Residential RML		2300	33	68	400
EPA Residential RSL		7800	11	0.68	400
Lower floatation tailings	8/19/2014	**11.9**	**1710**	**1030**	**7.55**
Upper floatation tailings	8/19/2014	**12.3**	**1180**	**453**	**8.87**
Lower calcine tailings	8/19/2014	**2.6**	**375**	**34.4**	**9**
Upper calcine tailings	8/19/2014	**0.37**	**520**	**10.5**	**9.31**
Wetland soil	8/19/2014	**48**	**1450**	**1140**	**11.1**

Source: Holloway et al, 2016

Notes: Bold type indicates the sample result is above the MDL.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result exceeds the least conservative (i.e., highest) screening level.

Key:

EPA = United States Environmental Protection Agency.
MDL = Method Detection Limit.
ppb = parts per billion.
ppm = parts per million.
RML = Removal Management Level.
RSL = Regional Screening Level.

Table 3-1 Sample and Analytical Summary

EPA Sample ID	Station Location	CLP Sample ID	Sample Date	Time	Matrix	Sampler	TAL Metals	TOC	Sulfate	Sulfide	Low Level Mercury	Methyl Mercury	Grain Size	PCBs	Agronomics	Total Mercury
Surface Soil Samples																
16344200	TP01SS	MJHQH0	8/23/2016	1213	SS	USCG	X					X			X	
16344201	TP02SS	MJHQH1	8/23/2016	1235	SS	USCG	X					X			X	
16344202	TP03SS	MJHQH2	8/23/2016	1250	SS	USCG	X					X				
16344203	TP04SS	MJHQH3	8/23/2016	1301	SS	USCG	X					X			X	
16344204	TP05SS	MJHQH4	8/23/2016	1310	SS	USCG	X					X			X	
16344205	TP06SS	MJHQH5	8/23/2016	1318	SS	USCG	X					X			X	
16344206	TP07SS	MJHQH6	8/23/2016	1332	SS	USCG	X					X				
16344207	TP08SS	MJHQH7	8/23/2016	1345	SS	USCG	X					X			X	
16344208	TP09SS	MJHQH8	8/23/2016	1406	SS	USCG	X					X				
16344209	RT01SS	MJHQH9	8/23/2016	1425	SS	USCG	X					X				
16344210	BS01SS	MJHQL6	8/24/2016	1115	SS	USCG	X					X				
16344211	BS02SS	MJHQM0	8/24/2016	1127	SS	USCG	X					X			X	
16344212	BS03SS	MJHQL9	8/24/2016	1142	SS	USCG	X					X			X	
16344213	BS04SS	MJHQL8	8/24/2016	1157	SS	USCG	X					X				
16344214	BS05SS	MJHQL7	8/24/2016	1206	SS	USCG	X					X			X	
16384164	OS01SS		9/21/2016	1100	SS	CE								X		
Total Surface Water Samples																
16344256	AD01SW	MJHQM6	8/24/2016	1406	SW	USCG	X									
16344257	AD02SW	MJHQM7	8/24/2016	1455	SW	USCG	X									
16344258	AD03SW	MJHQM8	8/24/2016	1612	SW	USCG	X									
16344259	WF01SW	MJHQJ7	8/24/2016	1301	SW	USCG	X									
16344260	WF02SW	MJHQJ0	8/24/2016	1358	SW	USCG	X									
16344261	WF03SW	MJHQL3	8/24/2016	1530	SW	USCG	X									
16344262	WF04SW	MJHQL4	8/24/2016	1616	SW	USCG	X									
16344263	WF05SW	MJHQL5	8/24/2016	1648	SW	USCG	X									
16344264	WF06SW	MJHQN9	8/26/2016	0840	SW	USCG	X									
16344265	WF07SW	MJHQP0	8/26/2016	1101	SW	USCG	X									
16344266	AD04SW	MJHQP2	8/25/2016	1540	SW	USCG	X		X							
16344269	WT01SW	MJHQJ1	8/24/2016	1604	SW	USCG	X									
16344272	CC01SW	MJHQF8	8/23/2016	1403	SW	USCG	X									
16344273	CC02SW	MJHQF9	8/23/2016	1450	SW	USCG	X									
16344274	CC03SW	MJHQG0	8/23/2016	1638	SW	USCG	X									
16344275	CC04SW	MJHQJ4	8/24/2016	1133	SW	USCG	X									
16344276	CC05SW	MJHQJ5	8/24/2016	1203	SW	USCG	X									
16344278	SC01SW	MJHQE6	8/22/2016	1626	SW	USCG	X									
16344279	SC02SW	MJHQE7	8/22/2016	1733	SW	USCG	X									
16344280	SC03SW	MJHQE8	8/22/2016	1820	SW	EPA	X									
16344281	SC04SW	MJHQG1	8/23/2016	1229	SW	USCG	X									
16344282	SC05SW	MJHQG2	8/23/2016	1343	SW	USCG	X									
16344283	UT01SW	MJHQN8	8/26/2016	0954	SW	USCG	X									
16344284	BG02SW	MJHQG3	8/23/2016	1420	SW	USCG	X									
16344285	BG03SW	MJHQJ6	8/24/2016	1233	SW	USCG	X									
16344286	BG04SW	MJHQE5	8/26/2016	1134	SW	USCG	X									
16384150	SC01SW		9/21/2016	1000	SW	CE					X	X				
16384151	BG02SW		9/21/2016	1200	SW	CE					X	X				
16384152	WF04SW		9/21/2016	1400	SW	CE					X	X				
16384153	WF03SW		9/21/2016	1330	SW	CE					X	X				
16384154	WF03SW		9/21/2016	1330	SW	CE					X	X				
16384155	WF05SW		9/21/2016	1430	SW	CE					X	X				
Dissolved Surface Water Samples																
16344289	AD01SWD	MJHQM3	8/24/2016	1403	SWD	USCG	X				X	X				
16344290	AD02SWD	MJHQM4	8/24/2016	1440	SWD	USCG	X				X	X				
16344291	AD03SWD	MJHQM5	8/24/2016	1620	SWD	USCG	X				X	X				
16344292	WF01SWD	MJHQJ8	8/24/2016	1302	SWD	USCG	X				X	X				
16344293	WF02SWD	MJHQJ9	8/24/2016	1402	SWD	USCG	X				X	X				
16344294	WF03SWD	MJHQL0	8/24/2016	1530	SWD	USCG	X				X	X				
16344295	WF04SWD	MJHQL1	8/24/2016	1616	SWD	USCG	X				X	X				

Table 3-1 Sample and Analytical Summary

EPA Sample ID	Station Location	CLP Sample ID	Sample Date	Time	Matrix	Sampler	TAL Metals	TOC	Sulfate	Sulfide	Low Level Mercury	Methyl Mercury	Grain Size	PCBs	Agronomics	Total Mercury
16344296	WF05SWD	MJHQL2	8/24/2016	1648	SWD	USCG	X				X	X				
16344297	WF06SWD	MJHQN6	8/26/2016	0843	SWD	USCG	X									
16344298	WF07SWD	MJHQN7	8/26/2016	1101	SWD	USCG	X									
16344303	WT01SWD	MJHQK0	8/24/2016	1611	SWD	USCG	X				X	X				
16344306	CC01SWD	MJHQG6	8/23/2016	1357	SWD	USCG	X				X	X				
16344307	CC02SWD	MJHQG7	8/23/2016	1445	SWD	USCG	X				X	X				
16344308	CC03SWD	MJHQG8	8/23/2016	1636	SWD	USCG	X				X	X				
16344309	CC04SWD	MJHQJ2	8/24/2016	1123	SWD	USCG	X				X	X				
16344310	CC05SWD	MJHQJ3	8/24/2016	1207	SWD	USCG	X				X	X				
16344312	SC01SWD	MJHQE9	8/22/2016	1622	SWD	USCG	X									
16344313	SC02SWD	MJHQF0	8/22/2016	1722	SWD	USCG	X				X	X				
16344314	SC03SWD	MJHQF1	8/22/2016	1806	SWD	EPA	X				X	X				
16344315	SC04SWD	MJHQG4	8/23/2016	1233	SWD	USCG	X				X	X				
16344316	SC05SWD	MJHQG5	8/23/2016	1337	SWD	USCG	X				X	X				
16344317	UT01SWD	MJHQN5	8/26/2016	0957	SWD	USCG	X									
16344318	BG02SWD	MJHQG9	8/23/2016	1431	SWD	USCG	X				X	X				
16344319	BG03SWD	MJHQE4	8/24/2016	1234	SWD	USCG	X				X	X				
16344320	BG04SWD	MJHQN3	8/26/2016	1140	SWD	USCG	X									
16384157	SC01SWD		9/21/2016	1000	SWD	CE					X	X				
16384158	BG02SWD		9/21/2016	1200	SWD	CE					X	X				
16384159	WF04SWD		9/21/2016	1400	SWD	CE					X	X				
16384160	WF03SWD		9/21/2016	1330	SWD	CE					X	X				
16384161	WF03SWD		9/21/2016	1330	SWD	CE					X	X				
16384162	WF05SWD		9/21/2016	1430	SWD	CE					X	X				
Sediment Samples																
16344216	AD01SD	MHJQE0	8/24/2016	1410	SD	USCG	X	X				X	X			
16344217	AD02SD	MJHQM1	8/24/2016	1457	SD	USCG	X	X				X	X			
16344218	AD03SD	MJHQM2	8/24/2016	1620	SD	USCG	X	X				X	X			
16344219	WF01SD	MJHQK1	8/24/2016	1304	SD	USCG	X	X				X	X			
16344220	WF02SD	MJHQK2	8/24/2016	1404	SD	USCG	X	X				X	X			
16344221	WF03SD	MJHQK7	8/24/2016	1551	SD	USCG	X	X				X	X			
16344222	WF04SD	MJHQK8	8/24/2016	1630	SD	USCG	X	X				X	X			
16344223	WF05SD	MJHQK9	8/24/2016	1654	SD	USCG	X	X				X	X			
16344224	WF06SD	MJHQN1	8/26/2016	0852	SD	USCG	X	X				X	X			
16344225	WF07SD	MJHQN2	8/26/2016	1105	SD	USCG	X	X				X	X			
16344229	WT01SD	MJHQK3	8/24/2016	1615	SD	USCG	X	X				X	X			
16344232	CC01SD	MJHQF2	8/23/2016	1413	SD	USCG	X	X				X	X			
16344233	CC02SD	MJHQF3	8/23/2016	1455	SD	USCG	X	X				X	X			
16344234	CC03SD	MJHQF4	8/23/2016	1643	SD	USCG	X	X				X	X			
16344235	CC04SD	MJHQK4	8/24/2016	1143	SD	USCG	X	X				X	X			
16344236	CC05SD	MJHQK5	8/24/2016	1212	SD	USCG	X	X					X			
16344238	SC01SD	MJHQE1	8/22/2016	1634	SD	USCG	X	X				X	X			
16344239	SC02SD	MJHQE2	8/22/2016	1735	SD	USCG	X	X				X	X			
16344240	SC03SD	MJHQE3	8/22/2016	1820	SD	EPA	X	X				X	X			
16344241	SC04SD	MJHQF5	8/23/2016	1249	SD	USCG	X	X				X	X			
16344242	SC05SD	MJHQF6	8/23/2016	1346	SD	USCG	X	X				X	X			
16344243	UT01SD	MJHQN0	8/26/2016	1006	SD	USCG	X	X				X	X			
16344244	BG01SS	MJHQP1	8/25/2016	1200	SS	USCG	X					X				
16344245	BG02SD	MJHQF7	8/23/2016	1440	SD	USCG	X	X				X	X			
16344246	BG03SD	MJHQK6	8/24/2016	1237	SD	USCG	X	X				X	X			
16344247	BG04SD	MJHQM9	8/26/2016	1157	SD	USCG	X	X				X	X			
Porewater Samples																
16344324	WF01PW		8/24/2016	1350	PW	CE		X	X	X	X	X				
16344325	WF02PW		8/24/2016	1330	PW	CE		X	X	X	X	X				
16344326	WF03PW		8/24/2016	1720	PW	CE		X	X	X	X	X				
16344327	WF04PW		8/24/2016	1700	PW	CE		X	X	X	X	X				
16344328	WF05PW		8/24/2016	0930	PW	CE		X	X	X	X	X				
16344330	WT01PW		8/25/2016	1200	PW	CE		X	X	X	X	X				

Table 3-1 Sample and Analytical Summary

EPA Sample ID	Station Location	CLP Sample ID	Sample Date	Time	Matrix	Sampler	TAL Metals	TOC	Sulfate	Sulfide	Low Level Mercury	Methyl Mercury	Grain Size	PCBs	Agronomics	Total Mercury
16344331	WT02PW		8/25/2016	1045	PW	CE		X	X	X	X	X				
16344332	WT03PW		8/24/2016	1130	PW	CE		X	X	X	X	X				
16344333	SC01PW		8/22/2016	1645	PW	CE		X	X	X	X	X				
16344334	CC02PW		8/23/2016	1600	PW	CE		X	X	X	X	X				
16344335	CC04PW		8/24/2016	1130	PW	CE		X	X	X	X	X				
16344336	BG02PW		8/24/2016	1415	PW	CE		X	X	X	X	X				
Quality Control Samples																
16344287	RI01WT	MJHQP3	8/25/2016	1429	SW	CE	X									
16344321	R101SWD	MJHQP4	8/29/2016	1429	SWD	CE	X									
16344338	RI02WT		8/25/2016	1400	PW	CE		X	X	X	X	X				
16354250	Blank		8/30/2016	1500	QC	CE					X	X				
16384156	Blank		9/21/2016	0830	QC	CE					X	X				
16384163	Blank		9/21/2016	0830	QC	CE					X	X				
Mesocosm Experiment Samples																
16404407	Tailings 1 - Unamended		10/5/2016	1030	PW	CE		X	X		X	X				
16404408	Tailings 2 - Unamended		10/5/2016	1030	PW	CE		X	X		X	X				
16404409	Tailings 3 - Unamended		10/5/2016	1030	PW	CE		X	X		X	X				
16404410	Tailings 4 - Proganics		10/5/2016	1030	PW	CE		X	X		X	X				
16404411	Tailings 5 - Proganics		10/5/2016	1030	PW	CE		X	X		X	X				
16404412	Tailings 6 - Proganics		10/5/2016	1030	PW	CE		X	X		X	X				
16404419	Blank		10/5/2019	0900	QC	CE		X	X		X	X				
16404420	Leaching Water		10/5/2019	1415	SW	CE		X	X		X	X				
16424401	Tailings 1 - Unamended		10/17/2016	1100	PW	CE		X	X		X	X				
16424402	Tailings 2 - Unamended		10/17/2016	1100	PW	CE		X	X		X	X				
16424403	Tailings 3 - Unamended		10/17/2016	1100	PW	CE		X	X		X	X				
16424404	Tailings 4 - Proganics		10/17/2016	1100	PW	CE		X	X		X	X				
16424405	Tailings 5 - Proganics		10/17/2016	1100	PW	CE		X	X		X	X				
16424406	Tailings 6 - Proganics		10/17/2016	1100	PW	CE		X	X		X	X				
16434401	Tailings 1 - Unamended		10/24/2016	1700	PW	CE		X	X	X	X	X				
16434402	Tailings 2 - Unamended		10/24/2016	1700	PW	CE		X	X	X	X	X				
16434403	Tailings 3 - Unamended		10/24/2016	1700	PW	CE		X	X	X	X	X				
16434404	Tailings 4 - Proganics		10/24/2016	1700	PW	CE		X	X	X	X	X				
16434405	Tailings 5 - Proganics		10/24/2016	1700	PW	CE		X	X	X	X	X				
16434406	Tailings 6 - Proganics		10/24/2016	1700	PW	CE		X	X	X	X	X				
16454401	Tailings 1 - Unamended		11/9/2016	1000	PW	CE		X	X	X	X	X				
16454402	Tailings 2 - Unamended		11/9/2016	1000	PW	CE		X	X	X	X	X				
16454403	Tailings 3 - Unamended		11/9/2016	1000	PW	CE		X	X	X	X	X				
16454404	Tailings 4 - Proganics		11/9/2016	1000	PW	CE		X	X	X	X	X				
16454405	Tailings 5 - Proganics		11/9/2016	1000	PW	CE		X	X	X	X	X				
16454406	Tailings 6 - Proganics		11/9/2016	1000	PW	CE		X	X	X	X	X				

Table 3-1 Sample and Analytical Summary

EPA Sample ID	Station Location	CLP Sample ID	Sample Date	Time	Matrix	Sampler	TAL Metals	TOC	Sulfate	Sulfide	Low Level Mercury	Methyl Mercury	Grain Size	PCBs	Agronomics	Total Mercury
16454407	Tailings 1 - Unamended		11/9/2016	1300	SD	CE		X	X			X				X
16454408	Tailings 2 - Unamended		11/9/2016	1300	SD	CE		X	X			X				X
16454409	Tailings 3 - Unamended		11/9/2016	1300	SD	CE		X	X			X				X
16454410	Tailings 4 - Proganics		11/9/2016	1300	SD	CE		X	X			X				X
16454411	Tailings 5 - Proganics		11/9/2016	1300	SD	CE		X	X			X				X
16454412	Tailings 6 - Proganics		11/9/2016	1300	SD	CE		X	X			X				X

Key:

CE = Chris Eckley.
CLP = Contract Laboratory Program.
EPA = United States Environmental Protection Agency.
ID = Identification.
PW = Porewater.
SD = Sediment.
SS = Surface Soil.
SW = Surface Water.
SWD = Dissolved Surface Water.
TAL = Target Analyte List.
USCG = United States Coast Guard.
X = Indicates the sample was analyzed for this parameter.
TOC = Total Organic Carbon

Table 3-2 Sample Coding Key

Digits	Description	Code	Key
1,2	Sampling Area	AD	Adit
		BG	Background
		BS	Borrow Source
		CC	Cinnabar Creek
		SC	Sugar Creek
		TP	Tailings Pile
		UT	Unnamed Tributary
		WF	West Fork Cinnabar Creek
		WT	Wetland
3,4	Consecutive Sample Number	01	First number of a sampling area
5,6,(7)	Matrix Code	GWD	Dissolved Groundwater
		PW	Porewater
		SW	Surface Water
		SWD	Dissolved Surface Water
		SD	Sediment
		SS	Surface Soil

Table 3-3 In-Water Surface Water/Sediment Distances

Starting Location	End Location	In-Water Distance (feet)
AD02SW/AD02SWD	WF06SW/WF06SWD	86.00
WF06SW/WF06SWD	WF07SW/SWF07SWD	69.00
WF07SW/SWF07SWD	WF05SW/WF05SWD	234.00
WF05SW/WF05SWD	WF04SW/WF04SWD	366.00
WF04SW/WF04SWD	WF03SW/SW03SWD	459.00
WF03SW/SW03SWD	WF02SW/WF02SWD	2250.00
WF02SW/WF02SWD	WF01SW/WF01SWD	181.00
BG03SW/BG03SWD	WF01SW/WF01SWD	139.00
WF01SW/WF01SWD	CC05SW/CC05SWD	51.00
CC05SW/CC05SWD	CC04SW/CC04SWD	79.00
CC04SW/CC04SWD	CC03SW/CC03SWD	4276.00
CC03SW/CC03SWD	CC02SW/CC02SWD	5188.00
CC02SW/CC02SWD	CC01SW/CC01SWD	669.00
BG02SW/BG02SWD	CC01SW/CC01SWD	606.00
CC01SW/CC01SWD	SC05SW/SC05SWD	1345.00
SC05SW/SC05SWD	UT01SW/UT01SWD	580.00
SC05SW/SC05SWD	SC04SW/SC04SWD	574.00
UT01SW/UT01SWD	SC04SW/SC04SWD	112.50
SC04SW/SC04SWD	SC03SW/SC03SWD	2935.00
SC03SW/SC03SWD	SC02SW/SC02SWD	3256.00
SC02SW/SC02SWD	SC01SW/SC01SWD	2711.00

Table 3-4 Analytical Methods and Reporting Limits

Analyte	Method	Water Reporting Limit	Soil/Sediment Reporting Limit
Aluminum	ICP-AES	200 µg/L	20 mg/kg
Antimony	ICP-AES (Water) ICP-MS (Soil/Sediment)	60 µg/L	1 mg/kg
Arsenic	ICP-AES (Water) ICP-MS (Soil/Sediment)	10 µg/L	0.5 mg/kg
Barium	ICP-AES	200 µg/L	20 mg/kg
Beryllium	ICP-AES	5 µg/L	0.5 mg/kg
Cadmium	ICP-AES (Soil/Sediment) ICP-MS (Water)	1 µg/L	0.5 mg/kg
Calcium	ICP-AES	5000 µg/L	500 mg/kg
Chromium	ICP-AES	10 µg/L	1 mg/kg
Cobalt	ICP-AES	50 µg/L	5 mg/kg
Copper	ICP-AES (Soil/Sediment) ICP-MS (Water)	2 µg/L	2.5 mg/kg
Dissolved Sulfide	Standard Method SM-4500-S2-D	0.05 mg/L	X
Grain Size	ASTM D422	X	0.0001 grams
Hardness	ICP-AES	33 µg/L	NA
Iron	ICP-AES	100 µg/L	10 mg/kg
Lead	ICP-AES (Soil/Sediment) ICP-MS (Water)	1 µg/L	1 mg/kg
Low -Level Mercury	EPA 1631E	0.5 ng/L	X
Magnesium	ICP-AES	5000 µg/L	500 mg/kg
Manganese	ICP-AES	15 µg/L	1.5 mg/kg
Mercury	CVAA	0.2 µg/L	0.1 mg/kg
Mercury	EPA 7471B	X	0.10 mg/kg
Methyl Mercury	EPA 1630	0.05 ng/L	1.0 ng/kg
Nickel	ICP-AES	40 µg/L	4 mg/kg
Potassium	ICP-AES	5000 µg/L	500 mg/kg
Selenium	ICP-AES (Soil/Sediment) ICP-MS (Water)	5 µg/L	3.5 mg/kg
Silver	ICP-MS	1 µg/L	0.50 mg/kg
Sodium	ICP-AES	5000 µg/L	500 mg/kg
Sulfate	EPA 300.0	0.3 mg/L	X
Sulfide	EPA 9030B Modified	0.1 - 20 mg/L	X
Thallium	ICP-AES (Water) ICP-MS (Soil/Sediment)	25 µg/L	0.5 mg/kg
Total Organic Carbon	PSEP Method (Soil/Sediment) Standard Method 5310B (Water)	1.0 mg/L	500 mg/kg
Vanadium	ICP-AES	50 µg/L	5 mg/kg
Zinc	ICP-AES	60 µg/L	6 mg/kg

Key:

µg/L = micrograms per liter.
AES= Atomic Emission Spectrometer.
ICP = Inductively coupled argon plasma.
mg/kg = milligrams per kilogram.
mg/L = milligrams per liter.
MS = Mass spectrometric detection.
ng/kg = nnaograms per kilogram.
ng/L = nanograms per liter.
X = Samples were not analyzed for this parameter.

Table 5-1 Soil Screening Levels

Analyte Name	EPA Residential RML (mg/kg)	EPA Residential RSL (mg/kg)	Idaho IDTL (mg/kg)
Antimony	94	31	4.77
Arsenic	68	0.68	0.391
Barium	46000	15000	896
Beryllium	470	160	1.63
Cadmium	210	71	1.35
Chromium (III)	350000	120000	2130
Chromium (VI)	30	0.3	7.9
Cobalt	70	23	NA
Copper	9400	3100	921
Lead	400	400	49.6
Manganese	5500	1800	223
Mercury	33	11	0.00509
Methyl Mercury	23	7.8	NA
Nickel	4600	1500	59.1
Selenium	1200	390	2.03
Silver	1200	390	0.189
Thallium	2.3	0.78	1.55
Vanadium	1200	390	NA
Zinc	70000	NA	886

Source: EPA 2016c, 2016d.

Key:

EPA = United States Environmental Protection Agency.
IDTL = Initial Default Target Level.
mg/kg = milligrams per kilogram.
NA = Not applicable. There is no screening criteria for this analyte from this source.
RML = Removal Management Level.
RSL = Regional Screening Level.

Table 5-2 Surface Water Screening Levels

Analyte Name	Water Quality Criteria – Aquatic Life (µg/L)		Matrix	Note	Source
	CMC	CCC			
Antimony	NA	NA			
Arsenic	340	150	Dissolved		IDEQ
Barium	NA	NA			
Beryllium	NA	NA			
Cadmium	1.3	0.6	Dissolved	Hardness (1)	IDEQ
Chromium (III)	570	74	Dissolved	Hardness (1)	IDEQ
Chromium (VI)	16	11	Dissolved		IDEQ
Cobalt	NA	NA			
Copper	17	11	Dissolved	Hardness (1)	IDEQ
Lead	65	2.5	Dissolved	Hardness (1)	IDEQ
Manganese	NA	NA			
Mercury	1.4	0.012	Dissolved		EPA (CMC) IDEQ (CCC)
Methyl Mercury	NA	NA	Dissolved		
Nickel	470	52	Dissolved	Hardness (1)	IDEQ
Selenium	20	5	Total		IDEQ
Silver	3.4	NA	Dissolved	Hardness (1)	IDEQ
Thallium	NA	NA			
Vanadium	NA	NA			
Zinc	120	120	Dissolved	Hardness (1)	IDEQ

Note: (1) Aquatic life criteria for these metals are a function of total hardness (mg/L as calcium carbonate), the pollutants water effect ration (WER) as defined in Subsection 210.03.c.iii and multiplied by an appropriate dissolved conversion factor as defined in Subsection 210.02. For comparative purposes only, the example values displayed in this table are shown as dissolved metal and correspond to a total hardness of one hundred (100) mg/L and a water effect ration of one (1.0).

Key:

CCC = Criterion Continuous Concentration.
CMC = Criterion Maximum Concentration.
EPA = United States Environmental Protection Agency
IDEQ = Idaho Department of Environmental Quality
NA = Not applicable. There is no screening criteria for this analyte from this source.

Table 5-3 Sediment Screening Levels

Analyte Name	Avocet SQS (mg/kg)		MacDonald Consensus-Based TEC (mg/kg)
	SL1	SL2	
Aluminum	NA	NA	NA
Antimony	0.3	12	NA
Arsenic	14	120	9.79
Barium	NA	NA	NA
Beryllium	NA	NA	NA
Cadmium	2.1	5.4	0.99
Calcium	NA	NA	NA
Chromium	72	82	43.4
Cobalt	NA	NA	NA
Copper	400	1200	31.6
Irion	NA	NA	NA
Lead	360	>1300	35.8
Magnesium	NA	NA	NA
Manganese	NA	NA	NA
Mercury	0.66	0.8	0.18
Methyl Mercury	NA	NA	NA
Nickel	26	110	22.7
Potassium	NA	NA	NA
Selenium	11	>20	NA
Silver	0.58	1.7	NA
Thallium	NA	NA	NA
Vanadium	NA	NA	NA
Zinc	3200	>4200	121

Source: Avocet 2011, MacDonald 2000.

Key:
mg/kg = milligrams per kilogram.
NA = Not applicable. There is no screening criteria for this analyte from this source.
SQS = Sediment Quality Standard.
TEC = Threshold Effect Concentration.

Table 5-4 August 2016 Borrow Source Soil Samples Analytical Results Summary

EPA Sample ID CLP Sample ID Station Location Description	EPA Residential RML	EPA Residential RSL	16344244 MJHQP1 BG01SS Background	16344210 MJHQL6 BS01SS	16344211 MJHQM0 BS02SS	16344212 MJHQL9 BS03SS	16344213 MJHQL8 BS04SS	16344214 MJHQL7 BS05SS
				Barrow Source				
Target Analyte List Metals (mg/kg)								
Aluminum	NA	NA	**29200**	**11900**	**11800**	**10000**	**13900**	**9870**
Antimony	94	31	**1.5**	**46.7**	**81.5**	**61.1**	**74.2**	**83.2**
Arsenic	68	0.68	**51.3**	**222**	**320**	**267**	**194**	**399**
Barium	46000	15000	**86.7**	**62.3**	**65.6**	**58.2**	**120**	**68.1**
Beryllium	470	160	0.26 JQ (SQL = 0.72)	**0.56**	**0.67**	**0.62**	**0.61**	**0.64**
Cadmium	210	71	**0.53**	**1.5**	**2.4**	**1.8**	**1.4**	**2.7**
Calcium	NA	NA	**7980**	**16500**	**6210**	**11900**	**5920**	**8940**
Chromium	350000	120000	**31.3**	**27.4**	**28.7**	**23.2**	**28.5**	**24.5**
Cobalt	70	23	**13.2**	**18.6**	**17.3**	**13.1**	**21.3**	**15.8**
Copper	9400	3100	**13.0**	**20.3**	**20.9**	**16.7**	**27.8**	**24.4**
Iron	NA	NA	**23400**	**24000**	**25600**	**18400**	**24800**	**27000**
Lead	400	400	**6.7**	**3.6**	**4.3**	**7.5**	**5.5**	**3.8**
Magnesium	NA	NA	**34700**	**11500**	**7940**	**9870**	**7570**	**8960**
Manganese	5500	1800	**595 JL**	**720**	**620**	**617**	**934**	**869**
Mercury	33	11	**1.1**	**664**	**285**	**307**	**29.8**	**406**
Nickel	4600	1500	**18.9**	**27.3**	**30.3**	**22.2**	**27.2**	**31.8**
Potassium	NA	NA	**1150**	**3040**	**3770**	**2100**	**2710**	**2920**
Thallium	2.3	0.78	0.46 U	**2.4**	**1.7**	**2.2**	**1.5**	**7.5**
Vanadium	1200	390	**31.9**	**24.0**	**26.1**	**18.6**	**24.9**	**22.9**
Zinc	70000	NA	**38.6**	**28.2**	**34.6**	**24.8**	**37.1**	**34.2**
Methyl Mercury (ng/g)								
Methyl Mercury	23000	7800	**0.56**	**2.25**	**7.54**	**1.34**	**9.96**	**3.31**

Note: Bold type indicates the sample result is above the CRQL.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.

Key:

CLP = Contract Laboratory Program.
CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The associated value is an estimated quantity.
L = Low bias.
MDL = Method detection limit.
mg/kg = milligrams per kilogram.
MRL = Method Reporting Limit.
ng/g = nanograms per gram.
NA = Not applicable. There is no screening criteria for this analyte from this source.
Q = Detected concentration is below the MRL/CRQL but is above the MDL.
RML = Removal Management Level.
RSL = Regional Screening Level.
SQL = Sample Quantitation Limit.
U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the SQL or the sample detection limit.

Table 5-5 **August 2016 Tailings Pile Surface Soil Samples Analytical Results Summary**

EPA Sample ID	Residential	Residential	16344244	16344200	16344203	16344204	16344206	16344207	16344208	16344201	16344202	16344205	16344209
CLP Sample ID			MJHQP1	MJHQH0	MJHQH3	MJHQH4	MJHQH6	MJHQH7	MJHQH8	MJHQH1	MJHQH2	MJHQH5	MJHQH9
Station Location			BG01SS	TP01SS	TP04SS	TP05SS	TP07SS	TP08SS	TP09SS	TP02SS	TP03SS	TP06SS	RT01SS
Description			Background	Yellow Tailings			Red Tailings						Former Mill Building
Target Analyte List Metals (mg/kg)													
Aluminum	NA	NA	**29200**	**11400**	**2470**	**7790**	**6570**	**11600**	**9470**	**7150**	**11300**	**9440**	**7790**
Antimony	94	31	**1.5**	**27.8**	**43.4**	**45.8**	**34.5**	**14.3**	**18.6**	**72.0**	**20.1**	**32.2**	**63.7**
Arsenic	68	0.68	**51.3**	**396**	**1080**	**2440**	**2020**	**607**	**1440**	**702**	**561**	**563**	**433**
Barium	46000	15000	**86.7**	**74.6**	**84.6**	**179**	**72.1**	**66.0**	**77.2**	**110**	**84.1**	**72.6**	**68.5**
Beryllium	470	160	0.26 JQ (SQL = 0.72)	0.35 JQ	**1.6**	**1.5**	**0.70**	**1.1**	**1.1**	**1.0**	**1.1**	**1.1**	**0.64**
Cadmium	210	71	**0.53**	**3.0**	**8.4**	**20.2**	**13.5**	**4.4**	**10.4**	**6.4**	**3.3**	**4.3**	**3.6**
Calcium	NA	NA	**7980**	**17000**	**1210**	**1370**	**2180**	**1080**	**1080**	**941**	**952**	**1490**	**18200**
Chromium	350000	120000	**31.3**	**24.1**	**6.9**	**10.8**	**8.2**	**13.4**	**10.5**	**6.0**	**10.1**	**12.6**	**18.4**
Cobalt	70	23	**13.2**	**13.6**	**12.9**	**10.7**	**4.2**	**34.5**	**6.7**	**15.1**	**11.4**	**12.9**	**13.0**
Copper	9400	3100	**13.0**	**29.0**	**15.7**	**13.9**	**21.7**	**9.7**	**11.7**	**7.7**	**8.0**	**18.9**	**32.3**
Iron	NA	NA	**23400**	**28600**	**21200**	**23900**	**26700**	**14000**	**25500**	**15000**	**12700**	**15900**	**21800**
Lead	400	400	**6.7**	**12.3**	**10.4**	**9.6**	**5.0**	**7.3**	**5.8**	**5.7**	**6.3**	**8.6**	**29.7**
Magnesium	NA	NA	**34700**	**13300**	**772**	**933**	**877**	406 JQ	**534**	217 JQ	465 JQ	**581**	**13500**
Manganese	5500	1800	**595 JL**	**625 JL**	**731 JL**	**447 JL**	**128 JL**	**339 JL**	**304 JL**	**94.3 JL**	**377 JL**	**236 JL**	**568 JL**
Mercury	33	11	**1.1**	**402**	**975**	**562**	**107**	**15.1**	**60.0**	**16.2**	**51.1**	**21.6**	**381**
Nickel	4600	1500	**18.9**	**29.6**	**45.7**	**40.4**	**12.6**	**18.1**	**15.4**	**11.1**	**17.8**	**15.1**	**26.1**
Potassium	NA	NA	**1150**	**2770**	**758**	**1650**	**1870**	**2840**	**2690**	**3400**	**3580**	**3010**	**1810**
Thallium	2.3	0.78	0.46 U	**3.3**	**32.9**	**26.2**	**11.6**	**6.9**	**11.9**	**1.5**	**6.3**	**4.9**	**4.9**
Vanadium	1200	390	**31.9**	**23.1**	**9.6**	**12.6**	**7.1**	**13.7**	**12.5**	**5.9**	**10.3**	**10.9**	**19.5**
Zinc	70000	NA	**38.6**	**186**	**79.5**	**73.7**	**40.4**	**32.4**	**38.6**	**33.9**	**35.4**	**44.4**	**224**
Methyl Mercury (ng/g)													
Methyl Mercury	23000	7800	**0.56**	**2.94**	**1.57**	**1.14**	**0.63**	**0.42**	**1.28**	0.09 JQ	**0.47**	0.20 JQ	**0.7**

Note:
Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample result is significant as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.

Key:

CLP = Contract Laboratory Program.
CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The associated value is an estimated quantity.
L = Low bias.
MDL = Method Detection Limit.
mg/kg = milligrams per kilogram.
MRL = Method Reporting Limit.
NA = Not Applicable. There is no screening criteria for this analyte for this source.
ng/g = nanograms per gram.
Q = Detected concentration is below the MRL/CRQL but is above the MDL.
RML = Removal Management Level.
RSL = Regional Screening Level.
SQL = Sample Quantitation Limit.
U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the SQL or the sample detection limit.

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Table 5-6 August 2016 Ponded Water and Seep Surface Water Samples Analytical Results Summary

EPA Sample ID (Unfiltered) CLP Sample ID (Unfiltered) Station Location (Unfiltered) EPA Sample ID (Filtered) CLP Sample ID (Filtered) Station Location (Filtered)	Water Quality Criteria - Aquatic Life		16344286 MJHQE5 BG04SW 16344320 MJHQN3 BG04SWD	16344269 MJHQJ1 WT01SW 16344303 MJHQK0 WT01SWD	16344266 MJHQP2 AD04SW X X X
Description	**CMC**	**CCC**	**Background**	**Ponded Area**	**Seep Area**
Hardness (mg/L)					
Hardness (Unfiltered)	NA	NA	**34.0**	**117**	**58.1**
Hardness (Filtered)	NA	NA	**33.2**	**120**	X
Unfiltered Target Analyte List Metals (µg/L)					
Arsenic	NA	NA	9.0 JQ (SQL = 10)	**229**	**659**
Calcium	NA	NA	**7980**	**29500**	**15900**
Copper	NA	NA	**6.7**	**6.9**	**10.0**
Iron	NA	NA	100 U	**308**	**13400**
Lead			1.0 U	0.28 JQ	**1.8**
Magnesium	NA	NA	3420 JQ	**10400**	**4440**
Manganese	NA	NA	15 U	**47.4**	**459**
Filtered (0.45 micrometer) Target Analyte List Metals (µg/L)					
Arsenic	340	150	9.0 JQ (SQL = 10)	**193**	X
Calcium	NA	NA	**7620**	**30400**	X
Copper	Hardness Dependent		**6.4**	**7.4**	X
	CMC (hardness calculation):		*6.0*	*20.2*	*X*
	CCC (hardness calculation):		*4.4*	*13.3*	*X*
Iron	NA	NA	100 U	**101**	X
Magnesium	NA	NA	3430 JQ	**10800**	X
Manganese	NA	NA	15.0 U	**41.0**	X
Filtered (0.45 micrometer) Mercury (ng/L)					
Mercury	1400	12	**19.1***	**302**	X
Methyl Mercury	NA	NA	0.053 UJL *	**1.58 JL**	X

Note:
Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample result is elevated as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.
* This sample was not analyzed for these constituents. The results from sample BG03SW/BG03SWD are being used to evaluate significant/elevated concentrations.

Key:

µg/L = microgram per liter.
CCC = Criterion Continuous Concentration.
CLP = Contract Laboratory Program.
CMC = Criterion Maximum Concentration.
CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The associated value is an estimated quantity.
MDL = Method Detection Limit.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
ng/L = nanograms per liter.
Q = Detected concentrations is below the MRL/CRQL but is above the MDL.
SQL = Sample Quantitation Limit.
U = The material was analyzed for, but was not detected above the levels of the associated value. The associated value
X = The sample was not analyzed for this parameter.

Table 5-7 August 2016 Adit Surface Water Samples Analytical Results Summary

EPA Sample ID (Unfiltered) CLP Sample ID (Unfiltered) Station Location (Unfiltered) EPA Sample ID (Filtered) CLP Sample ID (Filtered) Station Location (filtered) Description	Water Quality Criteria - Aquatic Life		16344286 MJHQE5 BG04SW 16344320 MJHQN3 BG04SWD	16344256 MJHQM6 AD01SW 16344289 MJHQM4 AD01SWD	16344257 MJHQM7 AD02SW 16344290 MJHQM5 AD02SWD	16344258 MJHQM8 AD03SW 16344291 MJHQJ8 AD03SWD
	CMC	CCC	Background	Adit 1	Adit 2	Adit 3
Hardness (mg/L)						
Hardness (Unfiltered)	NA	NA	**34.0**	**93.5**	**35.1**	**46.1**
Hardness (Filtered)	NA	NA	**33.2**	**95.7**	**39.4**	**45.2**
Unfiltered Target Analyte List Metals (µg/L)						
Arsenic	NA	NA	9.0 JQ (SQL = 10)	**43.3**	**40.3**	**32.4**
Calcium	NA	NA	**7980**	**22700**	**9700**	**12600**
Copper	NA	NA	**6.7**	**6.2**	**6.6**	**6.8**
Magnesium	NA	NA	3420 JQ	**8950**	2650 JQ	3560 JQ
Filtered (0.45 micrometer) Target Analyte List Metals (µg/L)						
Arsenic	340	150	9.0 JQ (SQL = 10)	**45.5**	**48.0**	**26.0**
Calcium	NA	NA	**7620**	**22700**	**10700**	**12100**
Copper	Hardness Dependent		**6.4**	**6.4**	**6.4**	**6.5**
	CMC (hardness calculation)		*6.0*	*16.3*	*7.1*	*8.1*
	CCC (hardness calculation)		*4.4*	*10.9*	*5.1*	*5.8*
Magnesium	NA	NA	3430 JQ	**9480**	3090 JQ	3630 JQ
Filtered (0.45 micrometer) Mercury (ng/L)						
Mercury	1400	12	**19.1***	**68.9**	**39.1**	**35.1**
Methyl Mercury	NA	NA	0.053 UJL*	0.058 UJL	0.055 UJL	**0.129 JL**

Note: Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample is elevated as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.
* This sample was not analyzed for these constituents. The results from sample BG03SW/BG03SWD are being used to evaluate significant/elevated concentrations.

Key:

µg/L = microgram per liter.
CCC = Criterion Continuous Concentration.
CLP = Contract Laboratory Program.
CMC = Criterion Maximum Concentration.
CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The associated value is an estimated quantity.
MDL = Method Detection Limit.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.

Table 5-8 August 2016 West Fork Cinnabar Creek Surface Water Samples Analytical Results Summary

EPA Sample ID (Unfiltered)	Water Quality Criteria - Aquatic Life		16344286	16344265	16344264	16344263	16344262	16344261	16344260	16344259
CLP Sample ID (Unfiltered)			MJHQE5	MJHQP0	MJHQN9	MJHQL5	MJHQL4	MJHQL3	MJHQJ0	MJHQJ7
Station Location (Unfiltered)			BG04SW	WF07SW	WF06SW	WF05SW	WF04SW	WF03SW	WF02SW	WF01SW
EPA Sample ID (Filtered)			16344320	16344298	16344297	16344296	16344295	16344294	16344293	16344292
CLP Sample ID (Filtered)			MJHQN3	MJHQN7	MJHQN6	MJHQL2	MJHQL1	MJHQL0	MJHQJ9	MJHQJ8
Station Location (Filtered)			BG04SWD	WF07SWD	WF06SWD	WF05SWD	WF04SWD	WF03SWD	WF02SWD	WF01SWD
Description	CMC	CCC	Background	West Fork Cinnabar Creek						
Hardness (mg/L)										
Hardness (Unfiltered)	NA	NA	**34.0**	**124**	**86.8**	**79.5**	**76.9**	**75.7**	**94.9**	**100**
Hardness (Filtered)	NA	NA	**33.2**	**112**	**82.9**	**79.5**	**73.9**	**72.4**	**93.5**	**93**
Unfiltered Target Analyte List Metals (mg/L)										
Arsenic	NA	NA	9.0 JQ (10 SQL)	6.3 JQ	**20.3**	**19.9**	**20.8**	**21.4**	**27.9**	**28.7**
Calcium	NA	NA	**7980**	**35500**	**24100**	**22100**	**21300**	**21100**	**28700**	**30200**
Copper	NA	NA	**6.7**	**6.4**	**6.6**	**6.8**	**6.7**	**6.5**	**6.3**	**6.4**
Magnesium	NA	NA	3420 JQ	**8520**	**6470**	**5890**	**5750**	**5610**	**5670**	**6010**
Filtered (0.45 micrometer) Target Analyte List Metals (mg/L)										
Arsenic	340	150	9.0 JQ (10 SQL)	6.9 JQ	**17.9**	**20.2**	**20.2**	**19.7**	**27.6**	**27.0**
Calcium			**7620**	**31600**	**22900**	**22100**	**20500**	**20100**	**28200**	**28100**
Copper	Hardness Dependent		**6.4**	**6.1**	**6.6**	**6.7**	**6.6**	**6.7**	**6.5**	**7.0**
	CMC (hardness calculation)		*6.0*	*18.9*	*14.3*	*13.7*	*12.8*	*12.6*	*16.0*	*15.9*
	CCC (hardness calculation)		*4.4*	*12.5*	*9.7*	*9.3*	*8.8*	*8.6*	*10.7*	*10.7*
Magnesium	NA	NA	3430 JQ	**8060**	**6250**	**5940**	**5480**	**5390**	**5620**	**5570**
Filtered (0.45 micrometer) Mercury (ng/L)										
Mercury	1400	12	**19.1***	X	X	**97.9**	**79.5**	**79.3**	**74.2**	**70.5**
Methyl Mercury	NA	NA	0.053 UJL *	X	X	**0.0665 JL**	**0.0670 JL**	**0.100 JL**	0.056 UJL	0.056 UJL

Note: Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample is elevated as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.
* This sample was not analyzed for these constituents. The results from sample BG03SW/BG03SWD are being used to evaluate significant/elevated concentrations.

Key:

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CCC = Criterion Continuous Concentration.
CLP = Contract Laboratory Program.
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CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The associated value is an estimated quantity.
MDL = Method Detection Limit.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
ng/L = nanograms per liter.
Q = Detected concentrations is below the MRL/CRQL but is above the MDL.
SQL = Sample Quantitation Limit.
U = The material was analyzed for, but was not detected above the levels of the associated value. The associated value is either the SQL or the sample detection limit.
X = The sample was not analyzed for this parameter.

Table 5-9 August 2016 Cinnabar Creek Surface Water Samples Analytical Results Summary

EPA Sample ID (Unfiltered)	Water Quality Criteria - Aquatic Life		16344285	16344276	16344275	16344274	16344273	16344272
CLP Sample ID (Unfiltered)			MJHQJ6	MJHQJ5	MJHQJ4	MJHQG0	MJHQF9	MJHQF8
Station Location (Unfiltered)			BG03SW	CC05SW	CC04SW	CC03SW	CC02SW	CC01SW
EPA Sample ID (Filtered)			16344319	16344310	16344309	16344308	16344307	16344306
CLP Sample ID (Filtered)			MJHQE4	MJHQJ3	MJHQJ2	MJHQG8	MJHQG7	MJHQG6
Station Location (Filtered)			BG03SWD	CC05SWD	CC04SWD	CC03SWD	CC02SWD	CC01SWD
Description	CMC	CCC	Background	Cinnabar Creek				
Hardness (mg/L)								
Hardness (Unfiltered)	NA	NA	40.4	**70.3**	**68.9**	**71.1**	**73.3**	**75.3**
Hardness (Filtered)	NA	NA	**41.3**	**67.4**	**68.2**	**74.4**	**73.4**	**74.5**
Unfiltered Target Analyte List Metals (µg/L)								
Arsenic	NA	NA	10 U	**15.2**	**13.8**	**12.6**	9.4 JQ	**10.6**
Calcium	NA	NA	**12000**	**21200**	**20800**	**22300**	**22500**	**24100**
Copper	NA	NA	**6.9**	**6.4**	**6.8**	**6.6**	**6.8**	**6.5**
Filtered (0.45 micrometer) Target Analyte List Metals (µg/L)								
Arsenic	340	150	10 U	**13.0**	**12.5**	**12.0**	**11.2**	**10.0**
Calcium	NA	NA	**12100**	**20200**	**20500**	**23400**	**23500**	**23900**
Copper	Hardness Dependent		**7.1**	**6.7**	**6.8**	**6.5**	**6.4**	**6.6**
	CMC (hardness calculation)		*7.4*	*11.7*	*11.9*	*12.9*	*12.7*	*12.9*
	CCC (hardness calculation)		*5.3*	*8.1*	*8.2*	*8.8*	*8.7*	*8.8*
Filtered (0.45 micrometer) Mercury (ng/L)								
Mercury	1400	12	**19.1**	**35.9**	**39.0**	**36.7**	**27.5**	**26.9**
Methyl Mercury	NA	NA	0.053 UJL	0.051 UJL	0.051 UJL	0.050 UJL	**0.0618 JL**	**0.0777 JL**

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MDL = Method Detection Limit.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
ng/L = nanograms per liter.
Q = Detected concentrations is below the MRL/CRQL but is above the MDL.
SQL = Sample Quantitation Limit.
U = The material was analyzed for, but was not detected above the levels of the associated value. The associated value is either the SQL or the sample detection limit.

Table 5-10 August 2016 Sugar Creek Surface Water Samples Analytical Results Summary

EPA Sample ID (Unfiltered) CLP Sample ID (Unfiltered) Station Location (Unfiltered) EPA Sample ID (Filtered) CLP Sample ID (Filtered) Station Location (Filtered)	Water Quality Criteria - Aquatic Life		16344284 MJHQG3 BG02SW 16344318 MJHQG9 BG02SWD	16344282 MJHQG2 SC05SW 16344316 MJHQG5 SC05SWD	16344283 MJHQN8 UT01SW 16344317 MJHQN5 UT01SWD	16344281 MJHQG1 SC04SW 16344315 MJHQG4 SC04SWD	16344280 MJHQE8 SC03SW 16344314 MJHQF1 SC03SWD	16344279 MJHQE7 SC02SW 16344313 MJHQF0 SC02SWD	16344278 MJHQE6 SC01SW 16344312 MJHQE9 SC01SWD
Description	CMC	CCC	Background	Sugar Creek	Attribution	Sugar Creek			
Hardness (mg/L)									
Hardness (Unfiltered)	NA	NA	**39.1**	**53.9**	**56.2**	**53.9**	**52.3**	**52.5**	**51.9**
Hardness (Filtered)	NA	NA	**38.4**	**52.5**	**54.9**	**52.9**	**50.2**	**51.9**	**54.2**
Unfiltered Target Analyte List Metals (µg/L)									
Arsenic	NA	NA	10.0 U	4.0 JQ	**13.3**	3.7 JQ	5.6 JQ	4.8 JQ	5.8 JQ
Calcium	NA	NA	**13900**	**18200**	**19700**	**18200**	**17700**	**17600**	**17100**
Copper	NA	NA	**6.3**	**6.5**	**6.4**	**6.6**	**6.5**	**6.4**	**6.5**
Filtered (0.45 micrometer) Target Analyte List Metals (µg/L)									
Arsenic	340	150	10.0 U	3.3 JQ	**13.8**	4.0 JQ	5.1 JQ	5.9 JQ	7.4 JQ
Calcium	NA	NA	**13900**	**17700**	**19200**	**17800**	**16700**	**17200**	**17700**
Copper	Hardness Dependent		**6.5**	**6.4**	**6.6**	**6.4**	**6.7**	**6.6**	**6.5**
	CMC (hardness calculation)		*6.9*	*9.3*	*9.7*	*9.3*	*8.9*	*9.2*	*9.6*
	CCC (hardness calculation)		*5.0*	*6.5*	*6.8*	*6.6*	*6.3*	*6.5*	*6.7*
Filtered (0.45 micrometer) Mercury (ng/L)									
Mercury	1400	12	0.573 U	**7.93**	X	**8.62**	**11.0**	**9.24**	X
Methyl Mercury	NA	NA	0.051 UJL	0.051 UJL	X	**0.121 JL**	**0.127 JL**	**0.146 JL**	X

Note: Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample is elevated as defined in Section 7.
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ID = Identification.
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MDL = Method Detection Limit.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
ng/L = nanograms per liter.
Q = Detected concentrations is below the MRL/CRQL but is above the MDL.
SQL = Sample Quantitation Limit.
U = The material was analyzed for, but was not detected above the levels of the associated value. The associated value is either the SQL or the sample detection limit.
X = The sample was not analyzed for this parameter.

Table 5-11 September 2016 EPA Surface Water Samples Analytical Results

EPA Sample ID (Unfiltered)	Water Quality Criteria - Aquatic Life		16384155	16384152	16384153	16384154	16384151	16384150
Station Location (Unfiltered)			WF05SW	WF04SW	WF03SW		BG02SW	SC01SW
EPA Sample ID (Filtered)			16384162	16384159	16384160	16384161	16384158	16384157
Station Location (Filtered)			WF05SWD	WF04SWD	WF03SWD		BG02SWD	SC01SWD
Description	CMC	CCC	West Fork Cinnabar Creek				Background	Sugar Creek
Unfiltered Mercury (ng/L)								
Mercury	NA	NA	**151**	**320**	**143**	**171**	0.665 U	**25.7**
Methyl Mercury	NA	NA	**0.0956 JL**	**0.0777 JL**	**0.0832 JL**	**0.0939 JL**	0.054 UJL	**0.114 JL**
Filtered (0.45 micrometer) Mercury (ng/L)								
Mercury	1400	12	**43.7**	**40.2**	**39.9**	**39.4**	0.646 U	**7.43**
Methyl Mercury	NA	NA	0.0629 UJL	0.0752 UJL	0.0624 UJL	0.0682 UJL	0.054 UJL	**0.107 JL**

Note: Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample is elevated as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.

Key:

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CLP = Contract Laboratory Program.
CMC = Criterion Maximum Concentration.
CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The associated value is an estimated quantity.
MDL = Method Detection Limit.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
ng/L = nanograms per liter.
U = The material was analyzed for, but was not detected above the levels of the associated value. The associated value is either the SQL or the sample detection limit.

Table 5-12 August 2016 Ponded Water Sediment Sample Analytical Results Summary

EPA Sample ID CLP Sample ID Station Location Description	Avocet SQS		MacDonald Consensus-Based TEC	16344247 MJHQM9 BG04SD Background	16344229 MJHQK3 WT01SD Ponded Area
	SL1	SL2			
Target Analyte List Metals (mg/kg)					
Aluminum	NA	NA	NA	**4310**	**4290**
Antimony	0.3	12	NA	**6.4**	**36.4**
Arsenic	14	120	9.79	**92.3**	**1570**
Barium	NA	NA	NA	**39.6**	**61.1**
Beryllium	NA	NA	NA	**0.66**	**2.3**
Cadmium	2.1	5.4	0.99	**0.78**	**13.0**
Calcium	NA	NA	NA	**6990**	**2480**
Chromium	72	82	43.4	**8.1**	**15.6**
Cobalt	NA	NA	NA	2.2 JQ (SQL = 5.0)	**7.8**
Copper	400	1200	31.6	**13.8**	**21.7**
Iron	NA	NA	NA	**6460**	**33700**
Lead	360	>1300	35.8	**3.6**	**11.2**
Magnesium	NA	NA	NA	**2340**	**884**
Manganese	NA	NA	NA	**245**	**422 JL**
Mercury	0.66	0.8	0.18	**4.6**	**491**
Nickel	26	110	22.7	**21.1**	**66.3**
Potassium	NA	NA	NA	**718**	**1130**
Thallium	NA	NA	NA	**1.5**	**36.1**
Vanadium	NA	NA	NA	**8.4**	**19.0**
Zinc	3200	>4200	121	**19.2**	**148**
Methyl Mercury (ng/g)					
Methyl Mercury	NA	NA	NA	**11.1**	**17.7**
Total Organic Carbon (mg/kg)					
Total Organic Carbon	NA	NA	NA	**100000 JK**	**30000**
Grain Size (Percent)					
Gravel, Medium	NA	NA	NA	3.28	5.11
Gravel, Fine	NA	NA	NA	5.68	1.55
Sand, Very Coarse	NA	NA	NA	14.98	2.21
Sand, Coarse	NA	NA	NA	16.27	1.24
Sand, Medium	NA	NA	NA	12.13	0.66
Sand, Fine	NA	NA	NA	13.68	1.26
Sand, Very Fine	NA	NA	NA	3.53	1.16
Silt	NA	NA	NA	19.61	68.28
Clay	NA	NA	NA	1.31	21.66

Note:
Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample result is elevated as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.

Key:

CLP = Contract Laboratory Program.
CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The associated value is an estimated quantity.
L = Low bias.
MDL = Method Detection Limit.
mg/kg = milligrams per kilogram.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
ng/g = nanograms per gram.
Q = Detected concentration is below the MRL/CRQL but is above the MDL.
SQL = Sample Quantitation Limit.
SQS = Sediment Quality Standard.
TEC = Threshold Effect Concentration.

Table 5-13 August 2016 Adit Sediment Samples Analytical Results Summary

EPA Sample ID CLP Sample ID Station Location Description	Avocet SQS		MacDonald Consensus-Based TEC	16344247 MJHQM9 BG04SD Background	16344216 MJHQE0 AD01SD Adit 1	16344217 MJHQM1 AD02SD Adit 2	16344218 MJGQM2 AD03SD Adit 3
	SL1	SL2					
Target Analyte List Metals (mg/kg)							
Aluminum	NA	NA	NA	**4310**	**8440**	**3590**	**5940**
Antimony	0.3	12	NA	**6.4**	**9.1**	**56.2**	**70.7**
Arsenic	14	120	9.79	**92.3**	**2440**	**158**	**464**
Barium	NA	NA	NA	**39.6**	**109**	**37.7**	**70.5**
Beryllium	NA	NA	NA	**0.66**	**3.4**	0.41 JQ	**0.78**
Cadmium	2.1	5.4	0.99	**0.78**	**18.2**	**1.7**	**3.9**
Calcium	NA	NA	NA	**6990**	**9390**	**2110**	**2110**
Chromium	72	82	43.4	**8.1**	**20.9**	**10.9**	**16.2**
Cobalt	NA	NA	NA	2.2 JQ (SQL = 5.0)	**38.1**	**14.8**	**14.1**
Copper	400	1200	31.6	**13.8**	**25.0**	**33.9**	**15.1**
Iron	NA	NA	NA	**6460**	**40300**	**10900**	**23500**
Lead	360	>1300	35.8	**3.6**	**7.7**	**2.1**	**35.0**
Magnesium	NA	NA	NA	**2340**	**9790**	**2340**	**3310**
Manganese	NA	NA	NA	**245**	**1820**	**306**	**512**
Mercury	0.66	0.8	0.18	**4.6**	**206**	**1600**	**227**
Nickel	26	110	22.7	**21.1**	**57.2**	**16.1**	**20.5**
Potassium	NA	NA	NA	**718**	**1610**	**1130**	**1650**
Selenium	11	>20	NA	2.4 JQ	**4.1 JL**	0.49 JQ	0.93 JQ
Thallium	NA	NA	NA	**1.5**	**15.7**	**3.9**	**4.1**
Vanadium	NA	NA	NA	**8.4**	**22.5**	**8.3**	**18.5**
Zinc	3200	>4200	121	**19.2**	**115**	**20.7**	**115**
Methyl Mercury (ng/g)							
Methyl Mercury	NA	NA	NA	**11.1**	**48.9**	**0.75**	**4.56**
Total Organic Carbon (mg/kg)							
Total Organic Carbon	NA	NA	NA	**100000 JK**	**97000**	**3040**	**6920**
Percent Solids (percentage)							
Gravel, Medium	NA	NA	NA	3.28	0.18	34.70	17.01
Gravel, Fine	NA	NA	NA	5.68	0.79	21.35	27.78
Sand, Very Coarse	NA	NA	NA	14.98	1.15	18.77	18.02
Sand, Coarse	NA	NA	NA	16.27	3.23	12.74	10.52
Sand, Medium	NA	NA	NA	12.13	5.08	7.08	7.07
Sand, Fine	NA	NA	NA	13.68	8.29	6.24	8.67
Sand, Very Fine	NA	NA	NA	3.53	2.66	0.99	2.57
Silt	NA	NA	NA	19.61	54.69	1.60	9.02
Clay	NA	NA	NA	1.31	16.43	0.23	3.19

Note:
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Underline type indicates the sample result is elevated as defined in Section 7.
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Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.

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mg/kg = milligrams per kilogram.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
ng/g = nanograms per gram.
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SQL = Sample Quantitation Limit.
SQS = Sediment Quality Standard.
TEC = Threshold Effect Concentration.

Table 5-14 August 2016 West Fork Cinnabar Creek Sediment Samples Analytical Results Summary

EPA Sample ID	Avocet SQS		MacDonald Consensus-Based TEC	16344247	16344225	16344224	16344223	16344222	16344221	16344220	16344219
CLP Sample ID				MJHQ1M9	MJHQN2	MJHQN1	MJHQK9	MJHQK8	MJHQK7	MJHQK2	MJHQK1
Station Location				BG04SD	WF07SD	WF06SD	WF05SD	WF04SD	WF03SD	WF02SD	WF01SD
Description	SL1	SL2		Background	West Fork Cinnabar Creek						
Target Analyte List Metals (mg/kg)											
Aluminum	NA	NA	NA	**4310**	**5860**	**5400**	**5350**	**2390**	**5750**	**4110**	**3390**
Antimony	0.3	12	NA	**6.4**	**24.5**	**17.2**	**25.2**	**31.9**	**19.3**	**25.5**	**19.3**
Arsenic	14	120	9.79	**92.3**	**238**	**195**	**152**	**167**	**245**	**223**	**86.9**
Barium	NA	NA	NA	**39.6**	**209**	**58.5**	**44.3**	**235**	**38.2**	**245**	**51.8**
Beryllium	NA	NA	NA	**0.66**	**0.86**	0.40 JQ	0.37 JQ	0.25 JQ	**0.45**	0.37 JQ	0.28 JQ
Cadmium	2.1	5.4	0.99	**0.78**	**2.4**	**1.3**	**1.9**	**0.89**	**2.2**	**1.6**	**1.5**
Calcium	NA	NA	NA	**6990**	**7940**	**1680**	**1410**	**11200**	**9460**	**12400**	**7230**
Chromium	72	82	43.4	**8.1**	**13.6**	**5.0**	**8.8**	**2.2**	**12.5**	**5.7**	**5.7**
Cobalt	NA	NA	NA	2.2 JQ (SQL = 5.0)	**36.5**	**27.8**	**5.1**	**507**	**5.6**	**19.5**	4.3 JQ
Copper	400	1200	31.6	**13.8**	**23.5**	**15.8**	**7.8**	**7.7**	**9.9**	**7.0**	**5.8**
Iron	NA	NA	NA	**6460**	**18500**	**5700**	**14700**	**4980**	**18900**	**8370**	**9200**
Lead	360	>1300	35.8	**3.6**	**7.7**	**3.3**	**4.1**	**63.4**	**2.9**	**3.0**	**1.7**
Magnesium	NA	NA	NA	**2340**	**6270**	**725**	**3320**	**6200**	**5570**	**4380**	**2270**
Manganese	NA	NA	NA	**245**	**1330 JL**	**356 JL**	**245 JL**	**1560 JL**	**329 JL**	**979**	**122**
Mercury	0.66	0.8	0.18	**4.6**	**99.5**	**6.8**	**85.2**	**131**	**46.5**	**11.0**	**37.6**
Nickel	26	110	22.7	**21.1**	**31.3**	**10.3**	**12.2**	**192**	**14.7**	**11.3**	**9.6**
Potassium	NA	NA	NA	**718**	**1590**	**1370**	**1080**	**403**	**1270**	**964**	**949**
Thallium	NA	NA	NA	**1.5**	**2.8**	**0.73**	**1.1**	**0.74**	**6.4**	**0.80**	**0.63**
Vanadium	NA	NA	NA	**8.4**	**14.5**	**5.1**	**9.9**	**5.9**	**11.9**	**8.3**	**6.1**
Zinc	3200	>4200	121	**19.2**	**30.6**	**30.6**	**34.5**	**29.2**	**38.5**	**24.0**	**27.2**
Methyl Mercury (ng/g)											
Methyl Mercury	NA	NA	NA	**11.1**	**2.60**	**1.39**	0.25 JQ	**3.02**	0.19 JQ	**1.57**	**0.84**
Total Organic Carbon (mg/kg)											
Total Organic Carbon	NA	NA	NA	**100000 JK**	**9210**	**9280**	**6450**	**5850**	**10300**	**5970**	**6730**
Percent Solids (percentage)											
Gravel, Medium	NA	NA	NA	3.28	18.88	21.84	26.49	31.10	27.61	34.10	26.63
Gravel, Fine	NA	NA	NA	5.68	14.66	29.05	26.36	33.96	35.27	28.63	36.22
Sand, Very Coarse	NA	NA	NA	14.98	16.10	22.34	15.47	18.36	17.24	21.50	22.44
Sand, Coarse	NA	NA	NA	16.27	16.33	13.76	11.21	7.51	8.31	13.66	11.8
Sand, Medium	NA	NA	NA	12.13	11.17	7.27	7.35	2.80	4.31	5.07	5.58
Sand, Fine	NA	NA	NA	13.68	10.27	5.53	5.94	1.81	4.31	2.76	3.61
Sand, Very Fine	NA	NA	NA	3.53	2.92	0.95	1.61	0.34	1.23	0.43	0.63
Silt	NA	NA	NA	19.61	8.29	1.65	4.44	1.04	3.05	0.84	1.33
Clay	NA	NA	NA	1.31	1.46	0.3	0.51	0.06	0.19	0.11	0.06

Note:
Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample result is elevated as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.

Key:

CLP = Contract Laboratory Program.
CRQL = Contract Required Quantitation Limit.
EPA = United States Environmental Protection Agency.
ID = Identification.
J = The associated value is an estimated quantity.
MDL = Method Detection Limit.
mg/kg = milligrams per kilogram.
MRL = Method Reporting Limit.
NA = Not applicable. There is no screening criteria for this analyte from this source.
ng/g = nanograms per gram.
Q = Detected concentration is below the MRL/CRQL but is above the MDL.
SQL = Sample Quantitation Limit.
SQS = Sediment Quality Standard.
TEC = Threshold Effect Concentration.

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Table 5-15 August 2016 Cinnabar Creek Sediment Samples Analytical Results Summary

EPA Sample ID CLP Sample ID Station Location Description	Avocet SQS		MacDonald Consensus-Based TEC	16344246 MJHQK6 BG03SD Background	16344236 MJHQK5 CC05SD	16344235 MJHQK4 CC04SD	16344234 MJHQF4 CC03SD	16344233 MJHQF3 CC02SD	16344232 MJHQF2 CC01SD
	SL1	SL2			Cinnabar Creek				
Target Analyte List Metals (mg/kg)									
Aluminum	NA	NA	NA	**12300**	**5780**	**8230**	**5630**	**2150**	**5340**
Antimony	0.3	12	NA	1.5 U	**14.3**	**14.7**	**9.5**	**9.6**	**10.1**
Arsenic	14	120	9.79	**46.6**	**50.7**	**135**	**98.4**	**102**	**113**
Barium	NA	NA	NA	**64.6**	**41.5**	**68.4**	**43.0**	**34.5**	**66.0**
Beryllium	NA	NA	NA	**0.76**	0.43 JQ	0.54 JQ	0.29 JQ	0.21 JQ	0.27 JQ
Cadmium	2.1	5.4	0.99	0.63 JQ (SQL = 0.76)	**2.6**	**1.6**	**1.0**	**1.1**	**1.0**
Calcium	NA	NA	NA	**4090**	**5820**	**5610**	**4040**	**1310**	**3680**
Chromium	72	82	43.4	**19.4**	**9.3**	**13.8**	**8.9**	**3.3**	**8.3**
Cobalt	NA	NA	NA	**55.5**	**41.7**	**25.6**	**11.9**	**5.4**	**9.5**
Copper	400	1200	31.6	**26.4**	**11.0**	**13.9**	**8.3**	**2.7**	**7.5**
Iron	NA	NA	NA	**15800**	**15200**	**16100**	**10800**	**7790**	**10600**
Lead	360	>1300	35.8	**3.9**	**3.1**	**3.3**	**4.7**	**0.95**	**3.2**
Magnesium	NA	NA	NA	**4290**	**3250**	**5150**	**3650**	**670**	**2930**
Manganese	NA	NA	NA	**528**	**358**	**330**	**187 JL**	**67.2 JL**	**211 JL**
Mercury	0.66	0.8	0.18	**2.7**	**13.2**	**468**	**223**	**3.9**	**64.7**
Nickel	26	110	22.7	**69.1**	**32.5**	**34.8**	**20.6**	**7.1**	**14.1**
Potassium	NA	NA	NA	**866**	**959**	**1820**	**1120**	**626**	**1250**
Thallium	NA	NA	NA	**1.4**	0.67 U	**1.4**	**1.7**	**2.5**	**1.1**
Vanadium	NA	NA	NA	**28.1**	**13.7**	**16.0**	**10.0**	3.8 JQ	**9.2**
Zinc	3200	>4200	121	**108**	**48.6**	**61.0**	**28.2**	**10.3**	**22.7**
Methyl Mercury (ng/g)									
Methyl Mercury	NA	NA	NA	**1.52**	**1.02**	**2.75**	**2.26**	**3.95**	**1.23**
Total Organic Carbon (mg/kg)									
Total Organic Carbon	NA	NA	NA	**31000**	**7170**	**6440**	**4990**	**2310**	**4180**
Percent Solids (percentage)									
Gravel, Medium	NA	NA	NA	37.60	40.89	15.59	0.54	37.45	11.67
Gravel, Fine	NA	NA	NA	23.97	27.07	11.48	14.19	28.90	19.72
Sand, Very Coarse	NA	NA	NA	18.54	18.35	15.97	16.81	19.23	12.61
Sand, Coarse	NA	NA	NA	8.17	9.83	18.94	15.77	9.52	22.38
Sand, Medium	NA	NA	NA	6.05	4.72	16.63	19.87	4.09	19.54
Sand, Fine	NA	NA	NA	7.13	2.57	13.77	25.35	1.49	11.72
Sand, Very Fine	NA	NA	NA	1.98	0.40	1.71	3.83	0.13	1.87
Silt	NA	NA	NA	4.52	0.83	2.2	3.92	0.27	2.29
Clay	NA	NA	NA	0.28	0.04	0.28	0.58	0.07	0.15

Note: Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample result is elevated as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.

Key:

CLP =	Contract Laboratory Program.
CRQL =	Contract Required Quantitation Limit.
EPA =	United States Environmental Protection Agency.
ID =	Identification.
J =	The associated value is an estimated quantity.
L =	Low bias.
MDL =	Method Detection Limit.
mg/kg =	milligrams per kilogram.
MRL =	Method Reporting Limit.
NA =	Not applicable. There is no screening criteria for this analyte from this source.
ng/g =	nanograms per gram.
Q =	Detected concentration is below the MRL/CRQL but is above the MDL.
SQL =	Sample Quantitation Limit.
SQS =	Sediment Quality Standard.
TEC =	Threshold Effects Concentration.

Table 5-16 August 2016 Sugar Creek Sediment Samples Analytical Results Summary

EPA Sample ID	Avocet SQS		MacDonald Consensus-Based TEC	16344245	16344242	16344243	16344241	16344240	16344239	16344238
CLP Sample ID				MJHQF7	MJHQF6	MJHQN0	MJHQF5	MJHQE3	NJHQE2	MJHQE1
Station Location				BG02SD	SC05SD	UT01SD	SC04SD	SC03SD	SC02SD	SC01SD
Description	SL1	SL2		Background	Sugar Creek	Attribution	Sugar Creek			
Target Analyte List Metals (mg/kg)										
Aluminum	NA	NA	NA	**3690**	**3940**	**4620**	**12000**	**9770**	**5080**	**2320**
Antimony	0.3	12	NA	0.94 U	**6.8**	**6.3**	**6.8**	**5.3**	**2.5**	**3.3**
Arsenic	14	120	9.79	**7.3**	**20.1**	**53.9**	**64.1**	**53.0**	**33.3**	**55.8**
Barium	NA	NA	NA	**24.4**	**30.6**	**36.3**	**103**	**62.5**	**36.5**	**21.8**
Cadmium	2.1	5.4	0.99	0.51 U	0.14 JQ	**0.75**	**1.3**	0.32 JQ	0.28 JQ	0.16 JQ
Calcium	NA	NA	NA	**1010**	**1190**	**5520**	**4610**	**3070**	**1420**	**653**
Chromium	72	82	43.4	**3.3**	**6.5**	**6.4**	**19.8**	**14.3**	**6.1**	**2.7**
Cobalt	NA	NA	NA	1.5 JQ (SQL = 7.2)	2.3 JQ	3.3 JQ (SQL = 6.3)	**11.7**	**7.0**	3.4 JQ	1.4 JQ
Copper	400	1200	31.6	1.8 JQ	1.8 JQ	**4.3**	**11.0**	**5.2**	**3.2**	1.4 JQ
Iron	NA	NA	NA	**7420**	**8690**	**9150**	**21100**	**13800**	**9510**	**4990**
Lead	360	>1300	35.8	**6.4**	**4.3**	**5.1**	**7.0**	**4.9**	**3.5**	**3.2**
Magnesium	NA	NA	NA	**904**	**1490**	**3540**	**6420**	**5280**	**2090**	**773**
Manganese	NA	NA	NA	**159**	**185**	**119 JL**	**469**	**147**	**128**	**125**
Mercury	0.66	0.8	0.18	0.094 U	**0.48**	**71.5**	**128**	**33.7**	**10.3**	**8.8**
Nickel	26	110	22.7	2.2 JQ (SQL = 5.8)	2.6 JQ	4.9 JQ (SQL = 5.0)	**16.5**	**10.8**	**4.5**	1.7 JQ
Potassium	NA	NA	NA	**929**	**890**	**940**	**2130**	**1650**	**1120**	**697**
Vanadium	NA	NA	NA	4.6 JQ (SQL = 7.2)	**7.0**	**7.1**	**20.7**	**14.9**	**8.0**	3.8 JQ
Zinc	3200	>4200	121	**26.0**	**23.1**	**20.2**	**51.5**	**39.5**	**26.2**	**12.8**
Methyl Mercury (ng/g)										
Methyl Mercury	NA	NA	NA	0.4 U	0.4 U	**15.0**	**2.55**	0.15 JQ	0.17 JQ	0.4 U
Total Organic Carbon (mg/kg)										
Total Organic Carbon	NA	NA	NA	**1120**	**2560**	**13200**	**13500**	**6660**	**1530**	**1250**
Percent Solids (percentage)										
Gravel, Medium	NA	NA	NA	21.92	6.58	20.61	1.67	27.96	0.87	12.59
Gravel, Fine	NA	NA	NA	29.27	37.51	14.78	2.24	18.05	1.59	28.76
Sand, Very Coarse	NA	NA	NA	37.32	42.67	7.21	5.45	17.11	17.26	39.48
Sand, Coarse	NA	NA	NA	12.71	9.23	9.67	11.59	4.07	43.02	15.81
Sand, Medium	NA	NA	NA	1.63	2.94	12.81	24.86	3.88	24.40	2.92
Sand, Fine	NA	NA	NA	0.37	1.75	15.83	36.98	20.55	11.59	0.96
Sand, Very Fine	NA	NA	NA	0.04	0.19	3.12	7.20	6.53	1.26	0.12
Silt	NA	NA	NA	0.03	0.58	5.66	6.26	5.53	1.56	0.09
Clay	NA	NA	NA	0.06	0.05	0.77	1.82	0.66	0.22	0.03

Note: Bold type indicates the sample result is above the CRQL.
Underline type indicates the sample result is elevated as defined in Section 7.
Yellow highlight indicates the sample result exceeds the most conservative (i.e., lowest) screening level.
Orange highlight indicates the sample result also exceeds the least conservative (i.e., highest) screening level.

Key:

CLP =	Contract Laboratory Program.
CRQL =	Contract Required Quantitation Limit.
EPA =	United States Environmental Protection Agency.
ID =	Identification.
J =	The associated value is an estimated quantity.
MDL =	Method Detection Limit.
mg/kg =	milligrams per kilogram.
MRL =	Method Reporting Limit.
NA =	Not applicable. There is no screening criteria for this analyte from this source.
ng/g =	nanograms per gram.
Q =	Detected concentration is below the MRL/CRQL but is above the MDL.
SQL =	Sample Quantitation Limit.
SQS =	Sediment Quality Standard
TEC =	Threshold Effect Concentration.
U =	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the SQL or the sample detection limit.

Table 9-1 Soil Sample Screening Level Summary Table

		Background	Borrow Source (Table 5-4)	Tailings (Table 5-5)
	No. of Samples	**1**	**5**	**10**
Arsenic	> RSL	1	5	10
	> RML	0	5	10
Mercury	> RSL	0	5	10
	> RML	0	4	7
Methyl Mercury	> RSL	0	0	0
	> RML	0	0	0

Key:

> = Above.
No. = Number.
RML = Removal Management Level.
RSL = Regional Screening Level.

Table 9-2 Surface Water Sample Screening Level Summary

		Background	Ponded Water (Table 5-6)	Adits (Table 5-7)	West Fork Cinnabar Creek (Table 5-8)	Cinnabar Creek (Table 5-9)	Sugar Creek (Table 5-10)	September West Fork (Table 5-11)	September Cinnabar Creek (Table 5-11)
	No. of Samples	4	1	3	5 to 7	5	4 to 6	4	1
Filtered Arsenic	> CCC	0	1	0	0	0	0	X	X
	> CMC	0	0	0	0	0	0	X	X
Filtered Mercury	> CCC	2	1	3	5 of 5	5	0 of 4	4	0
	> CMC	0	0	0	5 of 5	0	0 of 4	0	0
Filtered Methylmercury	> CCC	NA	NA	NA	NA	NA	NA	NA	NA
	> CMC	NA	NA	NA	NA	NA	NA	NA	NA

Key:

> = Above.
CCC = Criterion Continuous Concentration.
CMC = Criterion Maximum Concentration.
NA = There is no applicalble screening level for this analyte.
No. = Number.
X = The sample was not analyzed for this parameter.

Table 9-3 Sediment Screening Level Sample Summary

		Background	Ponded Area (Table 5-12)	Adit (Table 5-13)	West Fork Cinnabar Creek (Table 5-14)	Cinnabar Creek (Table 5-15)	Sugar Creek (Table 5-16)
	No. of Samples	**4**	**1**	**3**	**7**	**5**	**5**
Arsenic	> SQL SL1	2	1	3	7	5	5
	> SQS SL2	0	1	3	6	1	0
	> TEC	3	1	3	7	5	5
Mercury	> SQS SL1	3	1	3	7	5	5
	> SQS SL2	3	1	3	7	5	5
	> TEC	3	1	3	7	5	1
Methylmercury	> SQL SL1	NA	NA	NA	NA	NA	NA
	> SQS SL2	NA	NA	NA	NA	NA	NA
	> TEC	NA	NA	NA	NA	NA	NA

Key:

> Above.
NA = There is no applicable screening level for this analyte.
No. = Number.
SQS SL1 = Sediment Quality Standard Screening Level 1.
SQS SL2 = Sediment Quality Standard Screening Level 2.
TEC = Threshold Effect Concentration.

Table 9-4 Summary of Removal Action Alternatives

Removal Alternative	Key Advantage	Key Disadvantage	Estimated Cost
A1 – Engineered Soil Media and Vegetative Cover	▪ Cost-effective source control for tailings runoff; ▪ Reduces runoff velocities and volume; ▪ Avoids the need to import and spread topsoil; and ▪ Does not require mobilization and use of any heavy machinery.	▪ Does not address potential contaminant migration pathways occurring in the subsurface; ▪ May contribute to dissolved inorganic mercury mobilization and methylmercury production; ▪ Possible uptake of metals in plants that may be consumed by wildlife; and, ▪ The success of long-term vegetation establishment under site conditions remains uncertain.	$144,000
A2 – Selective Grading and Vegetative Buffer Strips	▪ Filters tailings from runoff before it reaches the stream; ▪ Willows provide shade which may improve stream temperatures; and ▪ Reduces runoff velocities and volume. ▪ Reduces methylmercury production from the ponded area on the tailings	▪ Short-term water quality impacts due to road construction and excavation near the stream; and ▪ Does not address potential contaminant migration pathways occurring in the subsurface.	$262,000
A3 – Tailings Consolidation and Stream Relocation	▪ Reduces contributing area and sediment load from tailings runoff; and ▪ Creates larger riparian buffer area to filter runoff before reaching the stream.	▪ Short-term water quality and fish habitat impacts due to road construction and excavation near the stream; ▪ Does not address potential contaminant migration pathways occurring in the subsurface; and ▪ High costs.	$1,047,000
A4 – Full-Scale Removal	▪ Complete removal of contaminant sources	▪ Short-term water quality and fish habitat impacts due to road construction and excavation near the stream; and ▪ High cost.	$2,604,000

The costs include estimates for capital costs using unit rates provided by R. S. Means 2017 and engineering estimates based on volume calculations and production rates from similar projects. Since O&M costs were not included, the net present value of capital was not calculated. The cost estimate assumes that construction starts this year and does not account for a delayed starting period.

A Sample Plan Alteration Form

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

OFFICE OF ENVIRONMENTAL CLEANUP
EMERGENCY MANAGEMENT PROGRAM

Site Specific Sampling Plan Alteration Form

Project Name: Cinnabar Mine Site ID: 101T

Author: Renee Nordeen Company: Ecology & Environment, Inc.

Changes from Final SSSP (include rationale, decision area, matrices, parameters, equipment, personnel, etc.:

1. **Tailings Piles:** Up to 6 shallow groundwater samples were planned. No groundwater samples were collected due to time restrictions.

2. **Water Samples:** Water samples were scheduled to be analyzed for methylmercury. Methylmercury analysis was not conducted as the correct containers were not ordered.

Approvals of SSSP Alteration Form		
Name	**Title**	**Signature**
Brooks Stanfield	On-Scene Coordinator (OSC)	
Kathy Parker	Emergency Management Program (EMP) Quality Assurance Coordinator (QAC) or alternate	

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B

Mesocosm Experiment Memorandum

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Title: Methylmercury at the abandoned Cinnabar Mine, ID: Assessment of current conditions and potential impacts of remediation actions involving organic carbon additions.

Prepared by: Chris Eckley, OERA, EPA R-10

1. Introduction

The western region of North America contains numerous areas of mercury (Hg) enriched ore deposits, which were extensively mined starting in the mid-1800s and mostly closing by the 1970s (Rytuba, 2000). As a result, thousands of abandoned Hg mines occur throughout the western US (Eagles-Smith et al., 2016). The processing of the Hg ore typically occurred at the mine sites via heating the ore and condensing the Hg vapor. Due to an incomplete extraction process, the waste tailings materials generated at these mine sites typically contain Hg concentrations many orders of magnitude above background concentrations (Kim et al., 2000; Rytuba, 2000). For some of the larger production mines, these tailings piles can be several meters deep and spread out over many hectares (Gustin et al., 2003; Nacht et al., 2004). Mercury mobilization from these tailings has been shown to negatively impact downstream aquatic ecosystems which often result in fish consumptions advisories related to Hg pollution (Park and Curtis, 1997; Suchanek et al., 2008). Identifying effective strategies to reduce the impacts of these mines is an area of ongoing research and discussion.

The Cinnabar Mercury Mine is an abandoned mine in central Idaho and is part of the South Fork of the Salmon River catchment. Cinnabar Creek flows through the tailings pile at the mine site and has been shown to contain elevated Hg concentrations (Holloway, 2016). A USGS stream monitoring station on the East Fork of South Fork of the Salmon River, which is more than 10 km downstream of the mine site, measured total-Hg (THg) concentrations during periods of elevated discharge up to 26,000 ng/L and depending on the water-year has annual loads between 13 and 28 kg (Etheridge, 2015). Annual flow-weighted stream concentrations of dissolved arsenic were around 11 µg/L, which is just above applicable human health criteria values. These elevated concentrations, particularly for Hg, are believed to reflect ongoing releases from the Cinnabar mine (Etheridge, 2015). In general, most Hg that is released from abandoned Hg mines occurs via the erosion of tailings and other contaminated materials, particularly during periods of elevated discharge (Curtis et al., 2013; Eckley et al., 2015; Etheridge, 2015). Remediation efforts aimed at reducing erosion of high Hg content materials can decrease the impacts of Hg on downstream ecosystems (Marvin-DiPasquale, 2011).

In general, the ore and waste materials associated with Hg mines occurs in various inorganic forms (Kim et al., 2004; Lowry et al., 2004; Sladek and Gustin, 2003). However, the main concern with Hg pollution is due to methylmercury (MeHg), an organic form of Hg that has increased toxicity and efficiently bioaccumulates up the food-chain. Almost all of the Hg found in sport fish, or any upper tropic position fish species, is MeHg and it is the main form associated with human exposure. As such, a key aspect of reducing the impacts of Hg pollution in the environment, focuses on decreasing the production of MeHg. To be effective, Hg mine site remediation strategies should take into consideration the impacts on MeHg production.

Mercury is methylated by anaerobic bacteria, with sulfate reducing bacteria (SRB) being one of the main groups associated with this process (Ullrich et al., 2001); though other anaerobic bacteria have also been shown to methylate Hg as well (Warner et al., 2003). Within areas where anoxic conditions occur, there are several factors that affect the amount of MeHg produced: 1) the concentration of bioavailable inorganic Hg; 2) the concentration of labile organic carbon; and 3) the concentration of sulfate or other electron accepting compounds such as ferric iron. Bioavailable inorganic Hg is typically a small percentage of total mercury (THg) in system (<10%) and at mine sites this percentage can be much smaller (<1%) (Marvin-DiPasquale et al., 2009). In general, Hg bound to the solid-phase matrix may be less bioavailable, whereas Hg in the porewater/dissolved phase typically has a higher bioavailability (Hsu-Kim et al., 2013; Schartup et al., 2014). This is particularly relevant at abandoned Hg mine sites, where the Hg concentrations of tailings may be very elevated, but may mostly occur bound to sulfide containing minerals such as cinnabar that have low solubility and bioavailability. Similarly, the quality of organic carbon and not just the total quantity can be an important factor governing its sorption with inorganic Hg as well as its utilization by microbial communities (Burns et al., 2013; Marvin-DiPasquale et al., 2009; Schuster et al., 2008). Finally, the relationship between sulfate and MeHg production is also complicated and has been suggested to follow a bell shaped curve, with MeHg production occurring at an optimal mid-level of sulfate concentrations and decreasing at lower and higher concentrations(Benoit et al., 2003; Gilmour and Henry, 1991). Because multiple factors can effect MeHg production, it is often difficult to determine which of these variables is controlling the amount of MeHg produced at a location. It is even more difficult to predict how MeHg production may be effected in the future under changing environmental conditions, such as mine site remediation efforts. In light of these challenges, remediation efforts at Hg mine sites need to be able to be considerate of potential impacts of the actions taken on MeHg production.

Remediation activities at Hg contaminated sites can take several forms, but often involve the excavation and disposal, capping, and/or armoring of stream channels near high Hg content materials to reduce erosion and aqueous transport. Other remediation options that have been applied to a lesser extent at Hg contaminated sites include: material stabilization/solidification, immobilization by adding stabilizing agents, vitrification, thermal desorption, soil washing (Wang et al., 2012). Some of the stabilization techniques such as biochar and activated carbon applications have shown the potential to reduce the bioavailability of inorganic Hg for methylation (Bussan et al., 2016; Gilmour et al., 2013).

Cinnabar Mine, like many abandoned mine sites in the western US, is located in a remote mountainous region, which affects the feasibility of applying different remediation options. One potential remediation option that could be implemented focuses on reducing the erosion of high Hg content tailings from the site by adding soil amendments that can promote the establishment of vegetation. While this would likely reduce the bulk loading of Hg as well as other heavy metals such as arsenic to streams, the addition of carbon has the potential to stimulate microbial activity and result in an increase in MeHg production. Providing information to assess the benefits of reduced mobilization of THg from the site and the potential impacts of on-site MeHg production is the focus of this study.

The overall objective of our study is to identify if the addition of organic material to mine tailings will increase MeHg production. The variables affecting Hg methylation rates are numerous, complex, and not entirely understood (Benoit et al., 1999; Graham et al., 2012; Hsu-Kim et al., 2013). As such, predicting future changes in Hg methylation as a result of remediation actions contain a fair degree of uncertainty. To address this uncertainty, we used multiple lines of evidence to test our predictions. Lines of evidence include: 1) an assessment of current MeHg concentrations in stream water, porewater, and sediment at the site and the relationship to several ancillary parameters; 2) the

measurement of Hg methylation rates at the site in response to different aqueous carbon amendments; and 3) mesocosm experiments where carbon amendments are applied to tailings materials and MeHg production monitored. The results from these three distinct approaches will be used to provide a robust assessment of the potential for increased MeHg production in response to site remediation efforts that involve carbon amendments.

2. Methods

2.1. Current MeHg concentrations at Cinnabar Mine.

Macro-Rhizon samplers (Rhizosphere Research Products, 0.15 µm, 9 cm porous part) were used for porewater collection (Seeberg-Elverfeldt et al., 2005). The Macro-Rhizons were inserted into stream sediment at the water line. Porewater was collected under vacuum into new 50 ml syringes that were luer locked to the Macro-Rhizons and subsequently transferred to separate sample bottles for THg/MeHg, DOC, sulfide, and sulfate analysis. All samples were preserved in the field following collection: THg/MeHg (ultra-pure HCl); DOC (sulfuric acid); sulfide (zinc acetate); sulfate (4°C).

Porewater samples were co-located with surface and sediment water samples at the following locations: upstream Sugar Creek (BG02), downstream Sugar Creek (SC01), Cinnabar Creek (CC02 and CC04), West Fork Cinnabar Creek (WF01-05), and the Cinnabar wetlands (WT01-3) (See Figure 3-1 in the parent document).

Collection of sediment and surface water is described in the parent document.

2.2 Stable Hg isotope addition experiments.

Solutions consisting of four different types of dissolved organic carbon were created to identify the influence of carbon quantity and quality on methylation rates. Four types of organic material were tested: 1) Proganics™ soil media, 2) Biotic Earth™ soil media, 3) biochar; and 4) natural organic matter (NOM). The Proganics™ and Biotic Earth™ are both engineered soil media designed to improve the agronomic potential of soils/substrates so that vegetation can be established and erosion reduced. The Progancis™ material is a combination of recycled thermally refined bark and wood fibers with a proprietary blend of biopolymers, biochar, and other minor constituents. The Biotic Earth™ is manufactured from thermally and mechanically processed straw, flax and peat moss, with other minor constituents. The biochar used in our study was created from a 50:50 mixture of pyrolized wood chips and poultry litter. The natural organic matter material used in our study consisted of soil litter material, which was mostly pine needles, collected at a background location near the mine site.

Approximately 100 grams of each of these organic materials were placed in separate bottles containing 1 L of DI water. After 3 days, the water from each of these mixtures was filtered (0.45 µm) to create four different organic carbon extracts. In the field, an inorganic enriched stable Hg isotope (Hg^{201}) tracer was added to each of the organic carbon extracts, plus a control solution that consisted of water collected from an on-site seep. The concentration of Hg isotope tracer in each of the solutions was 5 mg/L. Each of these solutions was purged with ultra-high purity nitrogen gas to remove all oxygen from the solutions for 1 hour prior to injecting into the soil cores.

Twenty soil core samples were collected for stable Hg isotope addition methylation assays from a small meadow created by a seep that was ~30m from the historical tailings pile at the site. The samples were collected to a depth of ~10 cm in small diameter (5 cm) polycarbonate core tubes and capped. All cores were collected from the same meadow (~75 m^2) in the hopes of representing similar biogeochemical conditions.

Within a few hours after collecting the soil cores, the top 4 cm of each core was spiked with 1 ml of Hg^{201} isotope solution which were applied using a syringe through small holes in the core tube that were drilled 1 cm apart and sealed with silicone. Each 1 cm section of the core received 5 µg of Hg^{201} isotope for a total of 20 µg added within the top 4 cm of the core. Each of the 5 organic carbon/Hg isotope solutions was injected into 4 replicate soil cores. The soil cores were incubated for 24 hours at ambient outside temperatures (5 to 15 °C). The incubations were terminated by extruding the soil from the core tubes and placing it in 4 oz glass jars that were immediately frozen by placing in a cooler with dry ice. The methylation rates are presented as the % of added inorganic Hg tracer that was methylated per unit time.

2.3 Laboratory mesocosm study.

Three full 5-gallon buckets of tailings materials were collected from the yellow flotation tailings piles at Cinnabar Mine during the sampling in August 2016. In addition, 30L of water from Cinnabar Creek upstream of the mine was collected in new plastic carboys. The tailings and water were transported to the EPA's Manchester Environmental Laboratory (MEL). The tailings were sequentially combined into a large plastic tub and mixed by hand with a shovel. The homogenized material was then fractionally shoveled into six 3 gallon buckets (hereafter referred to as mesocosms) by scooping an approximately equal amount of material in each mesocosm back and forth until all sample material was distributed across all mesocosms. The depth of material in each mesocosm was 15 cm (~50% full). The water sample was filtered (0.45 µm) and mixed 50:50 with DI water to create a working solution for use in the experiment.

Three of the mesocosms contained un-amended tailings and three were amended with 600 grams of ProGanics™ Biotic Soil Media. This addition of ProGanics™ material represented a 5% increase in the mass of the mesocosm material. This may be a higher rate of application than would typically occur during a remediation project and so the results likely overestimate the effect observed during an actual field application.

At the beginning of the experiment the working solution was added to each mesocosm until the materials were fully saturated (). Each mesocosm contained a sampling port 4 cm above the bottom that contained a MacroRhizon porewater sampler. Within an hour of wetting the materials, porewater samples were collected from each mesocosm for the analysis of THg, MeHg, sulfate, and DOC. In addition water was collected for analysis using a Horiba datasonde for pH, redox potential and dissolved oxygen (DO). The materials were allowed to dry over a two week period to soil moisture contents of 7% in the un-amended tailings and 28% in the amended tailings. In both types of mesocosm, this represents a 50% decrease in the water content below the initial saturated conditions. The mesocosms were then re-wetted to fully saturated conditions with the working solution and porewater collected. Fully saturated conditions were maintained over the ensuing 3-week time period by adding enough water so that there was at least 5 cm of water overlying the tailings and then sealing the mesocosms to reduce evaporation. Porewater samples were collected 1 week and 3weeks after fully saturated conditions had

been established. At the termination of the experiments, a solid-phase sample was collected from each mesocosm for THg, MeHg, TOC, and sulfide analysis.

3. Results and Discussion

3.1 Results from field measurements of water, porewater, and sediment.

3.1.1 Stream data

The dissolved MeHg (or MeHg-D) concentrations in stream samples at and downstream of Cinnabar mine are generally low (<0.15 ng/L); though higher than the background reference stream (<0.05 ng/L). Only a limited number of whole water MeHg (or MeHg-W) samples were collected (n=4), however these samples show that the majority of MeHg was in the dissolved phase (mean ±SE: 83 ±7%). For context, a fairly comprehensive assessment of stream MeHg-W concentrations across the US, the mean MeHg-W concentration of 0.19 ng/L (Scudder, 2009). As such, the existing methylation potential in the approximately 8 kilometers of stream directly below the site is relatively low, which is to be expected given the well oxygenated steep gradient streams with limited sediment in this area. The one exception being the water sample from the wetland area which had a MeHg concentration of 1.6 ng/L, over an order of magnitude higher than the maximum concentration measured in flowing water. These results suggest that the methylation potential at the site is not limited by the bioavailability of inorganic Hg—the amount of Hg in the tailings is so large that even a small % that is bioavailable would still be a big number. Instead methylation appears to be limited by conditions conducive to methylating microorganisms—stagnant water and fine grain sediment. The spatial extent of the wetlands is very small and does not appear to be hydrologically connected to Cinnabar Creek, at least during base flow conditions.

While all the dissolved MeHg (MeHg-D) stream concentrations were relatively low, the dissolved THg (THg-D ; up to 98 ng/L) and THg-W (up to 320 ng/L) concentrations are quite elevated relative to background levels for this area (THg-W: 0.67 ng/L; THg-D: 0.65 ng/L).

The THg-D concentrations were highest near the mine site and decreased with distance downstream, which is likely a result of dilution (**Figure 1**). In Sugar Creek, about 4km downstream of Cinnabar Mine, the THg-D concentrations were pretty consistent at 8.8 ±0.6 ng/L. While we only have four THg-W samples, the same downstream trends are observed with concentrations near the mine site of 205 ±58 ng/L compared to 26 ng/L in Sugar Creek. Conversely, MeHg-D concentrations were lowest near Cinnabar Mine and increased downstream (**Figure 1**). This suggests that the conditions conducive to methylation are likely lower near the mine site and increase downstream, or that other sources of MeHg exist within other drainages of Sugar Creek. In general, these results suggest that while there is limited Hg methylation currently occurring in streams near Cinnabar Mine site, the THg exported from the mine site may become methylated downstream where conditions are more favorable. As such, efforts to reduce THg loading from the mine into area creeks may reduce downstream MeHg production.

The percent ratio of dissolved MeHg/THg is often used as a measure of the methylation potential in an area (Mitchell et al., 2008). Plotting the %MeHg moving downstream of the mine clearly shows that the methylation potential at the mine is low and increases with distance downstream (**Figure 2**). From other studies, the median %MeHg ratio in streams in mining areas is 2.4% (Scudder, 2009). All of the %MeHg ratios in our measurements were <2%, which indicates that the methylation potential in the 8km reach of stream directly below the site is currently relatively low compared to other documented mining

areas. It can't be determined from this data, however, whether the trend of an increasing %MeHg continues as distance from the site also increases.

For the subset of stream samples where whole and filtered water samples were collected, the results show that the majority (75 ±8%) of THg was associated with particles in Cinnabar Creek. In comparison, the background stream location on Sugar Creek had only 3% of the THg associated with particles. These results suggest that the erosion/entrainment of particles from Cinnabar mine is an important mechanism for downstream loading. The 25% of THg that is in the dissolved phase is likely reflective of the groundwater contribution.

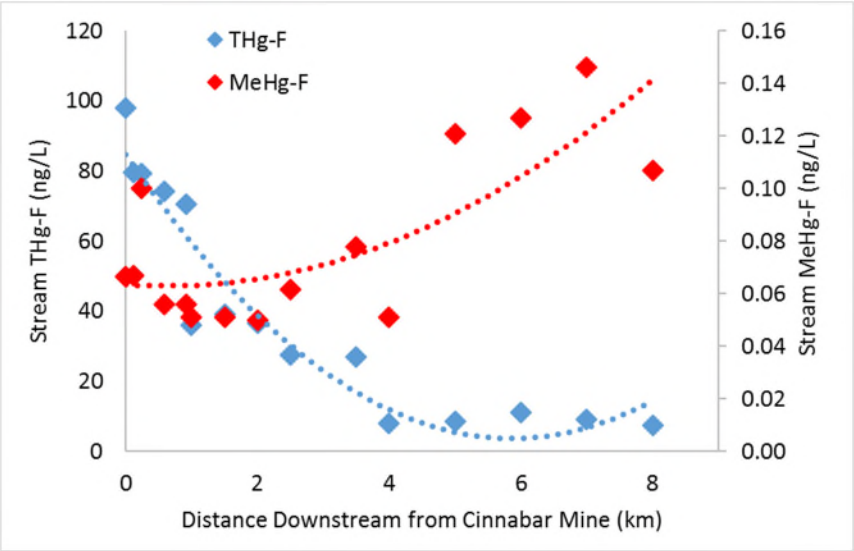

Figure 1. Graph showing filtered THg (blue diamonds) and MeHg (red diamonds) concentrations measured in the West Fork of Cinnabar Creek, Cinnabar Creek, and Sugar Creek during the August, 2016 field sampling campaign. The stream concentrations are plotted against the estimated distance downstream from the Cinnabar Mine site. A 2-order polynomial regression line was used to highlight the general downward trend in THg concentrations and upward trend in MeHg moving downstream from Cinnabar mine.

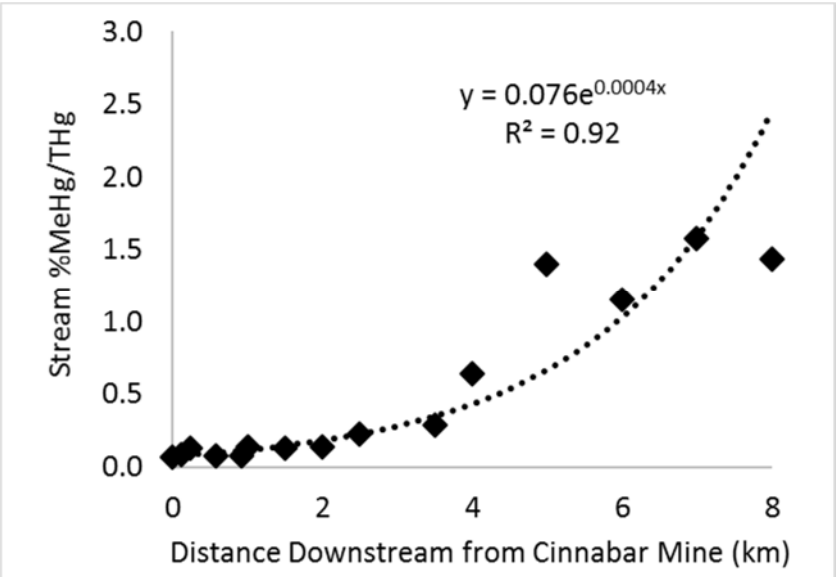

Figure 2. Graph showing the filtered %MeHg/THg downstream of Cinnabar Mine. An exponential regression line was fit to the data points.

3.1.2 Sediment and porewater data

Multiple linear regression (MLR) analysis of the sediment data showed that there was a significant relationship between TOC and MeHg (**Figure 3**; R^2=0.43, df=23, p<0.001), but that there was no significant correlation with THg (p=0.21). This is consistent with the results observed from the surface water samples where the MeHg production appears to be related to factors other than just THg concentrations.

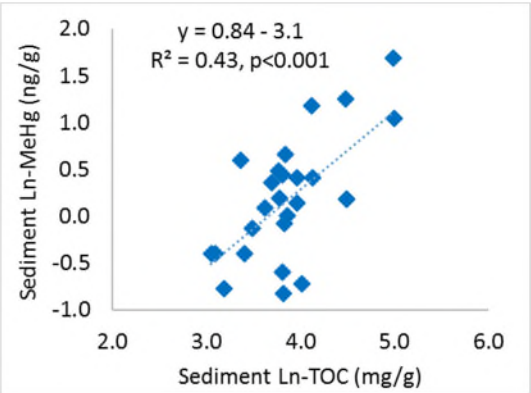

Figure 3. Stream sediment TOC versus stream sediment MeHg (on Ln-scale)

Stream sediment, porewater, and surface water THg concentrations are all significantly related (**Figure 4**). The porewater THg and DOC concentrations showed no relationship (p=0.79, df=11), suggesting that the partitioning of THg into the porewater phase is not being driven by the dissolved carbon in the system. This is in contrast to what occurred in the mesocosm experiments described later, where the addition of organic carbon to the tailings appears to have facilitate the partitioning of THg from the solid phase of tailings into the porewater phase. This difference in results may be a function of: 1) different characteristics of the natural carbon compared to the Proganics™ material; 2) differences in THg sorption with the stream sediments versus the tailings; or 3) the mesocosm results representing a temporally isolated flux after new carbon is added and would be apparent under the existing conditions at the site. Regardless, under current conditions at the site, the movement of THg from the solid phase into the porewater and surface water does not appear to be controlled by DOC.

The relatively strong correlation between porewater and surface water THg-D concentrations (**Figure 4**) suggests that shallow groundwater flow may be an important source of THg-D in the stream during low flow conditions.

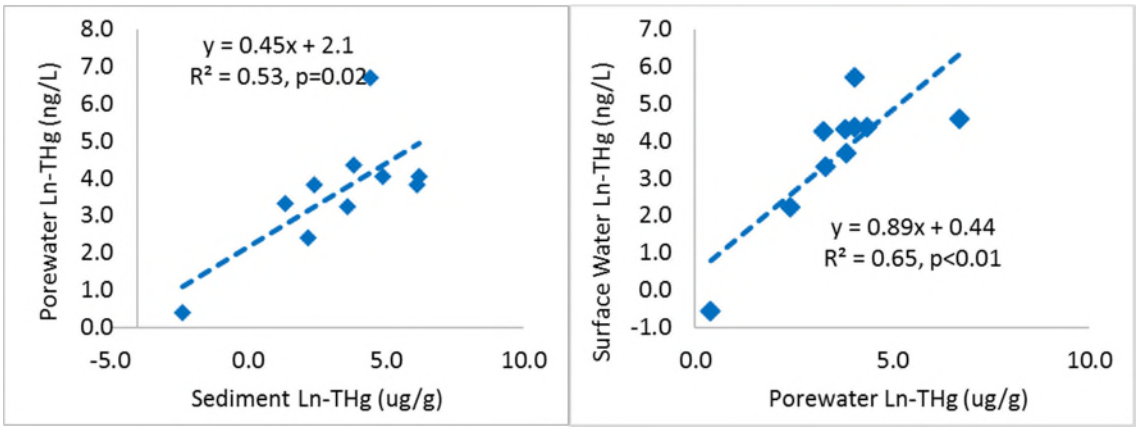

Figure 4. Left graph shows relationship between sediment and porewater THg. Right graph shows relationship between porewater and surface water THg. Both graph are plotted on natural log scales.

Unlike THg, the only parameter that porewater MeHg concentrations were significantly correlated with were porewater DOC (**Figure 5**), with porewater THg and sulfate showing no significant relationship. However, if the sample point from the wetlands area is removed, then this correlation is no longer significant (p=0.22, df=9). Given the fairly elevated THg concentrations in the water, porewater and sediment in the Cinnabar area, it is not surprising that THg concentrations are not limiting MeHg production. Instead, MeHg production appears to be limited by carbon availability, which is generally low in the stream porewater samples (2.5 ±0.5 mg/L) and only relatively high in the wetlands (6.5 ±1.7 mg/L). Because we only see a significant relationship between porewater DOC and MeHg when including the wetlands sample, this suggests that the conditions in the wetland responsible for methylation (such as low dissolved oxygen) were a more important factor affecting methylation than just the amount of carbon present.

Relative to surface water, there is a less robust national average value for porewater since this is a less common measurement. However, one paper that included data from several streams throughout the US found that the average concentration of MeHg was 0.34 ng/L (Marvin-DiPasquale et al., 2009). All but one porewater measurements in our study were below this average value, which indicates that the magnitude of the MeHg concentrations in porewater in our study are similar to streams in regions un-impacted by a Hg mine.

The stream porewater sample locations that occurred downstream of the mine site were forested/vegetated. In the context of the question this study is addressing—will organic carbon additions and the establishment of vegetation increase MeHg production—it is noteworthy that the porewater DOC concentrations from the forested stream sections were all low (2.3 ±0.4 mg/L). This suggests that establishing native vegetation on the tailings may not significantly increased porewater DOC concentrations and stimulate MeHg production.

An import observation associated with these field measurements is that the vast majority of the watershed area of Sugar and Cinnabar Creek is forested. Even at the Cinnabar Mine site, there are patches of vegetation. While the THg concentrations in these streams were quite elevated above background level, the methylation potential and MeHg concentrations measured within the 8 kilometers of stream directly below the site are all lower than mean and median concentrations measured in other streams throughout the US (Scudder, 2009). These results suggest, that at a localized watershed level, a

remediation action that resulted in vegetation covering the tailings would likely have a negligible impact on organic carbon in the stream and may not result in increased MeHg production.

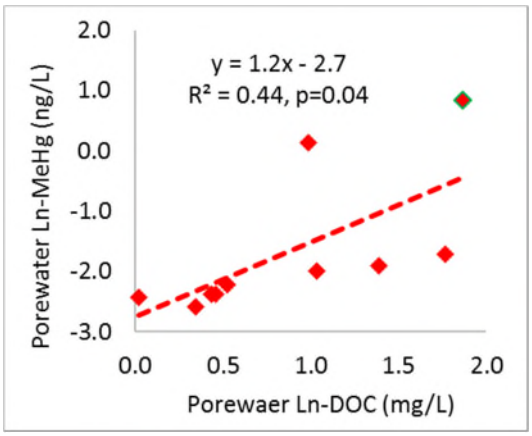

Figure 5. Porewater MeHg versus DOC concentrations. Note, the sample with the green outline is from the wetland area, whereas all other samples are from streams.

3.2 Results of the stable isotope addition methylation assays

There was a large range in DOC concentrations in the Hg isotope spike solutions (1-1,500 mg/L; **Figure 6)**. The solutions with the highest DOC concentrations were the Proganics™ and natural organic matter (NOM) solutions. The methylation rates in the soil cores that were spiked with these two solutions were higher than the other amendments and the control. The soil organic matter content (measured as %LOI) showed some variability between the soil cores used in the assays (68± 10 to 80± 1%--note that in Figure 6 these values are divided by 200 so that they plot on the same scale as methylation rates); however the trends in MeHg production were much more clearly affected by the dissolved carbon additions in the spike solutions than the solid organic matter content of the soils.

The low DOC concentrations in the Bio-Earth™ and biochar amendments suggest that not all types of soil amendments have the same propensity to generate DOC. However, it is important to note that DOC is just a measure of the total amount of carbon in the sample, but does not tell us about differences in the quality of that organic carbon. Excitation-Emission Matrixes (EEMs) are a method that has been used to identify differences in the quality of organic carbon (**Figure 7**). The results provide values for different EEMs peaks which are associated with different components of organic material. Comparing the isotopic methylation rates with each of the EEMs peaks, showed that the T and N peaks have the best correlation (R^2 value of 0.73 and 0.80 respectively). Correlations with all of the other EEMs peaks and methylation rates resulted in lower R^2 values than obtained when comparing directly with DOC (R^2=0.72). The T and N peaks are associated with relatively labile humic acid components of DOC, which may be preferred by the microbial communities involved in methylation. These results help explain why the biochar solution had a low total DOC concentration (similar to the control and Bio-Earth™) values, but a higher methylation rate, similar to the NOM and Proganics™ solutions (**Figure 8**).

Overall, these results highlight the important role that organic carbon quality has on stimulating Hg methylation, which may not be captured by just looking at the total amount of organic carbon in a system. Furthermore, these results also suggest that different types of soil amendments (i.e. Bio-Earth™, Proganics™, etc) contain different qualities of carbon and may be selected to maximize the

revegetation potential of a site, while minimizing an increase in Hg methylation. While these findings are compelling because they suggest that using a soil amendment such Bio-Earth™ instead of Proganics™ could be applied without stimulating MeHg production, these results are based on a single sample of the carbon quality from each spike solution and only four methylation assay samples. Additional samples may need to be collected to confirm these findings.

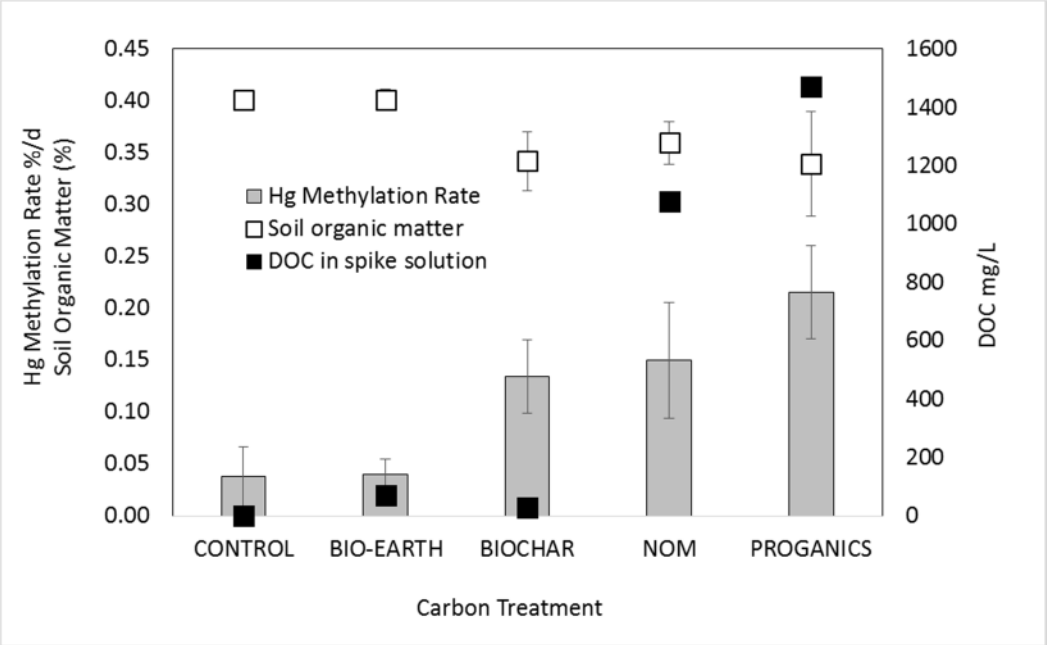

Figure 6. Graph of Hg stable isotope methylation rates and organic carbon concentrations. The columns represent the mean ±SE stable isotope Hg methylation rate from four replicate assays. The black square markers represent the DOC concentrations of the solution used to deliver the Hg isotope; and the white squares represent a measure of the mean ±SE soil organic matter content from each of the assays. The soil organic matter was measured as % loss on ignition (LOI) and in order to present that data on the scale of this graph, the values were divided by 200.

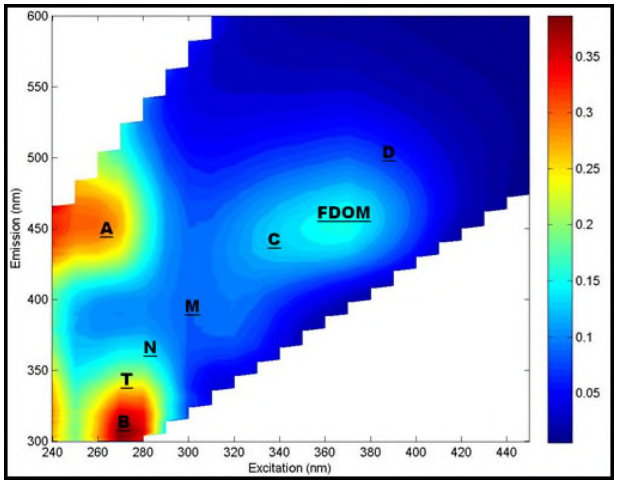

Figure 7. An example excitation-emission matrix (EEM) showing the general locations of selected fluorescence peaks. Letters represent key peaks in excitation-emission responses and are associated with different sources and components of organic matter in water. Text and Figure source (https://or.water.usgs.gov/proj/carbon/EEMS.html)

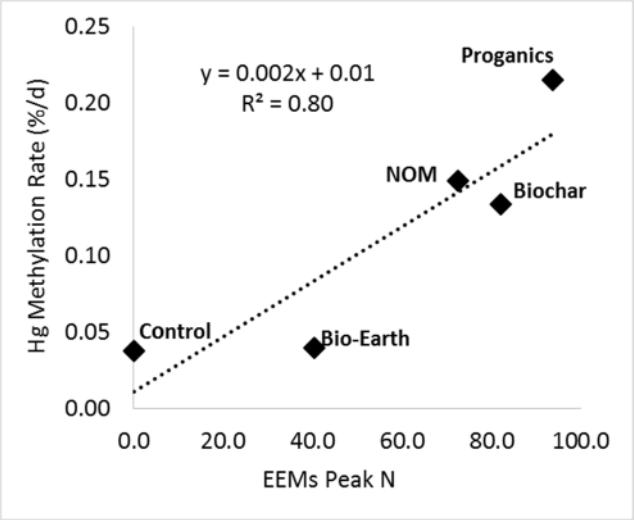

Figure 8. Regression of stable isotope Hg methylation rates versus EEMs Peak N values. The type of treatment is labeled next to each data point. The results show that the control sample and Bio-Earth™ both had lower methylation rates and lower Peak N values. While the NOM, biochar, and Proganics™ all had higher methylation rates and Peak N values.

3.3 Results of the mesocosm amendment study

The mesocosm experiments were used to test the impact of Proganics™ carbon amendments on tailings samples collected at the site. Both the amended and un-amended tailings showed very similar changes in DO concentrations over the duration of the experiment (**Figure 9A**). The DO concentrations quickly dropped in half after first week of the experiment, and became completely anoxic after 19 days. Whether the tailings were amended or not appeared to have no effect on the development of anoxic conditions. While both types of mesocosms showed similar impacts on DO, the amended tailings clearly had a lower redox potential (**Figure 9B**) and an increase in DOC (**Figure 9C**). Consistent with the lower redox potential in the amended tailings we also see a decrease in sulfate during the experiment (**Figure 10C**), indicating that the conditions are conducive to the activity of SRB that are often associated Hg methylation. As such, we observed MeHg concentrations to increase over the duration of the experiment in the amended tailings, but remained much lower in the un-amended tailings (**Figure 10B**). The MeHg concentrations were increasing in the amended tailings during each sampling event; however it is not clear how long and at what concentrations the MeHg concentrations would eventually plateau and steady-state conditions would develop.

These results clearly show that the addition of organic material to the tailings has the potential to generate high concentrations of MeHg. However, in the mesocosms the tailings were saturated with stagnant water and allowed to go anoxic. This is a critical factor for allowing methylation to occur. Under current conditions at the Cinnabar Mine site, there are only a few spatially isolated areas where the tailings are saturated with stagnant (or slow moving) water, such as the wetland area and a few seeps. It is worth noting that the MeHg concentrations measured in the un-amended tailings (all <0.4 ng/L) are of similar magnitude as porewater measurements collected along the streams and discussed previously in section 3.1. The amended tailings showed porewater MeHg concentrations by the end of the experiment that were larger than any of the values measured in the field, including the wetland areas. These results suggest that the addition of organic carbon to the tailings has the *potential* to

generate high concentrations of MeHg under the right conditions (i.e. anoxic stagnant water). However, these results likely represent a theoretical upper level of MeHg production (though we do not know how high these concentrations would have reached if the experiment was continued longer), and it is unlikely that an actual organic carbon amendment to the tailings in the field would result in saturated anoxic conditions developing.

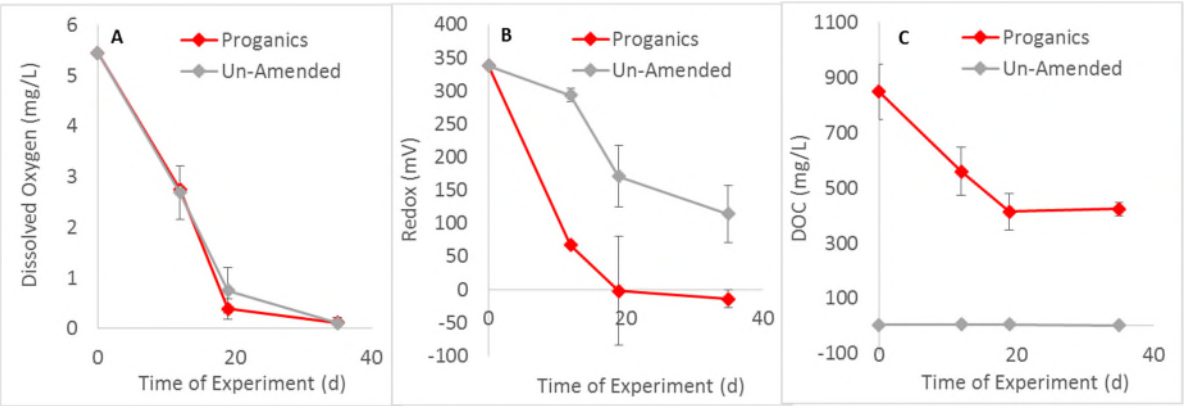

Figure 9. Graphs of several ancillary parameters (mean ±SE) measured during the duration of the mesocosm experiments: A) Dissolved Oxygen (DO); B) Redox potential; and C) DOC.

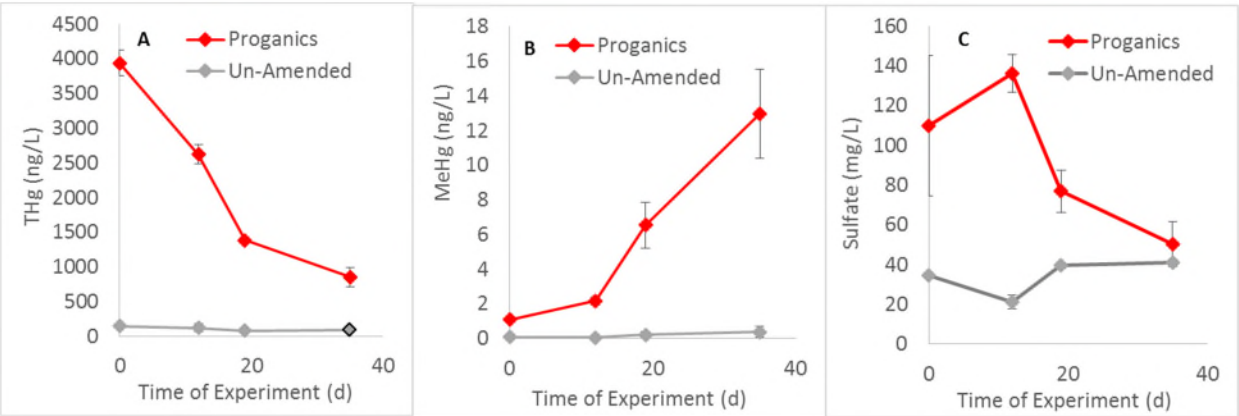

Figure 10. Graphs of measured parameters (mean ±SE) during the duration of the mesocosm experiments: A) THg (DO); B) MeHg; and C) Sulfate. All symbols represent the mean value from the three replicate mesocosms, with the exception of the THg value from the un-amended tailings collected on the 35th day of the experiment (symbol shown with black outline on graph A), which is based on the mean of two samples. The third sample had a concentration of 5,490 ng/L which was over an order of magnitude larger than the other two mesocosm, but was also an order of magnitude higher than measured from this same mesocosm during the previous three sampling events on days (0, 12 and 19). As such, it was considered an outlier and not included in the analysis.

The results showing that adding water and carbon to high Hg content tailings results in MeHg production is consistent with our expectations and a large body of scientific literature on the factors affecting Hg methylation (as summarized in Ullrich et al, 2001). The results showing much higher THg concentrations in the amended tailings were more surprising, particularly given the magnitude of the difference between the amended and un-amended tailings (amended: 3,940 ±326 ng/L; un-amended: 148 ±21 ng/L; **Figure 10A**). There are two key aspects of these results. One is that the THg concentrations were highest at the start of the experiment and dropped significantly over the duration of the study, though the study was not conducted long enough to identify when and if the THg concentrations would become similar to the un-amended tailings. However, extrapolating a regression

slope from these data points indicates that a concentration of 90 ng/L (which is what the un-amended tailings showed) would be reached after 40 days. The second key point is that the highest concentrations of THg occurred when conditions in the materials were still oxic (see **Figure 9A**). As such, these results from the mesocosm study would likely translate well to what we might see during an on-site application, with the caveat that our application rate of Proganics™ material was likely higher than what would occur during an actual remediation.

In general, inorganic Hg has a strong affinity for binding with sulfur compounds. Organic matter contains several functional groups that include sulfur, which inorganic Hg likes to bind to. This is why almost all dissolved Hg in aquatic systems is associated with DOC. In our mesocosm experiment, the addition of Proganics™ material resulted in some of this carbon dissolving into the water (becoming DOC; **Figure 9C**) and the sulfur containing functional groups on this DOC were able to "pick up" some of the more loosely bound inorganic Hg in the tailings. Presumably, the vast majority of the THg associated with the tailings if fairly tightly bound and the ability for DOC to facilitate the mobilization of Hg from the solid phase of tailings into the aqueous phase may be short lived (i.e. ~40 days) at the high rates we observed, but may continue over a longer duration at a reduced rate. Our mesocosm study did not last long enough to identify the longer term impacts of the carbon addition on THg mobilization.

Theoretically, the addition of organic material could reduce the pH, which could further facilitate the partitioning of Hg from being bound to tailings and promote it dissolving into the aqueous phase. Though in our study, we observed similar pH values in the amended and un-amended tailings (amended: 5.7 ±0.2; un-amended: 5.8 ±0.6).

3.4 Overall conceptual model assessment of results.

Our conceptual model of Hg dynamics at the site suggest that during low flow periods some of the Hg associated with the tailings dissolves into the water as it moves towards Cinnabar Creek. This results in elevated THg-D concentrations in Cinnabar Creek. THg-W concentrations are also elevated during low flow conditions; however these concentrations are expected to increase by several orders of magnitude during stormflow periods when high Hg content tailings are eroded and become part of the suspended load, which are observable several km downstream (Etheridge, 2015). Apart from the small wetlands area, the conditions conducive to MeHg production at the mine site are low. Conditions favorable for methylation increase downstream of the site, but still remain relatively low. Further downstream, the methylation potential likely further increases as the gradients decrease further and the river shifts from being dominated by erosion to deposition. As such, efforts to reduce Hg transport from the mine site may reduce Hg availability for methylation downstream.

The results from all three aspects of this study show that MeHg concentrations increase with organic carbon concentrations. This is consistent with Hg literature on this topic. On one hand, this conclusion could suggest that the addition of organic carbon in order to facilitate vegetation and reduce erosion could increase MeHg production. While this remains a possible outcome; it is unlikely that saturated and anoxic conditions would develop in much of the area of the tailings. Currently at the site, there are several small seeps, as well as the wetland area where the soil or tailings are saturated, anoxic conditions exist, and MeHg production is high. This is seen not only in the data from the wetlands, but also from the meadow/seep area where our soils samples for the methylation assay were collected (soil MeHg: 102 ±19 ng/g). For comparison, at the end of mesocosm experiments, the amended tailings only had a MeHg concentration of 7 ±2 ng/g. The areas at Cinnabar mine site that are affected by seeps/saturated conditions are already colonized by vegetation. The area of the tailings that remains

un-vegetated is well-drained and contains dry materials. If organic matter were added to these areas, there would likely be an increase in moisture during precipitation events and snowmelt, but on an annual basis would likely have water contents well below saturation and conditions not conducive to methylation.

In general, the areas at the mine site where conditions become saturated already are vegetated and are likely important zones of MeHg production. However, given the isolated spatial extent of these areas, their current influence on MeHg concentrations in the West Fork of Cinnabar Creek is minimal (see results from section 3.1). Adding organic carbon and vegetation to the drier sections of the tailings may result in a modest increase in MeHg production (similar to observed in the first few weeks of the mesocosm experiments), but the more dramatic increases in MeHg observed later in the experiments are unlikely.

Under current conditions, the methylation potential increases downstream from the site. This effect was measured within the first 8km downstream, but likely increases further downstream as the stream gradient decreases and deposition is more common. Additions in organic material at the mine site are believed to have a minimal influence on downstream sediment total organic carbon (TOC) or water dissolved organic carbon (DOC) contents because the footprint of the mine site/carbon addition would be a small percentage of the overall watershed for Cinnabar and Sugar Creeks. Because the proposed remediation of the site is expected to result in a reduction in the downstream loading of total-Hg (THg), it is assumed that this would have a larger effect of decreasing downstream MeHg production than a small increase in carbon loading. The results of the mesocosm experiments raise an important concern that the addition of organic carbon may facilitate the partitioning of Hg from the solid phase of the tailings into the aqueous phase. The increased production of aqueous THg that could be transported downstream where conditions are more conducive to methylation would be a negative outcome of an amendment to the tailings. However, our results suggest that this mobilization of THg may be confined to the first few months following an soil amendment application.

4. Summary

In summary, the main conclusions from these studies are:

- The vast majority of Hg in Cinnabar Creek is in an inorganic form (99.5 ±0.1%)
- A limited number of whole and dissolved water samples (n=4) indicate that the majority of Hg in Cinnabar and Sugar Creeks is bound to particles (75 ±4%)
- Current MeHg concentrations in Cinnabar and Sugar Creeks are similar to average values observed in un-impacted streams across the US and <2-fold different than local background concentrations. In contrast, the THg concentrations in Cinnabar Creek were up to 100-fold higher than values typically observed in US streams and almost 500-fold higher than local background concentrations.
- Organic carbon concentrations are well correlated with MeHg concentrations at the site under existing conditions in sediment and porewater. Organic carbon additions also were shown to increase MeHg production in short-term isotope addition experiments and longer term mesocosm experiments.
- Under current conditions, MeHg production at the mine site is driven by hydrological flow paths that result in saturated conditions developing in soils and tailings. These areas are spatially isolated and do not exert a large influence on MeHg concentrations in Cinnabar Creek.

- Addition of organic material/vegetation to the well-drained sections of the tailings is expected to significantly reduce erosion of high Hg content material into the stream, particularly during high flow events where very large pulses of THg have been observed several km downstream of the mine (see Etheridge, 2015). Because these tailings would remain un-saturated during most of the year, they are not expected to become a large source of MeHg.
- The conditions favorable to Hg methylation increase downstream from the mine site. Efforts to reduce THg from being transported downstream from the mine site could help reduce downstream MeHg production.
- The potential for carbon additions to facilitate the partitioning of THg into the aqueous phase in association with DOC remains an important concern, as this Hg would be available for methylation downstream (more so than particulate bound Hg). However, the large magnitude of this effect is likely temporally isolated to the first few months following carbon application.
- Different types of soil amendments contain different qualities of organic matter and appear to have different effects on Hg methylation rates. For example, Bio-Earth™ soil amendments appear to contain a carbon that does not promote methylating microorganisms to the same extent that other soil amendments do.

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C Photographic Documentation

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Photo 1 Cinnabar Creek surface water/sediment sample at CC01 location.

Direction: *Down* *Date: 8/22/16* *Time: 16:46*

Photo 2 View of mine from the former mill building towards Adit 1 with West Fork Cinnabar Creek on the right.

Direction: *Southeast* *Date: 8/23/16* *Time: 12:25*

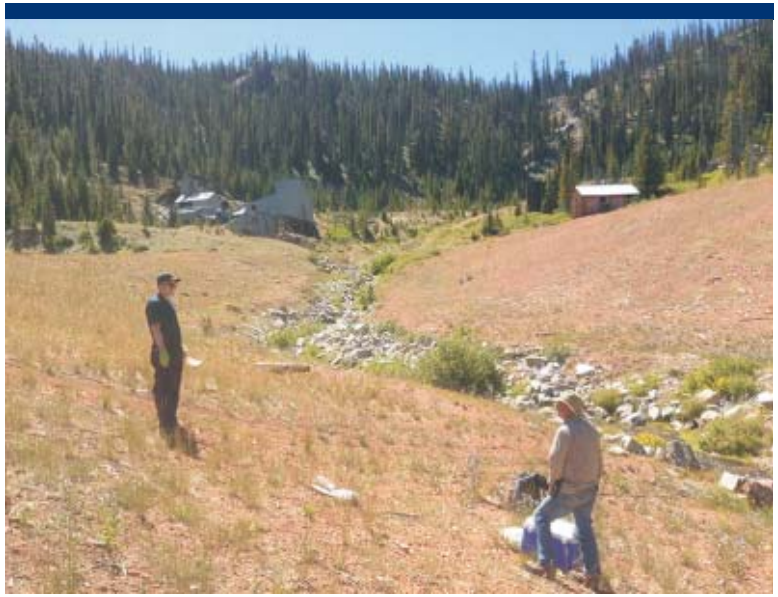

Photo 3 West Fork Cinnabar Creek flowing through the tailings piles.

Direction: *Southeast* *Date: 8/23/16* *Time: 13:26*

Photo 4 Location of Cinnabar Creek sample location CC01.

Direction: *Down* *Date: 8/23/16* *Time: 14:13*

Photo 5 Cinnabar Creek CC02 sample location.

Direction: *Down* *Date: 8/23/16* *Time: 15:07*

Photo 6 West Fork Cinnabar Creek surface water/sediment sample at WF03 location.

Direction: *Down* *Date: 8/24/16* *Time: 15:31*

Photo 7 West Fork Cinnabar Creek surface water sample at WF04 location.

Direction: *Down* *Date: 8/24/16* *Time: 16:20*

Photo 8 West Fork Cinnabar Creek sediment sample at WF04 location.

Direction: *Down* *Date: 8/24/16* *Time: 16:36*

Photo 9 West Fork Cinnabar Creek surface water sample at WF05 location.

Direction: *Down* *Date: 8/24/16* *Time: 16:51*

Photo 10 West Fork Cinnabar Creek sediment sample at WF05 location.

Direction: *Down* *Date: 8/24/16* *Time: 17:00*

Photo 11 Sugar Creek surface water/sediment sample at SC02 location.

Direction: *Down* *Date: 8/22/16* *Time: 17:41*

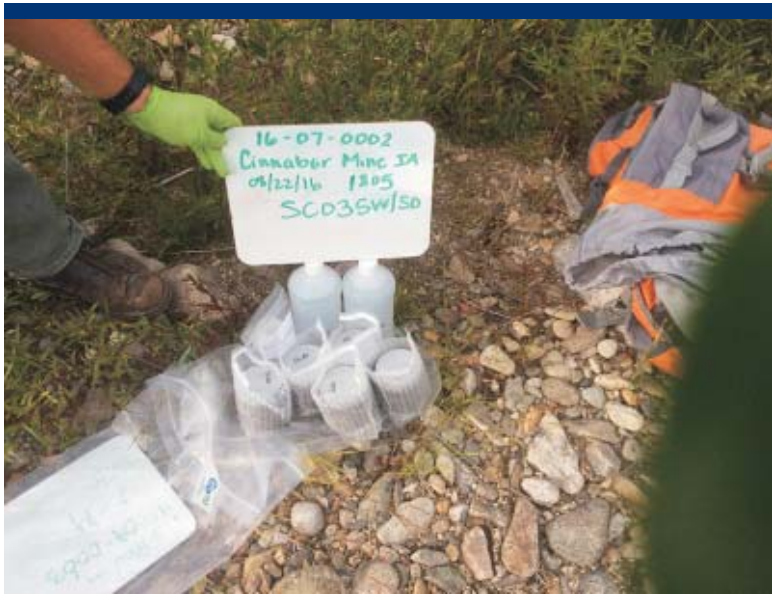

Photo 12 Sugar Creek surface water/sediment sample from SC03.

Direction: *Down* *Date: 8/22/16* *Time: 18:26*

Photo 13 Sugar Creek surface water sample at SC04 location.

Direction: *Down* *Date: 8/23/16* *Time: 12:52*

Photo 14 Sugar Creek surface water sample at SC05 location.

Direction: *Down* *Date: 8/23/16* *Time: 13:42*

Photo 15 Sugar Creek sediment sample at SC05 location.

Direction: *Down* *Date: 8/23/16* *Time: 13:52*

Photo 16 Soil sample from Yellow Tailings Pile at TP01 location.

Direction: *Down* *Date: 8/23/16* *Time: 12:25*

Photo 17 Soil sample from Red Tailings Pile at TP02 location.

Direction: *Down* *Date: 8/23/16* *Time: 12:42*

Photo 18 Location of TP02 sample.

Direction: *Southeast* *Date: 8/23/16* *Time: 12:43*

Photo 19 Soil sample from Red Tailings pile at TP03 location.

Direction: *Down* *Date: 8/23/16* *Time: 12:53*

Photo 20 Soil sample from Yellow Tailings Pile at TP04 location.

Direction: *Down* *Date: 8/23/16* *Time: 13:05*

Photo 21 Location of sample TP04.

Direction: *Northeast* *Date: 8/23/16* *Time: 13:06*

Photo 22 Soil sample from Red Tailings Pile at TP05 location.

Direction: *Down* *Date: 8/23/16* *Time: 13:14*

Photo 23 Soil sample from Red Tailings Pile at TP06 location.

Direction: *Down* *Date: 8/23/16* *Time: 13:26*

Photo 24 Soil sample from Red Tailings Pile at TP07 location.

Direction: *Down* *Date: 8/23/16* *Time: 13:37*

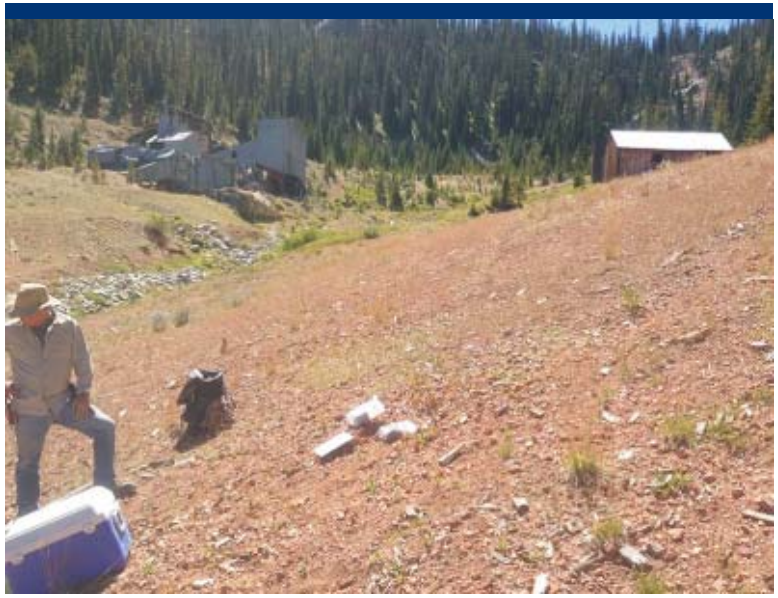

Photo 25 View of Red Tailings Pile at TP07 location with former mill building in the background.

Direction: *Southeast* *Date: 8/23/16* *Time: 13:38*

Photo 26 Soil sample from Red Tailings Pile at TP08 location.

Direction: *Down* *Date: 8/23/16* *Time: 13:50*

Photo 27 Soil sample from Red Tailings Pile at TP09 location.

Direction: *Down* *Date: 8/23/16* *Time: 14:11*

Photo 28 Location of soil sample TP09.

Direction: *Southwest* *Date: 8/23/16* *Time: 14:12*

Photo 29 Location of Adit 1.

Direction: *West* *Date: 8/23/16* *Time: 12:55*

Photo 30 Adit surface water/sediment sample at AD01 location.

Direction: *Down* *Date: 8/24/16* *Time: 14:08*

Photo 31 Adit surface water/sediment sample at AD02 location.

Direction: *Down* *Date: 8/24/16* *Time: 15:09*

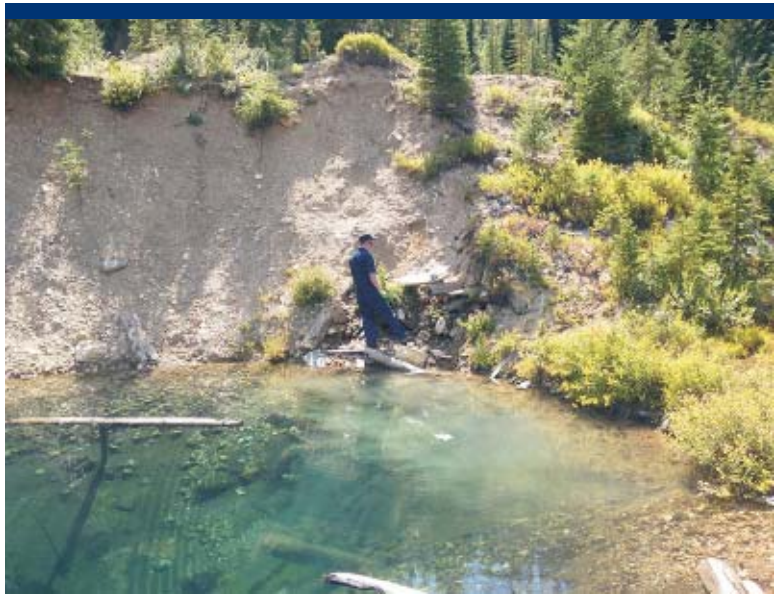

Photo 32 Adit 2 with pond in foreground.

Direction: *Northwest* *Date: 8/24/16* *Time: 15:09*

Photo 33 Adit surface water/sediment sample at AD03 location.

Direction: *Down* *Date: 8/24/16* *Time: 16:25*

Photo 34 Former building debris near Adit 3.

Direction: *Southeast* *Date: 8/24/16* *Time: 16:25*

Photo 35 Soil sample from the former mill building at RT01 location.

Direction: *Down* *Date: 8/23/16* *Time: 14:31*

Photo 36 Location of sample RT01 next to the former mill building.

Direction: *Northwest* *Date: 8/23/16* *Time: 14:31*

Photo 37 Borrow source soil sample BS02 location.

Direction: *Down* *Date: 8/24/16* *Time: 11:34*

Photo 38 Borrow source soil sample BS03 location.

Direction: *Down* *Date: 8/24/16* *Time: 11:50*

Photo 39 Borrow source soil sample BS04 location.

Direction: *Down* *Date: 8/24/16* *Time: 12:00*

Photo 40 Borrow Source soil sample at BS05 location.

Direction: *Down* *Date: 8/24/16* *Time: 12:15*

Photo 41 Ponded water WT01 sample location.

Direction: *Down* *Date: 8/24/16* *Time: 16:16*

Photo 42 Background surface soil sample BG01.

Direction: *Down* *Date: 8/24/16* *Time: 11:22*

Photo 43 Background surface water sample BG02.

Direction: *Down* *Date: 8/23/16* *Time: 14:29*

Photo 44 Background sediment sample at BG02 location.

Direction: *Down* *Date: 8/23/16* *Time: 14:36*

Photo 45 Location of background surface soil sample.

Direction: *South* *Date: 8/24/16* *Time: 11:23*

D Sample Collection Forms

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Cinnabar Mine Integrated Assessment
Event Summary

Site Name Cinnabar Mine

Event Integrated Assessment

TDD 16-07-0006

Sampling Dates 08/22/16 - 08/26/16

Sample Number	Location	Date	Time	Signed
16344200	TP01SS	8/23/2016	1213	Renee L'Nordeen
16344201	TP02SS	8/23/2016	1235	Renee L'Nordeen
16344202	TP03SS	8/23/2016	1250	Renee L'Nordeen
16344203	TP04SS	8/23/2016	1301	Renee L'Nordeen
16344204	TP05SS	8/23/2016	1310	Renee L'Nordeen
16344205	TP06SS	8/23/2016	1318	Renee L'Nordeen
16344206	TP07SS	8/23/2016	1332	Renee L'Nordeen
16344207	TP08SS	8/23/2016	1345	Renee L'Nordeen
16344208	TP09SS	8/23/2016	1406	Renee L'Nordeen

Signed on 08/26/16 Renee L'Nordeen

Cinnabar Mine Integrated Assessment
Event Summary (Continued)

Sample Number	Location	Date	Time	Signed
16344209	RT01SS	8/23/2016	1425	Renee L Nordeen
16344210	BS01SS	8/24/2016	1115	Renee L Nordeen
16344211	BS02SS	8/24/2016	1127	Renee L Nordeen
16344212	BS03SS	8/24/2016	1142	Renee L Nordeen
16344213	BS04SS	8/24/2016	1157	Renee L Nordeen
16344214	BS05SS	8/24/2016	1206	Renee L Nordeen
16344216	AD01SD	8/24/2016	1410	Renee L Nordeen
16344217	AD02SD	8/24/2016	1457	Renee L Nordeen
16344218	AD03SD	8/24/2016	1620	Renee L Nordeen
16344239	SC02SD	8/22/2016	1735	Renee L Nordeen
16344256	AD01SW	8/24/2016	1406	Renee L Nordeen
16344257	AD02SW	8/24/2016	1455	Renee L Nordeen
16344258	AD03SW	8/24/2016	1612	Renee L Nordeen

Signed on 08/26/16 Renee L Nordeen

Cinnabar Mine Integrated Assessment
Event Summary (Continued)

Sample Number	Location	Date	Time	Signed
16344279	SC02SW	8/22/2016	1733	Renee L Nordeen
16344289	AD01SWD	8/24/2016	1403	Renee L Nordeen
16344290	AD02SWD	8/24/2016	1440	Renee L Nordeen
16344291	AD03SWD	8/24/2016	1620	Renee L Nordeen
16344313	SC02SWD	8/22/2016	1722	Renee L Nordeen
16344221	WF03SD	8/24/2016	1551	Renee L Nordeen
16344222	WF04SD	8/24/2016	1630	Renee L Nordeen
16344223	WF05SD	8/24/2016	1654	Renee L Nordeen
16344241	SC04SD	8/23/2016	1249	Renee L Nordeen
16344242	SC05SD	8/23/2016	1346	Renee L Nordeen
16344245	BG02SD	8/23/2016	1440	Renee L Nordeen
16344261	WF03SW	8/24/2016	1530	Renee L Nordeen
16344262	WF04SW	8/24/2016	1616	Renee L Nordeen

Signed on 08/26/16 Renee L Nordeen

Cinnabar Mine Integrated Assessment
Event Summary (Continued)

Sample Number	Location	Date	Time	Signed
16344263	WF05SW	8/24/2016	1648	Renee Li Nordeen
16344281	SC04SW	8/23/2016	1229	Renee Li Nordeen
16344284	BG02SW	8/23/2016	1420	Renee Li Nordeen
16344294	WF03SWD	8/24/2016	1530	Renee Li Nordeen
16344295	WF04SWD	8/24/2016	1616	Renee Li Nordeen
16344296	WF05SWD	8/24/2016	1648	Renee Li Nordeen
16344315	SC04SWD	8/23/2016	1233	Renee Li Nordeen
16344316	SC05SWD	8/23/2016	1337	Renee Li Nordeen
16344318	BG02SWD	8/23/2016	1431	Renee Li Nordeen
16344219	WF01SD	8/24/2016	1304	Renee Li Nordeen
16344220	WF02SD	8/24/2016	1404	Renee Li Nordeen
16344229	WT01SD	8/24/2016	1615	Renee Li Nordeen
16344232	CC01SD	8/23/2016	1413	Renee Li Nordeen

Signed on 08/26/16 Renee Li Nordeen

Cinnabar Mine Integrated Assessment
Event Summary (Continued)

Sample Number	Location	Date	Time	Signed
16344234	CC03SD	8/23/2016	1643	Renee L Nordeen
16344235	CC04SD	8/24/2016	1143	Renee L Nordeen
16344236	CC05SD	8/24/2016	1212	Renee L Nordeen
16344238	SC01SD	8/22/2016	1634	Renee L Nordeen
16344240	SC03SD	8/22/2016	1820	Renee L Nordeen
16344246	BG03SD	8/24/2016	1237	Renee L Nordeen
16344259	WF01SW	8/24/2016	1301	Renee L Nordeen
16344260	WF02SW	8/24/2016	1358	Renee L Nordeen
16344269	WT01SW	8/24/2016	1604	Renee L Nordeen
16344272	CC01SW	8/23/2016	1403	Renee L Nordeen
16344273	CC02SW	8/23/2016	1450	Renee L Nordeen
16344274	CC03SW	8/23/2016	1638	Renee L Nordeen
16344275	CC04SW	8/24/2016	1133	Renee L Nordeen

Signed on 08/26/16 Renee L Nordeen

Cinnabar Mine Integrated Assessment
Event Summary (Continued)

Sample Number	Location	Date	Time	Signed
16344276	CC05SW	8/24/2016	1203	Renee L Nordeen
16344278	SC01SW	8/22/2016	1626	Renee L Nordeen
16344280	SC03SW	8/23/2016	1820	Renee L Nordeen
16344285	BG03SW	8/24/2016	1233	Renee L Nordeen
16344292	WF01SWD	8/24/2016	1302	Renee L Nordeen
16344293	WF02SWD	8/24/2016	1404	Renee L Nordeen
16344303	WT01SWD	8/24/2016	1611	Renee L Nordeen
16344306	CC01SWD	8/23/2016	1357	Renee L Nordeen
16344307	CC02SWD	8/23/2016	1445	Renee L Nordeen
16344308	CC03SWD	8/23/2016	1636	Renee L Nordeen
16344309	CC04SWD	8/24/2016	1123	Renee L Nordeen
16344310	CC05SWD	8/24/2016	1207	Renee L Nordeen
16344312	SC01SWD	8/22/2016	1622	Renee L Nordeen

Signed on 08/26/16 Renee L Nordeen

Cinnabar Mine Integrated Assessment
Event Summary (Continued)

Sample Number	Location	Date	Time	Signed
16344314	SC03SWD	8/22/2016	1806	Renee L Nordeen
16344319	BG03SWD	8/24/2016	1234	Renee L Nordeen
16344224	WF06SD	8/26/2016	852	Renee L Nordeen
16344225	WF07SD	8/26/2016	1105	Renee L Nordeen
16344233	CC02SD	8/23/2016	1455	Renee L Nordeen
16344243	UT01SD	8/26/2016	1006	Renee L Nordeen
16344244	BG01SS	8/25/2016	1200	Renee L Nordeen
16344247	BG04SD	8/26/2016	1157	Renee L Nordeen
16344264	WF06SW	8/26/2016	840	Renee L Nordeen
16344265	WF07SW	8/26/2016	1101	Renee L Nordeen
16344266	AD04SW	8/25/2016	1540	Renee L Nordeen
16344282	SC05SW	8/23/2016	1343	Renee L Nordeen
16344283	UT01SW	8/26/2016	954	Renee L Nordeen

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Cinnabar Mine Integrated Assessment
Event Summary (Continued)

Sample Number	Location	Date	Time	Signed
16344286	BG04SW	8/26/2016	1134	Renee Li Nordeen
16344287	RI01WT	8/25/2016	1429	Renee Li Nordeen
16344297	WF06SWD	8/26/2016	843	Renee Li Nordeen
16344298	WF07SWD	8/26/2016	1101	Renee Li Nordeen
16344317	UT01SWD	8/26/2016	957	Renee Li Nordeen
16344320	BG04SWD	8/26/2016	1140	Renee Li Nordeen
16344324	WF01PW	8/24/2016	1350	Renee Li Nordeen
16344325	WF02PW	8/24/2016	1330	Renee Li Nordeen
16344326	WF03PW	8/24/2016	1720	Renee Li Nordeen
16344327	WF04PW	8/24/2016	1700	Renee Li Nordeen
16344328	WF05PW	8/24/2016	930	Renee Li Nordeen
16344330	WT01PW	8/25/2016	1200	Renee Li Nordeen
16344331	WT02PW	8/25/2016	1045	Renee Li Nordeen

Signed on 08/26/16 Renee Li Nordeen

Cinnabar Mine Integrated Assessment
Event Summary (Continued)

Sample Number	Location	Date	Time	Signed
16344332	WT03PW	8/24/2016	1130	Renee L'Nordeen
16344333	SC01PW	8/22/2016	1645	Renee L'Nordeen
16344334	CC02PW	8/23/2016	1600	Renee L'Nordeen
16344335	CC04PW	8/24/2016	1130	Renee L'Nordeen
16344336	BG02PW	8/24/2016	1415	Renee L'Nordeen
16344338	RI02WT	8/25/2016	1400	Renee L'Nordeen

Signed on 08/26/16 Renee L'Nordeen

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344200**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	12:13	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	TP01SS	**Sample Description**	Tan tailings, fine
Sampled By	USCG		

Photo 8-23-2016 12.26.31.jpg

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344200**

Latitude 44.919651 **Longitude** -115.289426

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344201**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	12:35	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Dusky Red
Location	TP02SS	**Sample Description**	Fine grain tailings
Sampled By	USCG		

Photo 8-23-2016 12.43.22.jpg

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344201**

Latitude 44.919897 **Longitude** -115.289001

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344202**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	12:50	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Dusky Red
Location	TP03SS	**Sample Description**	Fine grain tailings
Sampled By	USCG		

Photo 8-23-2016 12.55.12.jpg

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344202**

Latitude 44.920109 **Longitude** -115.288486

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344203**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:01	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	TP04SS	**Sample Description**	Fine grain tailings
Sampled By	USCG		

Photo 8-23-2016 13.06.02.jpg

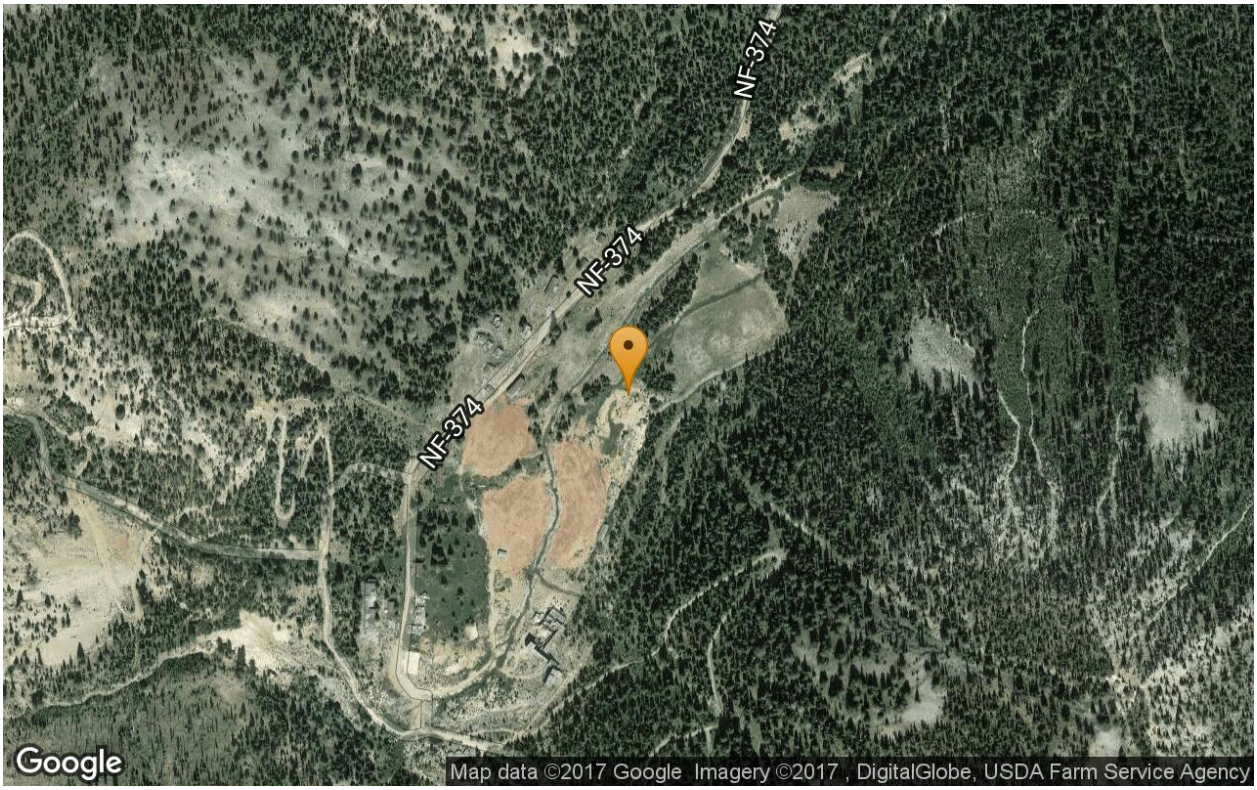
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344203**



Latitude 44.921189 **Longitude** -115.288318

Signed on 08/23/16

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344204**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:10	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Tan
Location	TP05SS	**Sample Description**	Fine grain tailings
Sampled By	USCG		

Photo 8-23-2016 13.14.14.jpg

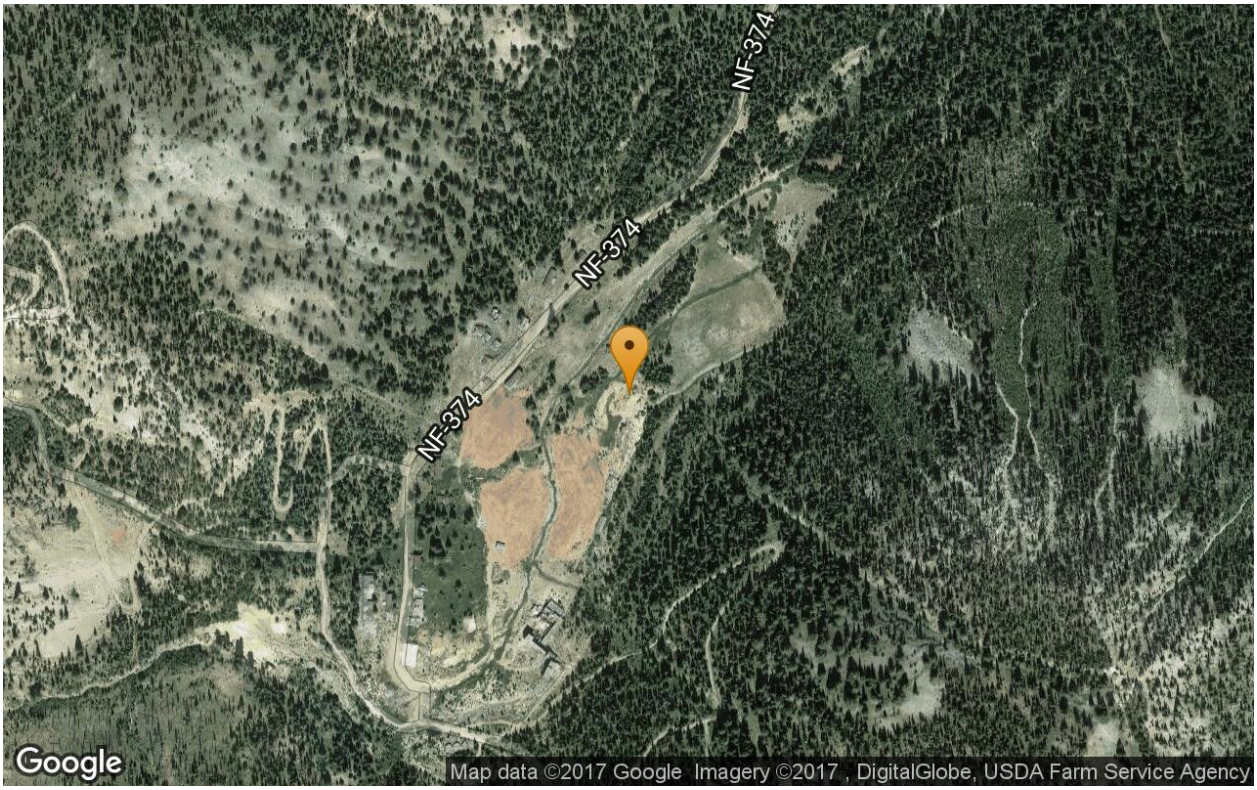
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344204**



Latitude 44.921126 **Longitude** -115.288287

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344205**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:18	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Dusky Red
Location	TP06SS	**Sample Description**	Fine grain tailings
Sampled By	USCG		

Photo 8-23-2016 13.26.59.jpg

Sampling Equipment/Technique:

Refusal at 4 in

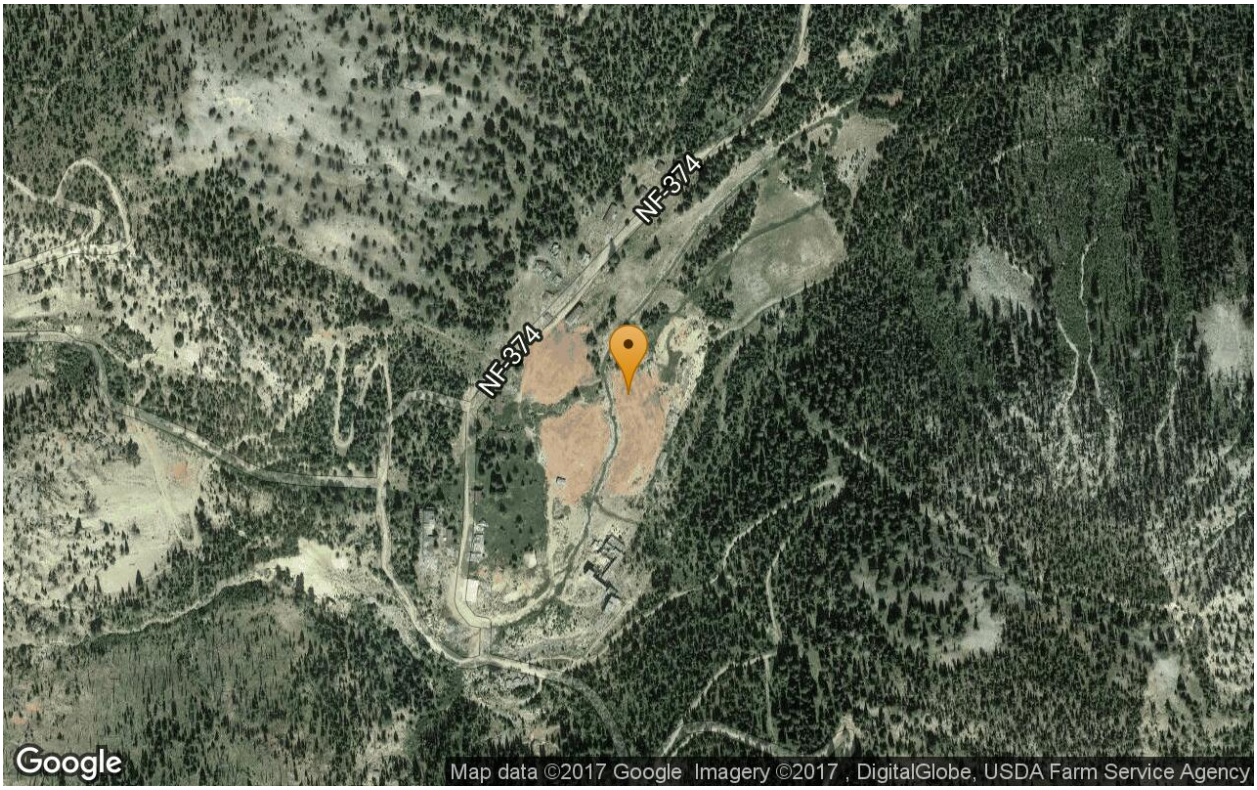
Signed on 08/23/16 Renee L'Nordeen

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344205**



Latitude 44.920629 **Longitude** -115.288956

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344206**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:32	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Dark Reddish
Location	TP07SS	**Sample Description**	Fine grain tailings
Sampled By	USCG		

Photo 8-23-2016 13.38.11.jpg

Signed on 08/23/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344206**

Latitude 44.920314 **Longitude** -115.289412

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344207**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:45	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Dusky Red
Location	TP08SS	**Sample Description**	Fine grain tailings
Sampled By	USCG		

Photo 8-23-2016 13.51.21.jpg

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344207**

Latitude 44.920016 **Longitude** -115.28977

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344208**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:06	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Dusky Red
Location	TP09SS	**Sample Description**	Fine grain tailings
Sampled By	USCG		

Photo 8-23-2016 14.12.13.jpg

Sampling Equipment/Technique:

Refusal at 4 in

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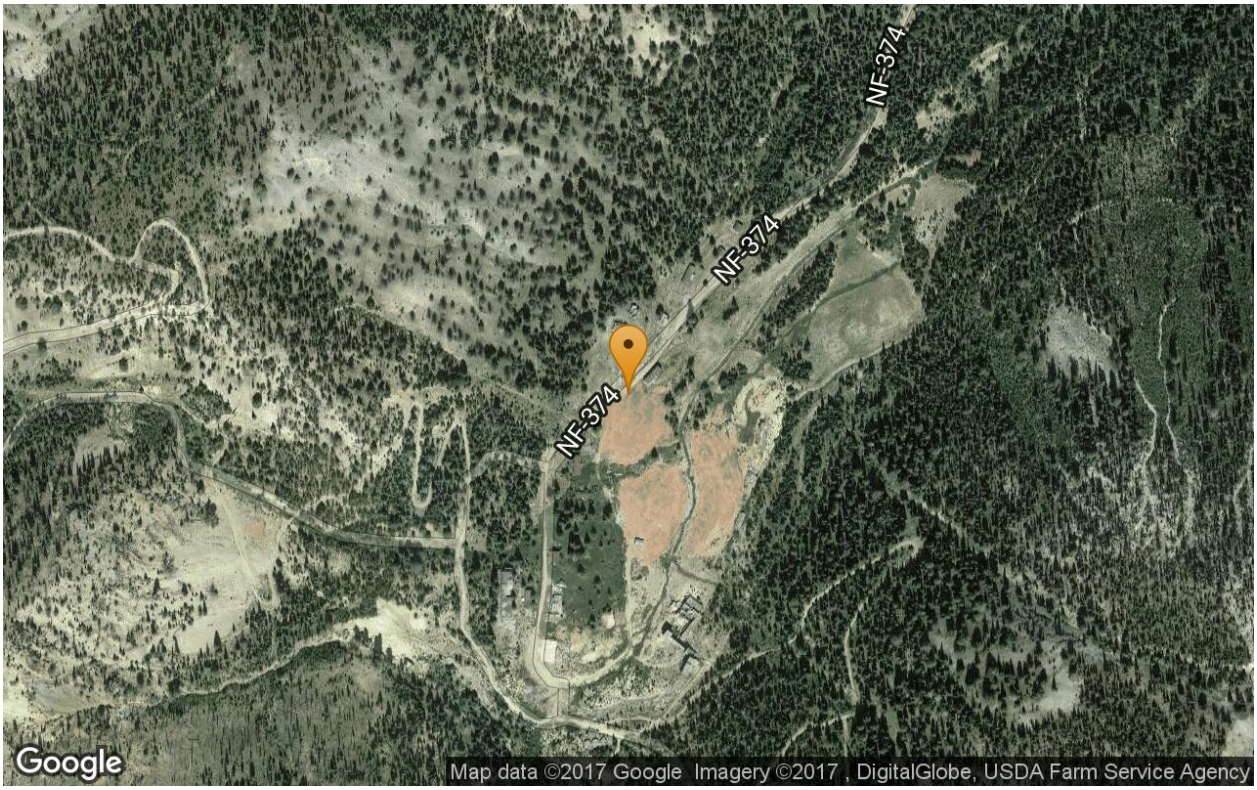
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344208**



Latitude 44.921101 **Longitude** -115.289818

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344209**

Sampling Date	8/23/2016	**Collection Method**	Composite
Sampling Time	14:25	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Tan
Location	RT01SS	**Sample Description**	Fine silty gravel
Sampled By	USCG		

Photo 8-23-2016 14.31.27.jpg

Sampling Equipment/Technique:

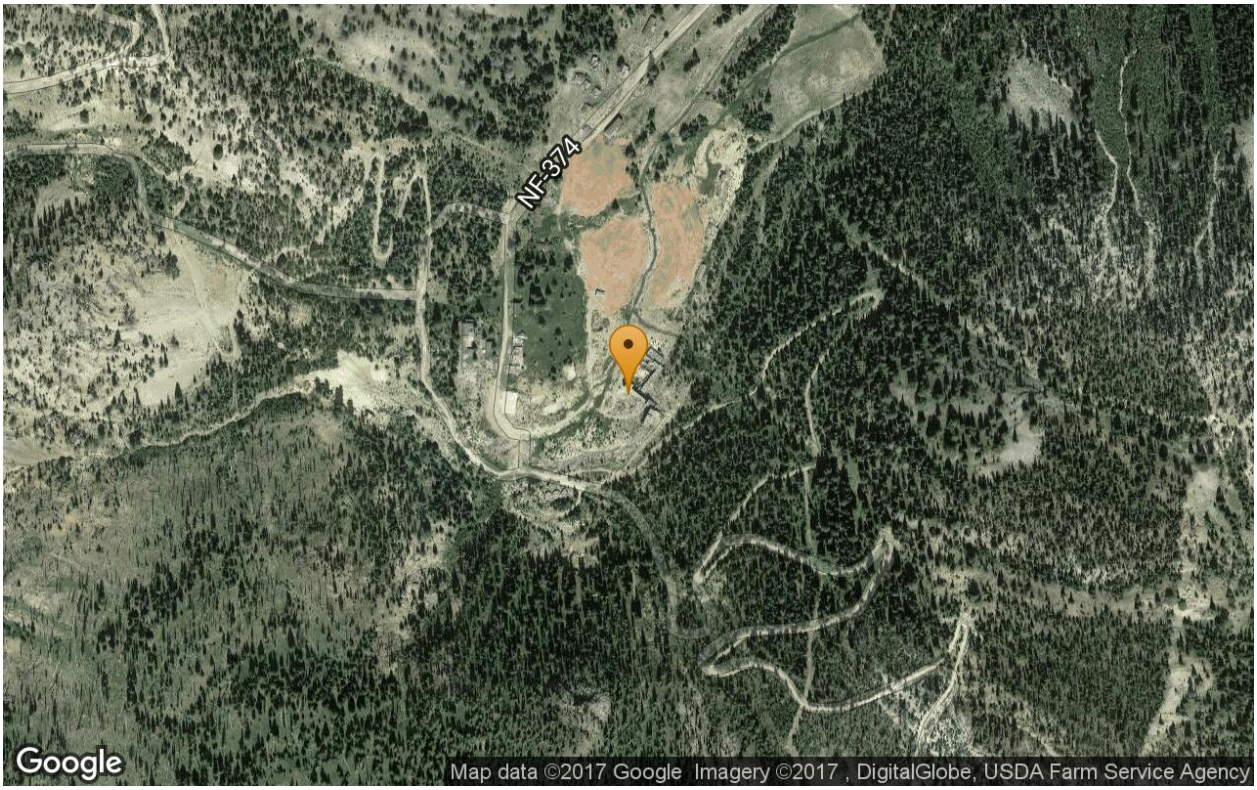
4pt composite

Signed on 08/23/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344209**



Latitude 44.919176 **Longitude** -115.289391

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344210**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:15	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	BS01SS	**Sample Description**	Sandy silt with fine
Sampled By	USCG		

Photo 8-24-2016 11.23.11.jpg

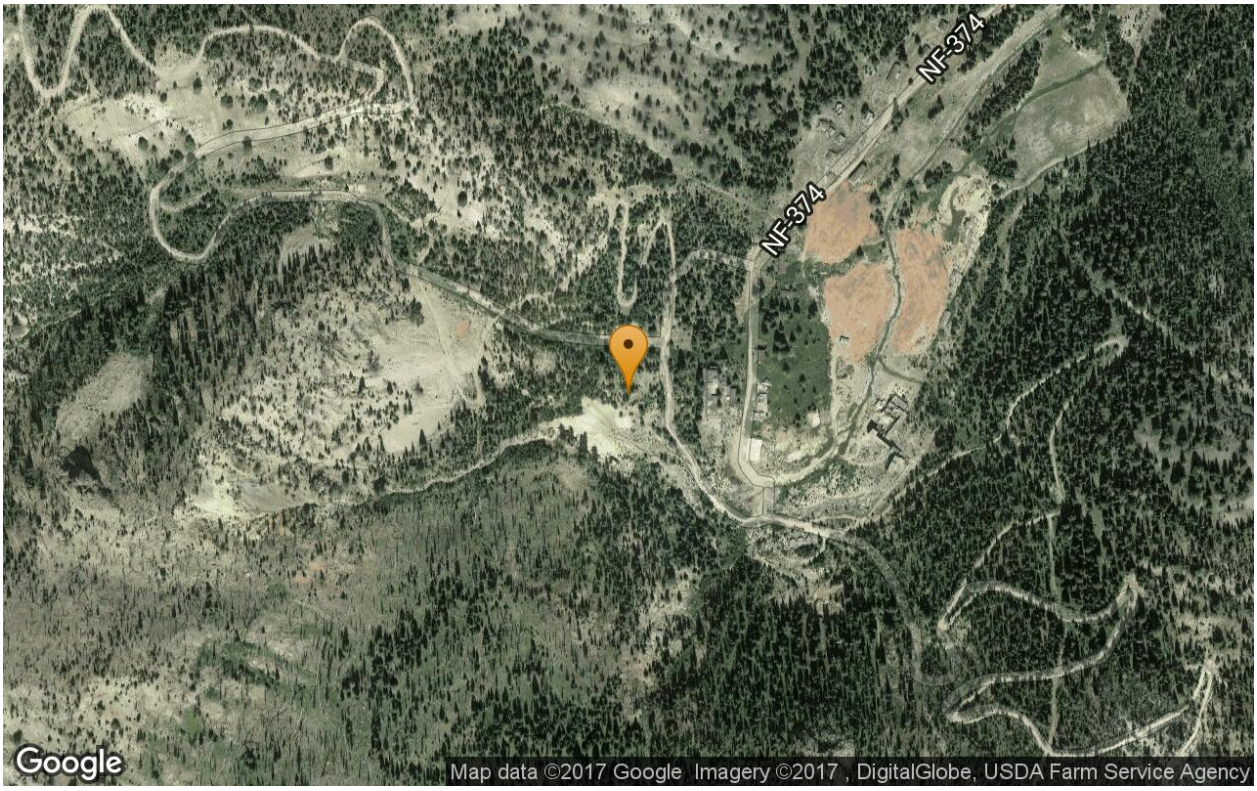
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344210**



Latitude 44.919538 **Longitude** -115.292067

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344211**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:27	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	BS02SS	**Sample Description**	Sandy silt with fine
Sampled By	USCG		

Photo 8-24-2016 11.35.41.jpg

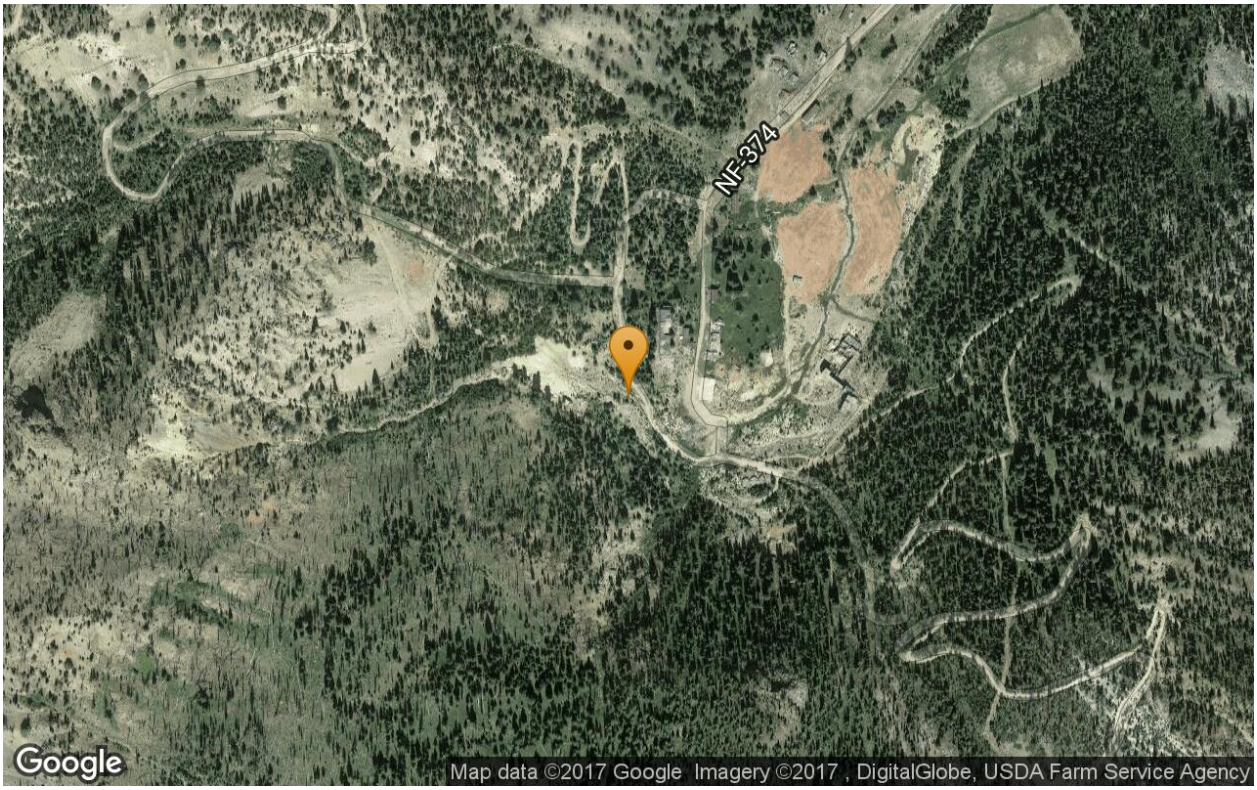
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344211**



Latitude 44.919062 **Longitude** -115.291557

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344212**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:42	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	BS03SS	**Sample Description**	Sandy silt with fine
Sampled By	USCG		

Photo 8-24-2016 11.51.01.jpg

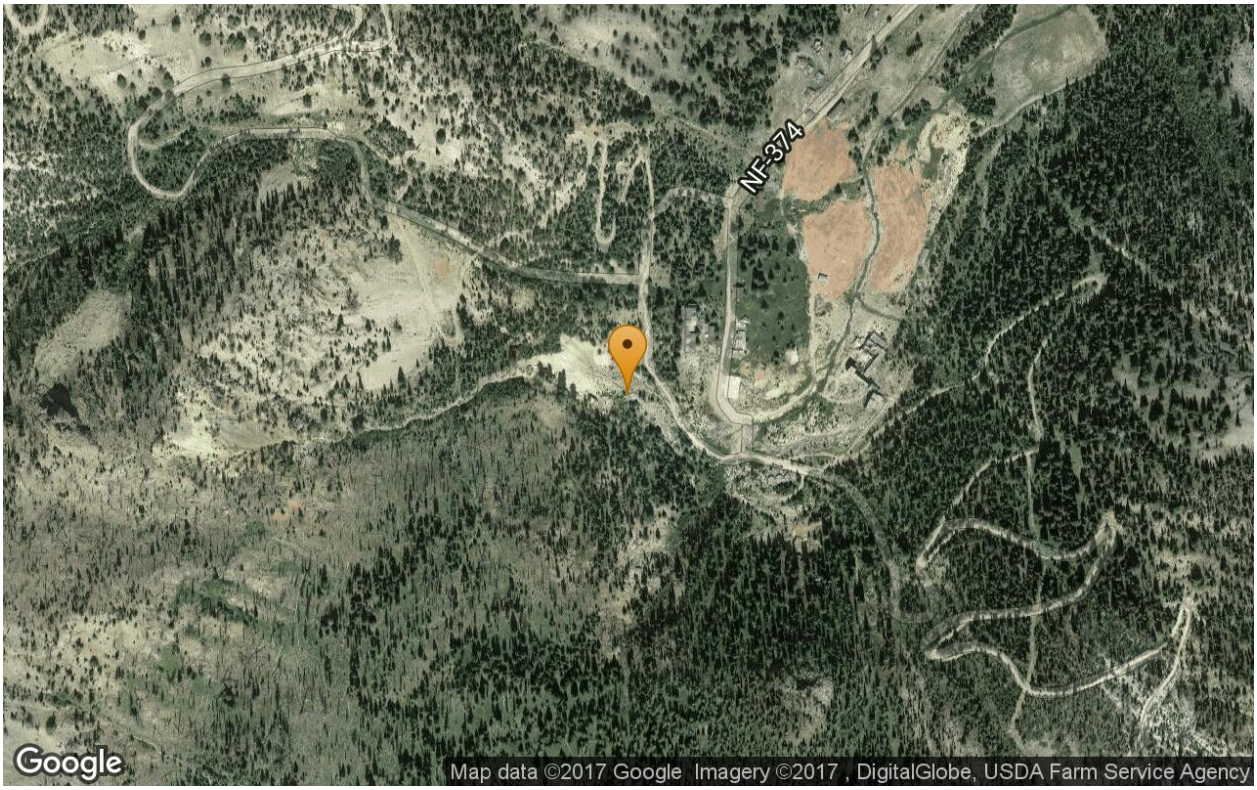
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344212**



Latitude 44.919052 **Longitude** -115.291843

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344213**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:57	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	BS04SS	**Sample Description**	Sandy silt with fine
Sampled By	USCG		

Photo 8-24-2016 12.01.09.jpg

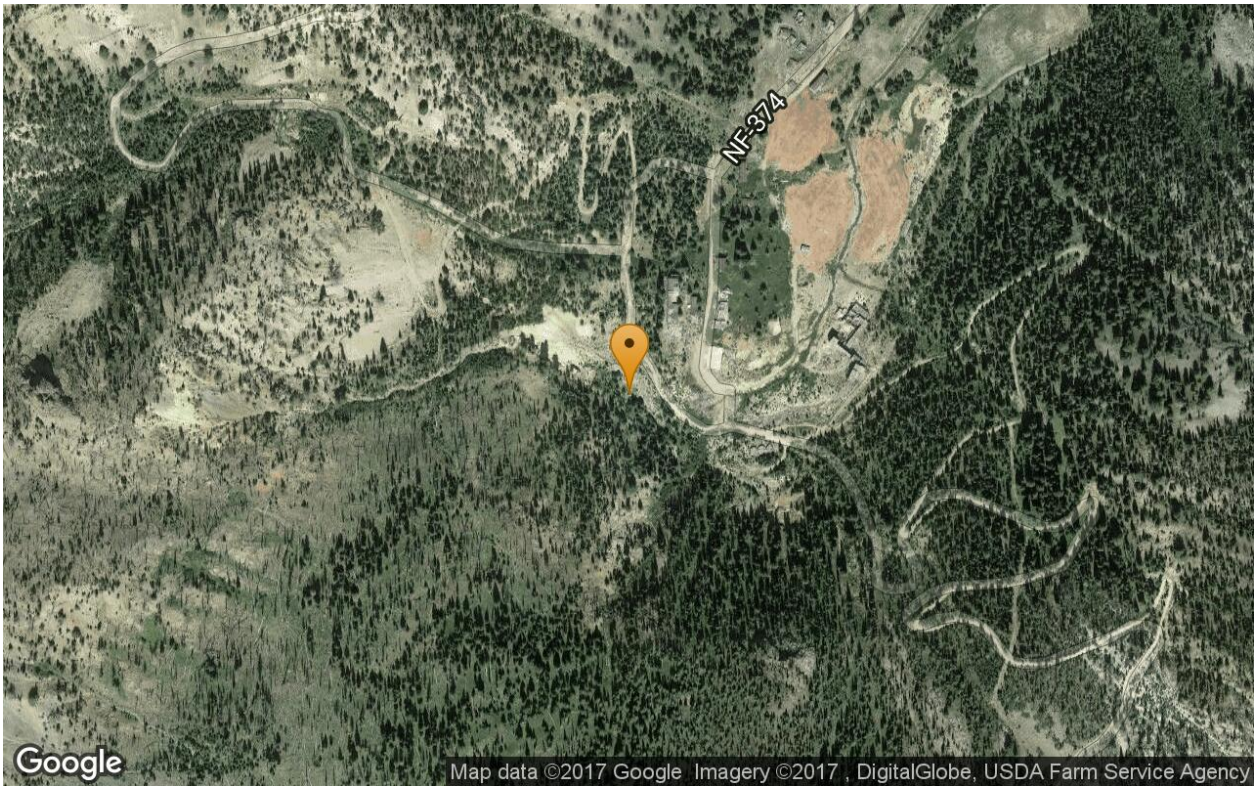
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344213**



Latitude 44.918829 **Longitude** -115.291637

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344214**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	12:06	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	BS05SS	**Sample Description**	Sandy silt with fine
Sampled By	USCG		

Photo 8-24-2016 12.16.22.jpg

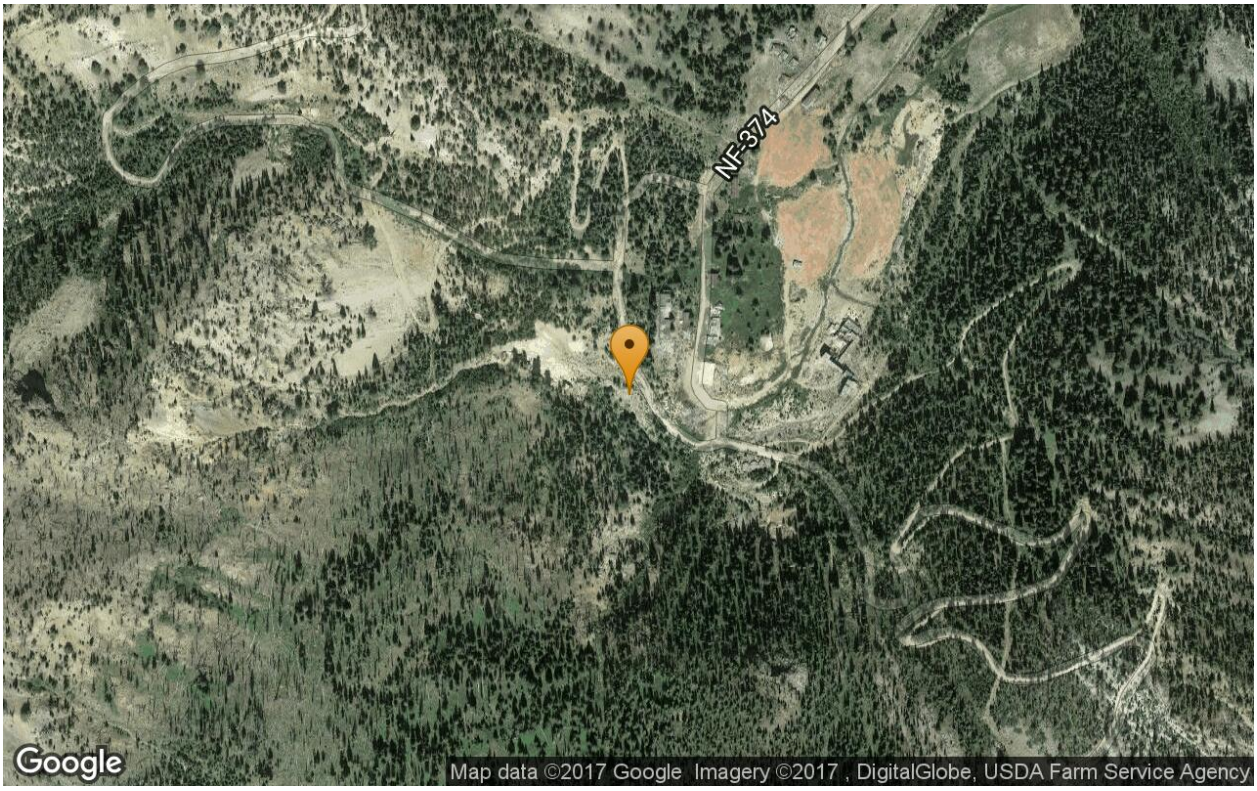
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344214**



Latitude 44.918944 **Longitude** -115.29155

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344216**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:10	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Dark Brown
Location	AD01SD	**Sample Description**	Organic SILT with
Sampled By	USCG		

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344216**

Latitude 44.919694 **Longitude** -115.288943

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344217**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:57	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	AD02SD	**Sample Description**	Fine to medium
Sampled By	USCG		

Photo 8-24-2016 15.01.04.jpg

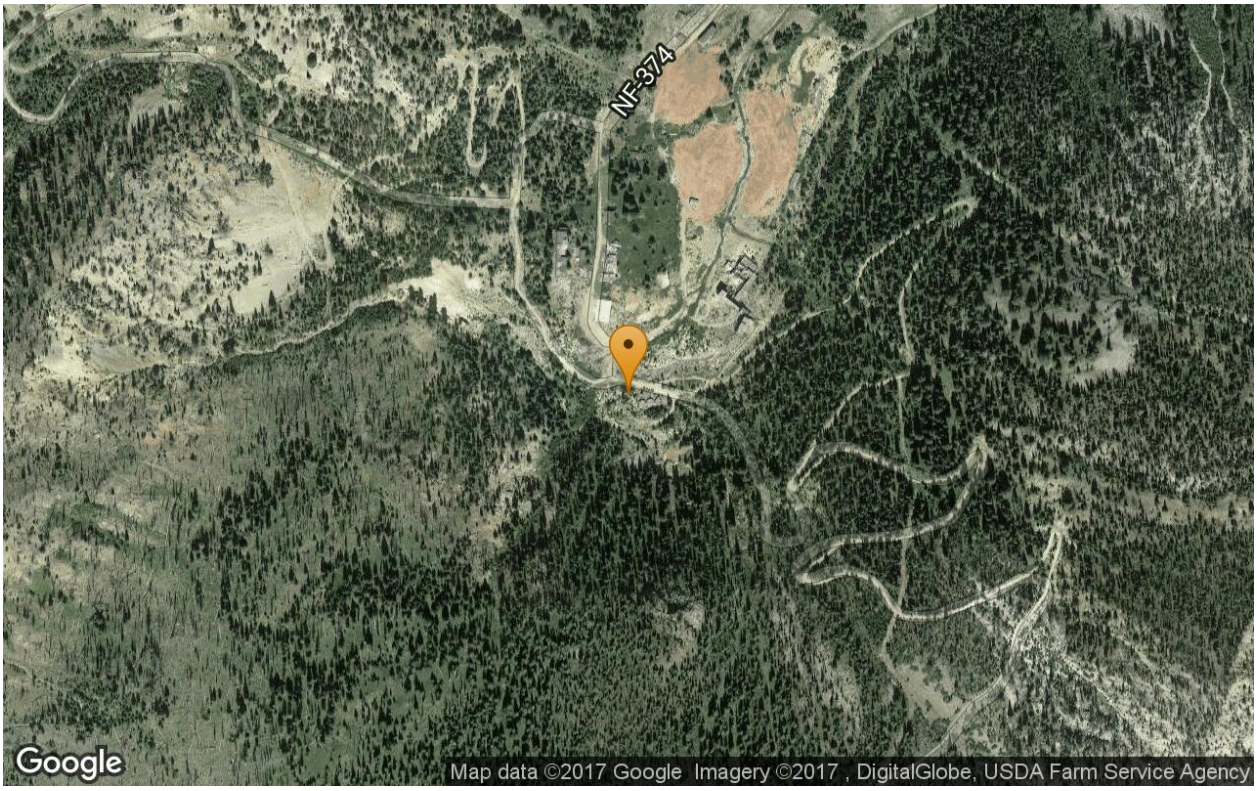
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344217**



Latitude 44.918458 **Longitude** -115.290423

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344218**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:20	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Tan
Location	AD03SD	**Sample Description**	Sandy silt with fine
Sampled By	USCG		

Photo 8-24-2016 16.21.41.jpg

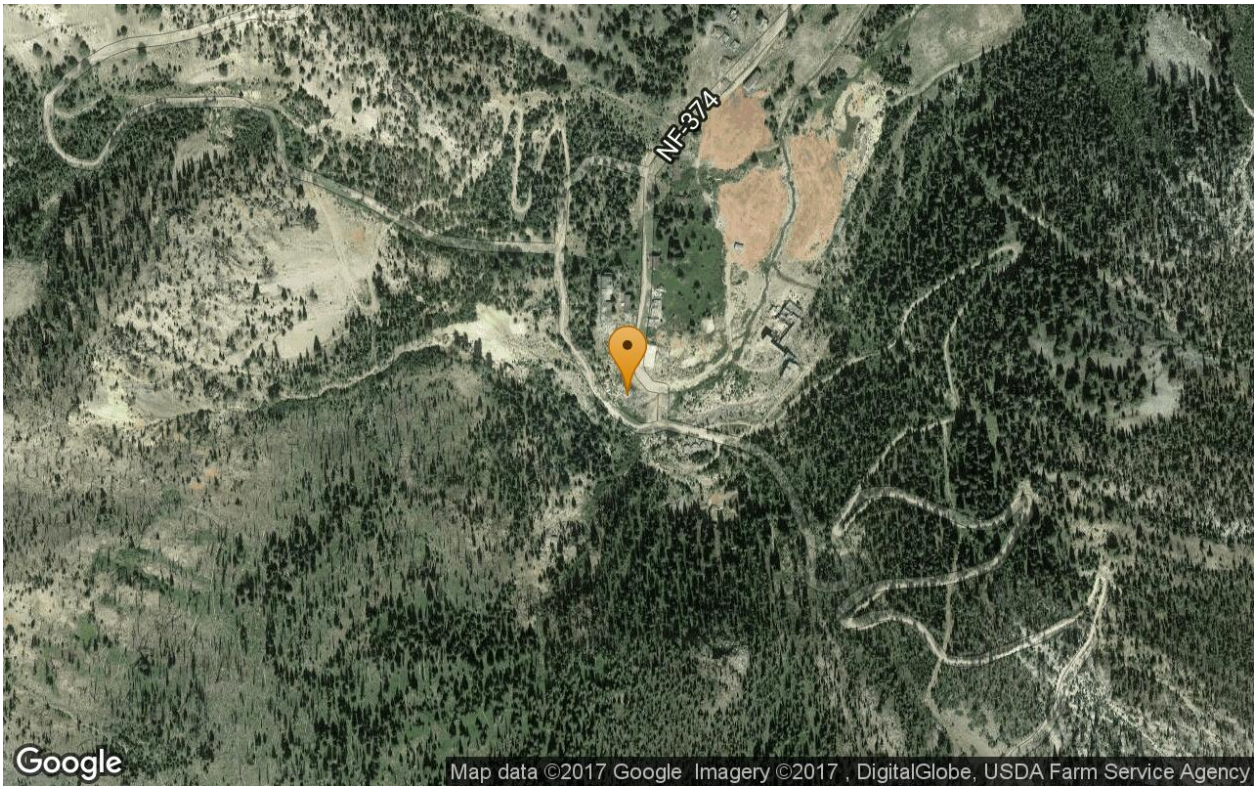
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344218**



Latitude 44.918803 **Longitude** -115.290921

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344239**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	17:35	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	SC02SD		
Sampled By	USCG		

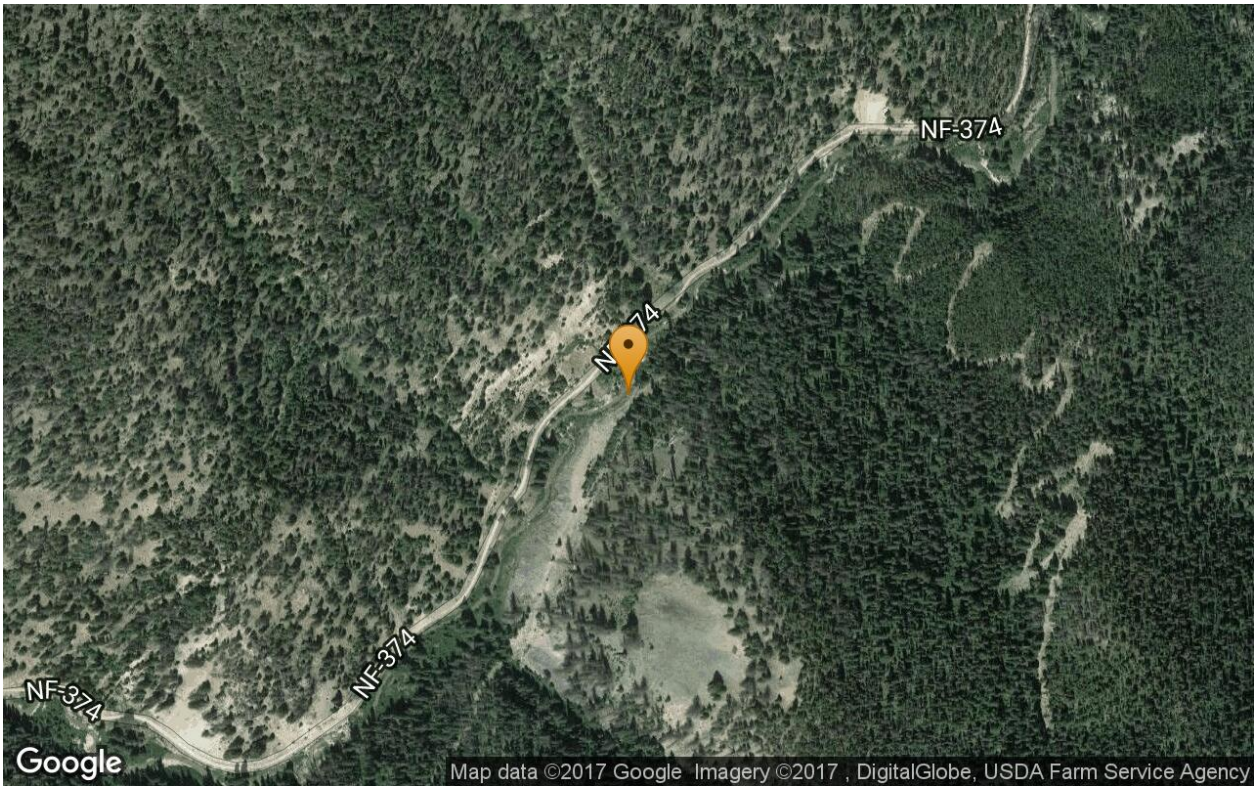
Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344239**



Latitude 44.941532 **Longitude** -115.316468

Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344256**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:06	**Type**	Field Sample
Matrix	Surface Water		
Location	AD01SW		
Sampled By	USCG		

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344256**

Latitude 44.919694 **Longitude** -115.288943

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344257**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:55	**Type**	Field Sample
Matrix	Surface Water		
Location	AD02SW		
Sampled By	USCG		

Photo 8-24-2016 15.09.45.jpg

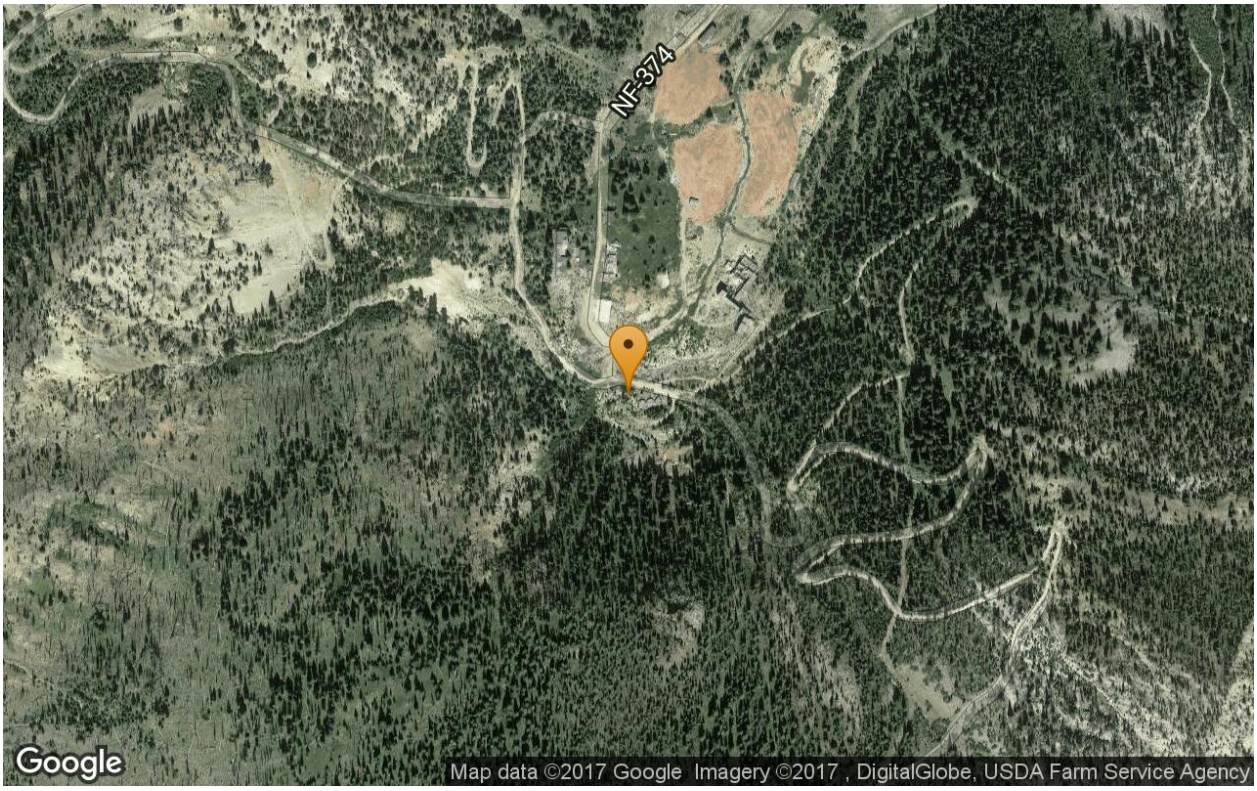
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344257**



Latitude 44.918458 **Longitude** -115.290423

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344258**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:12	**Type**	Field Sample
Matrix	Surface Water		
Location	AD03SW		
Sampled By	USCG		

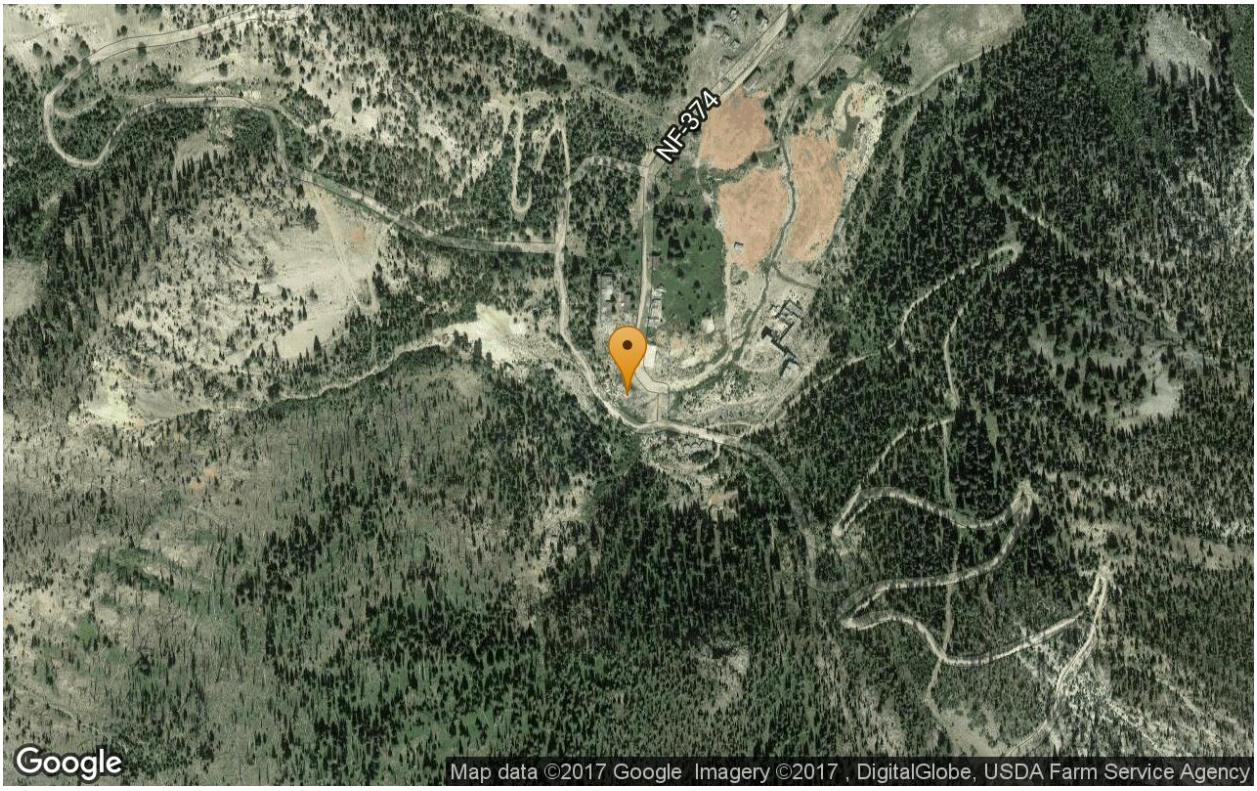
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344258**



Latitude 44.918803 **Longitude** -115.290921

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344279**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	17:33	**Type**	Field Sample
Matrix	Surface Water		
Location	SC02SW		
Sampled By	USCG		

Photo 8-22-2016 17.41.45.jpg

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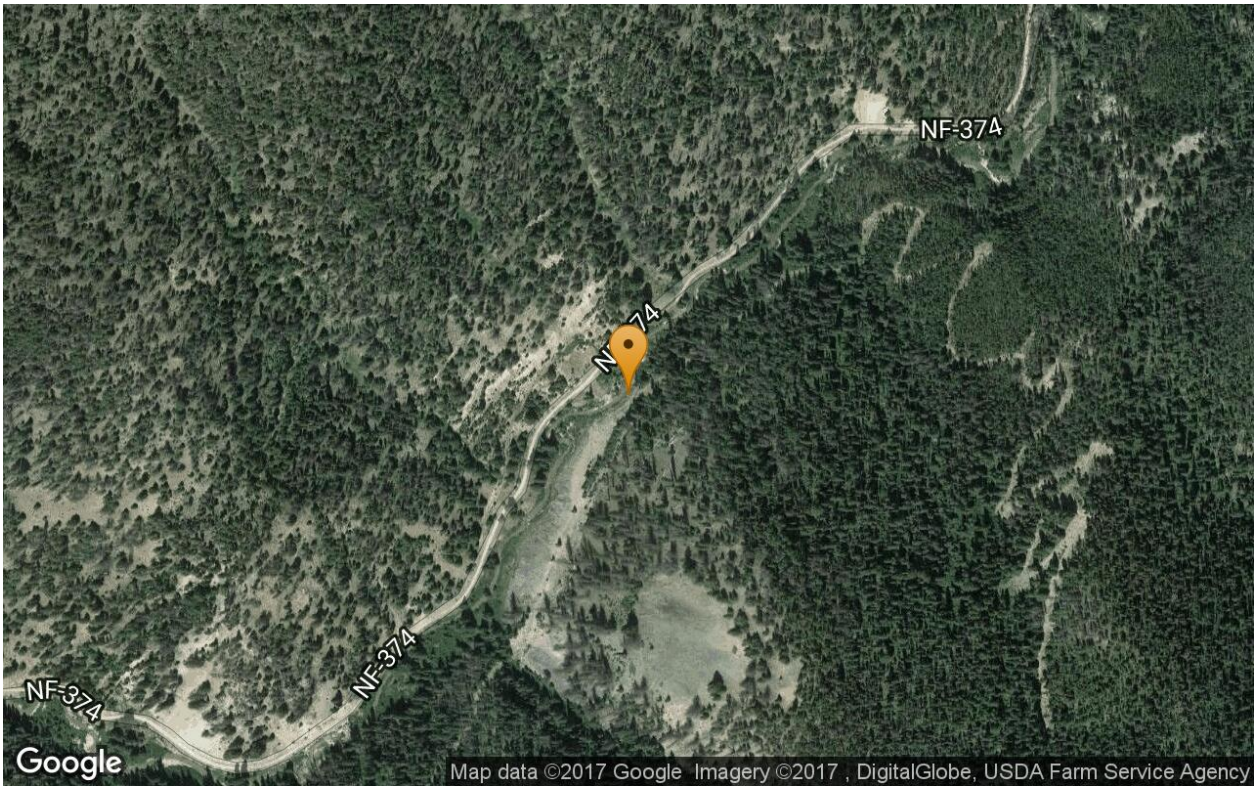
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344279**



Latitude 44.941532 **Longitude** -115.316468

Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344289**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:03	**Type**	Field Sample
Matrix	Surface Water		
Location	AD01SWD		
Sampled By	USCG		

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344289**

Latitude 44.919694 **Longitude** -115.288943

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344290**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:40	**Type**	Field Sample
Matrix	Surface Water		
Location	AD02SWD		
Sampled By	USCG		

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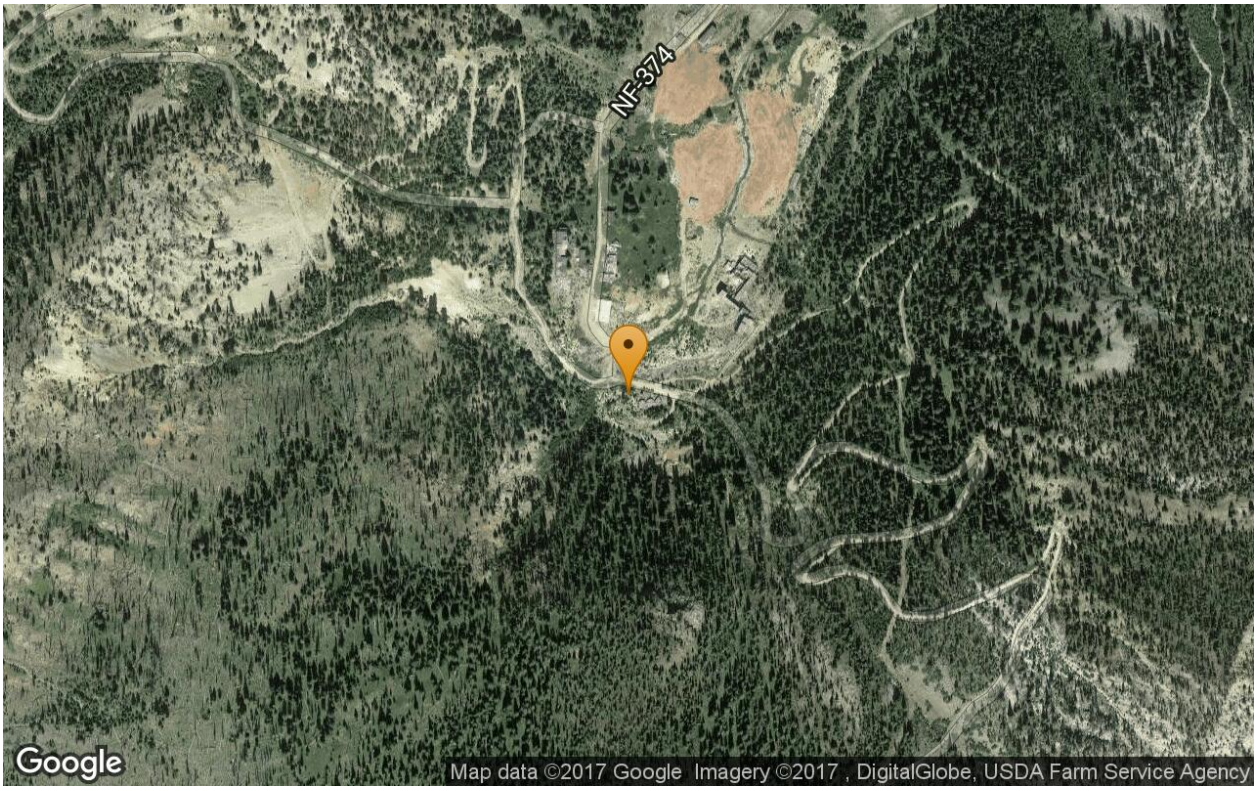
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344290**



Latitude 44.918458 **Longitude** -115.290423

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344291**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:20	**Type**	Field Sample
Matrix	Surface Water		
Location	AD03SWD		
Sampled By	USCG		

Photo 8-24-2016 16.25.34.jpg

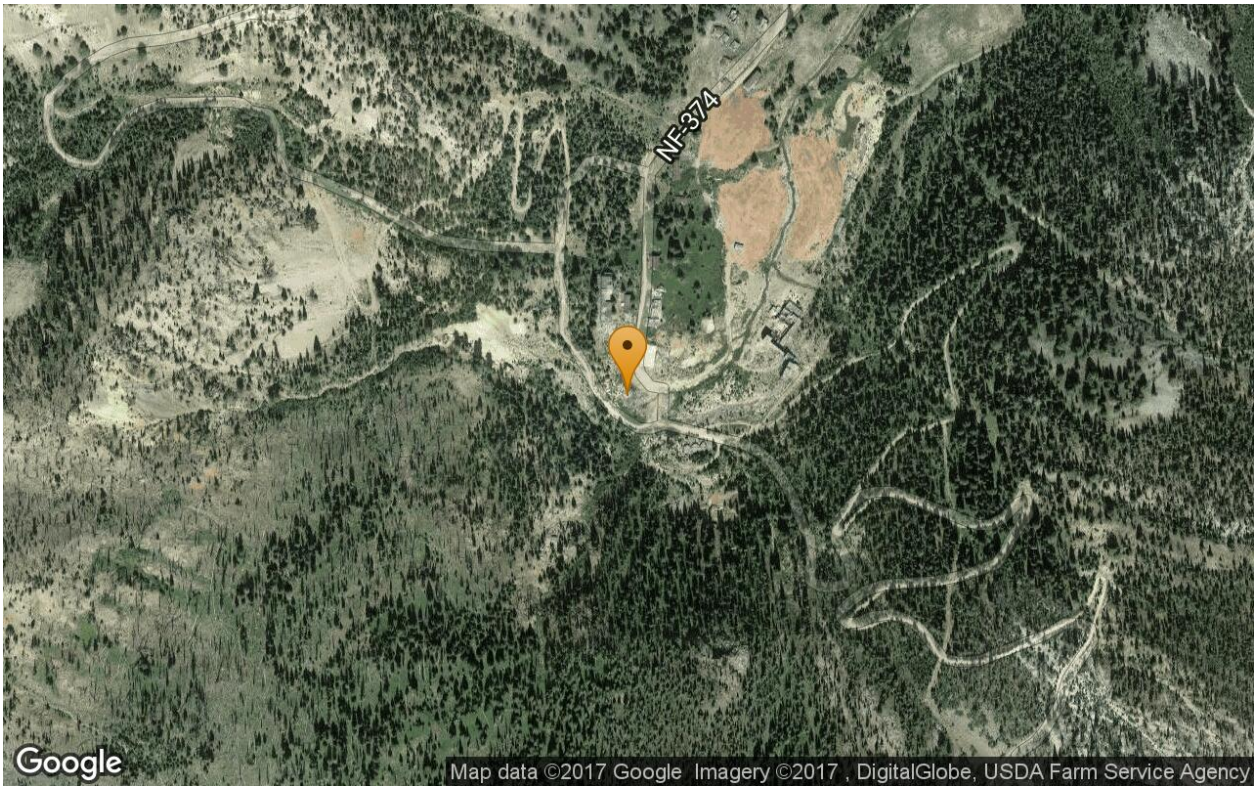
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344291**



Latitude 44.918803 **Longitude** -115.290921

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344313**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	17:22	**Type**	Field Sample
Matrix	Surface Water		
Location	SC02SWD		
Sampled By	USCG		

Water Quality Parameters

Temp	pH	Diss O2
13.4 °C	7.81	12.06

ORP
171

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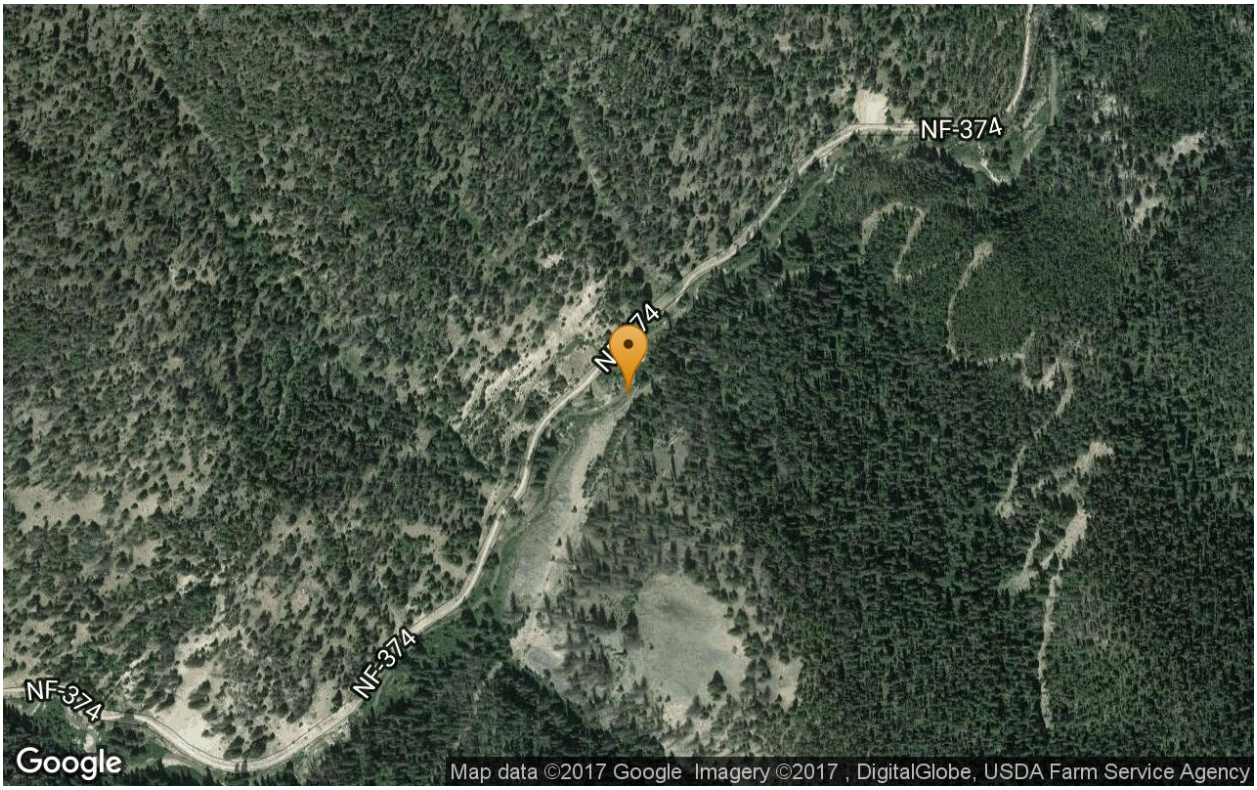
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344313**



Latitude 44.941532 **Longitude** -115.316468

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344221**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	15:51	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	WF03SD	**Sample Description**	Sandy GRAVEL
Sampled By	USCG		

Photo 8-24-2016 15.57.08.jpg

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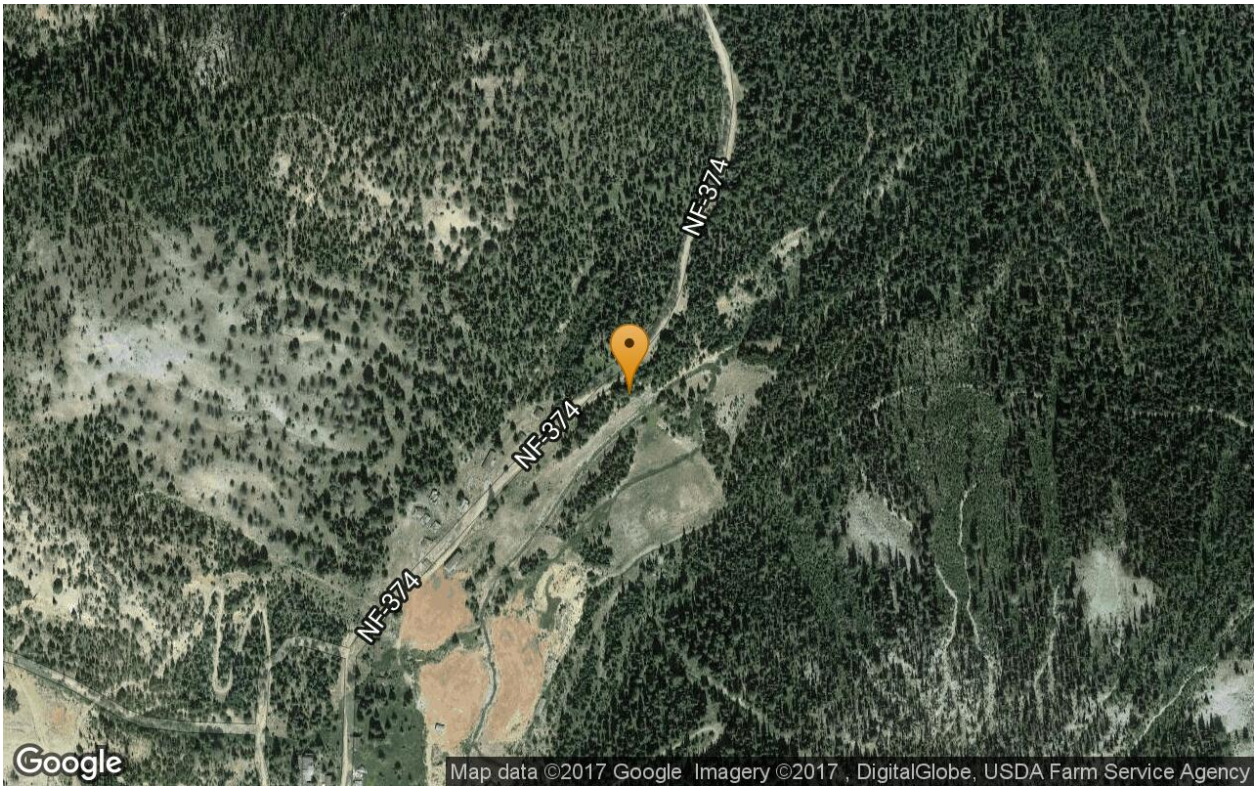
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344221**



Latitude 44.922552 **Longitude** -115.287624

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344222**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:30	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	WF04SD	**Sample Description**	Sandy GRAVEL
Sampled By	USCG		

Photo 8-24-2016 16.36.12.jpg

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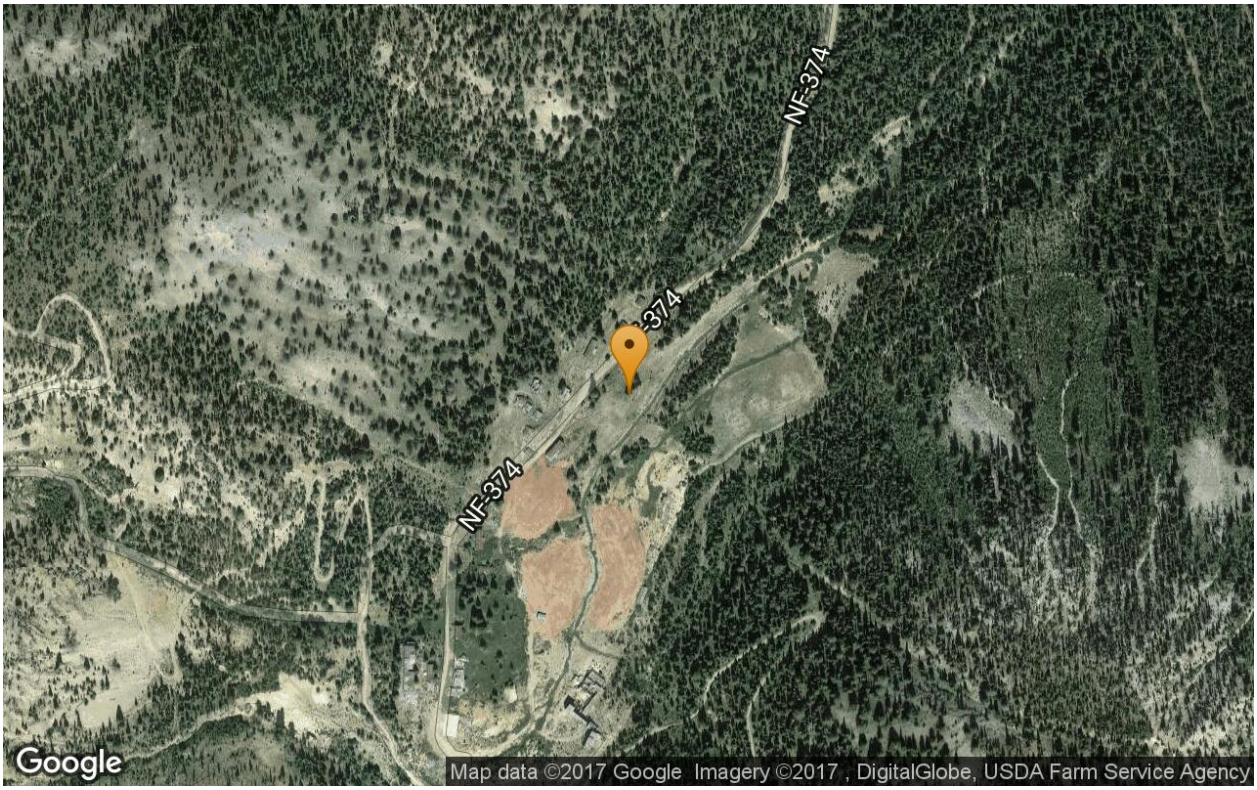
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344222**



Latitude 44.921676 **Longitude** -115.288737

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344223**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:54	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	WF05SD	**Sample Description**	Sandy GRAVEL
Sampled By	USCG		

Photo 8-24-2016 17.00.47.jpg

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344223**

Latitude 44.920752 **Longitude** -115.289265

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344241**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	12:49	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	SC04SD	**Sample Description**	Silty SAND
Sampled By	USCG		

Photo 8-23-2016 12.54.59.jpg

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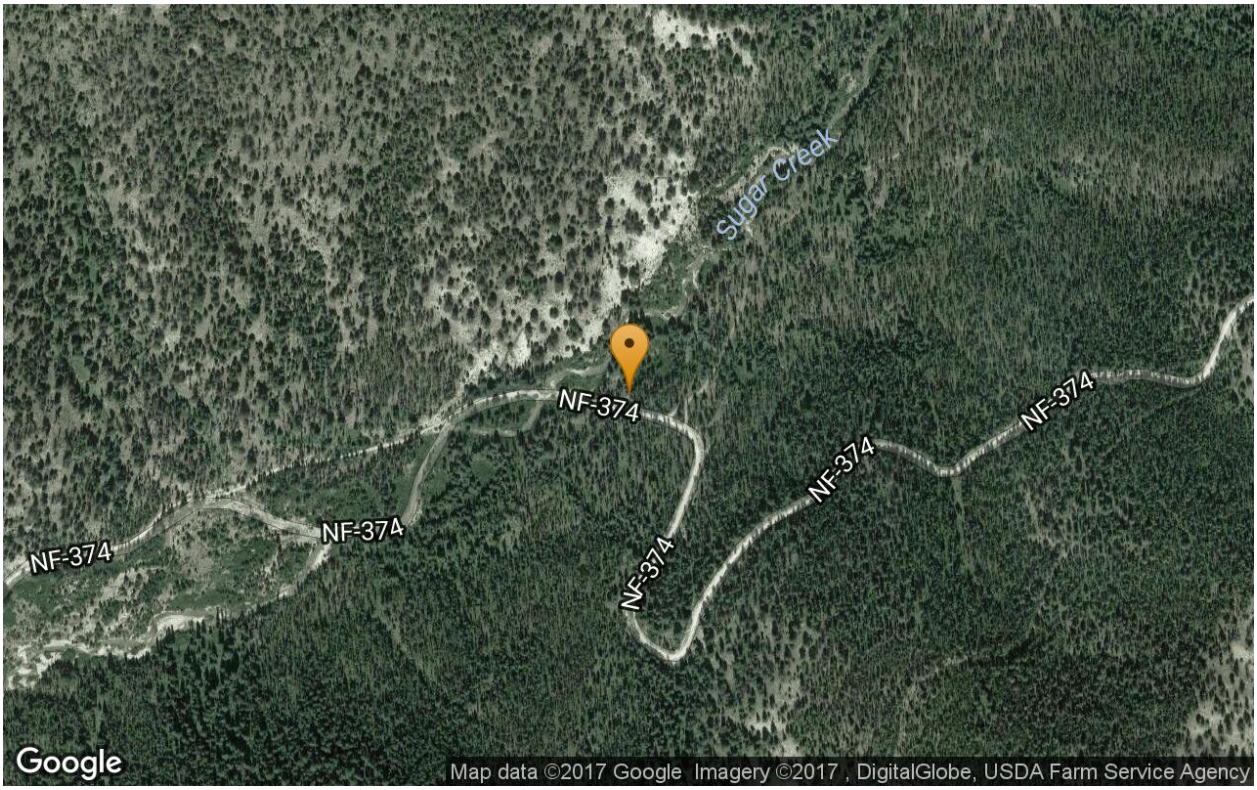
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344241**



Latitude 44.948875 **Longitude** -115.297043

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344242**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:46	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Light Brownish
Location	SC05SD	**Sample Description**	Gravelly SAND
Sampled By	USCG		

Photo 8-23-2016 13.52.34.jpg

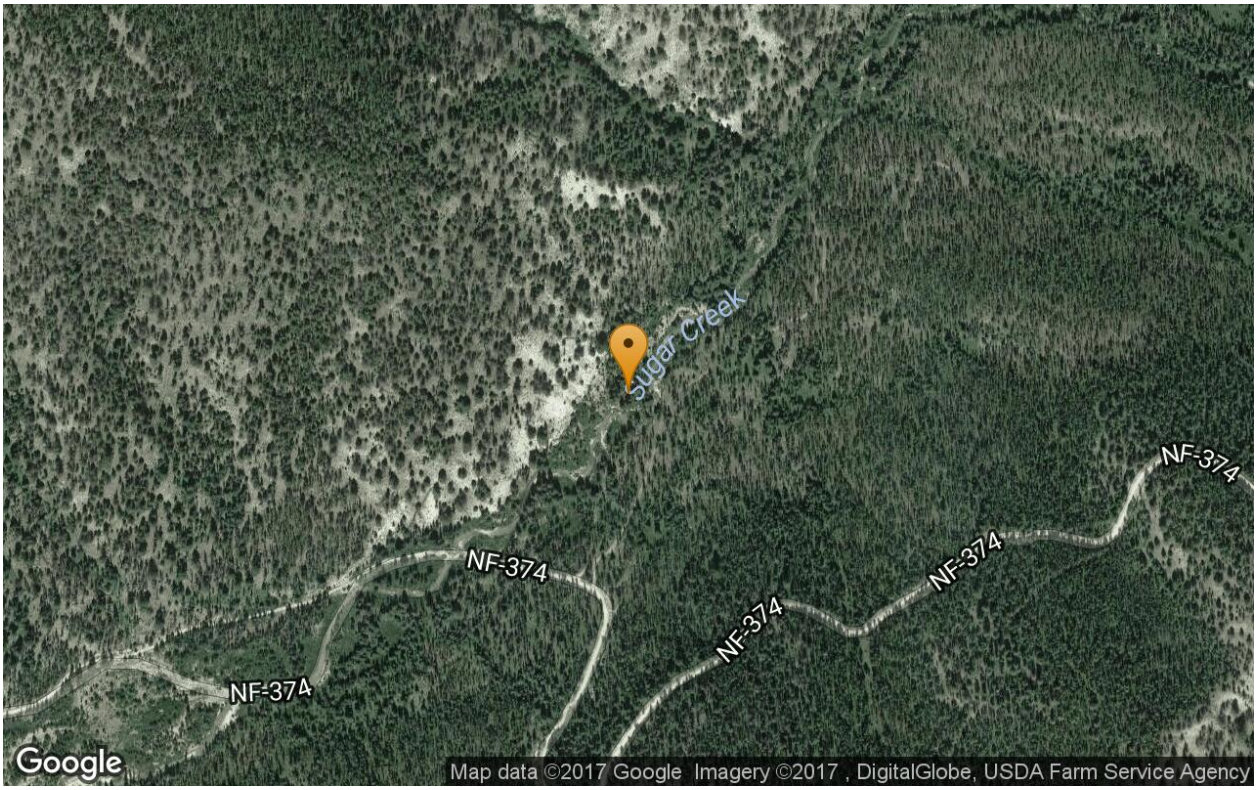
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344242**



Latitude 44.950119 **Longitude** -115.296045

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344245**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:40	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Light Brownish
Location	BG02SD	**Sample Description**	Gravelly SAND
Sampled By	USCG		

Photo 8-23-2016 14.36.52.jpg

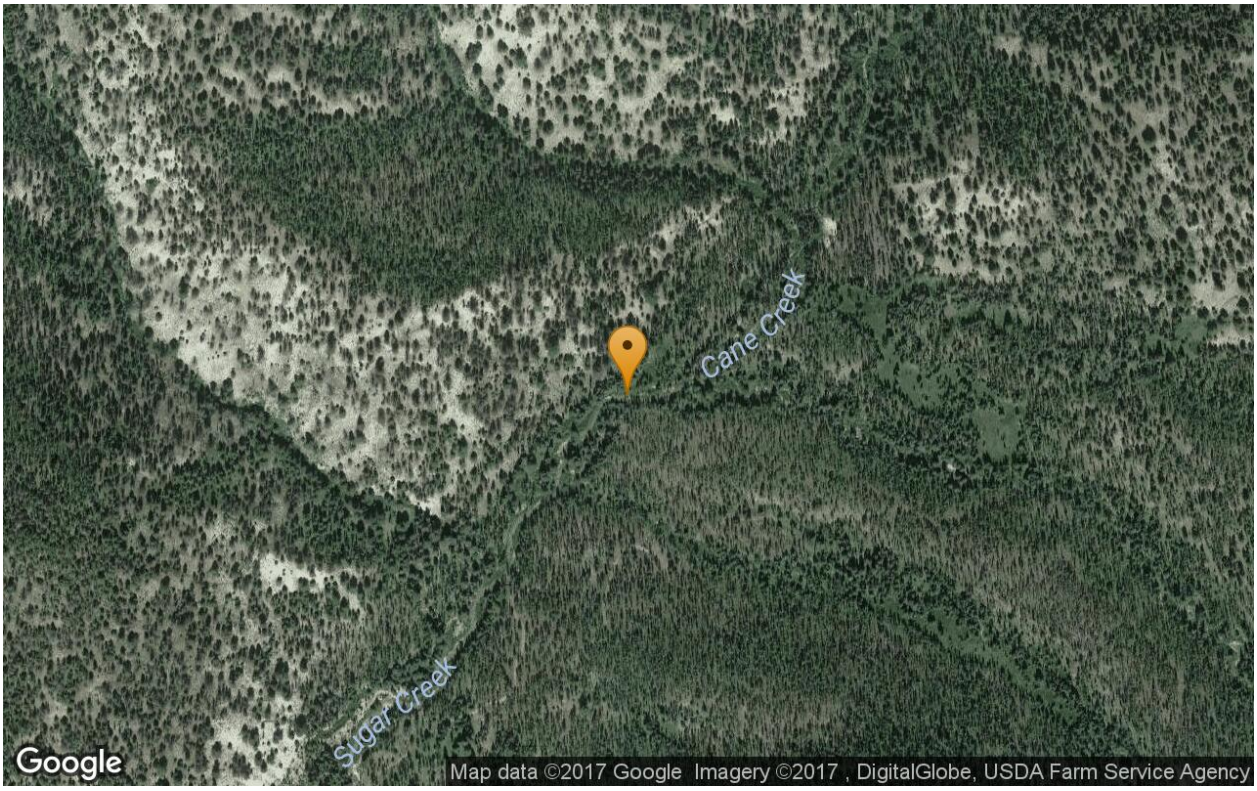
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344245**



Latitude 44.953086 **Longitude** -115.292744

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344261**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	15:30	**Type**	Field Sample
Matrix	Surface Water		
Location	WF03SW		
Sampled By	USCG		

Photo 8-24-2016 15.31.30.jpg

Water Quality Parameters

Temp	pH	Diss O2
11.2 °C	8.33	10.22
Cond.	**Turbidity**	**ORP**
.14	0	171

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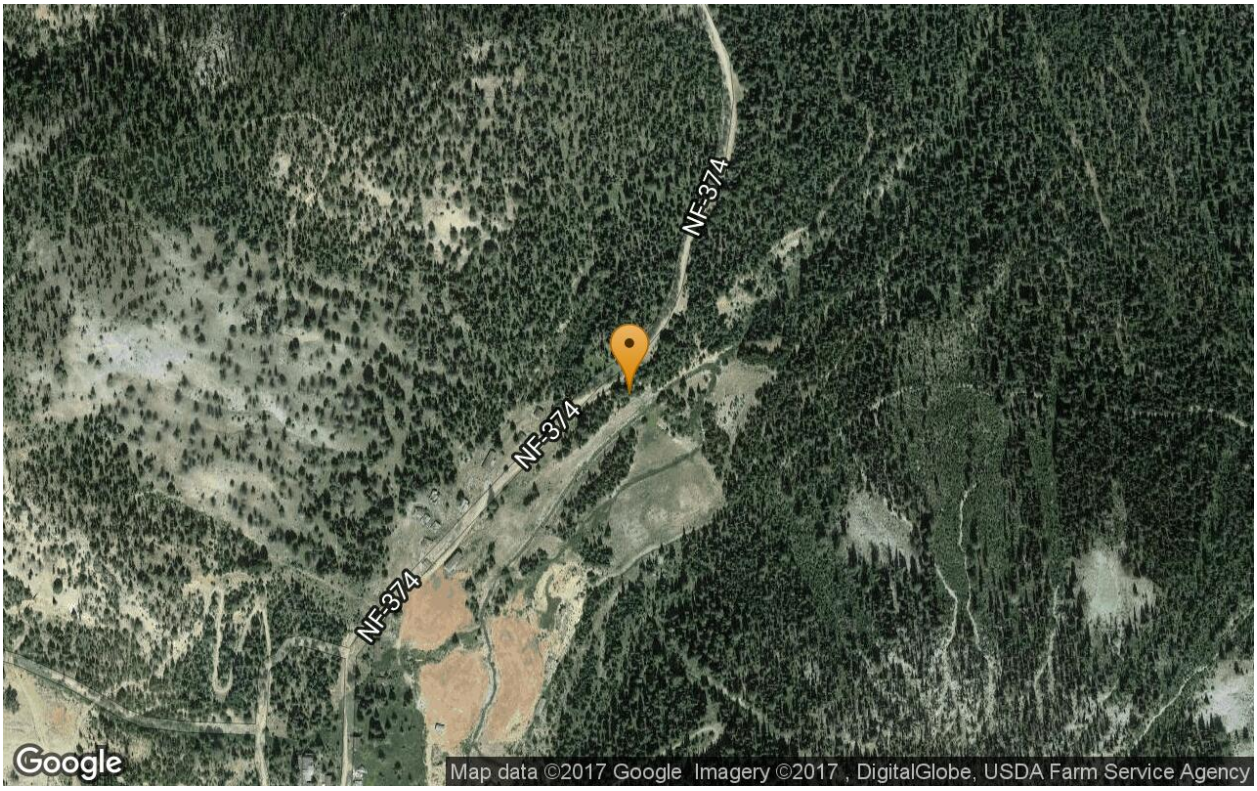
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344261**



Latitude 44.922552 **Longitude** -115.287624

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344262**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:16	**Type**	Field Sample
Matrix	Surface Water		
Location	WF04SW		
Sampled By	USCG		

Photo 8-24-2016 16.20.51.jpg

Water Quality Parameters

Temp	pH	Diss O2
11.1 °C	8.27	9.72
Cond.	**Turbidity**	**ORP**
.141	0	214

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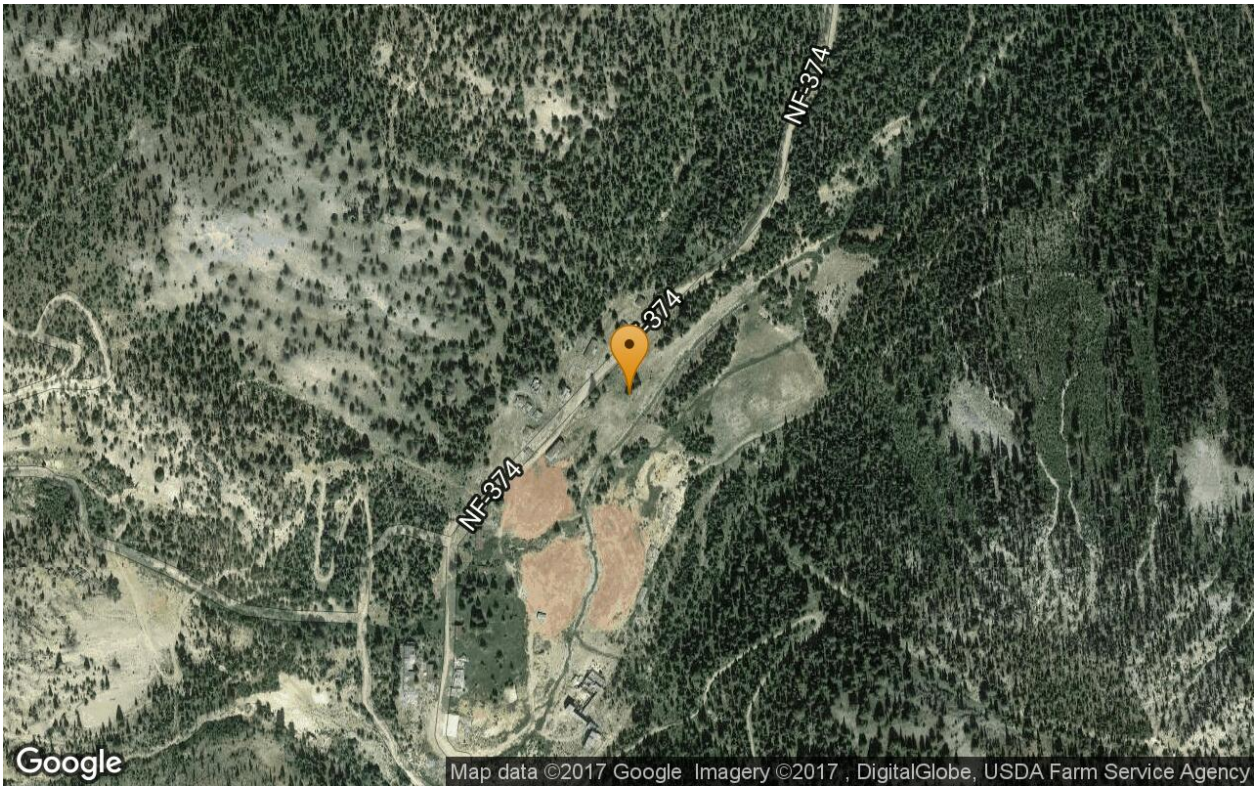
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344262**



Latitude 44.921676 **Longitude** -115.288737

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344263**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:48	**Type**	Field Sample
Matrix	Surface Water		
Location	WF05SW		
Sampled By	USCG		

Photo 8-24-2016 16.51.48.jpg

Water Quality Parameters

Temp	pH	Diss O2
11.4 °C	7.96	7.63
Cond.	**Turbidity**	**ORP**
.062	1.2	219

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344263**

Latitude 44.920752 **Longitude** -115.289265

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344281**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	12:29	**Type**	Field Sample
Matrix	Surface Water		
Location	SC04SW		
Sampled By	USCG		

Photo 8-23-2016 12.53.36.jpg

Water Quality Parameters

Temp		Diss O2
7.7 °C		8.15
Cond.	**Turbidity**	**ORP**
.105	0	93

Sampling Equipment/Technique:

Sample id should be SC04S

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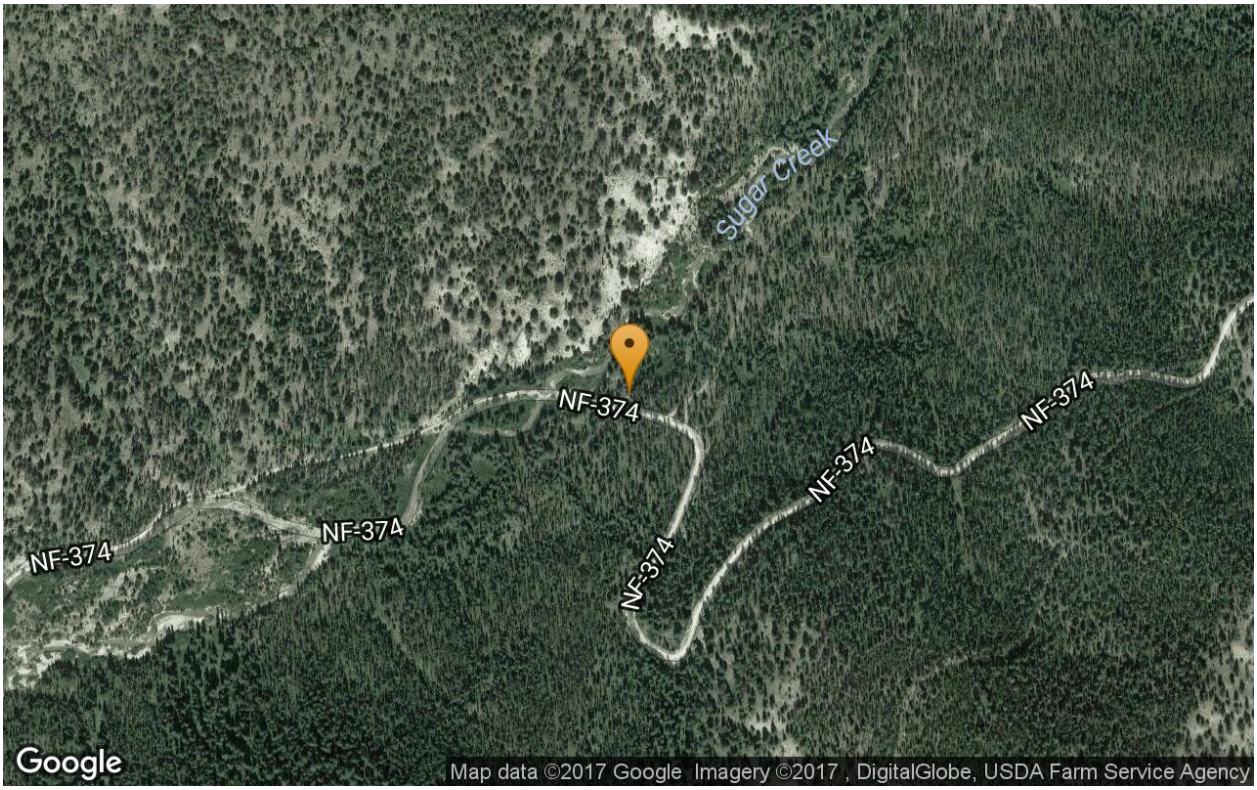
Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344281**



Latitude 44.948875 **Longitude** -115.297043

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344284**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:20	**Type**	Field Sample
Matrix	Surface Water		
Location	BG02SW		
Sampled By	USCG		

Photo 8-23-2016 14.31.02.jpg

Water Quality Parameters

Temp	pH	Diss O2
10.0 °C	6.82	872
Cond.	**Turbidity**	**ORP**
.04	0	128

Sampling Equipment/Technique:

Adit Background

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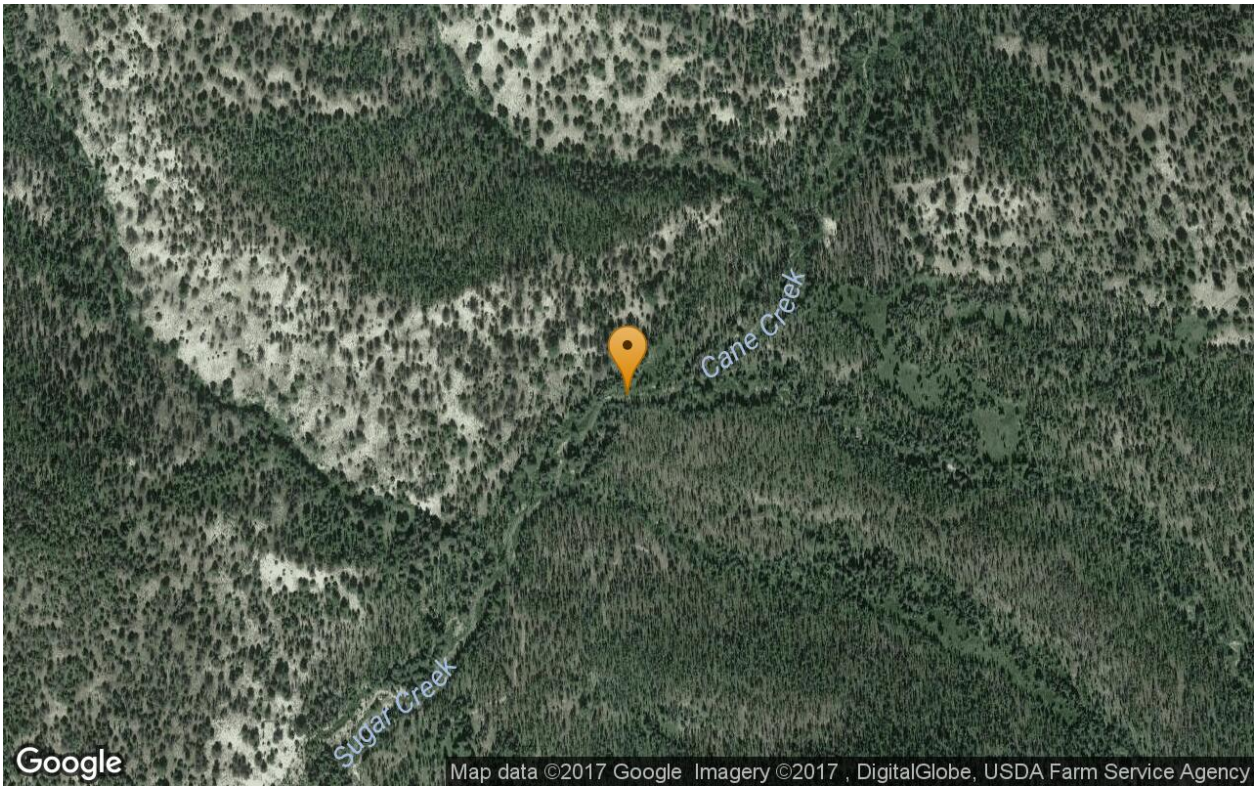
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344284**



Latitude 44.953086 **Longitude** -115.292744

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344294**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	15:30	**Type**	Field Sample
Matrix	Surface Water		
Location	WF03SWD		
Sampled By	USCG		

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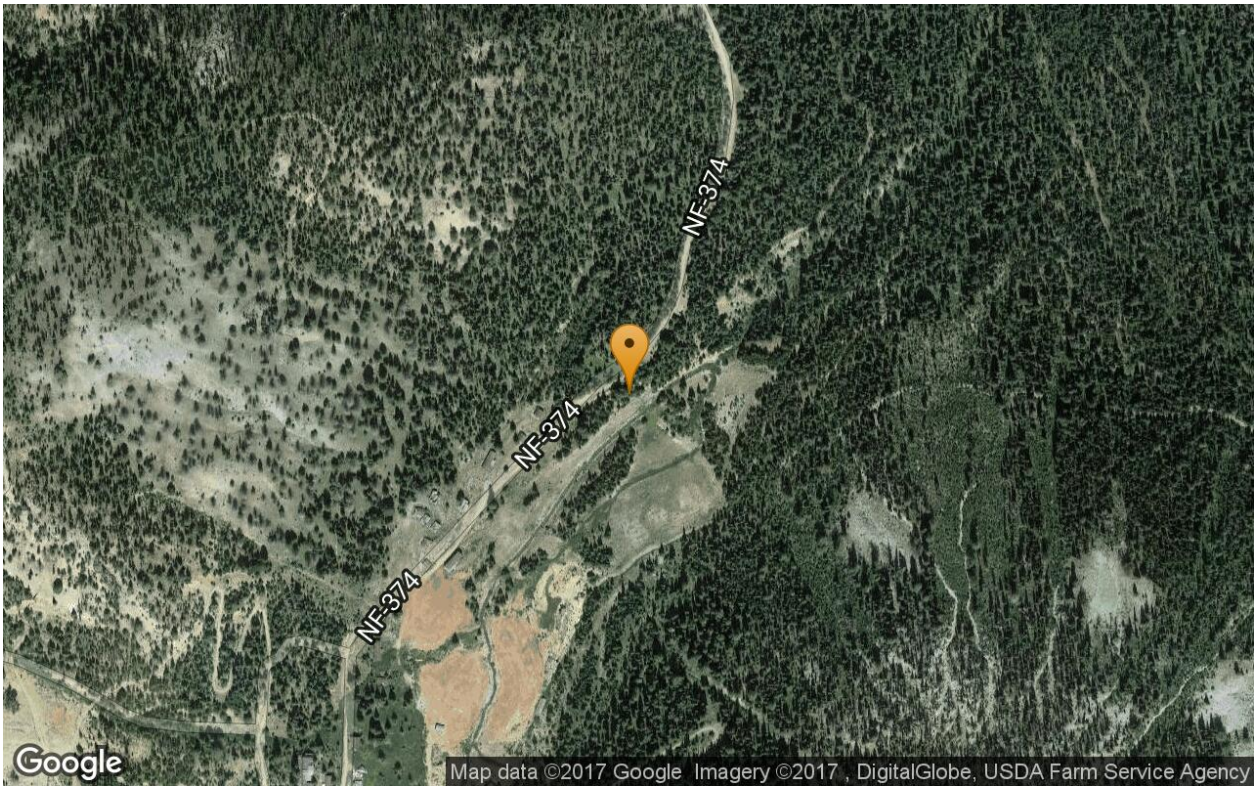
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344294**



Latitude 44.922552 **Longitude** -115.287624

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344295**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:16	**Type**	Field Sample
Matrix	Surface Water		
Location	WF04SWD		
Sampled By	USCG		

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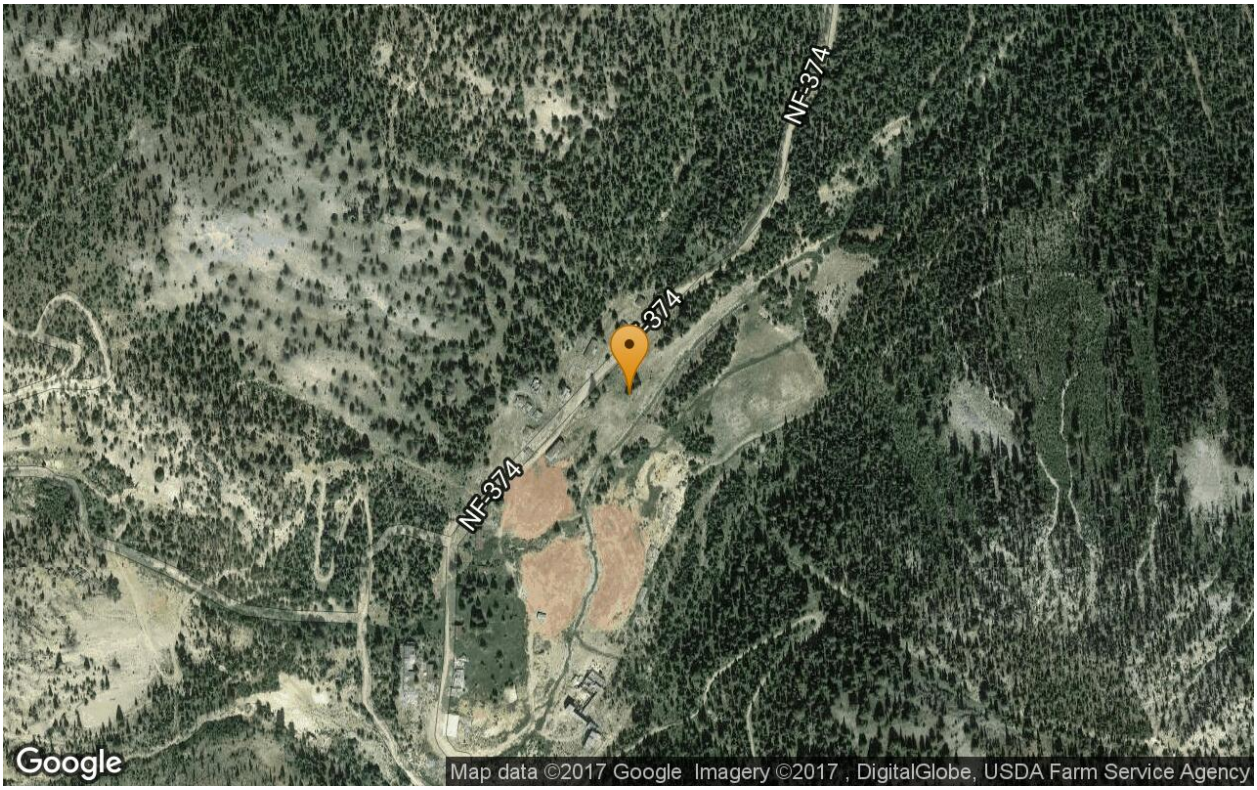
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344295**



Latitude 44.921676 **Longitude** -115.288737

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344296**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:48	**Type**	Field Sample
Matrix	Surface Water		
Location	WF05SWD		
Sampled By	USCG		

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344296**

Latitude 44.920752 **Longitude** -115.289265

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344315**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	12:33	**Type**	Field Sample
Matrix	Surface Water		
Location	SC04SWD		
Sampled By	USCG		

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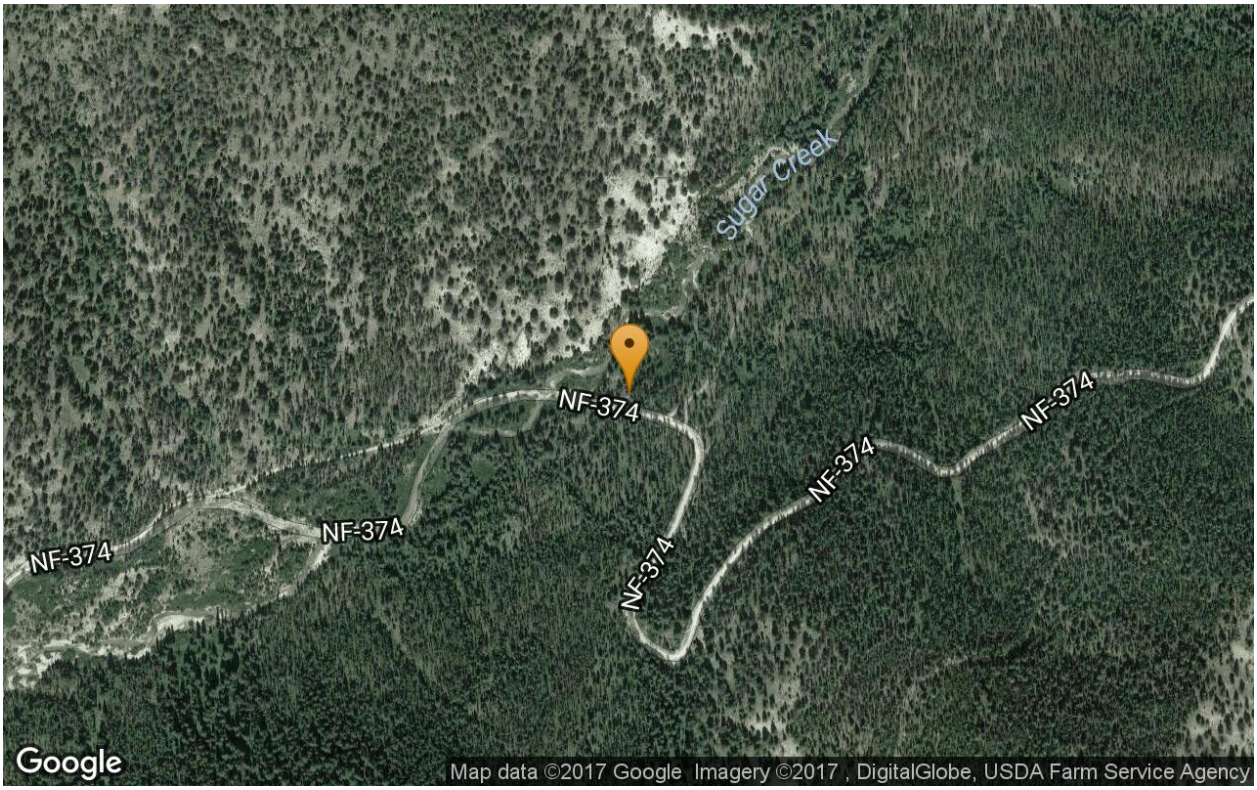
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344315**



Latitude 44.948875 **Longitude** -115.297043

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344316**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:37	**Type**	Field Sample
Matrix	Surface Water		
Location	SC05SWD		
Sampled By	USCG		

Photo 8-23-2016 13.42.08.jpg

Water Quality Parameters

Temp	pH	Diss O2
9.1 °C	7.64	8.52
Cond.	**Turbidity**	**ORP**
.106	0	53

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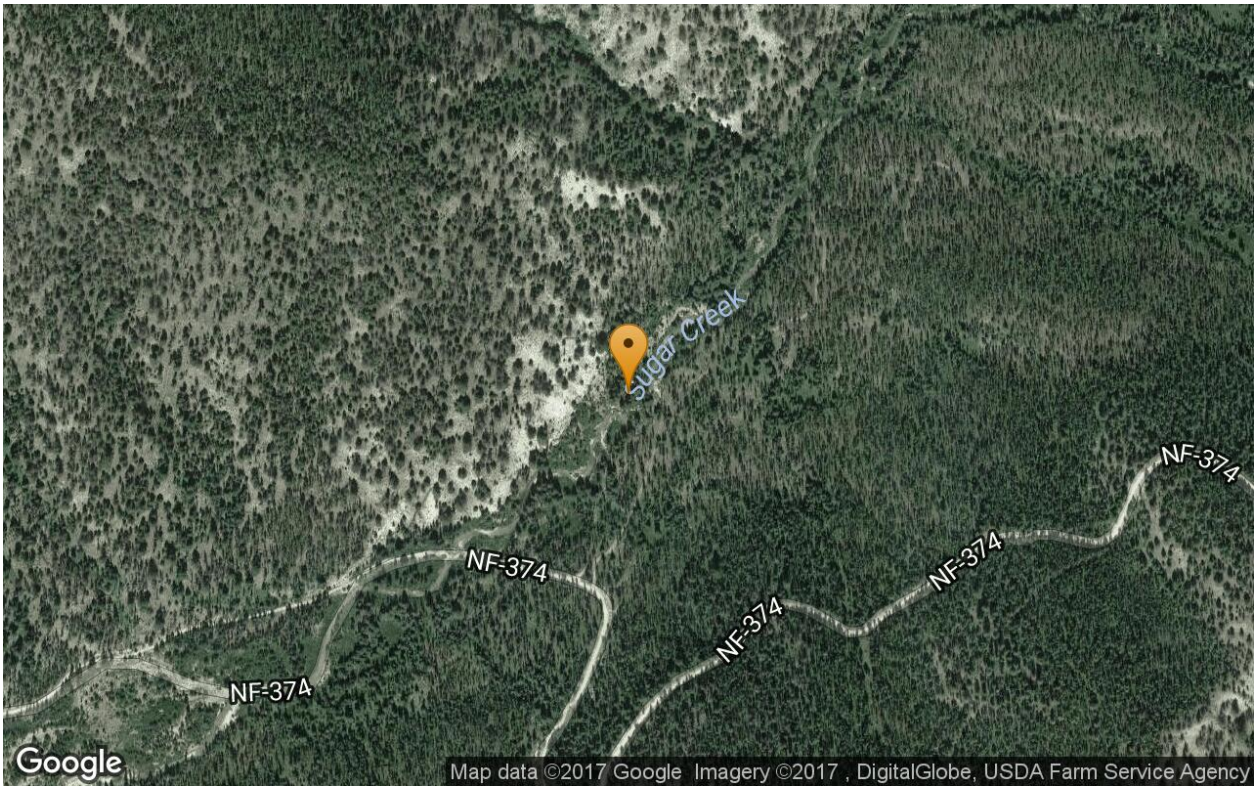
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344316**



Latitude 44.950119 **Longitude** -115.296045

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344318**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:31	**Type**	Field Sample
Matrix	Surface Water		
Location	BG02SWD		
Sampled By	USCG		

Sampling Equipment/Technique:

Adit Background Dissolved

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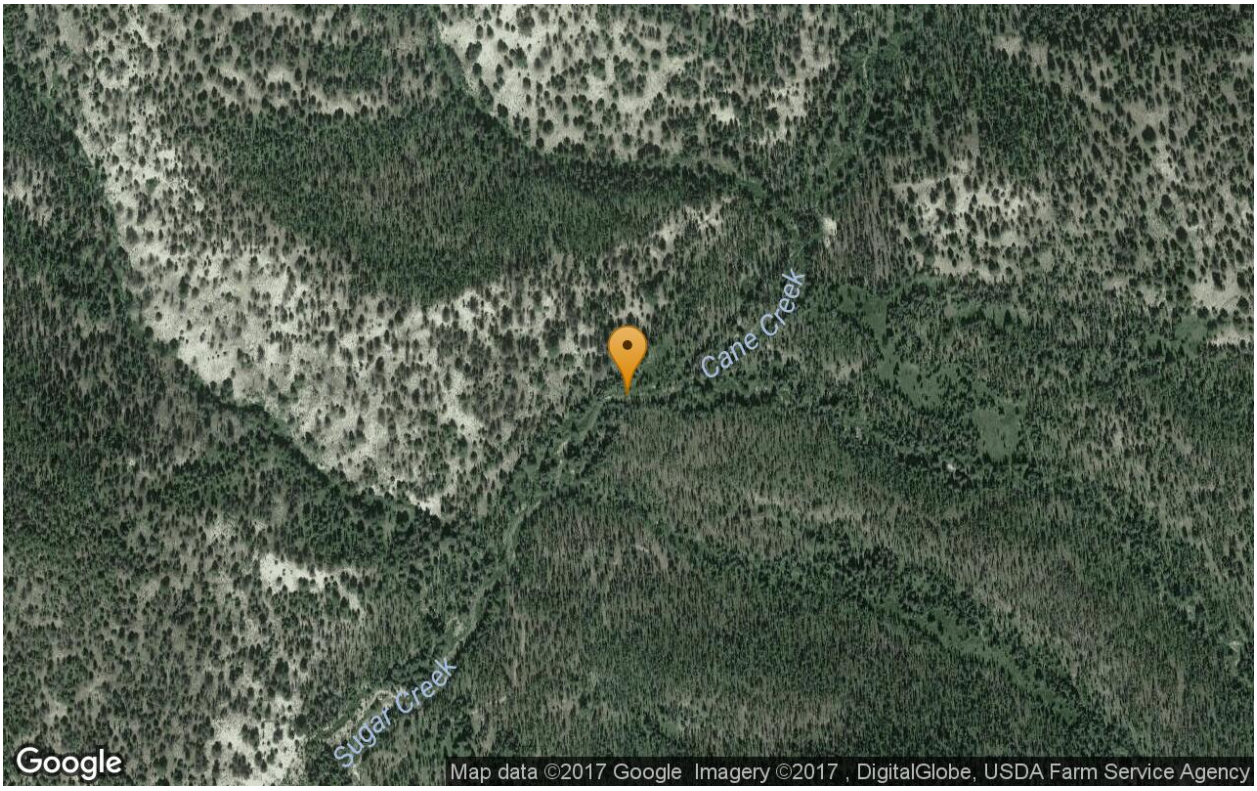
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344318**



Latitude 44.953086 **Longitude** -115.292744

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344219**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	13:04	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	WF01SD		

Sampled By USCG

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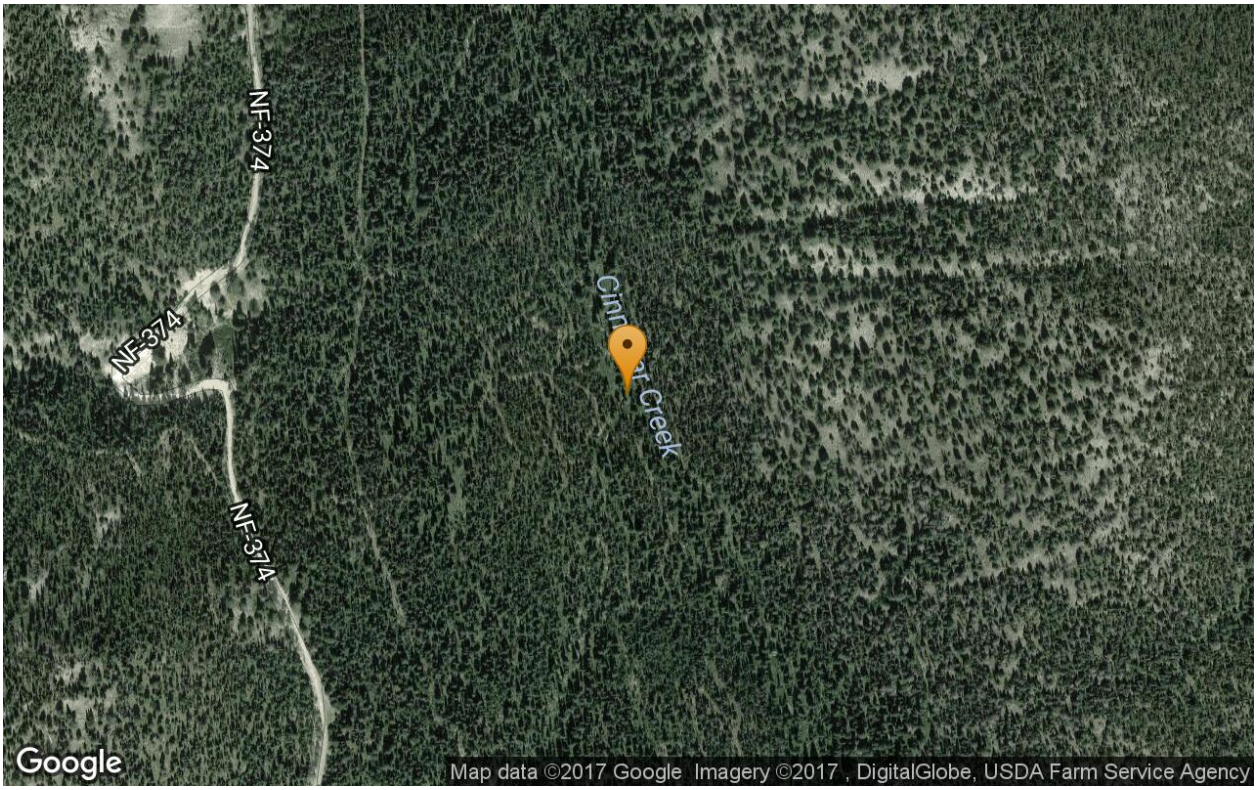
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344219**



Latitude 44.927374 **Longitude** -115.283153

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Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344220**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:04	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.	**Sample Color**	Brown
Location	WF02SD	**Sample Description**	Silty SAND
Sampled By	USCG		

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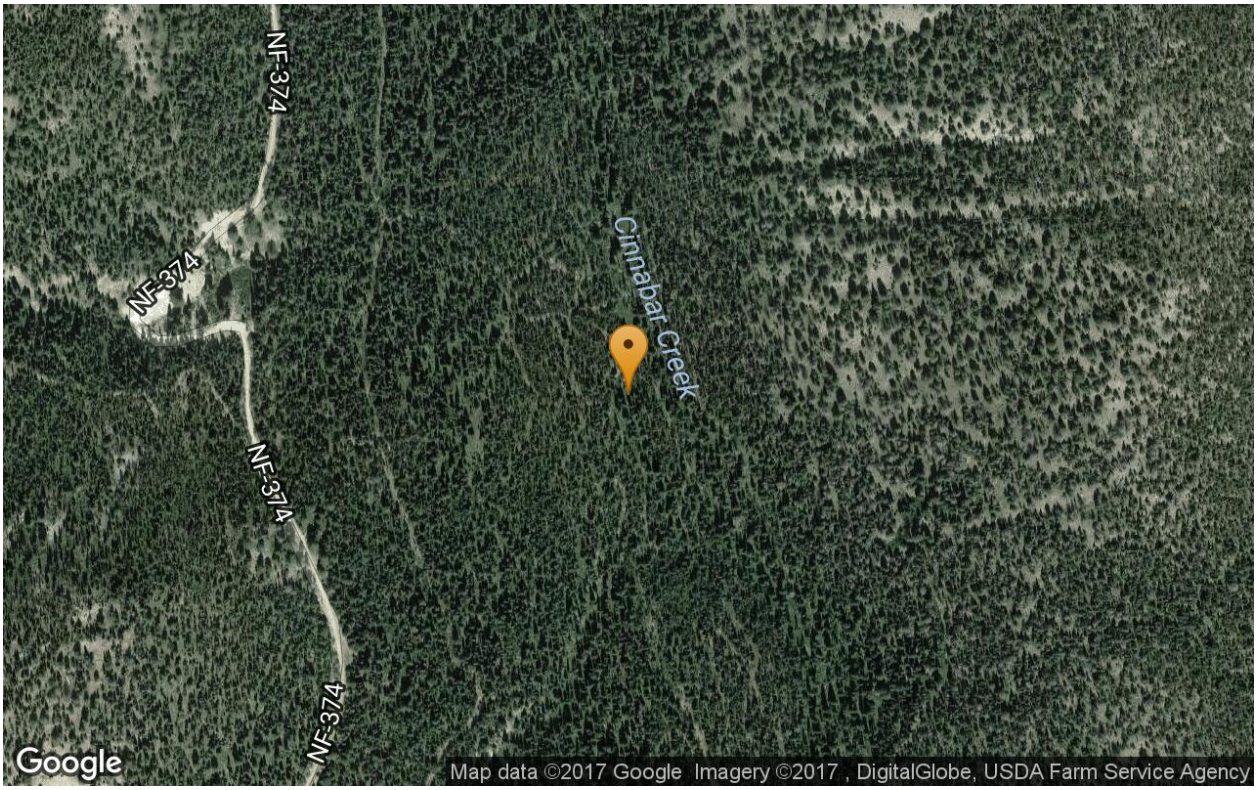
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344220**



Latitude 44.926918 **Longitude** -115.283341

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344229**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:15	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	WT01SD		
Sampled By	USCG		

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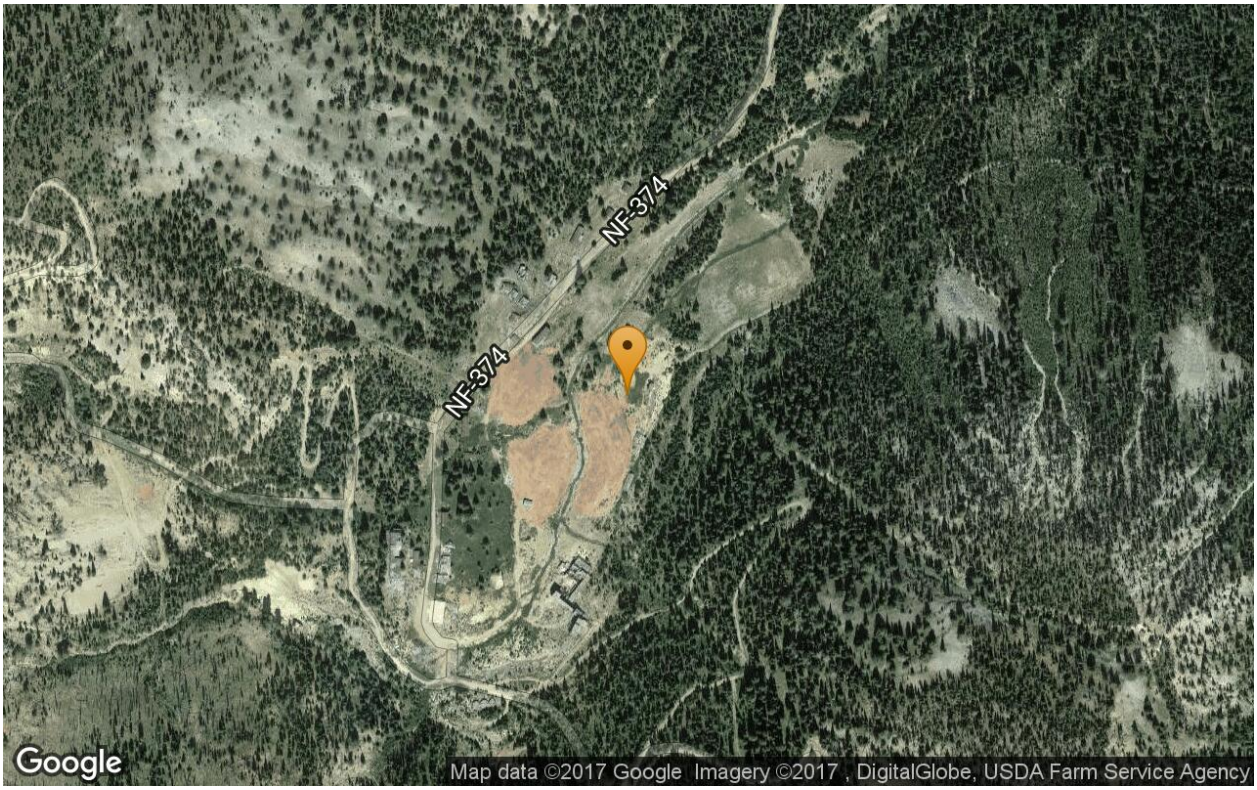
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344229**



Latitude 44.920791 **Longitude** -115.288603

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344232**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:13	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	CC01SD		
Sampled By	USCG		

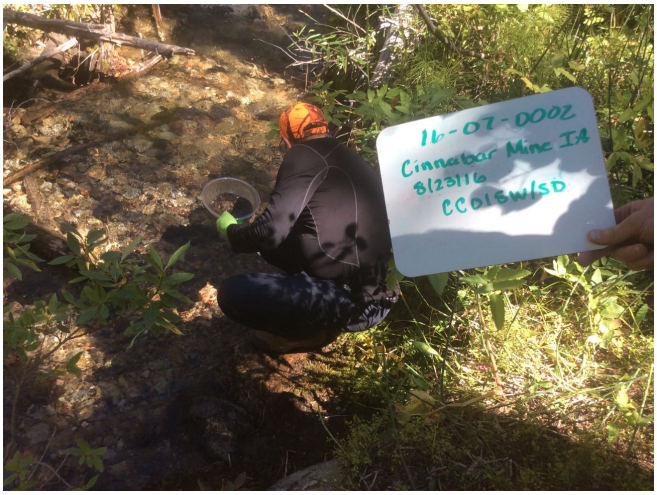


Photo 8-23-2016 2.13.42 PM.jpg

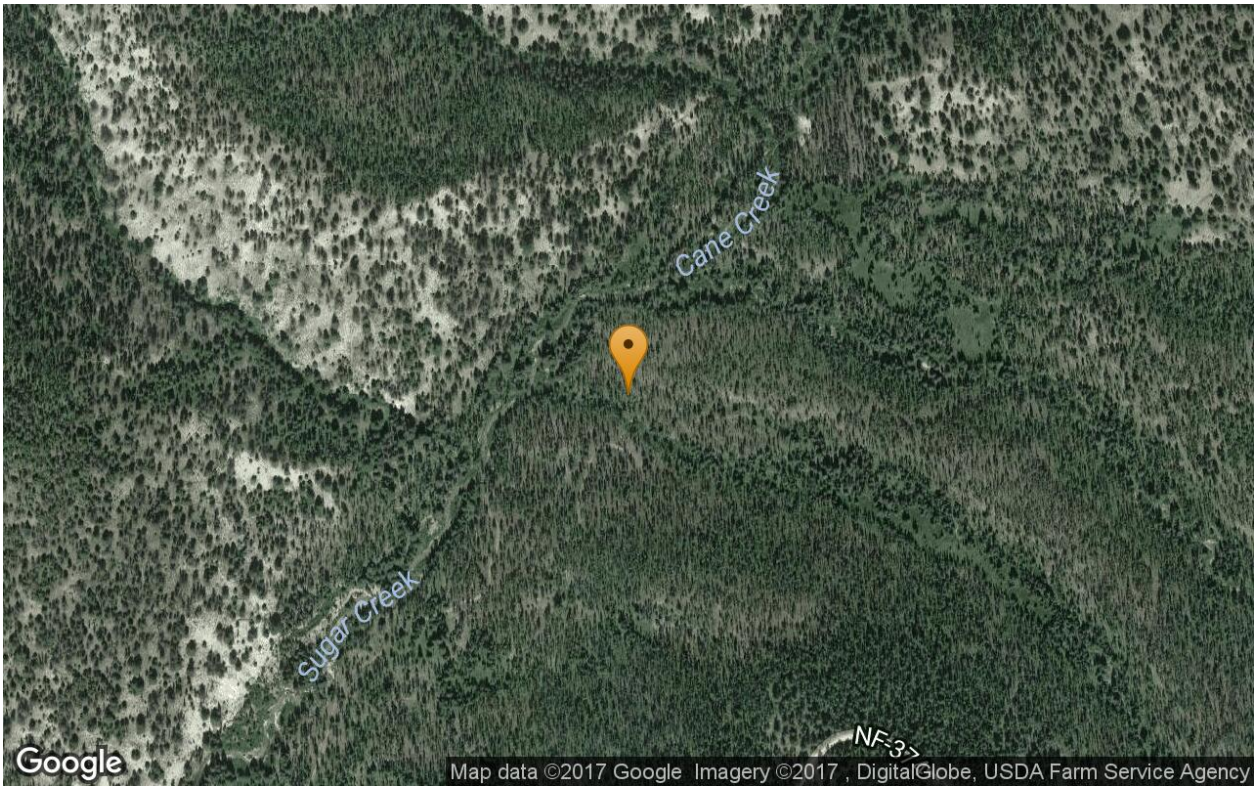
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344232**



Latitude 44.9523 **Longitude** -115.292461

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344234**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	16:43	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	CC03SD		
Sampled By	USCG		

Photo 8-23-2016 4.50.02 PM.jpg

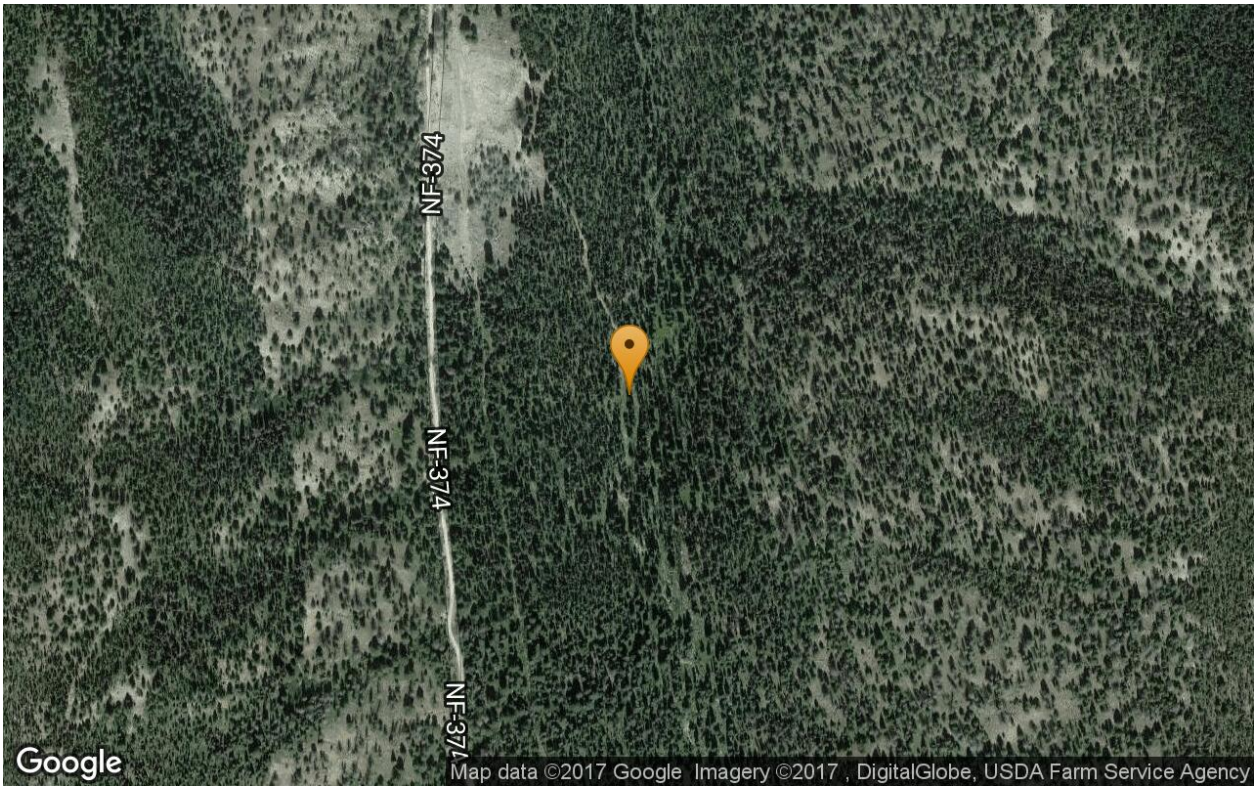
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344234**



Latitude 44.93894 **Longitude** -115.287495

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344235**

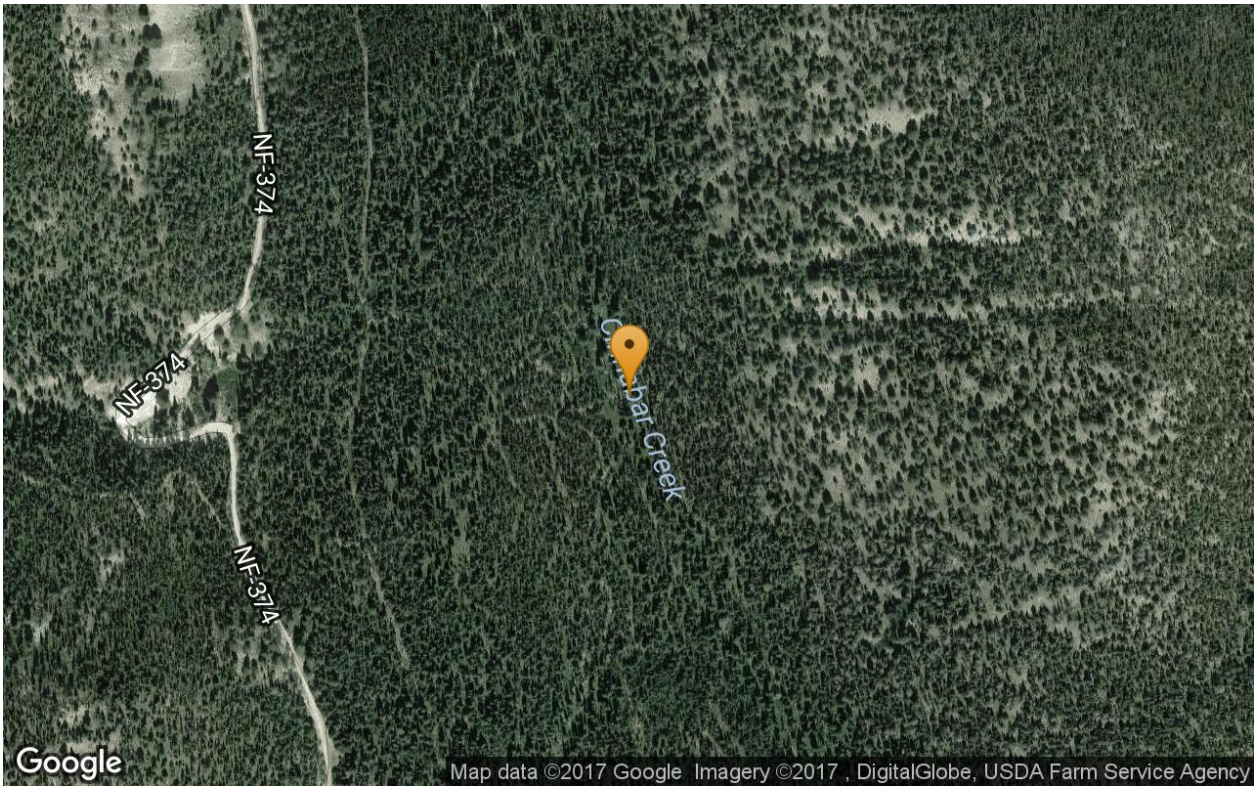
Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:43	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	CC04SD		
Sampled By	USCG		

Signed on 08/24/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344235**



Latitude 44.927713 **Longitude** -115.283179

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344236**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	12:12	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	CC05SD		
Sampled By	USCG		

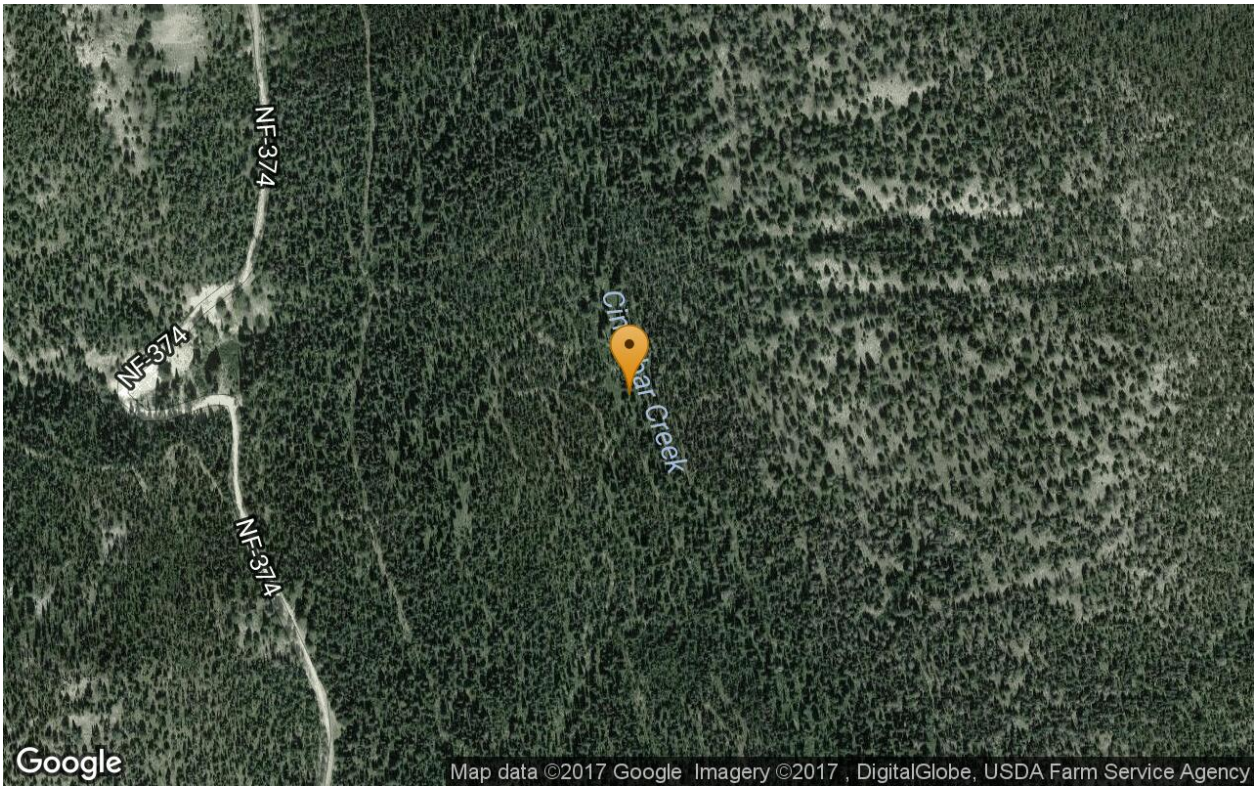
Photo 8-24-2016 12.12.29 PM.jpg

Signed on 08/24/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344236**



Latitude 44.9275 **Longitude** -115.283201

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344238**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	16:34	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	SC01SD		
Sampled By	USCG		

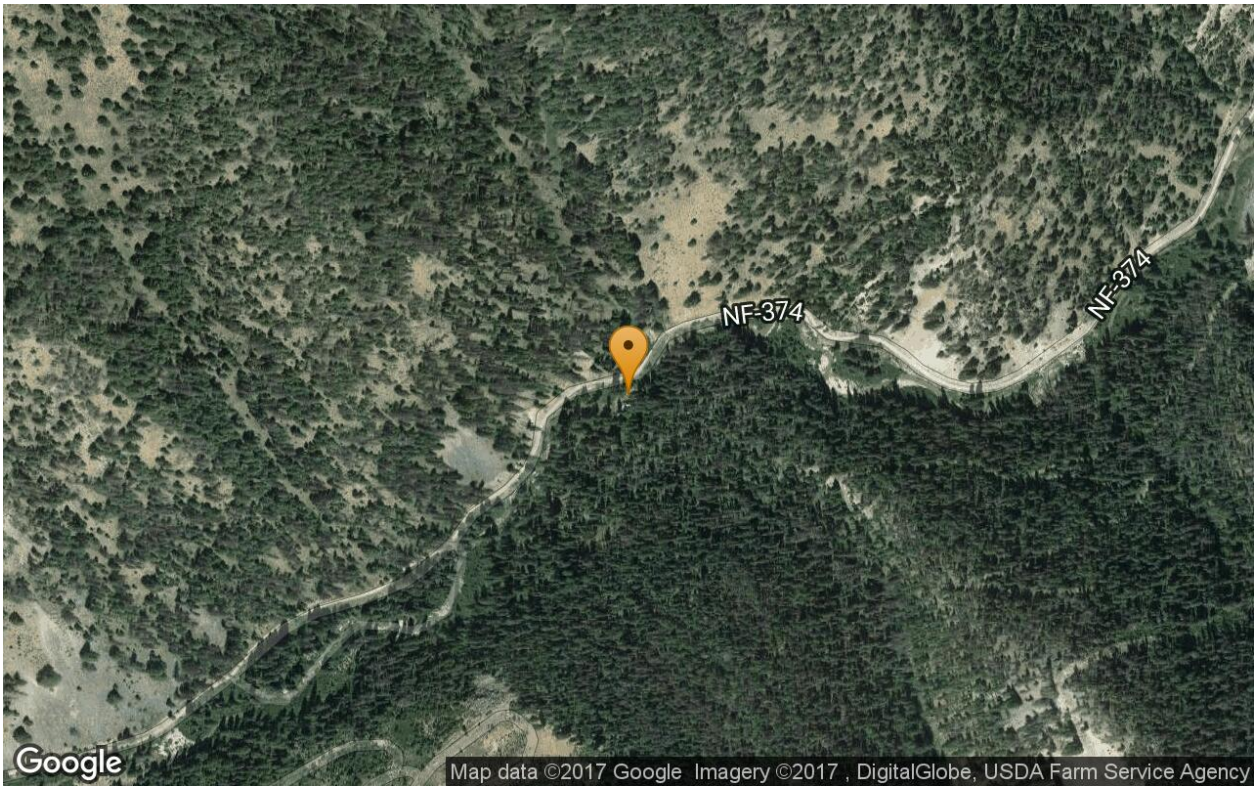
Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344238**



Latitude 44.938582 **Longitude** -115.324534

Signed on 08/22/16

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344240**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	18:20	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	SC03SD	**Sample Description**	Silty SAND
Sampled By	EPA		

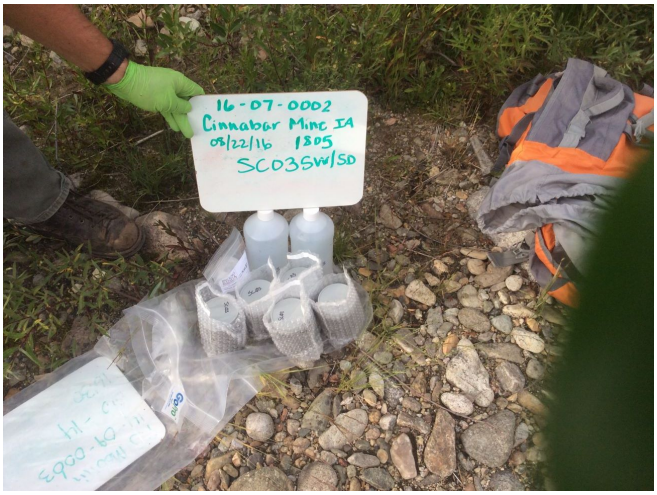
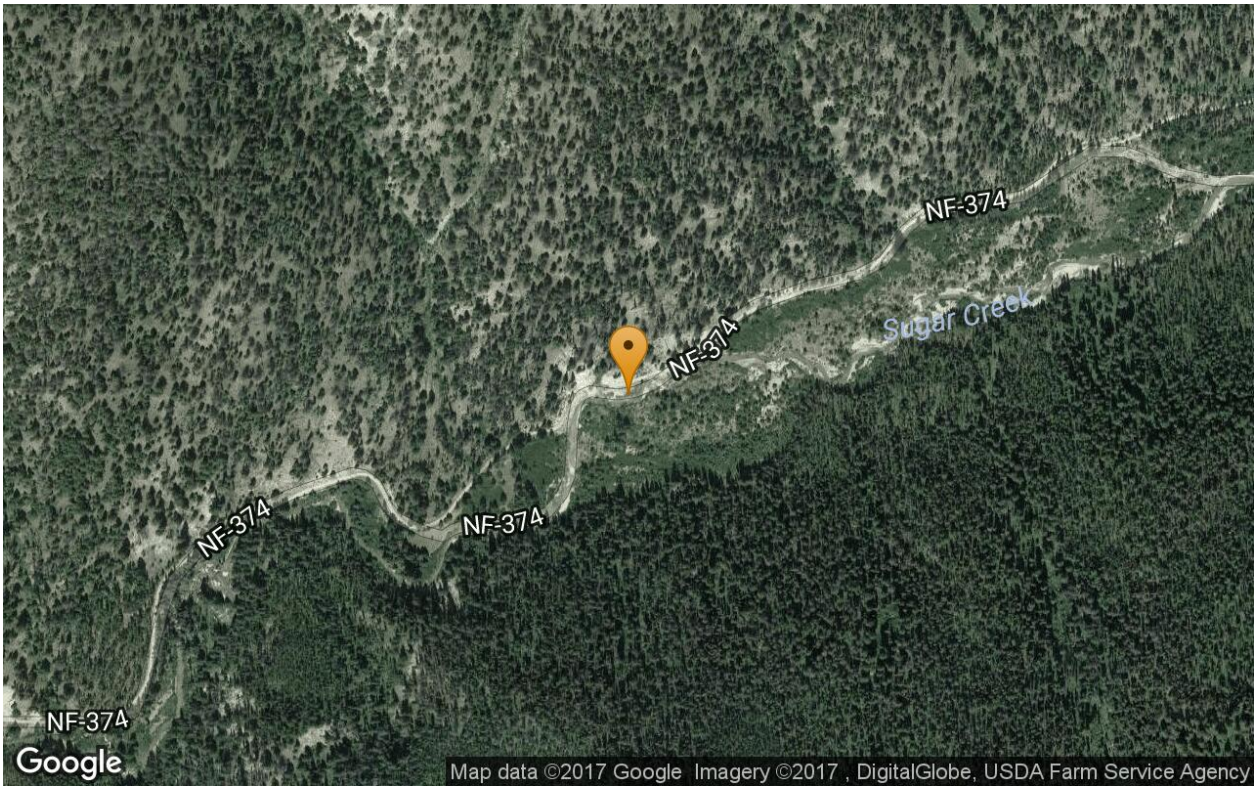


Photo 8-22-2016 6.26.09 PM.jpg

Signed on 08/22/16

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344240**



Latitude 44.946132 **Longitude** -115.306877

Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344246**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	12:37	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	BG03SD		
Sampled By	USCG		

Photo 8-24-2016 12.43.27 PM.jpg

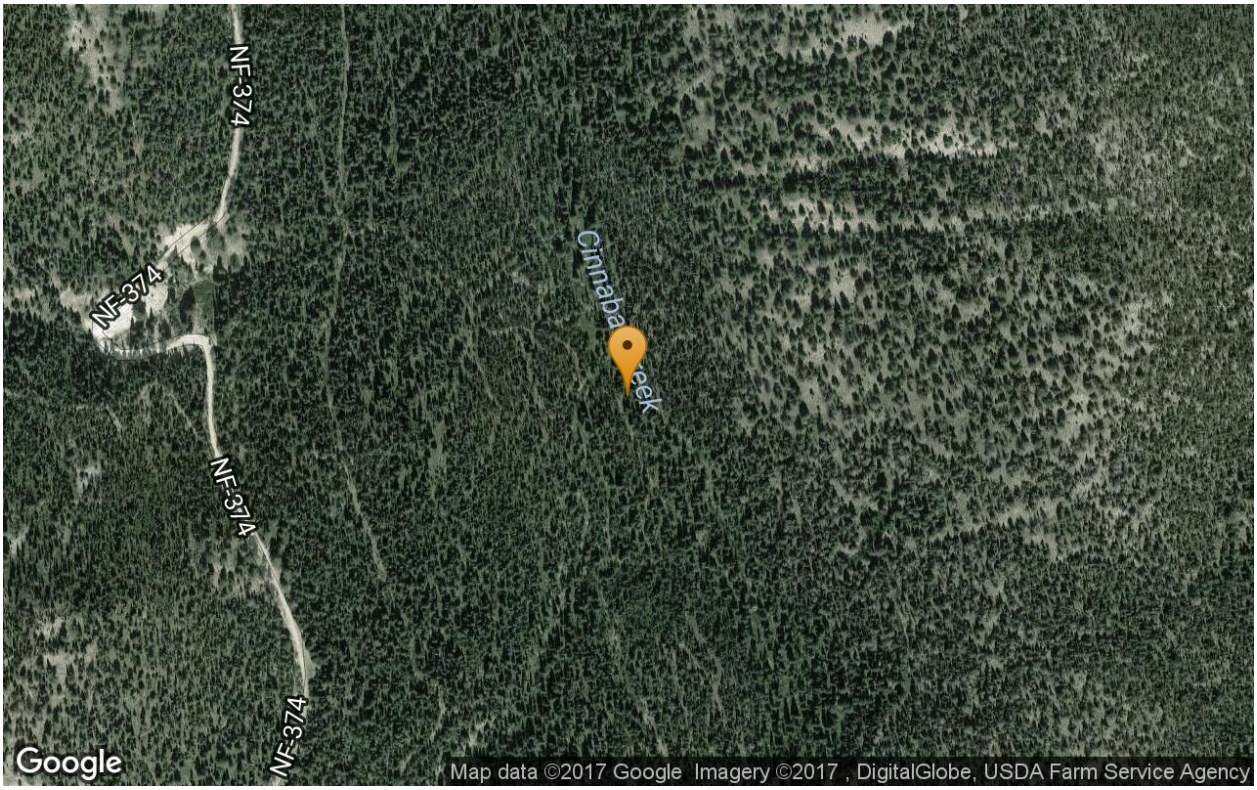
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344246**



Latitude 44.927022 **Longitude** -115.282937

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344259**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	13:01	**Type**	Field Sample
Matrix	Surface Water		
Location	WF01SW		
Sampled By	USCG		

Water Quality Parameters

Temp		Diss O2
7.8 °C		11.48
Cond.	**Turbidity**	**ORP**
.177	1.5	195

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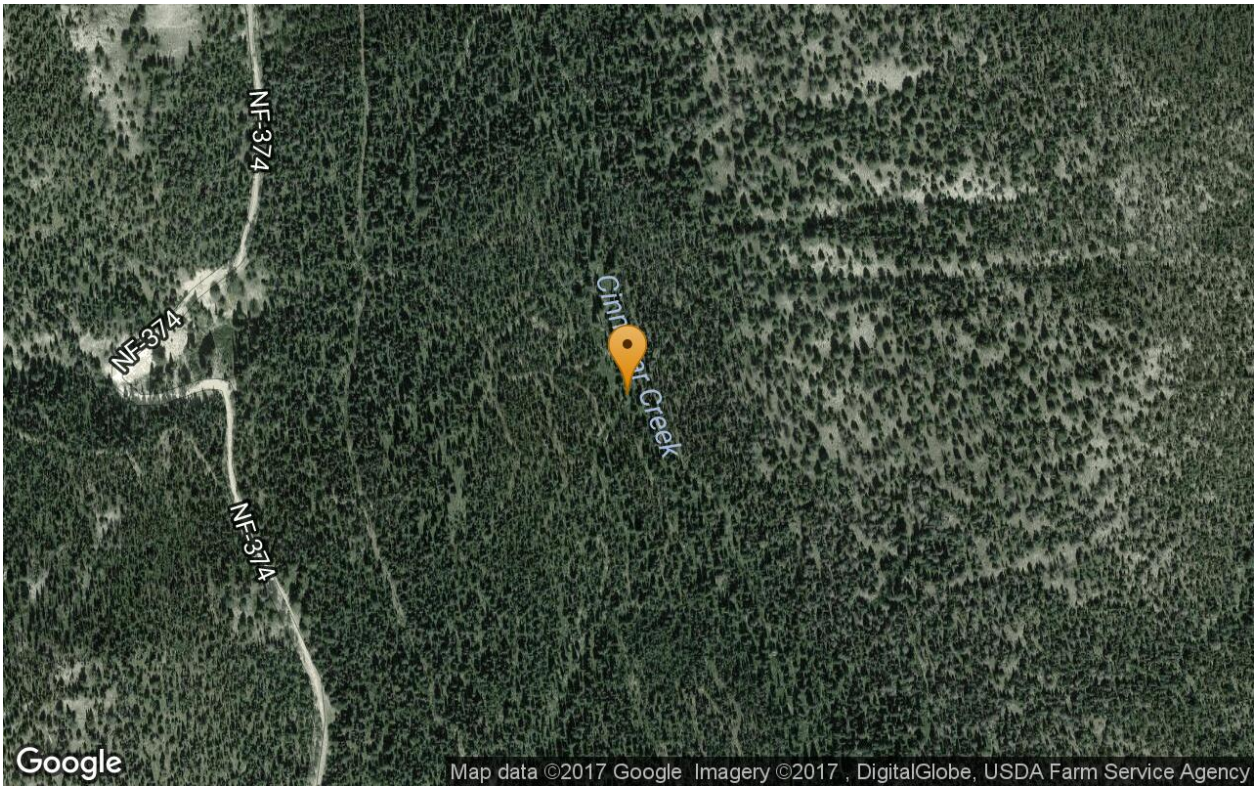
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344259**



Latitude 44.927374 **Longitude** -115.283153

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344260**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	13:58	**Type**	Field Sample
Matrix	Surface Water		
Location	WF02SW		
Sampled By	USCG		

Water Quality Parameters

Temp	pH	Diss O2
8.6	8.16	10.81
Cond.	**Turbidity**	**ORP**
.172	1	180

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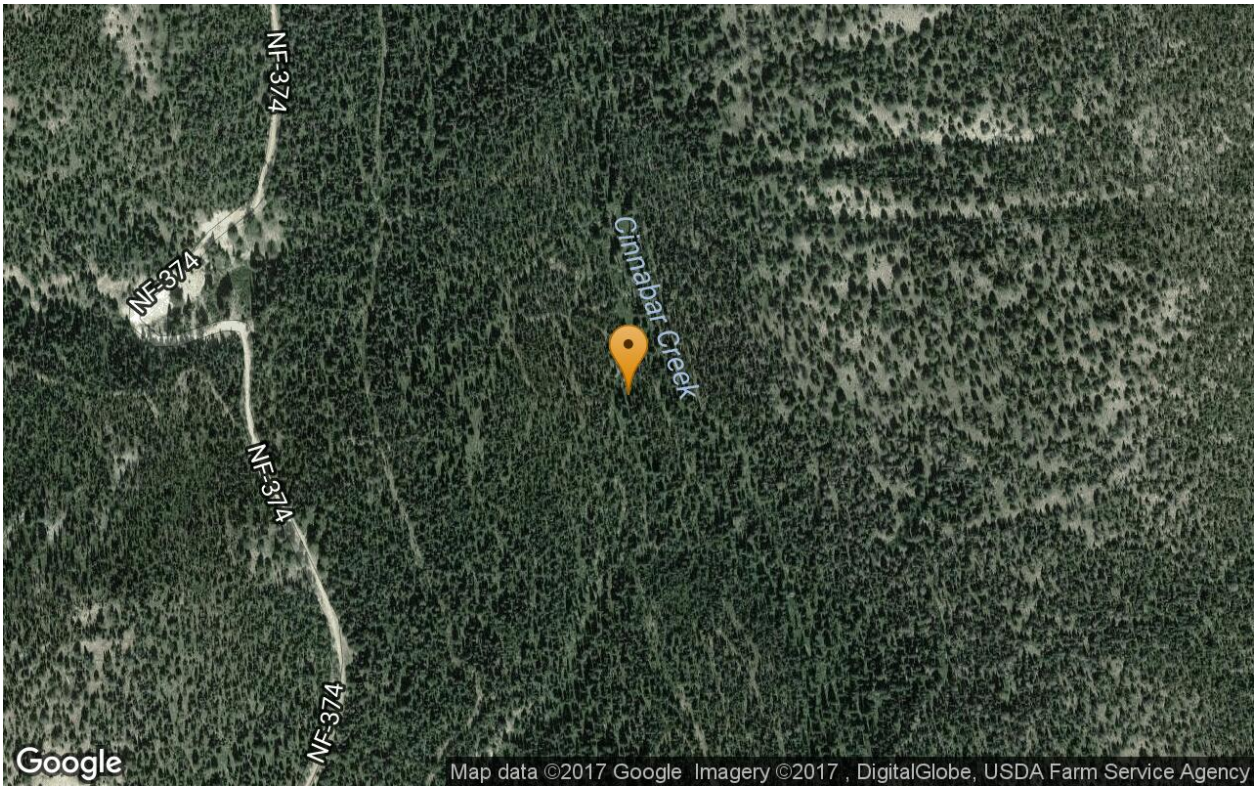
Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344260**



Latitude 44.926918 **Longitude** -115.283341

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344269**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:04	**Type**	Field Sample
Matrix	Surface Water		
Location	WT01SW		
Sampled By	USCG		

Photo 8-24-2016 4.16.52 PM.jpg

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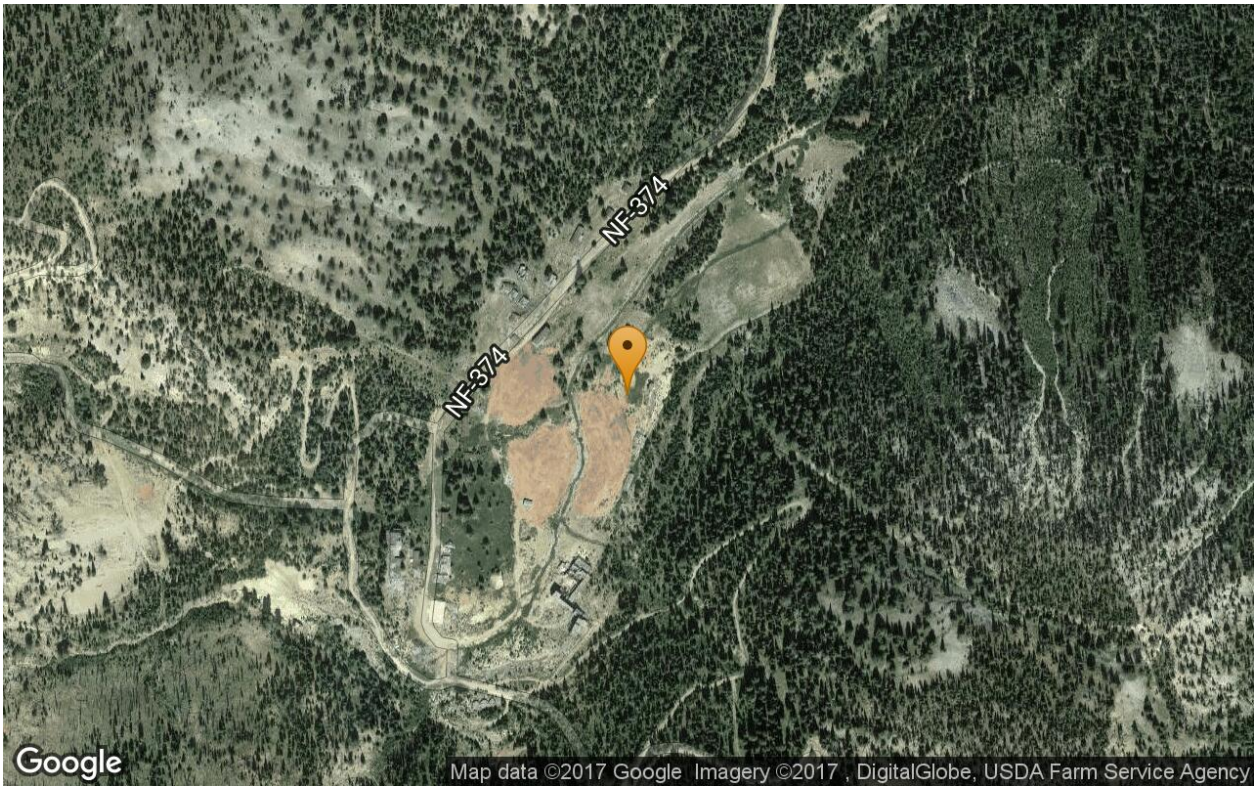
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344269**



Latitude 44.920791 **Longitude** -115.288603

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344272**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:03	**Type**	Field Sample
Matrix	Surface Water		
Location	CC01SW		
Sampled By	USCG		

Water Quality Parameters

Temp	pH	Diss O2
9.3 °C	6.82	1.36
Cond.	**Turbidity**	**ORP**
.09	.065	253

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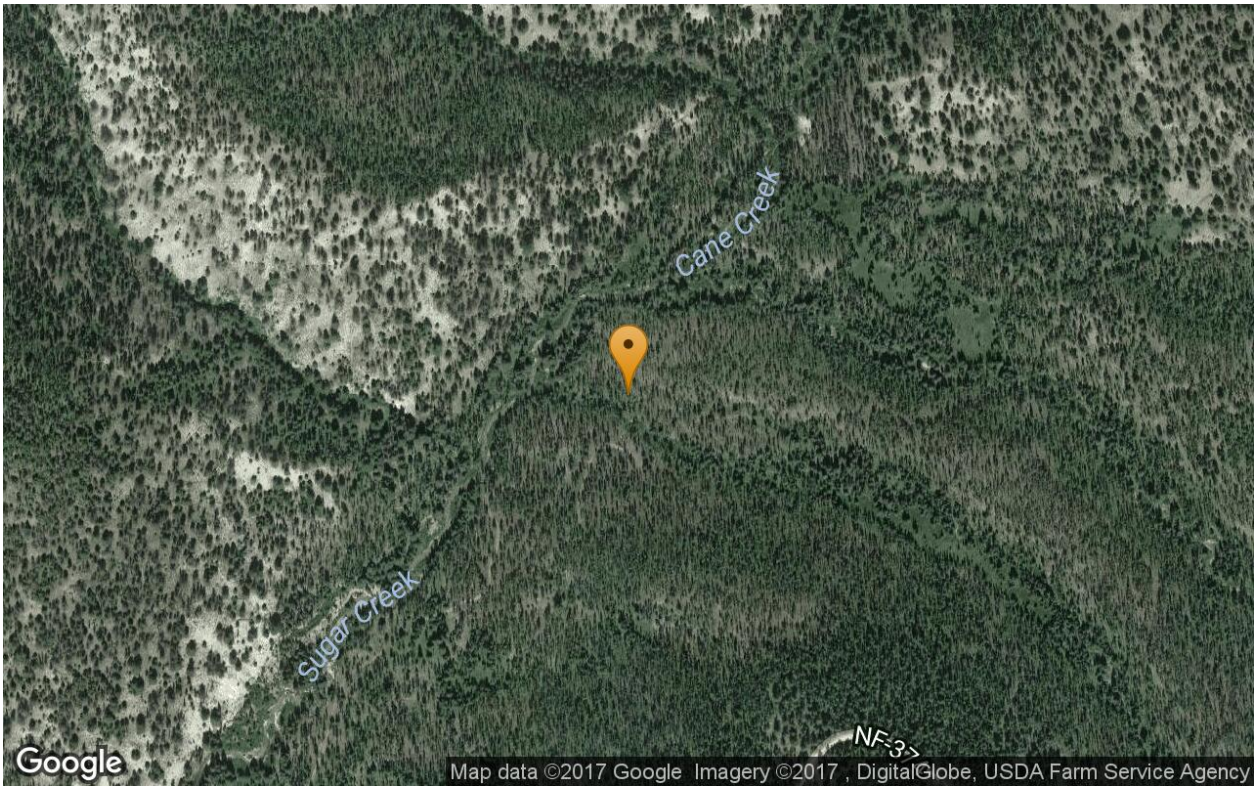
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344272**



Latitude 44.9523 **Longitude** -115.292461

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344273**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:50	**Type**	Field Sample
Matrix	Surface Water		
Location	CC02SW		
Sampled By	USCG		

Photo 8-23-2016 3.07.37 PM.jpg

Water Quality Parameters

Temp	pH	Diss O2
9.7 °C	7.07	15.1
Cond.	**Turbidity**	**ORP**
.141	.91	226

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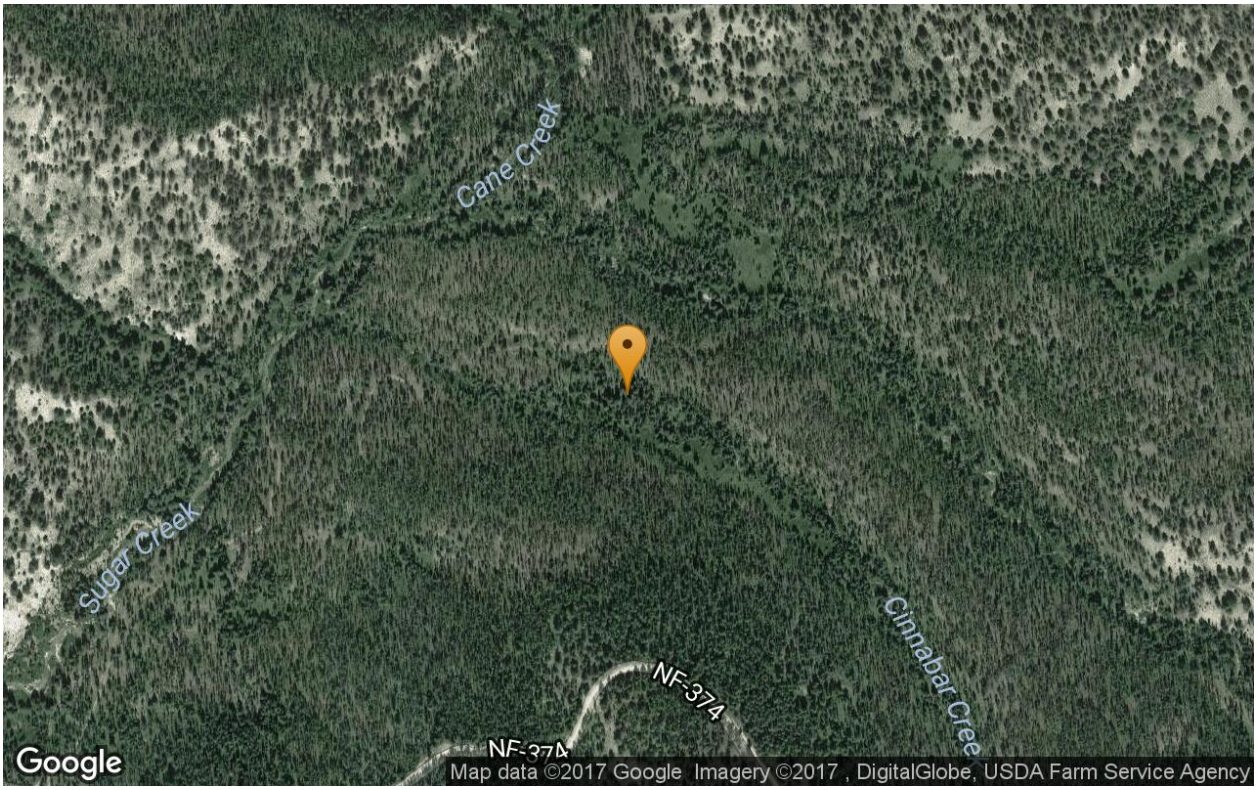
Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344273**



Latitude 44.951769 **Longitude** -115.290062

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344274**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	16:38	**Type**	Field Sample
Matrix	Surface Water		
Location	CC03SW		
Sampled By	USCG		

Water Quality Parameters

Temp	pH	Diss O2
9.3	7.96	15.99
Cond.	**Turbidity**	**ORP**
.13	.085	35

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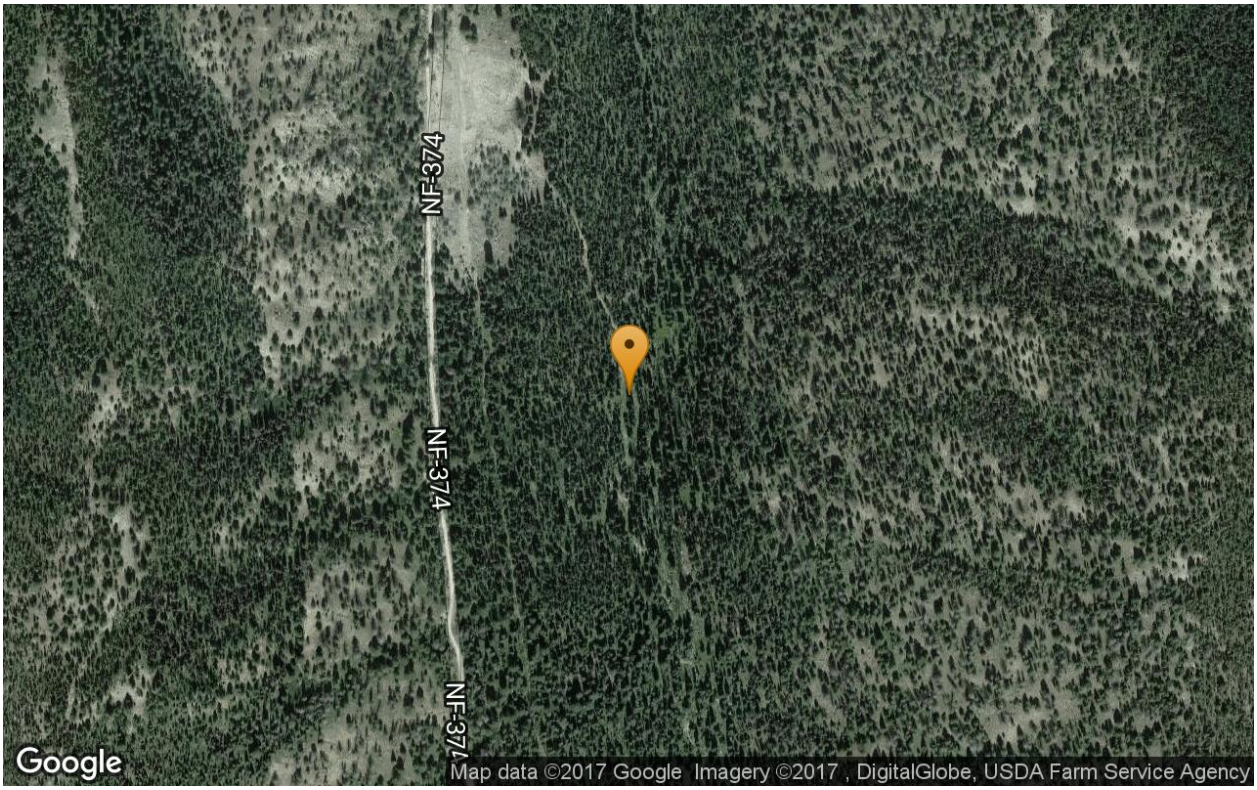
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344274**



Latitude 44.93894 **Longitude** -115.287495

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344275**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:33	**Type**	Field Sample
Matrix	Surface Water		
Location	CC04SW		
Sampled By	USCG		

Water Quality Parameters

Temp	pH	Diss O2
6.9 °C	5.76	11.69
Cond.	**Turbidity**	**ORP**
.156	.5	248

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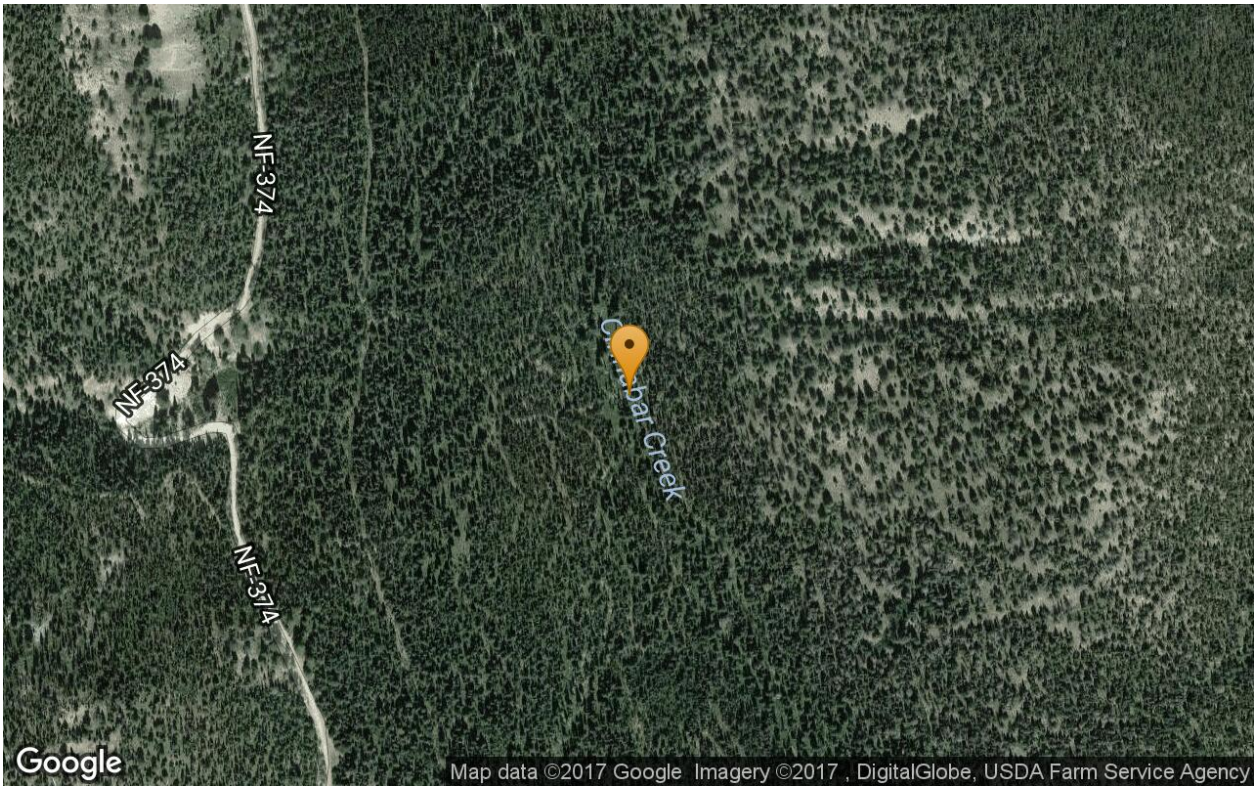
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344275**



Latitude 44.927713 **Longitude** -115.283179

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344276**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	12:03	**Type**	Field Sample
Matrix	Surface Water		
Location	CC05SW		
Sampled By	USCG		

Water Quality Parameters

Temp		Diss O2
6.7 °C		12.27
Cond.	**Turbidity**	**ORP**
.132	.2	180

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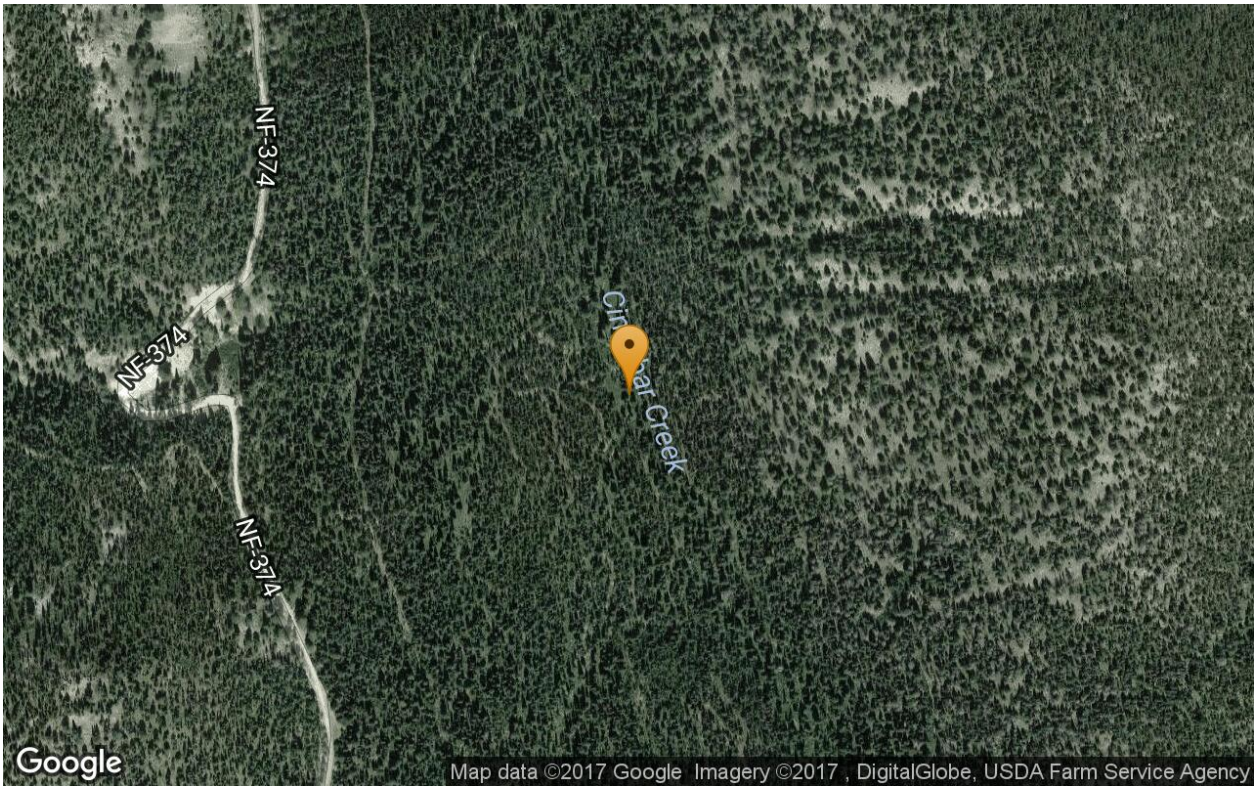
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344276**



Latitude 44.9275 **Longitude** -115.283201

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344278**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	16:26	**Type**	Field Sample
Matrix	Surface Water		
Location	SC01SW		
Sampled By	USCG		

Photo 8-22-2016 4.46.35 PM.jpg

Water Quality Parameters

Temp	pH	Diss O2
15.2 °C	6.25	14.8
Cond.	**Turbidity**	**ORP**
.2	8.9	184

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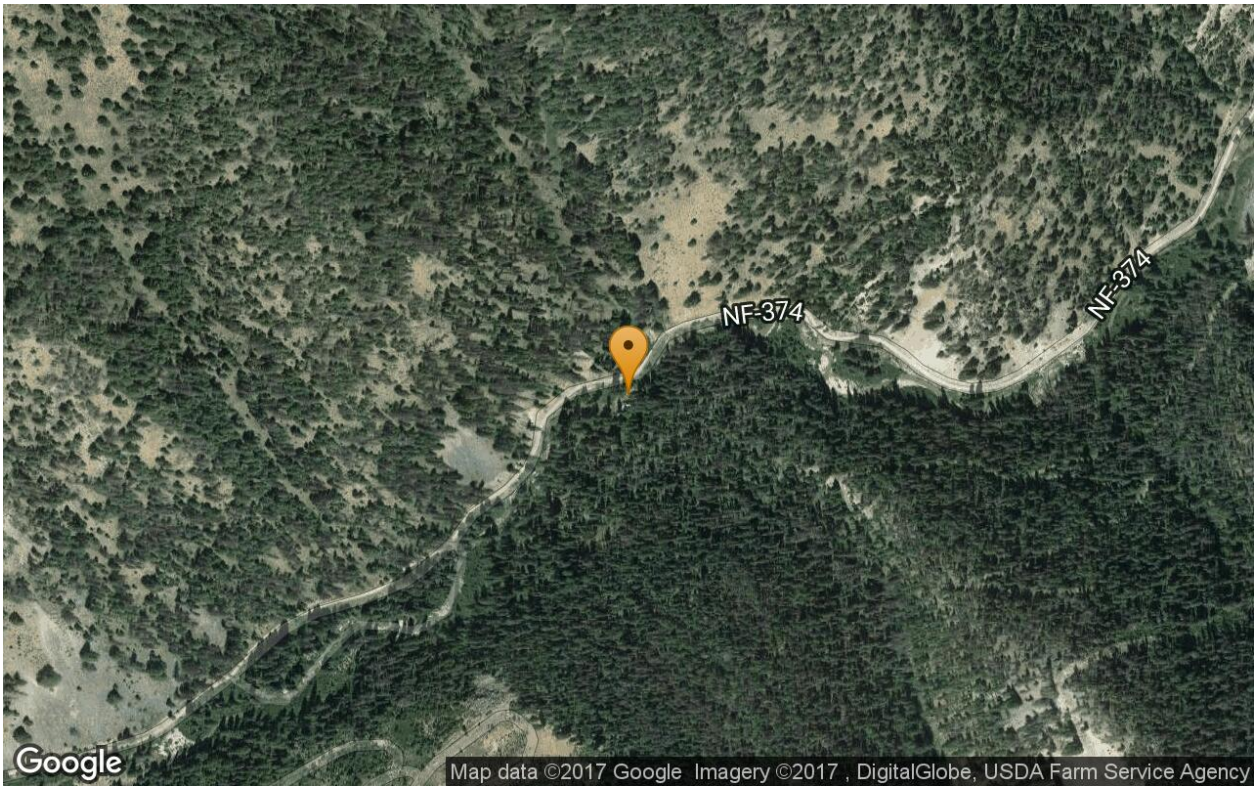
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344278**



Latitude 44.938582 **Longitude** -115.324534

Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344280**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	18:20	**Type**	Field Sample
Matrix	Surface Water		
Location	SC03SW		
Sampled By	EPA		

Water Quality Parameters

Temp	pH	Diss O2
14.2 °C	5.34	12.07
Cond.	**Turbidity**	**ORP**
.121	2	201

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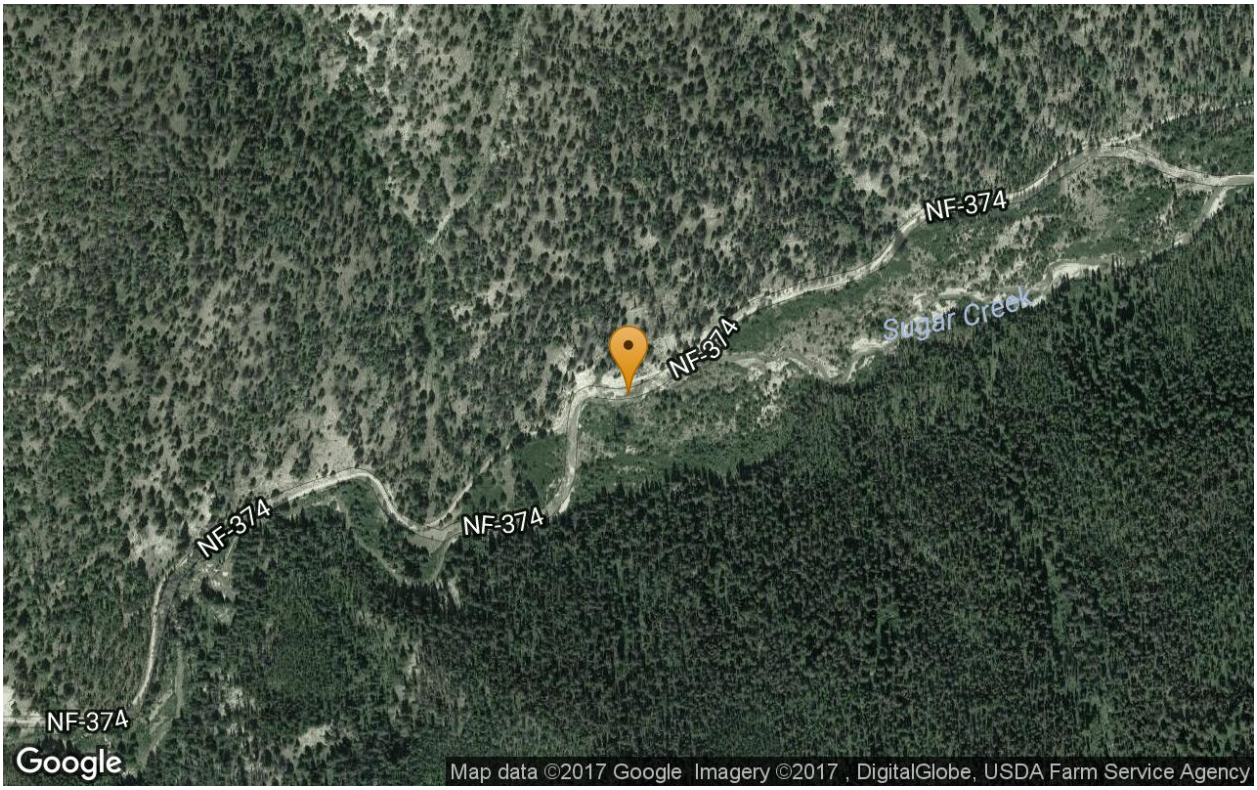
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344280**



Latitude 44.946132 **Longitude** -115.306877

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344285**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	12:33	**Type**	Field Sample
Matrix	Surface Water		
Location	BG03SW		
Sampled By	USCG		

Water Quality Parameters

Temp	pH	Diss O2
6.5 °C	7.2	13.5
Cond.	**Turbidity**	**ORP**
.086	.056	188

Sampling Equipment/Technique:

Adit Background

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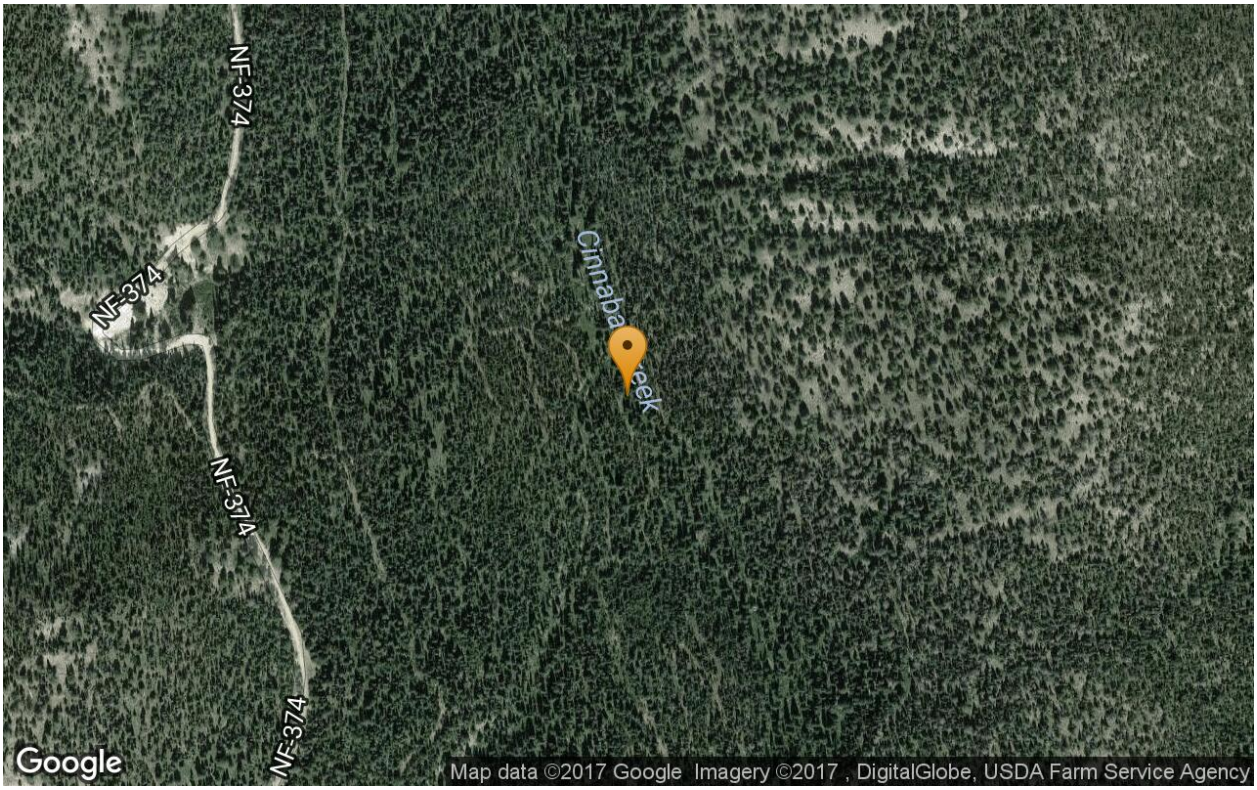
TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344285**



Latitude 44.927022 **Longitude** -115.282937

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344292**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	13:02	**Type**	Field Sample
Matrix	Surface Water		
Location	WF01SWD		
Sampled By	USCG		

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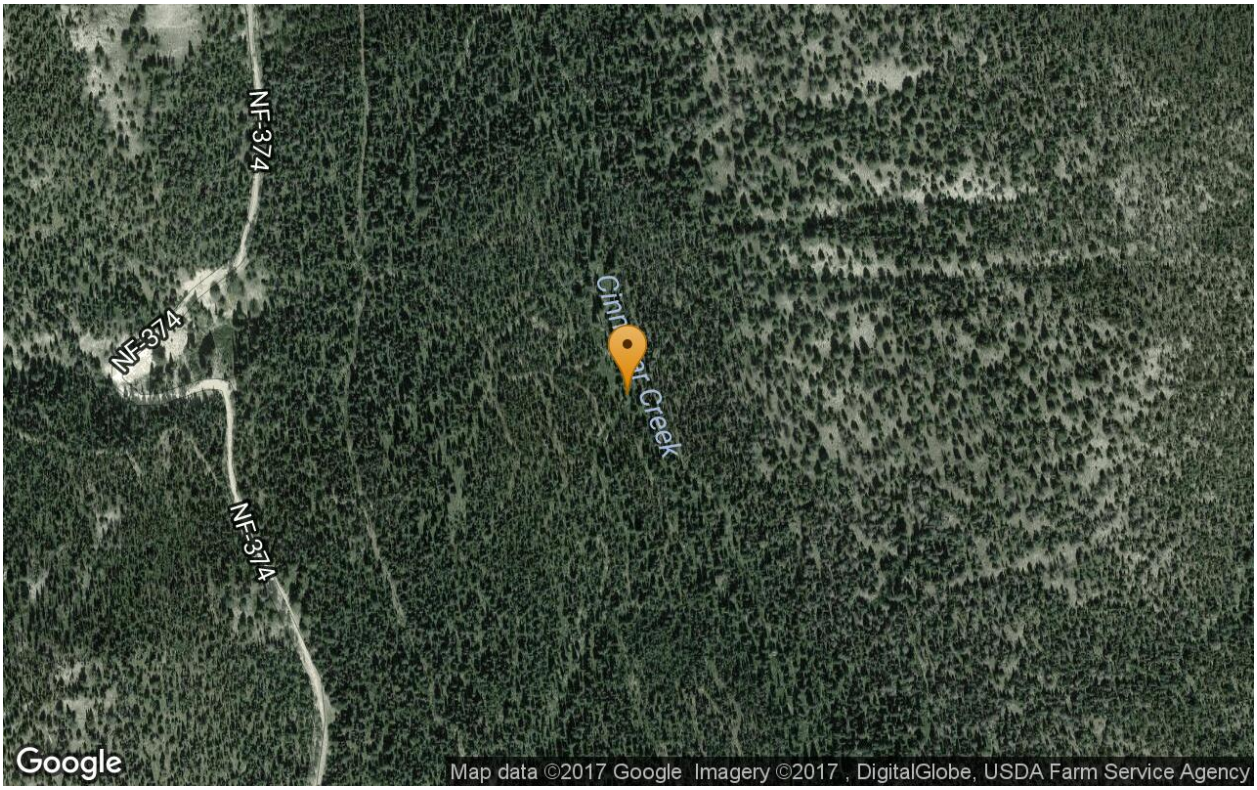
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344292**



Latitude 44.927374 **Longitude** -115.283153

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344293**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:04	**Type**	Field Sample
Matrix	Surface Water		
Location	WF02SWD		
Sampled By	USCG		

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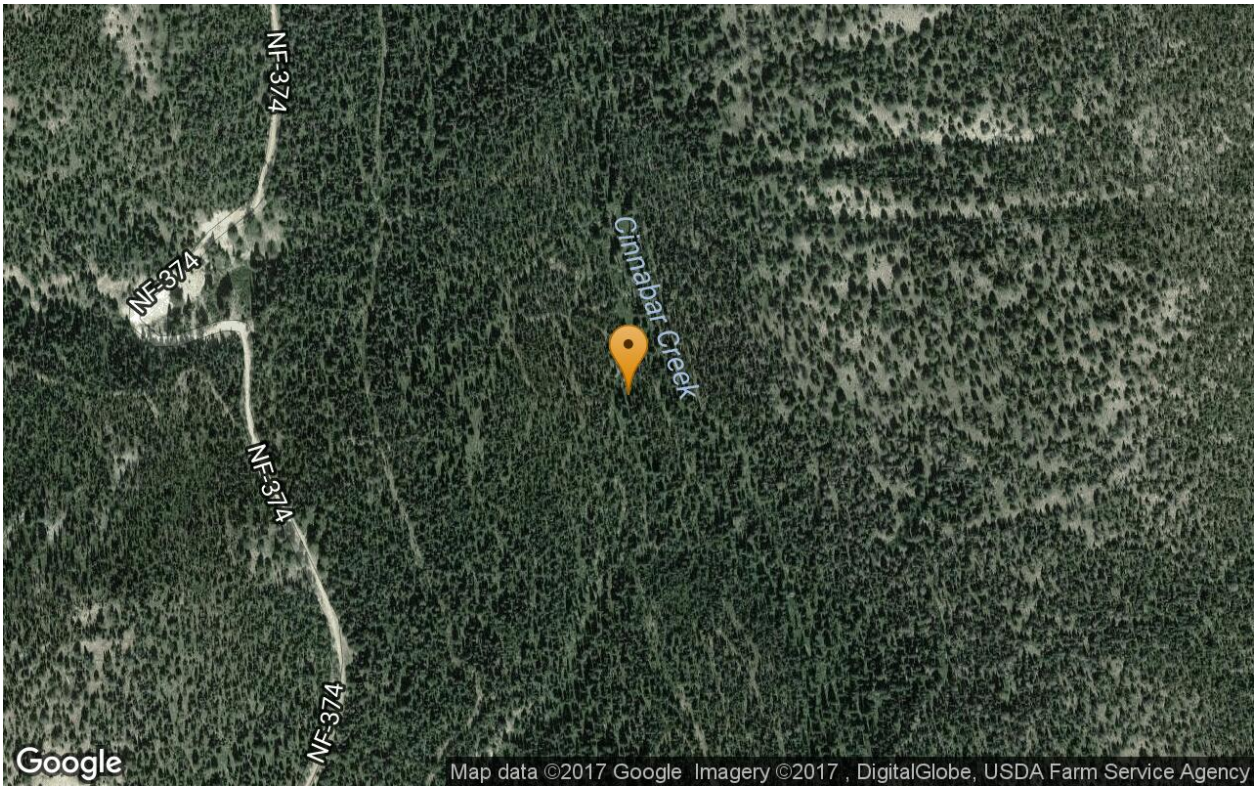
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344293**



Latitude 44.926918 **Longitude** -115.283341

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344303**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	16:11	**Type**	Field Sample
Matrix	Surface Water		
Location	WT01SWD		
Sampled By	USCG		

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344303**

Latitude 44.920791 **Longitude** -115.288603

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344306**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:57	**Type**	Field Sample
Matrix	Surface Water		
Location	CC01SWD		
Sampled By	USCG		

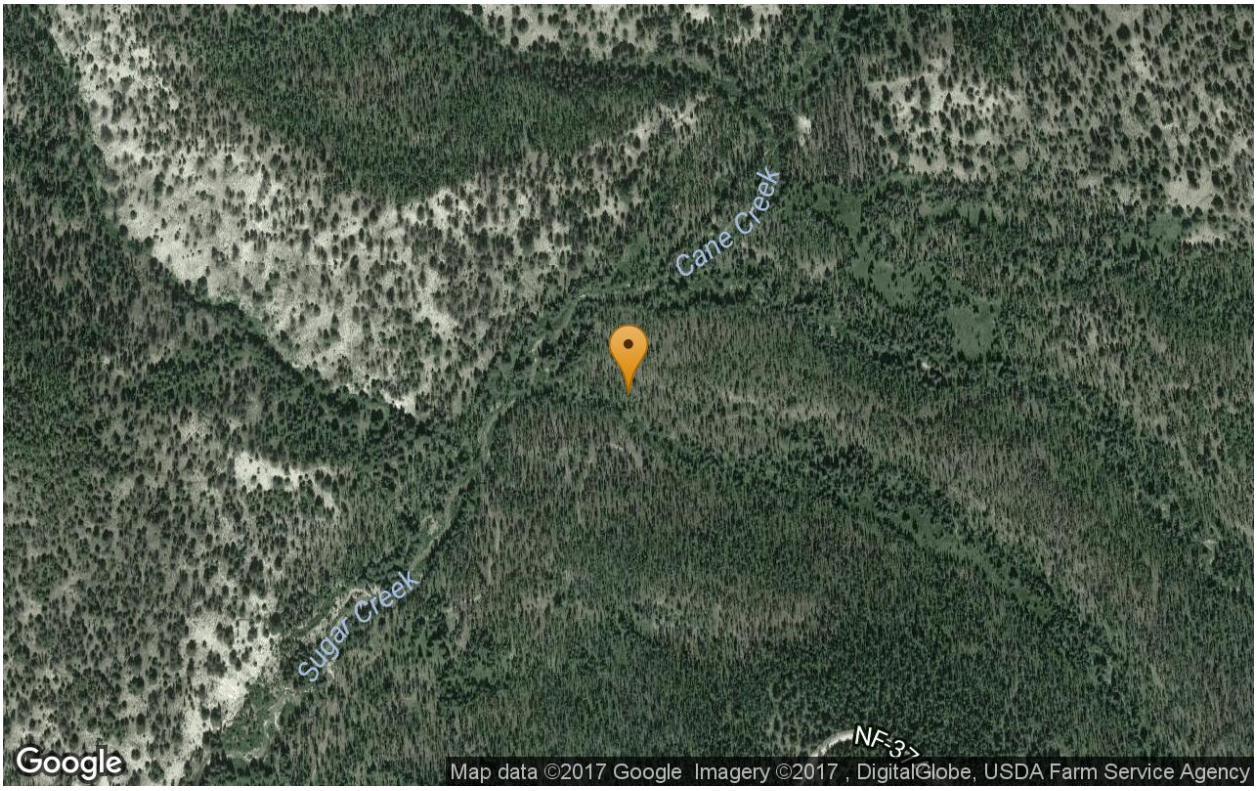
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344306**



Latitude 44.9523 **Longitude** -115.292461

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

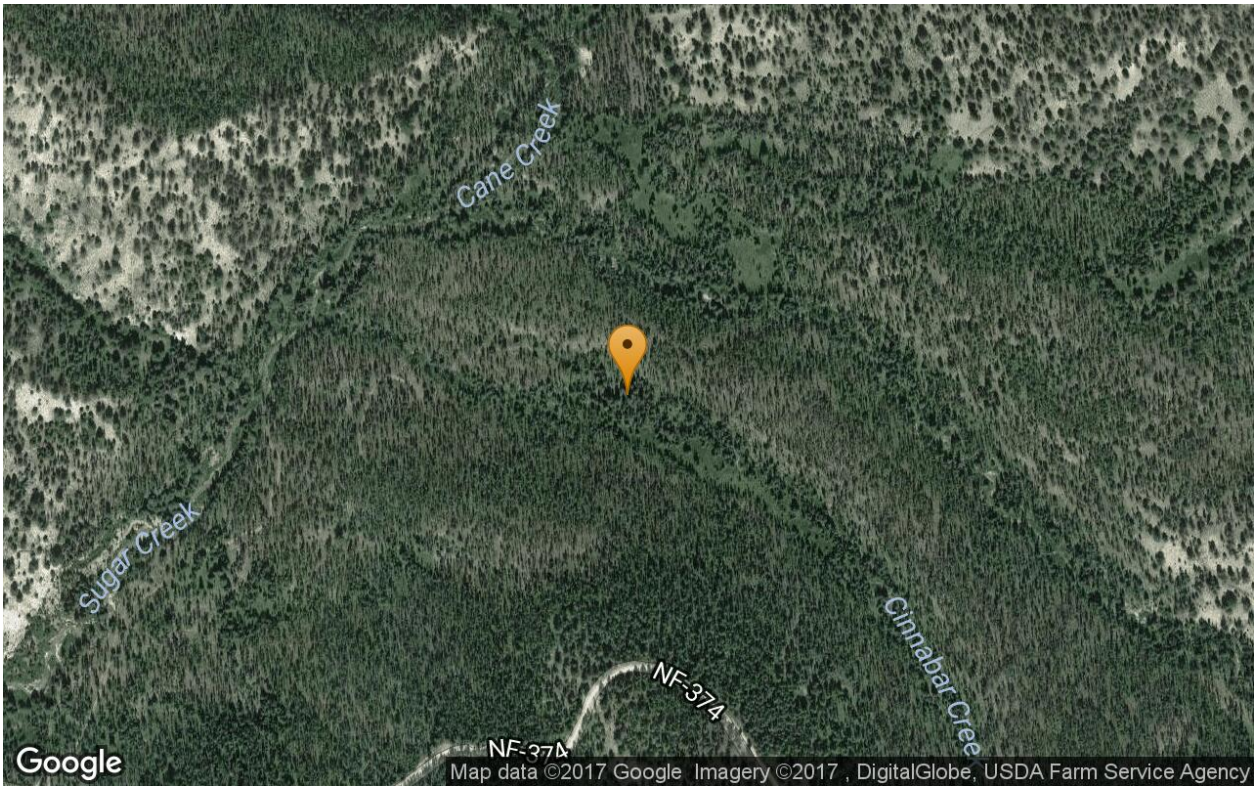
Sample Number **16344307**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:45	**Type**	Field Sample
Matrix	Surface Water		
Location	CC02SWD		
Sampled By	USCG		

Signed on 08/23/16

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344307**



Latitude 44.951769 **Longitude** -115.290062

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344308**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	16:36	**Type**	Field Sample
Matrix	Surface Water		
Location	CC03SWD		
Sampled By	USCG		

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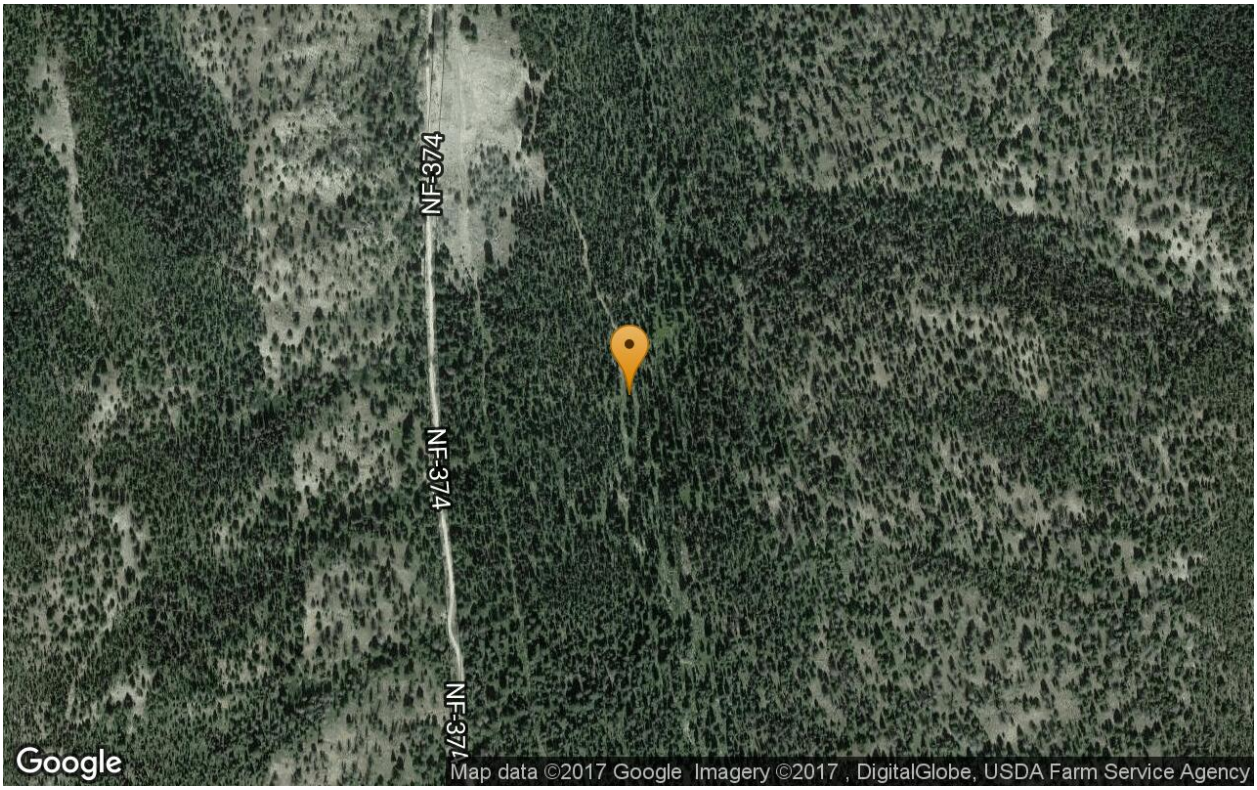
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344308**



Latitude 44.93894 **Longitude** -115.287495

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344309**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:23	**Type**	Field Sample
Matrix	Surface Water		
Location	CC04SWD		
Sampled By	EPA		

Photo 8-24-2016 11.34.12 AM.jpg

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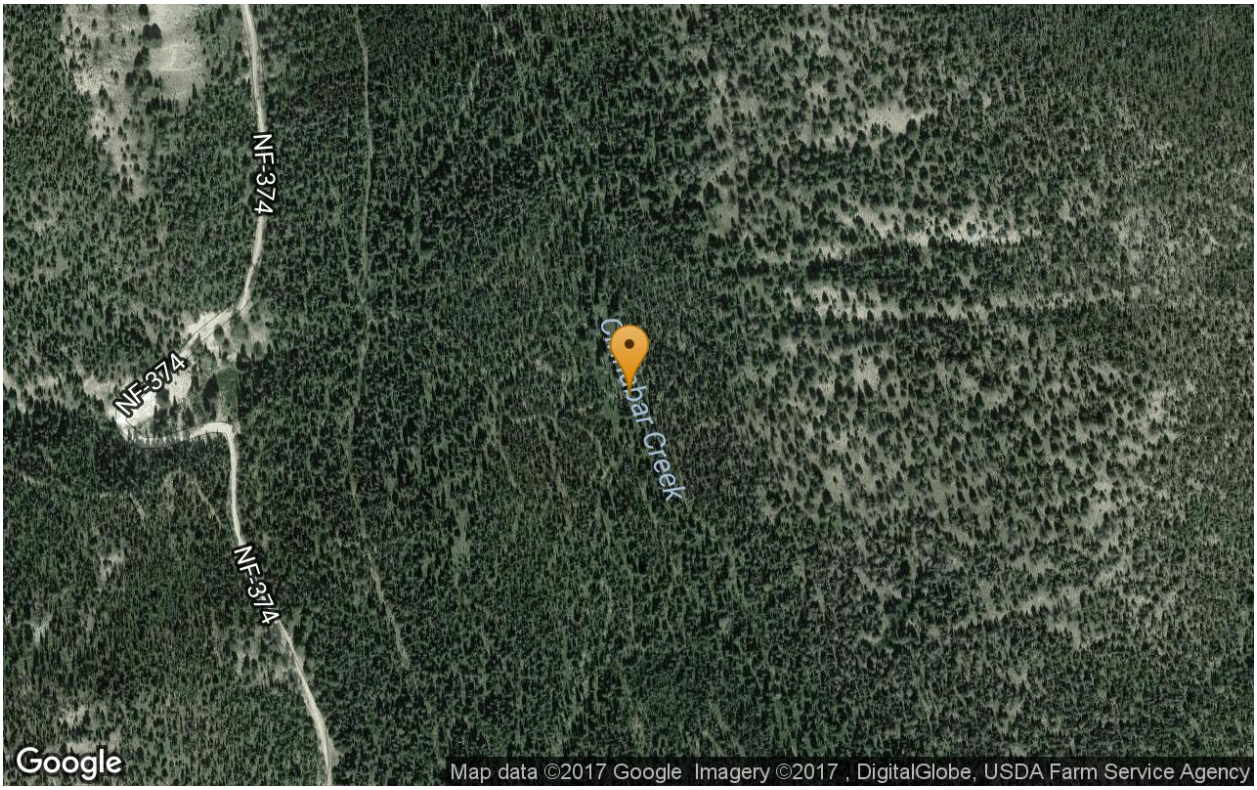
Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344309**



Latitude 44.927713 **Longitude** -115.283179

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TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344310**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	12:07	**Type**	Field Sample
Matrix	Surface Water		
Location	CC05SWD		
Sampled By	USCG		

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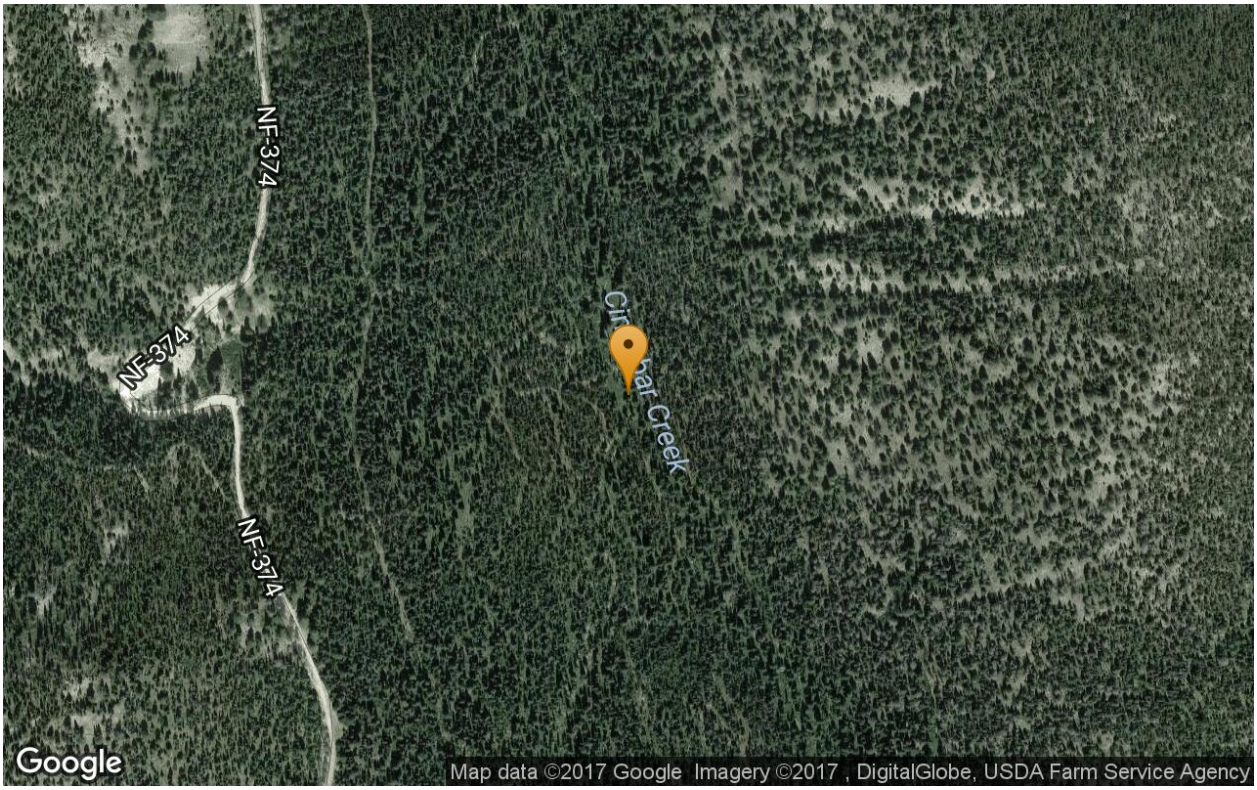
Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344310**



Latitude 44.927499 **Longitude** -115.283231

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344312**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	16:22	**Type**	Field Sample
Matrix	Surface Water		
Location	SC01SWD		
Sampled By	USCG		

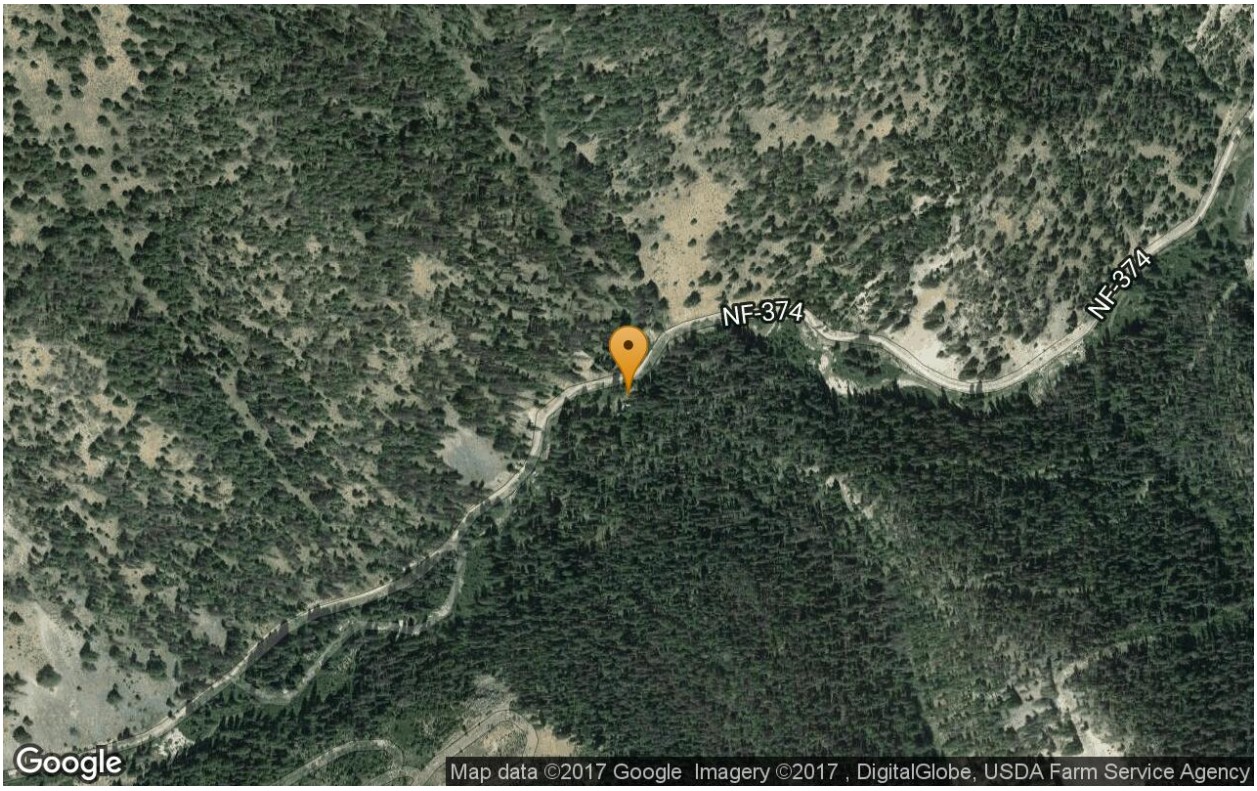
Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344312**



Latitude 44.938582 **Longitude** -115.324534

Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344314**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	18:06	**Type**	Field Sample
Matrix	Surface Water		
Location	SC03SWD		
Sampled By	EPA		

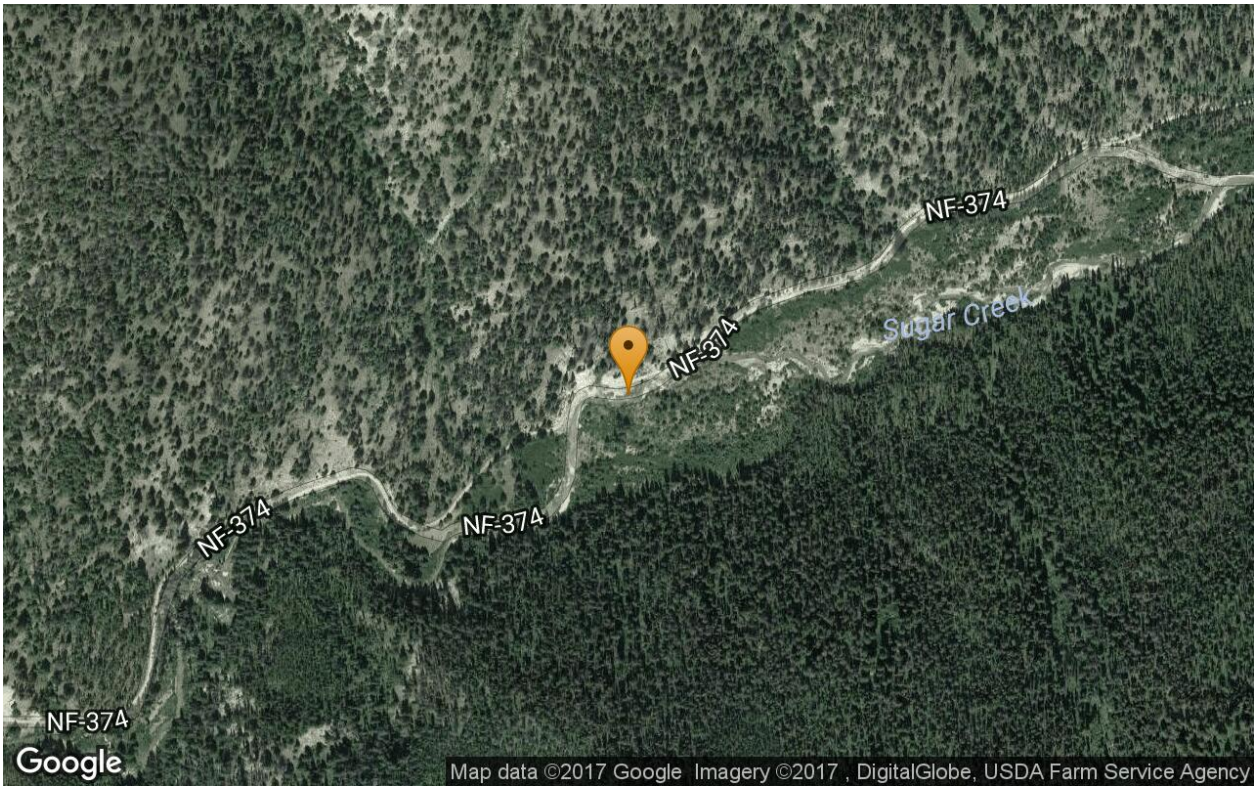
Photo 8-22-2016 6.06.32 PM.jpg

Signed on 08/22/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344314**



Latitude 44.946132 **Longitude** -115.306877

Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344319**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	12:34	**Type**	Field Sample
Matrix	Surface Water		
Location	BG03SWD		
Sampled By	USCG		

Photo 8-24-2016 12.34.55 PM.jpg

Sampling Equipment/Technique:

Adit Background Dissolved

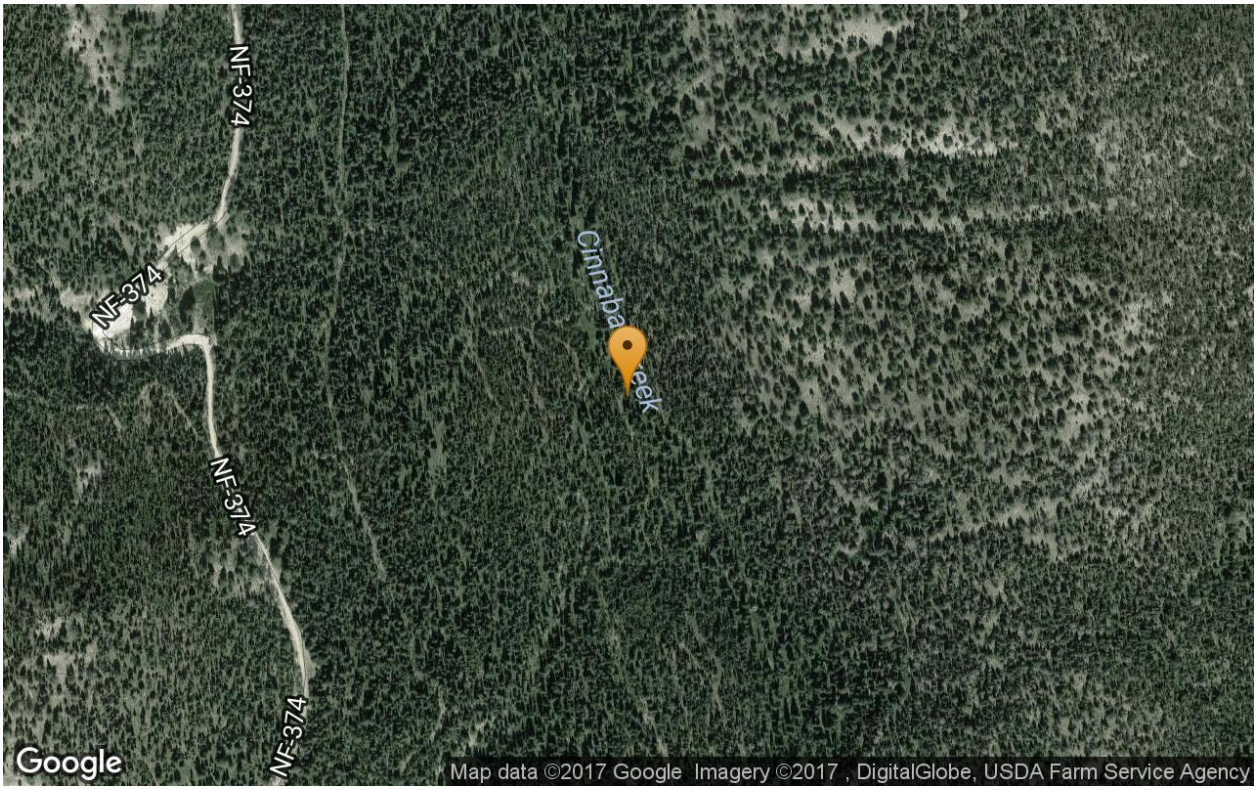
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344319**



Latitude 44.927022 **Longitude** -115.282937

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344224**

Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	08:52	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	WF06SD		

Sampled By USCG

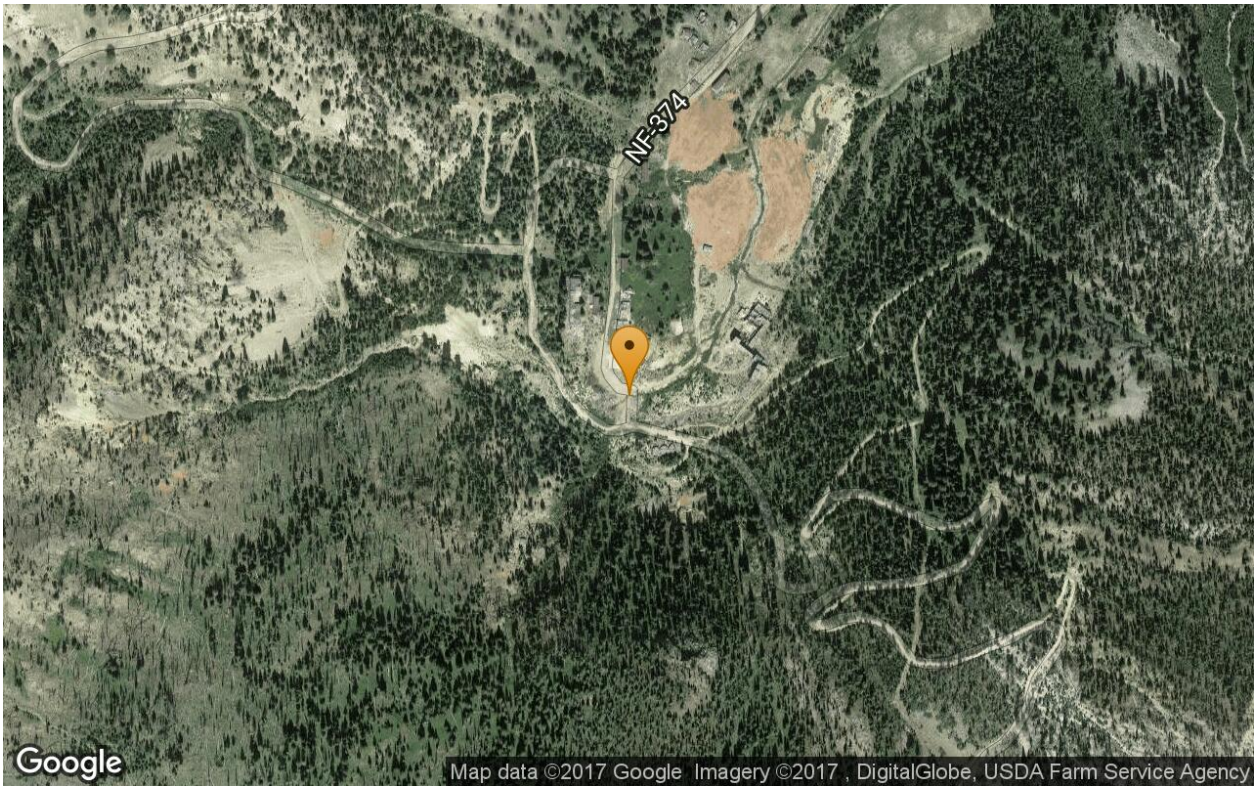
Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344224**



Latitude 44.918816 **Longitude** -115.290561

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344225**

Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	11:05	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	WF07SD		
Sampled By	USCG		

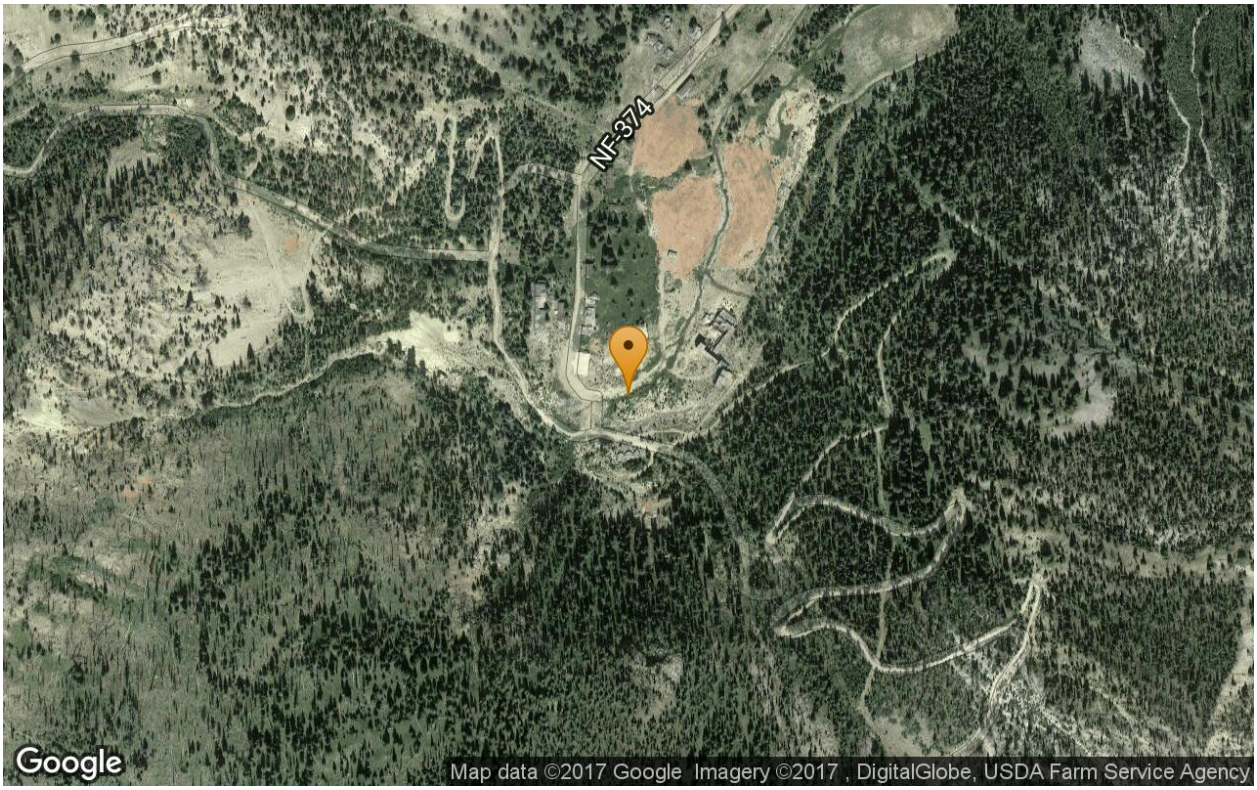
Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344225**



Latitude 44.918863 **Longitude** -115.290183

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344233**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	14:55	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	CC02SD		

Sampled By USCG

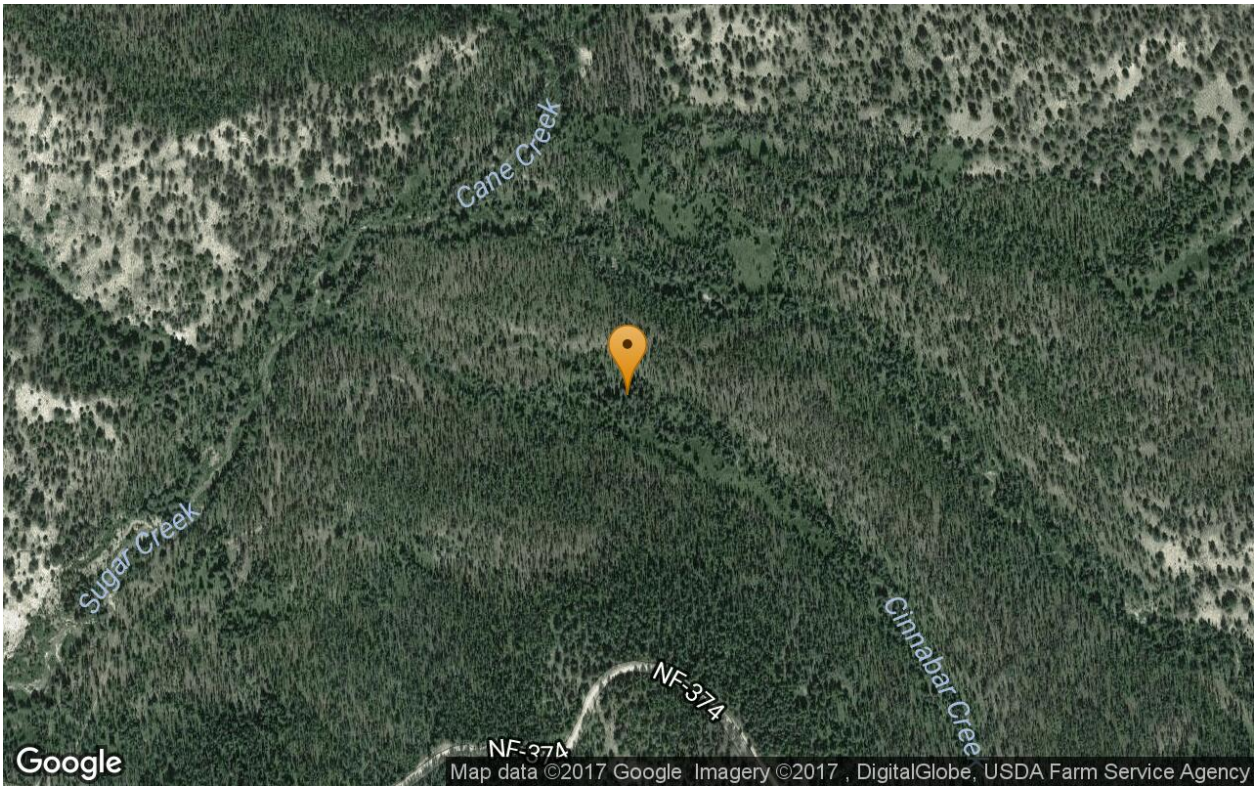
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344233**



Latitude 44.951769 **Longitude** -115.290062

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344243**

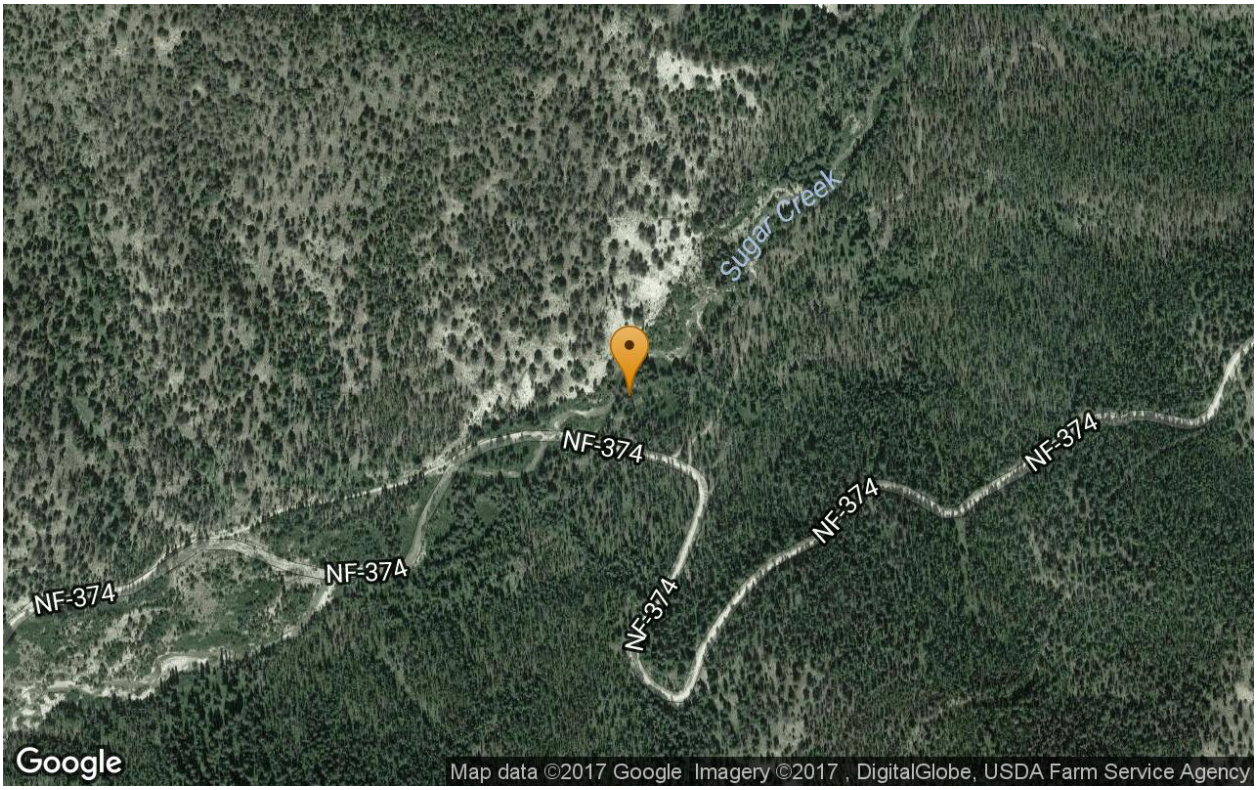
Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	10:06	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	UT01SD		
Sampled By	USCG		

Signed on 08/26/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344243**



Latitude 44.949182 **Longitude** -115.297087

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344244**

Sampling Date	8/25/2016	**Collection Method**	Grab
Sampling Time	12:00	**Type**	Field Sample
Matrix	Soil Surface		
Depth	0 to 6 in.		
Location	BG01SS		
Sampled By	USCG		

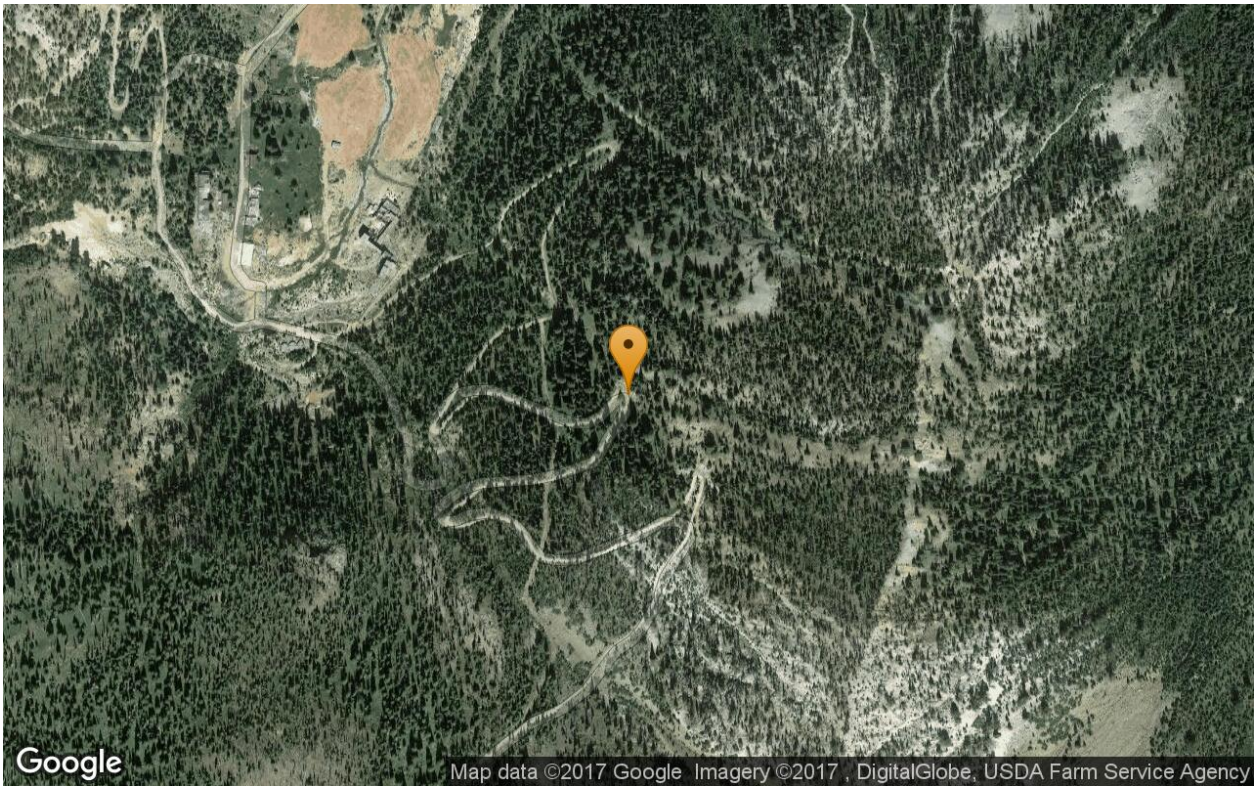
Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344244**



Latitude 44.918017 **Longitude** -115.286498

Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344247**

Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	11:57	**Type**	Field Sample
Matrix	Sediment Surface		
Depth	0 to 6 in.		
Location	BG04SD		
Sampled By	USCG		

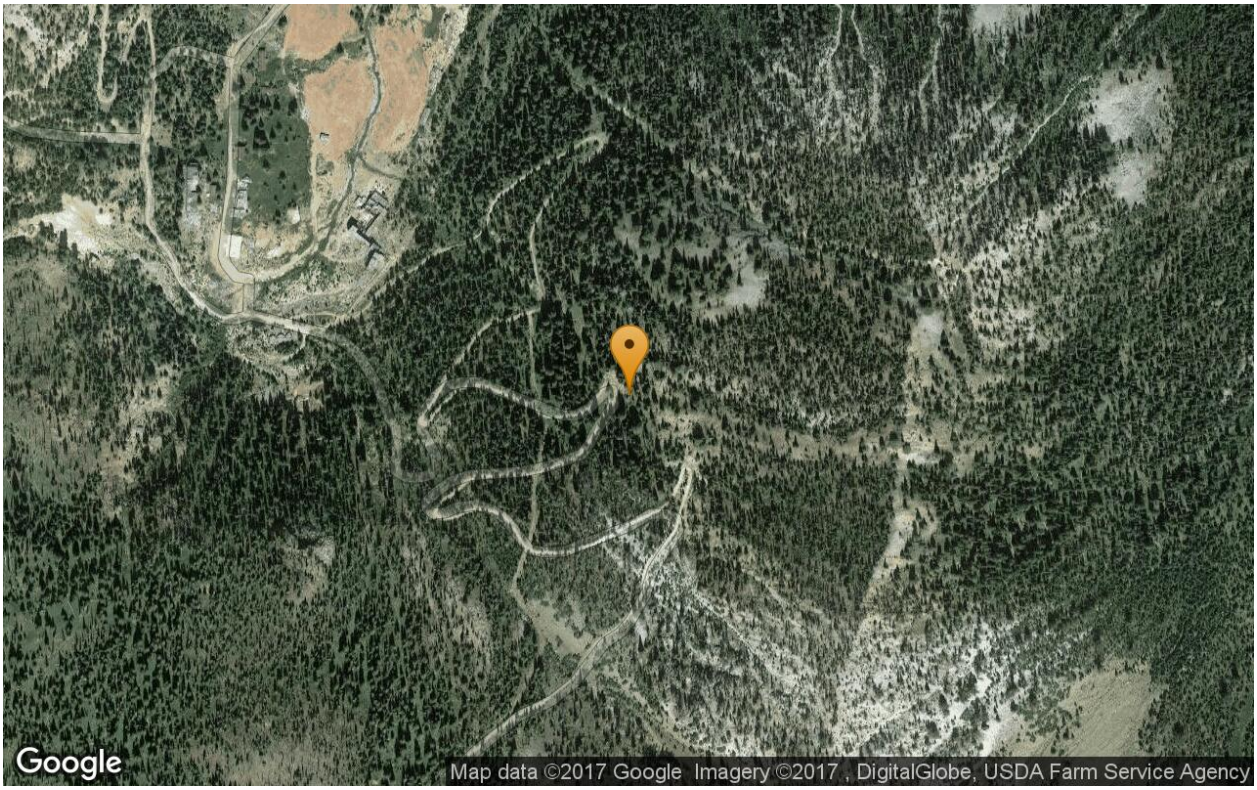
Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344247**



Latitude 44.917958 **Longitude** -115.286355

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344264**

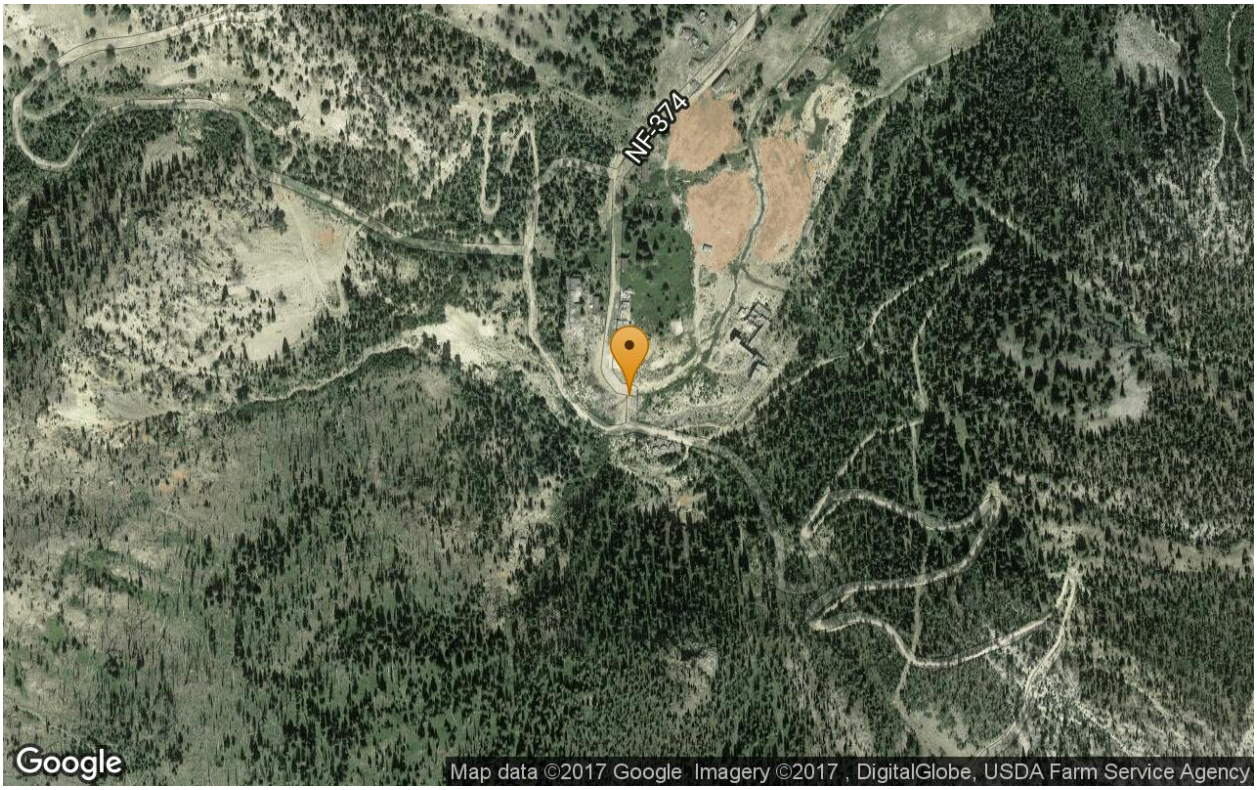
Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	08:40	**Type**	Field Sample
Matrix	Surface Water		
Location	WF06SW		
Sampled By	USCG		

Signed on 08/26/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344264**



Latitude 44.918816 **Longitude** -115.290561

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344265**

Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	11:01	**Type**	Field Sample
Matrix	Surface Water		
Location	WF07SW		
Sampled By	USCG		

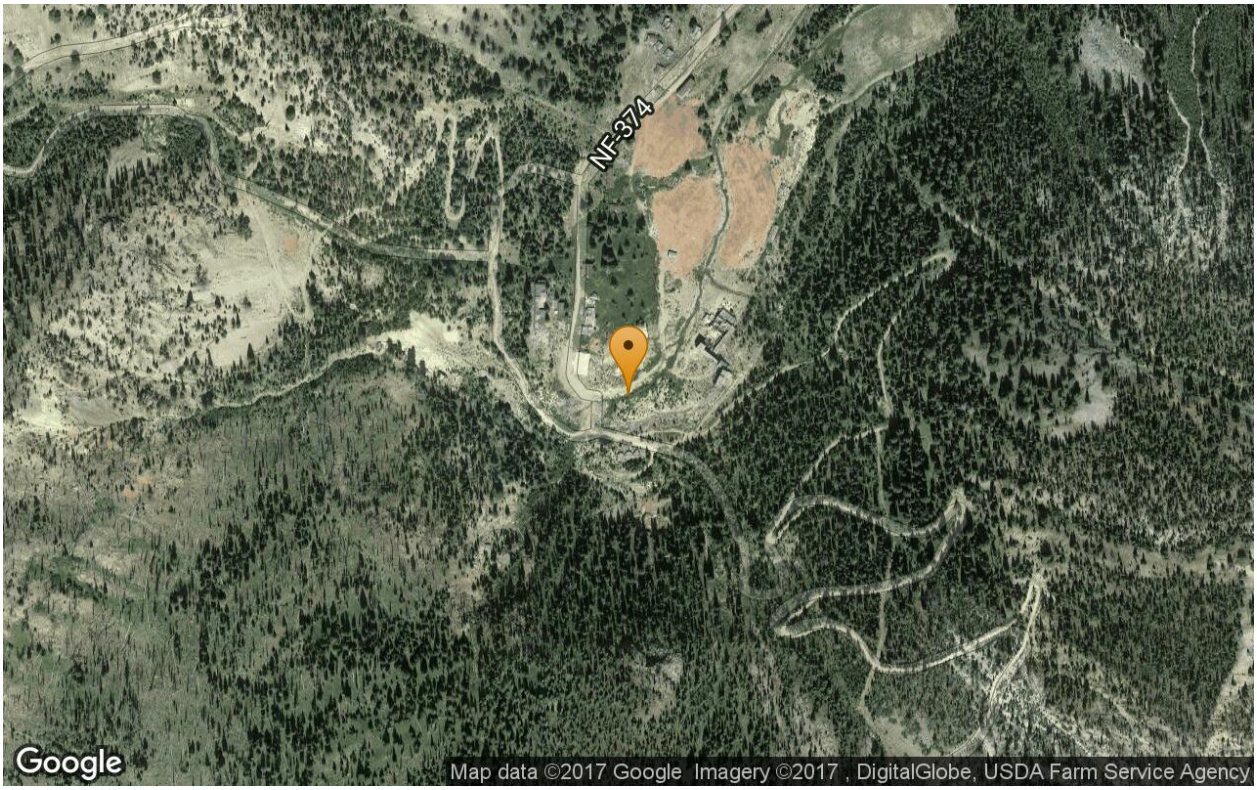
Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344265**



Latitude 44.918863 **Longitude** -115.290183

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344266**

Sampling Date	8/25/2016	**Collection Method**	Grab
Sampling Time	15:40	**Type**	Field Sample
Matrix	Surface Water		
Location	AD04SW		
Sampled By	USCG		

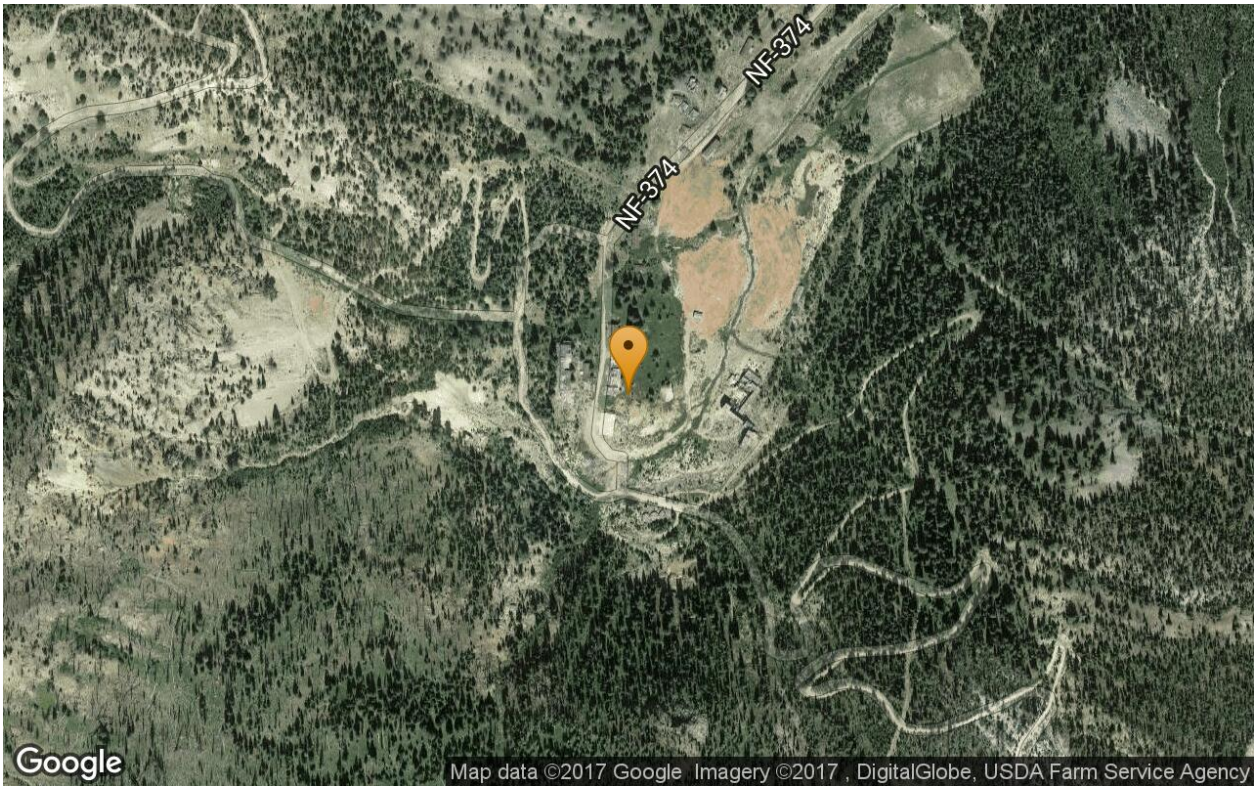
Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344266**



Latitude 44.919334 **Longitude** -115.290468

Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344282**

Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	13:43	**Type**	Field Sample
Matrix	Surface Water		
Location	SC05SW		
Sampled By	USCG		

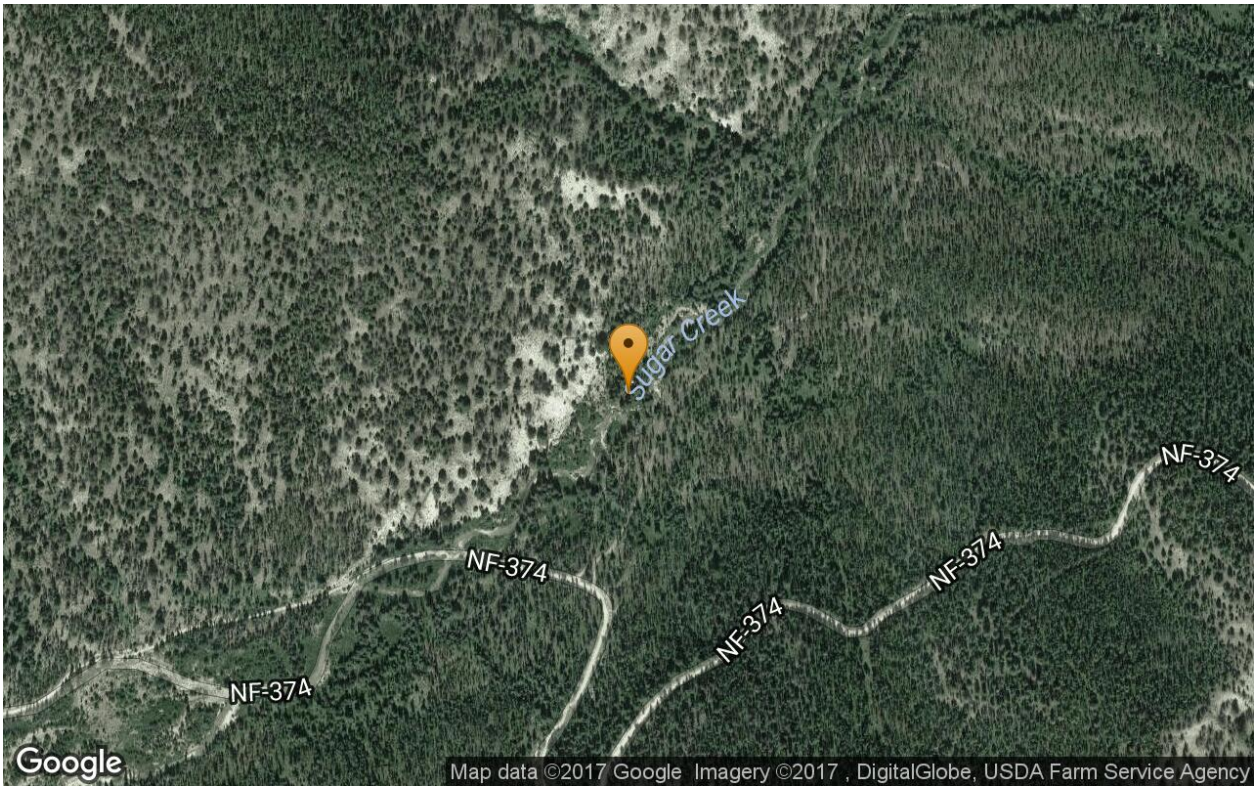
Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344282**



Latitude 44.950119 **Longitude** -115.296045

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344283**

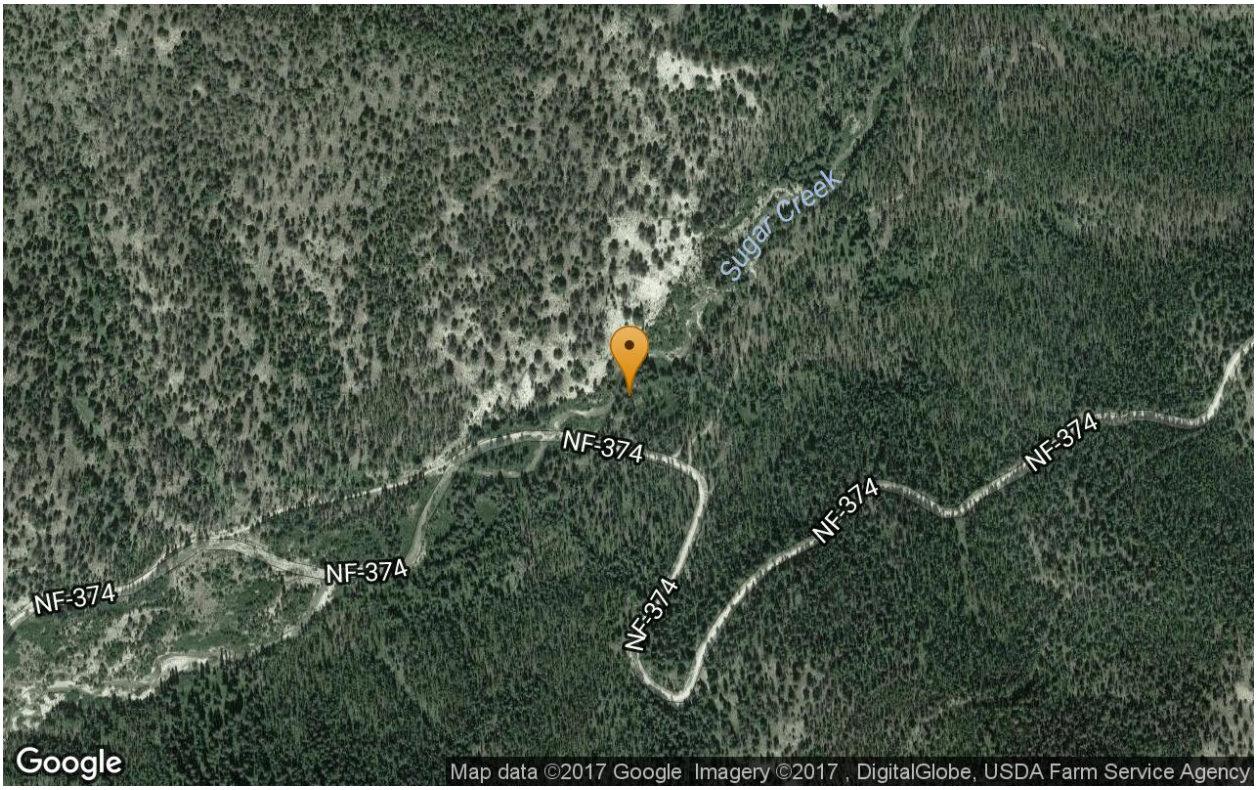
Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	09:54	**Type**	Field Sample
Matrix	Surface Water		
Location	UT01SW		
Sampled By	USCG		

Signed on 08/26/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344283**



Latitude 44.949182 **Longitude** -115.297087

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344286**

Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	11:34	**Type**	Field Sample
Matrix	Surface Water		
Location	BG04SW		
Sampled By	USCG		

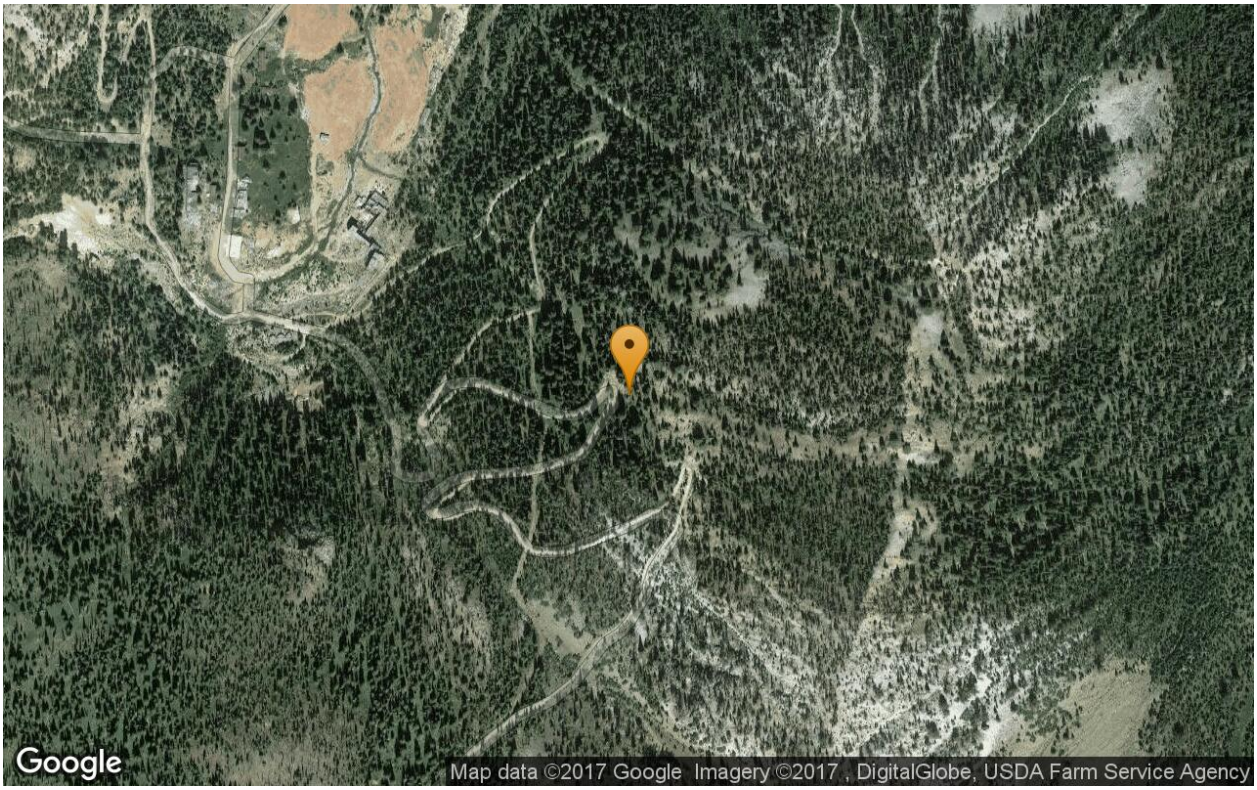
Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344286**



Latitude 44.917958 **Longitude** -115.286355

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344287**

Sampling Date	8/25/2016	**Collection Method**	Grab
Sampling Time	14:29	**Type**	QC Blank -
Matrix	Surface Water		
Location	RI01WT		
Sampled By	Chris Eckley		

Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344287**

Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344297**

Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	08:43	**Type**	Field Sample
Matrix	Surface Water		
Location	WF06SWD		
Sampled By	USCG		

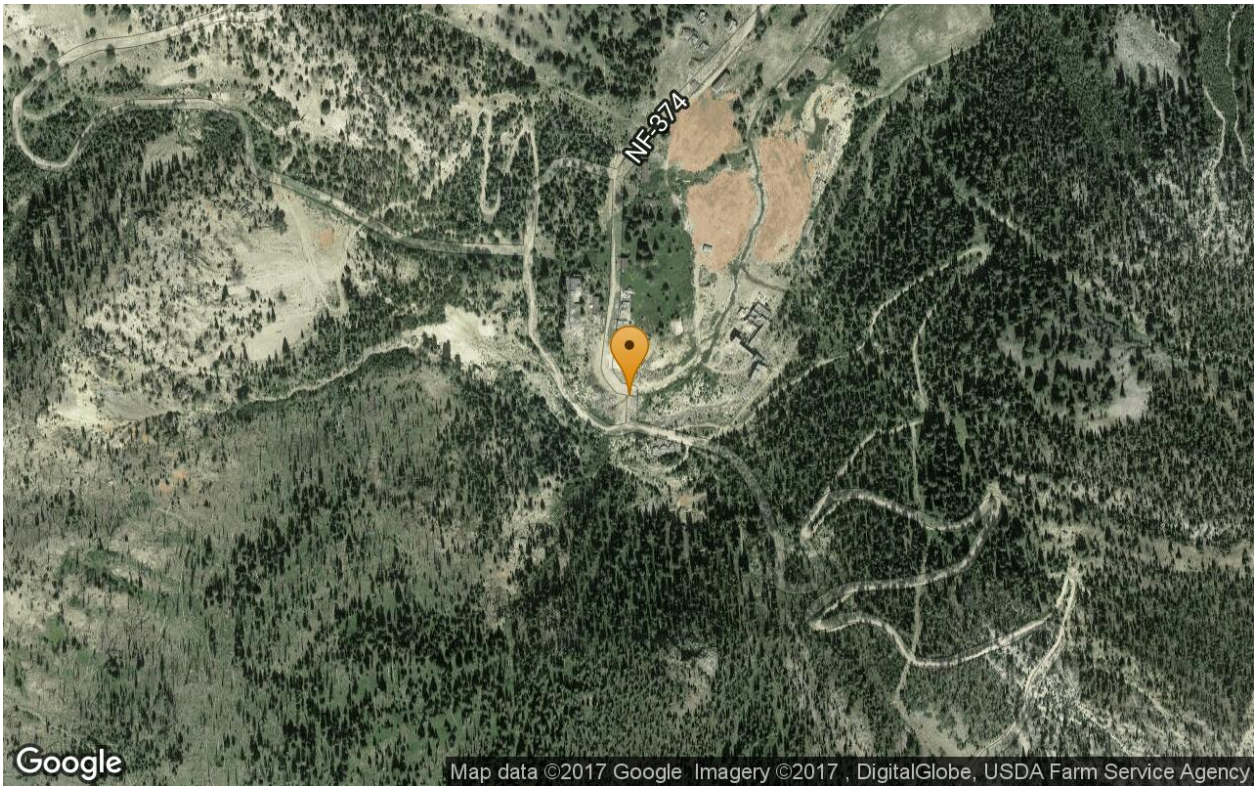
Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344297**



Latitude 44.918816 **Longitude** -115.290561

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344298**

Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	11:01	**Type**	Field Sample
Matrix	Surface Water		
Location	WF07SWD		
Sampled By	USCG		

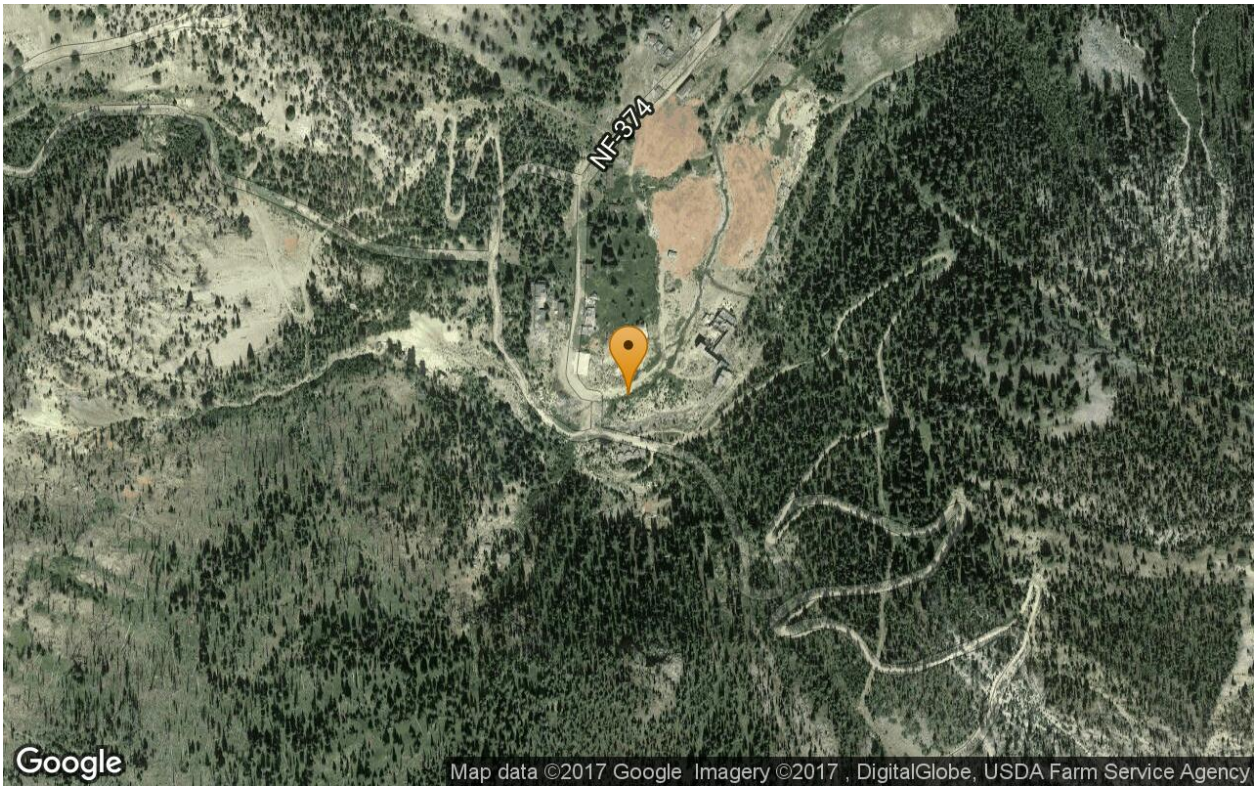
Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344298**



Latitude 44.918863 **Longitude** -115.290183

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344317**

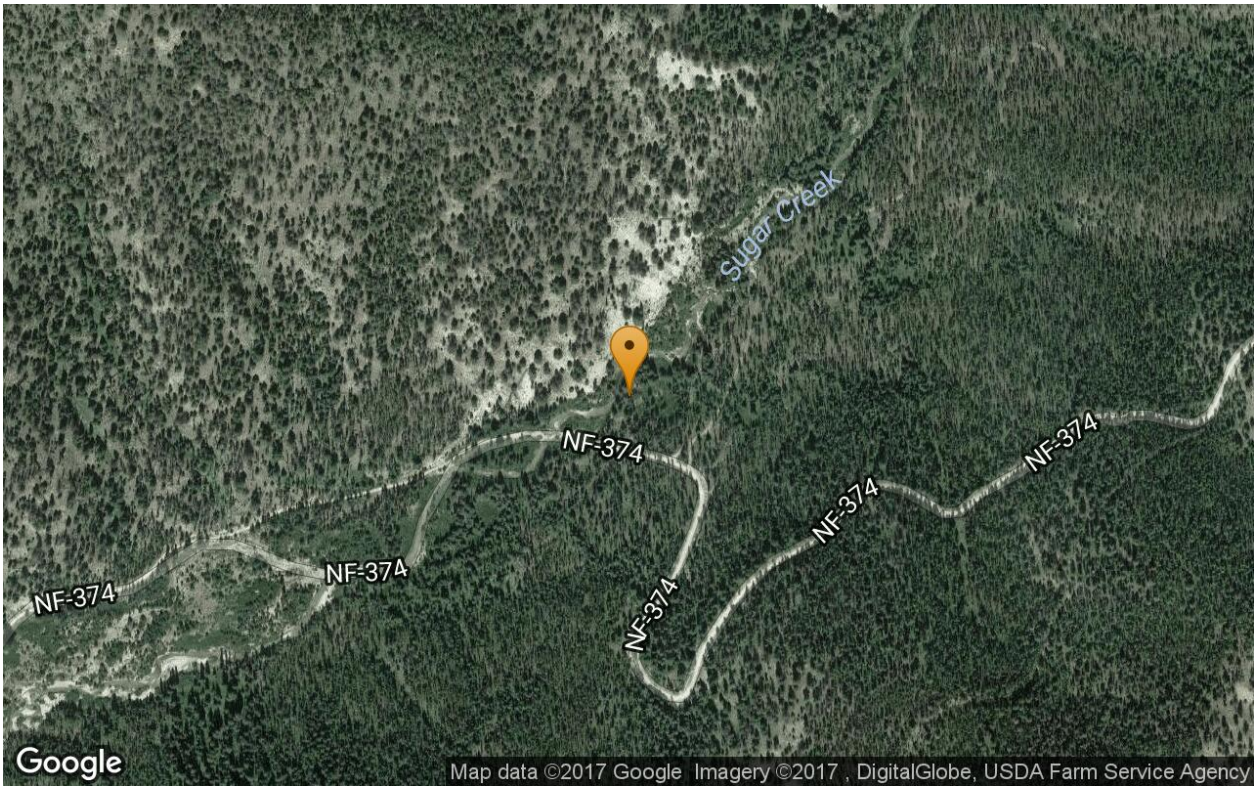
Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	09:57	**Type**	Field Sample
Matrix	Surface Water		
Location	UT01SWD		
Sampled By	USCG		

Signed on 08/26/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344317**



Latitude 44.949182 **Longitude** -115.297087

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344320**

Sampling Date	8/26/2016	**Collection Method**	Grab
Sampling Time	11:40	**Type**	Field Sample
Matrix	Surface Water		
Location	BG04SWD		
Sampled By	USCG		

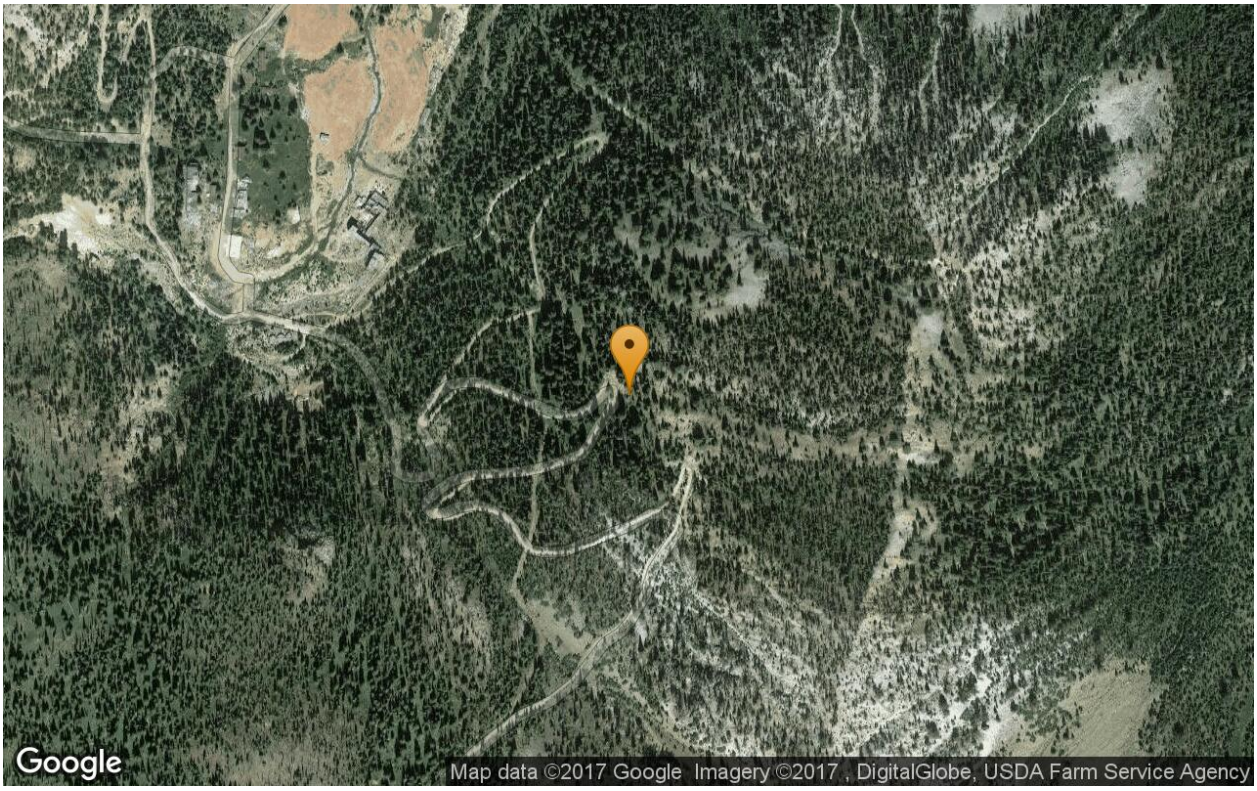
Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344320**



Latitude 44.917958 **Longitude** -115.286355

Signed on 08/26/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344324**

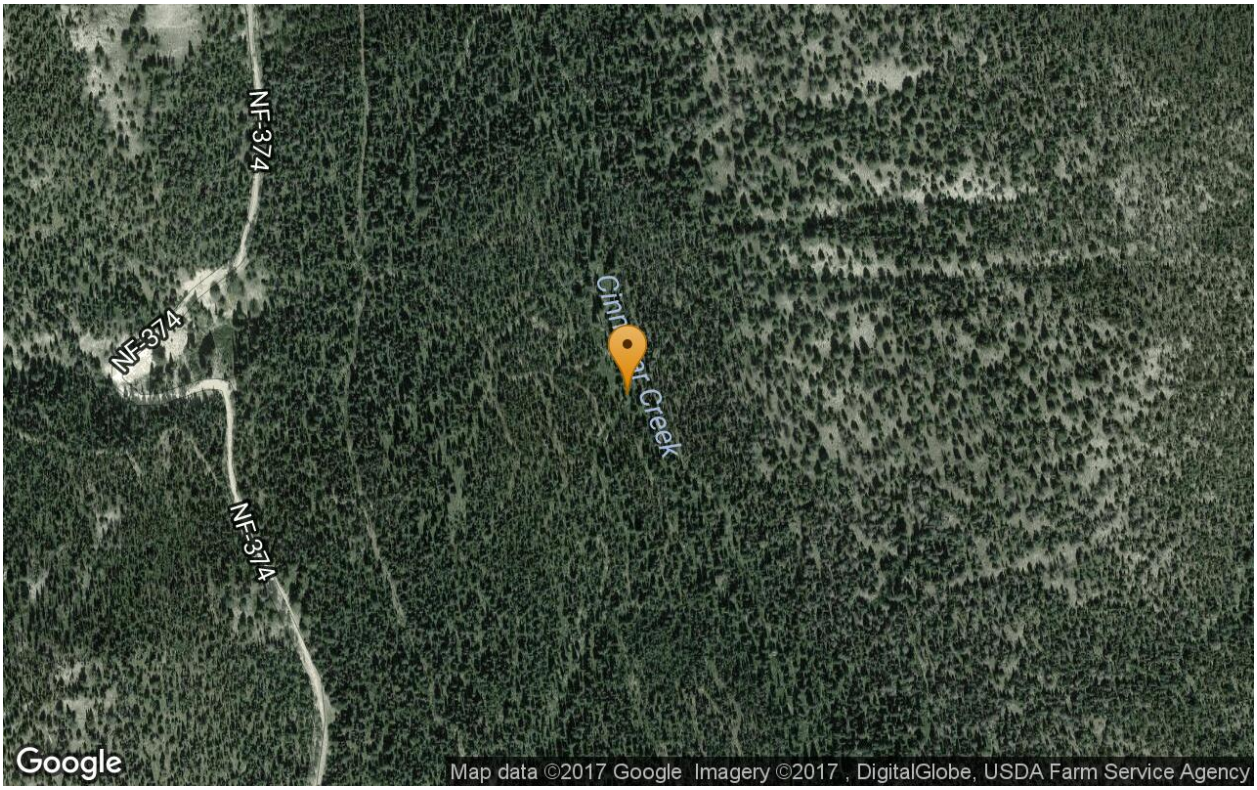
Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	13:50	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	WF01PW		
Sampled By	Chris Eckley		

Signed on 08/24/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344324**



Latitude 44.927374 **Longitude** -115.283153

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

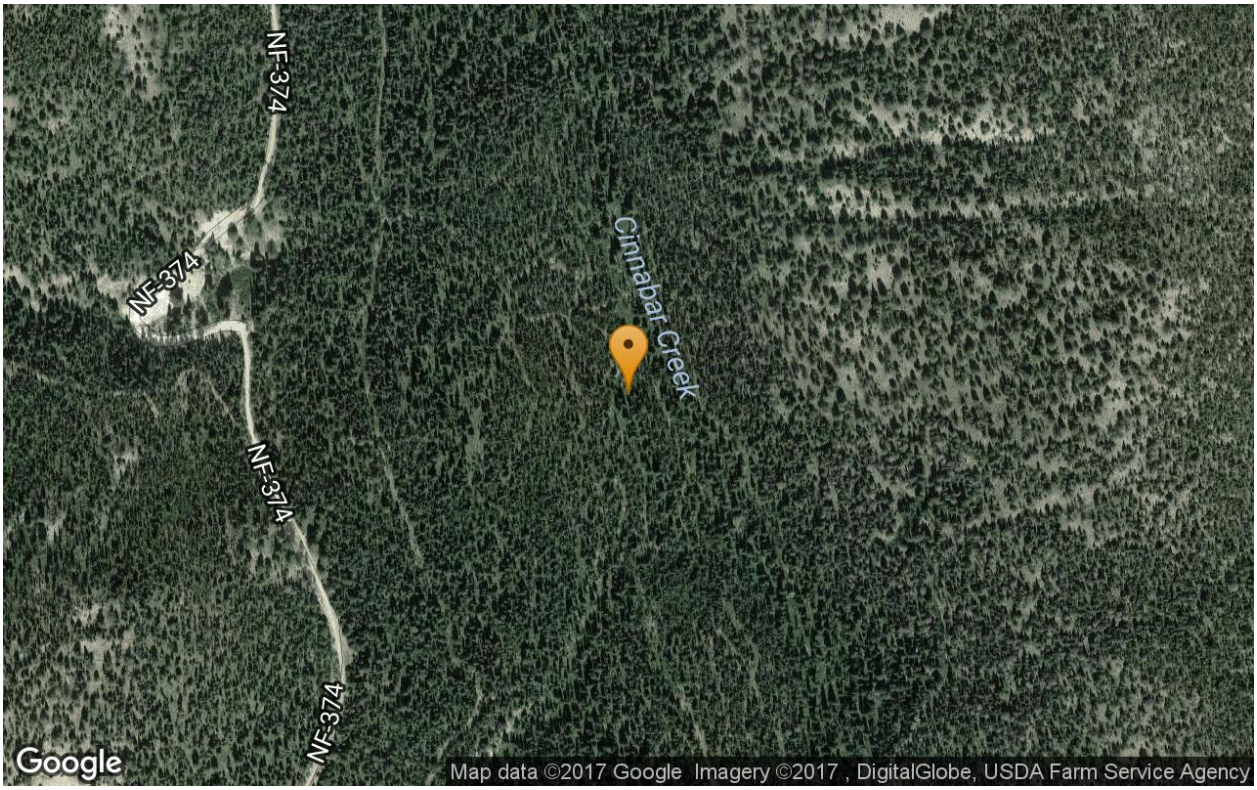
Sample Number **16344325**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	13:30	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	WF02PW		
Sampled By	Chris Eckley		

Signed on 08/24/16

Cinnabar Mine Integrated Assessment
Sample Details

Sample Number **16344325**



Latitude 44.926918 **Longitude** -115.283341

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344326**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	17:20	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	WF03PW		
Sampled By	Chris Eckley		

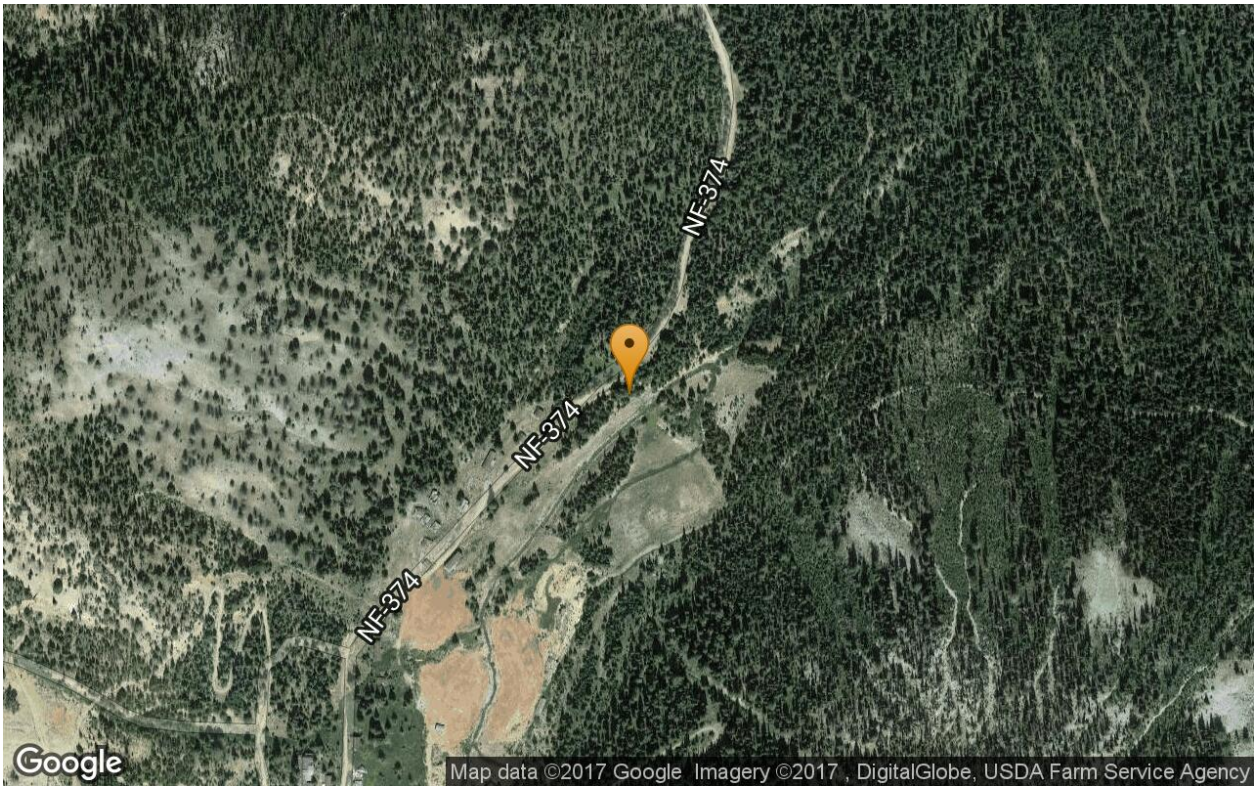
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344326**



Latitude 44.922552 **Longitude** -115.287624

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344327**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	17:00	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	WF04PW		
Sampled By	Chris Eckley		

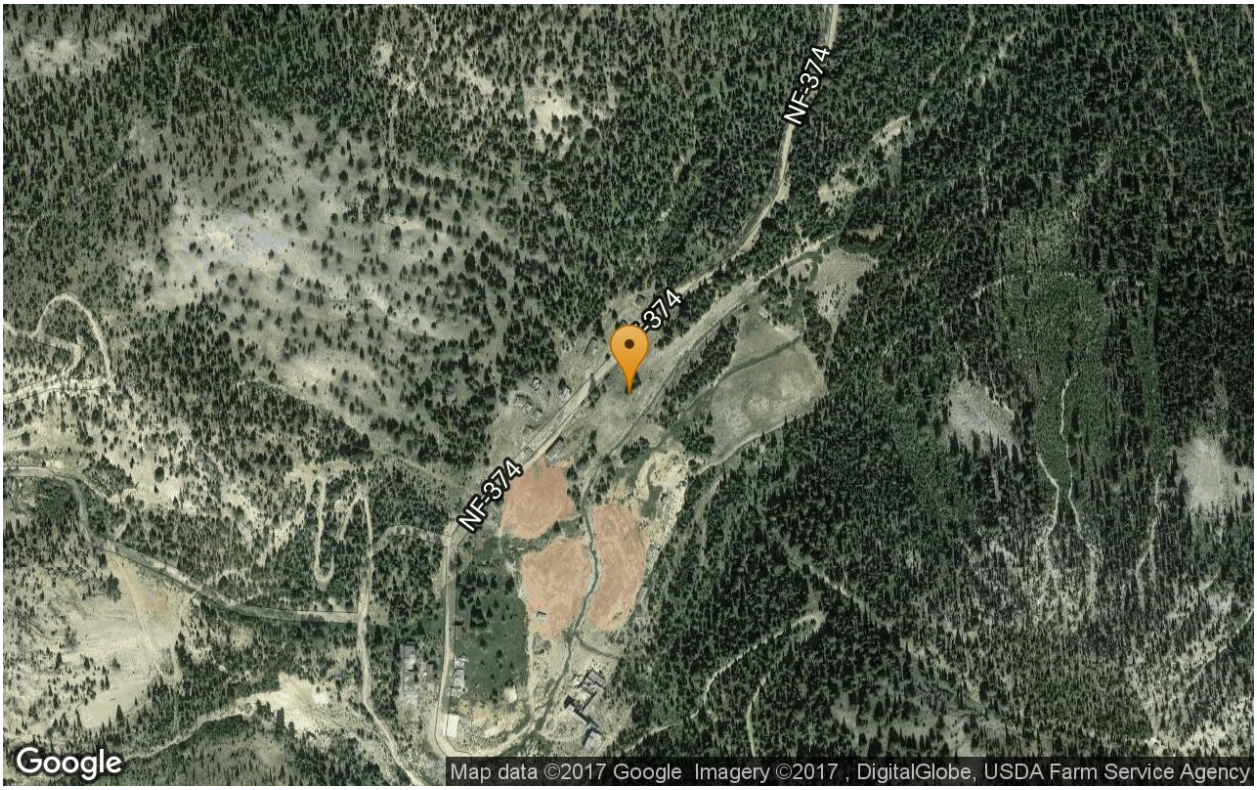
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344327**



Latitude 44.921676 **Longitude** -115.288737

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344328**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	09:30	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	WF05PW		
Sampled By	Chris Eckley		

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344328**

Latitude 44.920752 **Longitude** -115.289265

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344330**

Sampling Date	8/25/2016	**Collection Method**	Grab
Sampling Time	12:00	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	WT01PW		
Sampled By	Chris Eckley		

Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344330**

Latitude 44.920791 **Longitude** -115.288603

Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344331**

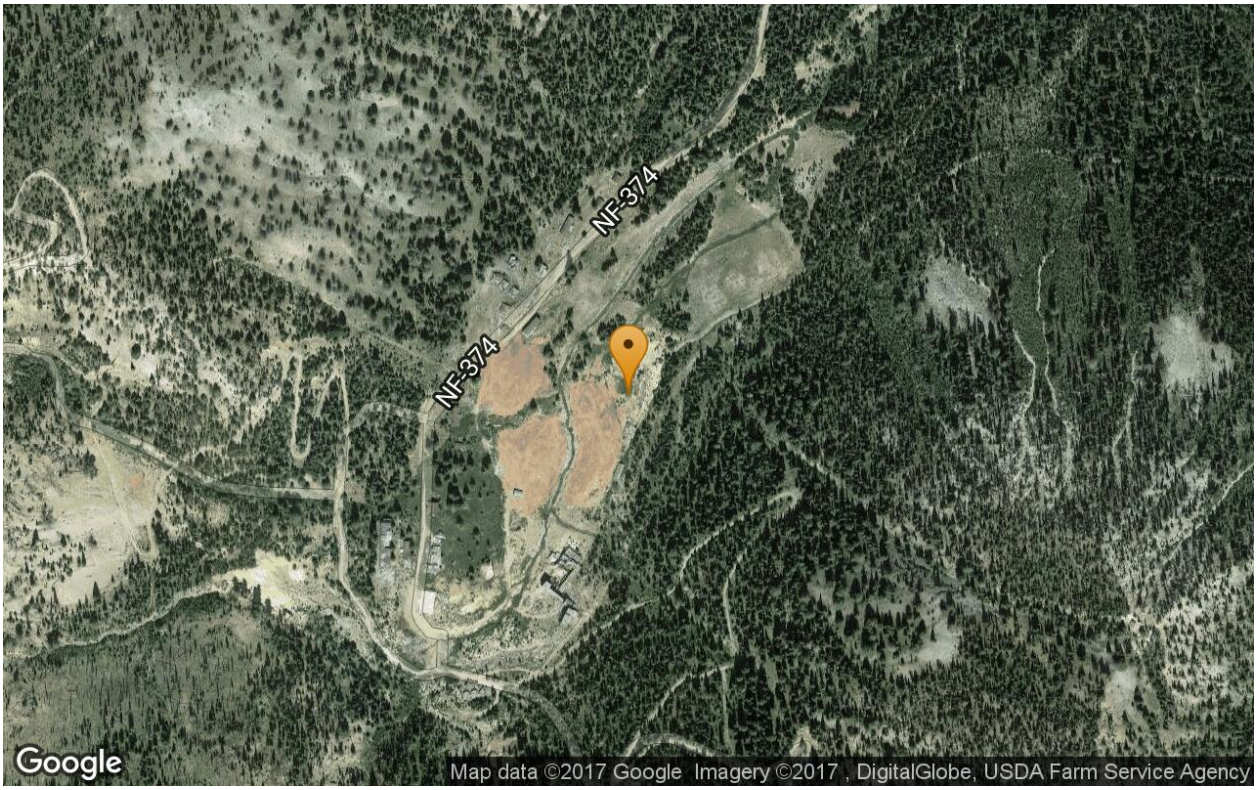
Sampling Date	8/25/2016	**Collection Method**	Grab
Sampling Time	10:45	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	WT02PW		
Sampled By	Chris Eckley		

Signed on 08/25/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344331**



Latitude 44.920726 **Longitude** -115.288486

Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344332**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:30	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	WT03PW		
Sampled By	Chris Eckley		

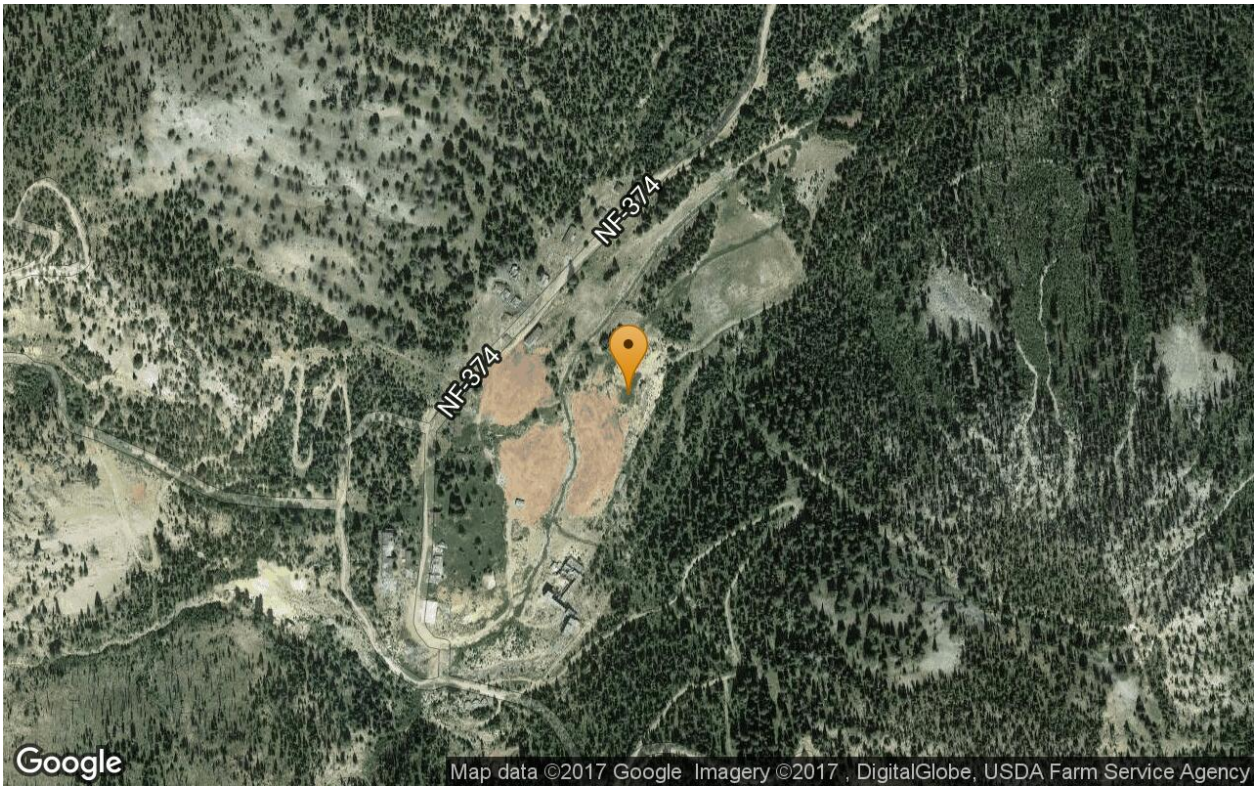
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344332**



Latitude 44.920799 **Longitude** -115.288507

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344333**

Sampling Date	8/22/2016	**Collection Method**	Grab
Sampling Time	16:45	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	SC01PW		
Sampled By	Chris Eckley		

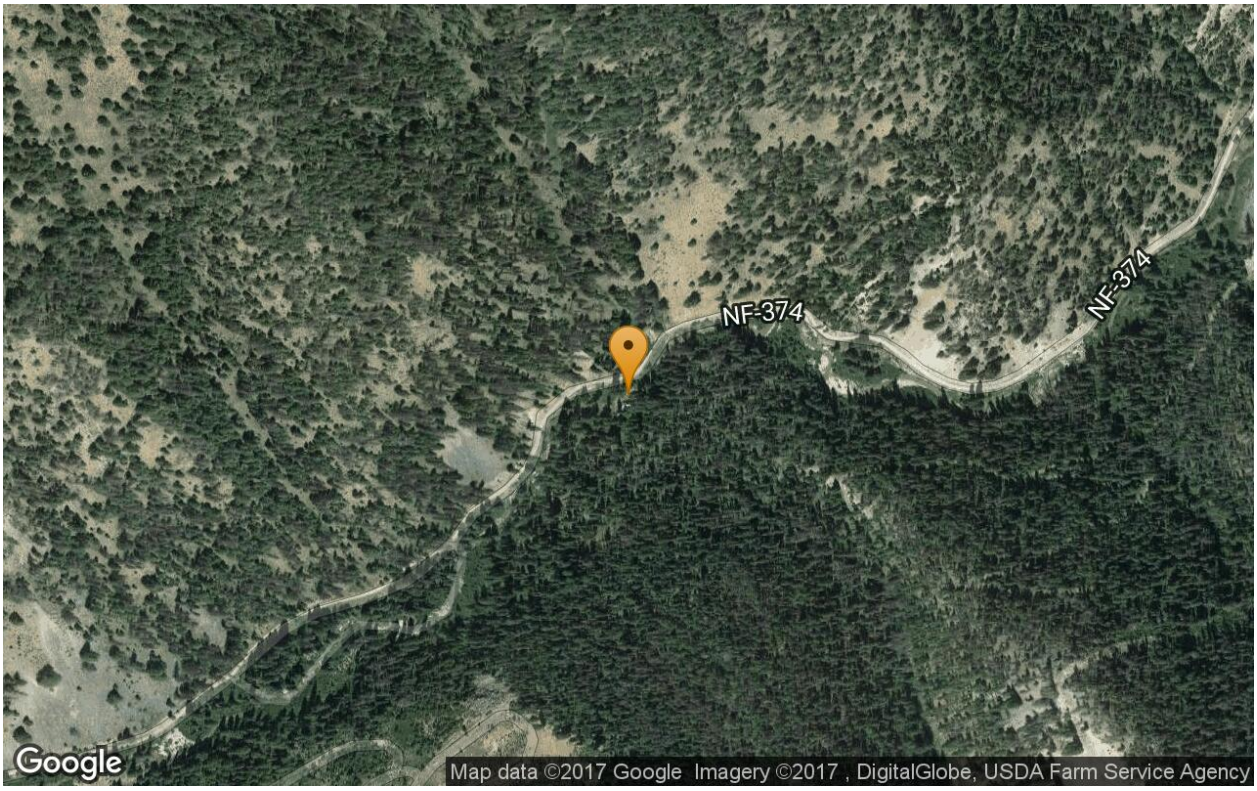
Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344333**



Latitude 44.938582 **Longitude** -115.324534

Signed on 08/22/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344334**

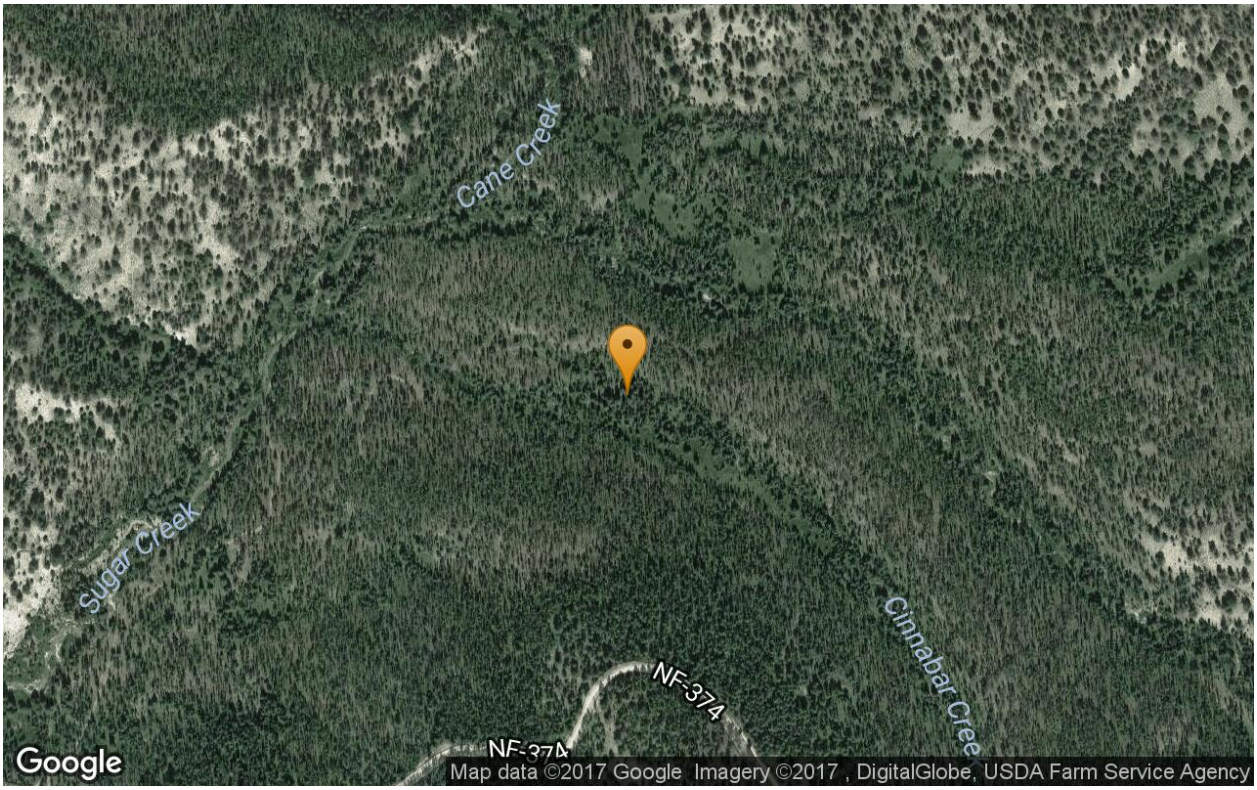
Sampling Date	8/23/2016	**Collection Method**	Grab
Sampling Time	16:00	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	CC02PW		
Sampled By	Chris Eckley		

Signed on 08/23/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344334**



Latitude 44.951769 **Longitude** -115.290062

Signed on 08/23/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344335**

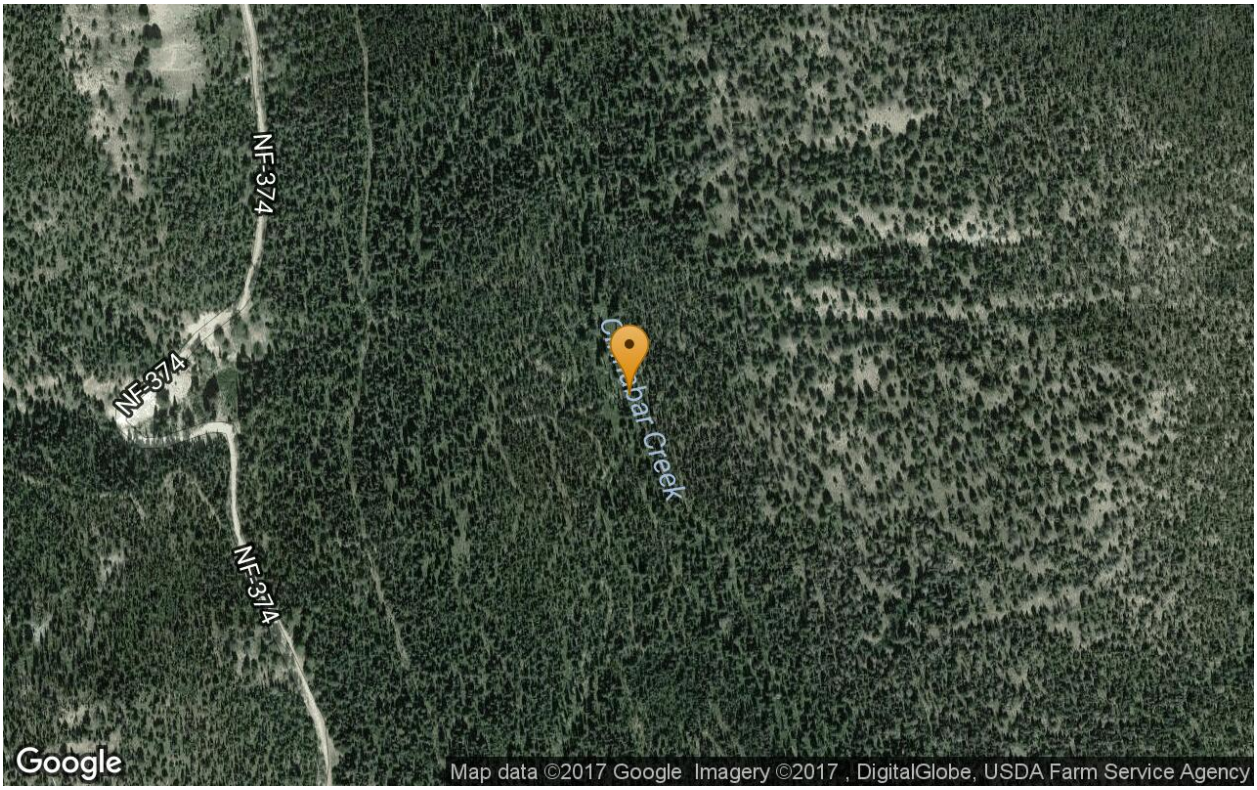
Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	11:30	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	CC04PW		
Sampled By	Chris Eckley		

Signed on 08/24/16

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344335**



Latitude 44.927713 **Longitude** -115.283179

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344336**

Sampling Date	8/24/2016	**Collection Method**	Grab
Sampling Time	14:15	**Type**	Field Sample
Matrix	Porewater Filtered		
Location	BG02PW		
Sampled By	Chris Eckley		

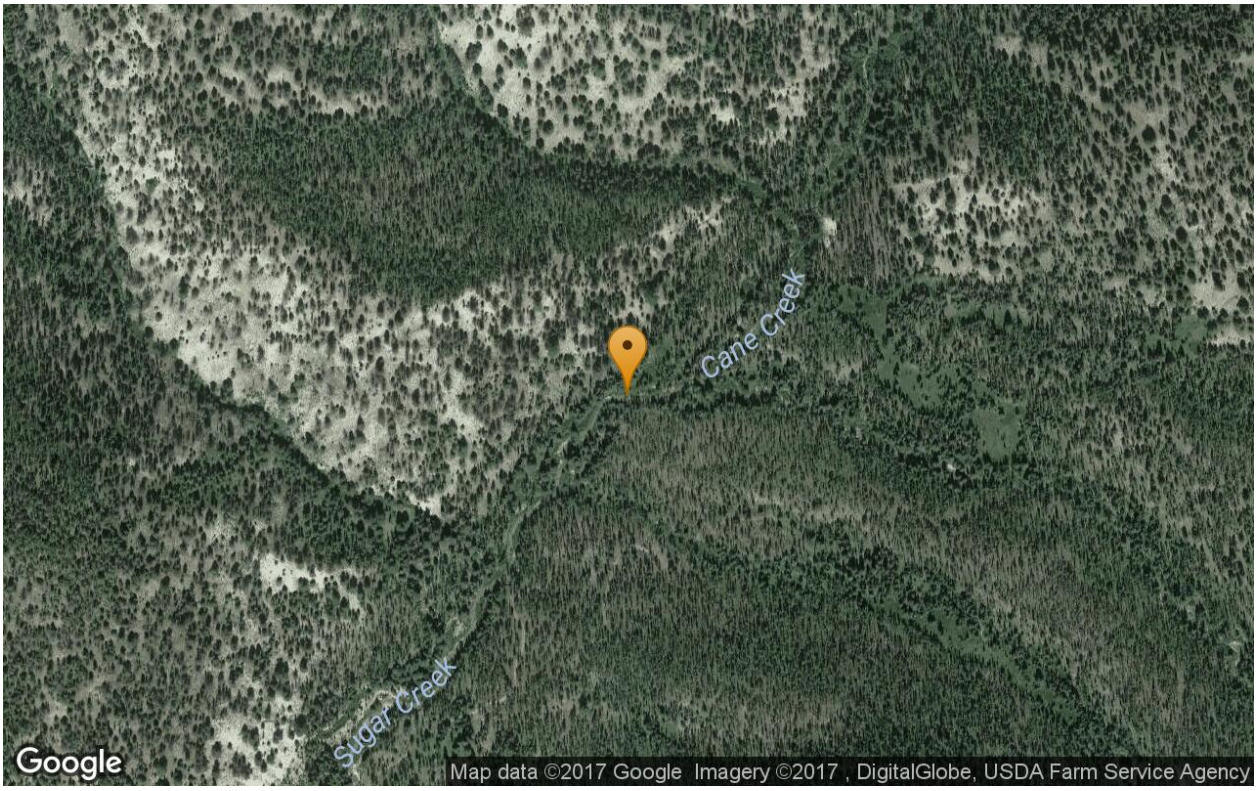
Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344336**



Latitude 44.953086 **Longitude** -115.292744

Signed on 08/24/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344338**

Sampling Date	8/25/2016	**Collection Method**	Grab
Sampling Time	14:00	**Type**	QC Blank Rinsate
Matrix	Porewater Filtered		
Location	RI02WT		
Sampled By	Chris Eckley		

Signed on 08/25/16

TDD No: 16-07-0006

Cinnabar Mine Integrated Assessment

Sample Details

Sample Number **16344338**

Signed on 08/25/16

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Data Validation Memoranda and Chain-of-Custody Documentation

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MEMORANDUM

DATE: January 5, 2017

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Validation Memo, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data validation of 6 porewater and 6 surface soil samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for dissolved sulfide (Standard Method SM-4500-S2-D) and methyl mercury (Method ALS SOP/Modified EPA Method 1630) were performed at ALS Environmental, Inc., Kelso, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16454401	16454402	16454403	16454404	16454405	16454406
16454407	16454408	16454409	16454410	16454411	16454412

1. Sample Holding Times: Acceptable.

The samples were maintained at < 6°C. The samples were collected on November 9, 2016, and were analyzed by November 16, 2016 for dissolved sulfide and by December 2, 2016 for methyl mercury.

2. Initial Calibration/Continuing Calibration/Ongoing Precision and Recovery (OPR): Acceptable.

All calibration and OPR results were within QC limits.

3. Blanks: Acceptable.

A method blank was analyzed for each 20 samples or per matrix per concentration level. There were no detections in any blanks.

4. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

6. Spike Duplicate Analysis: Acceptable.

Laboratory spike duplicate analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. All spike duplicate results were within QC limits.

7. Matrix Spike/Laboratory Control Sample/Quality Control Sample Analysis: Acceptable.

Spike sample analyses were analyzed per SDG per matrix. All spike results were within the established control limits.

8. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "National Functional Guidelines for Inorganic Superfund Data Review, August 2014". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

JH - The result is an estimated quantity, but the result may be biased high.

JL - The result is an estimated quantity, but the result may be biased low.

JK - The result is an estimated quantity, but the result may have an unknown bias.

JQ - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1613957
Project:	START IV BOA 2016/SFP-114B	**Date Collected:**	11/9/16
Sample Matrix:	Pore Water	**Date Received:**	11/15/16
Analysis Method:	SM 4500-S2- D	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Sulfide, Dissolved

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
16454401	K1613957-001	ND U	0.050	0.020	1	11/16/16 23:32	
16454402	K1613957-002	ND U	0.050	0.020	1	11/16/16 23:32	
16454403	K1613957-003	ND U	0.050	0.020	1	11/16/16 23:32	
16454404	K1613957-004	ND U	0.050	0.020	1	11/16/16 23:32	
16454405	K1613957-005	ND U	0.050	0.020	1	11/16/16 23:32	
16454406	K1613957-006	ND U	0.050	0.020	1	11/16/16 23:32	
~~Method Blank~~	~~K1613957-MB1~~	~~ND U~~	0.050	0.020	1	11/16/16 23:32	
Method Blank	K1613957-MB2	ND U	0.050	0.020	1	~~11/16/16 23:32~~	

MW 1-5-17

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1613957
Project:	START IV BOA 2016/SFP-114B	**Date Collected:**	11/09/16
Sample Matrix:	Soil	**Date Received:**	11/15/16

Methyl Mercury

Prep Method:	ALS SOP	Units:	ng/g
Analysis Method:	ALS SOP	Basis:	Dry
Test Notes:			

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
16454407	K1613957-007	0.5	0.05	1	12/01/16	12/02/16	2.26	
16454408	K1613957-008	0.6	0.06	1	12/01/16	12/02/16	7.15	
16454409	K1613957-009	0.4	0.04	1	12/01/16	12/02/16	11.1	
16454410	K1613957-010	0.6	0.06	1	12/01/16	12/02/16	11.9	
16454411	K1613957-011	0.7	0.07	1	12/01/16	12/02/16	3.67	
16454412	K1613957-012	0.5	0.05	1	12/01/16	12/02/16	6.87	
~~Method Blank 1~~	~~K1613957-MB1~~	~~0.4~~	~~0.04~~	~~1~~	~~12/01/16~~	~~12/02/16~~	~~ND~~	
Method Blank 2	K1613957-MB2	0.4	0.04	1	12/01/16	12/02/16	ND	
Method Blank 3	K1613957-MB3	0.4	0.04	1	12/01/16	12/02/16	ND	

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MEMORANDUM

DATE: October 4, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Organic Data Validation Memo, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data validation of 27 porewater/soil samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Grain Size (ASTM Method D422) Dissolved Sulfide (Standard Method 4500-S2-D) and Methyl Mercury (EPA Method 1630M/ALS SOP) were performed at ALS Environmental, Inc., Kelso, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16344210	16344211	16344212	16344213	16344214
16344216	16344219	16344224	16344225	16344235
16344236	16344243	16344244	16344247	16344324
16344325	16344326	16344327	16344328	16344330
16344331	16344332	16344333	16344334	16344335
16344336	16344338			

1. Sample Holding Times: Acceptable.

The samples were maintained at < 6°C. The samples were collected between August 22 and 25, 2016, and were analyzed by September 7, 2016.

2. Initial and Continuing Calibration/Quality Control (QC) Analyses: Acceptable.

All initial calibration and QC analysis recovery results were within QC limits.

3. Blanks: Satisfactory.

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks that potentially affected sample results except methyl mercury (0.09 ng/g) in one of the blanks. No actions were taken as all sample results were greater than five times the positive blank result.

4. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

6. Matrix Spike and/or Ongoing Precision and Recovery (OPR) Analysis: Acceptable.

Matrix spike and/or OPR analyses were performed per method per SDG or per matrix per concentration level, whichever was more frequent as applicable. Spike and OPR recoveries were within the QC limits.

7. Duplicate Analysis: Acceptable.

Laboratory spike duplicate analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

8. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

9. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "National Functional Guidelines for Inorganic Superfund Data Review, August 2014". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

<u>Data Qualifiers and Definitions</u>

U - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

JH - The result is an estimated quantity, but the result may be biased high.

JL - The result is an estimated quantity, but the result may be biased low.

JK - The result is an estimated quantity, but the result may have an unknown bias.

JQ - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344216
Lab Code: K1610102-006

Sand Fraction: Weight (Grams)	0.4566
Sand Fraction: Weight Recovered (Grams)	0.4556
Sand Fraction: Percent Recovery	99.78

Weight as received (Grams)	19.0342
Percent Solids	9.8
Weight Oven-Dried (Grams)	1.8558

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0034	0.18
Gravel, Fine	2.00 mm	10	0.0146	0.79
Sand, Very Coarse	0.850 mm	20	0.0214	1.15
Sand, Coarse	0.425 mm	40	0.0600	3.23
Sand, Medium	0.250 mm	60	0.0943	5.08
Sand, Fine	0.106 mm	140	0.1539	8.29
Sand, Very Fine	0.075 mm	200	0.0494	2.66
Silt			1.0150	54.69
Clay			0.3050	16.43
		Total	1.7170	92.50

MW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344219
Lab Code: K1610102-007

Sand Fraction: Weight (Grams)	47.3736
Sand Fraction: Weight Recovered (Grams)	47.2467
Sand Fraction: Percent Recovery	99.73

Weight as received (Grams)	61.3981
Percent Solids	71.8
Weight Oven-Dried (Grams)	44.0838

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	11.7408	26.63
Gravel, Fine	2.00 mm	10	15.9663	36.22
Sand, Very Coarse	0.850 mm	20	9.8920	22.44
Sand, Coarse	0.425 mm	40	5.2030	11.80
Sand, Medium	0.250 mm	60	2.4609	5.58
Sand, Fine	0.106 mm	140	1.5909	3.61
Sand, Very Fine	0.075 mm	200	0.2767	0.63
Silt			0.5850	1.33
Clay			0.0250	0.06
		Total	47.7406	108.30

JAW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/26/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344224
Lab Code: K1610102-008

Sand Fraction: Weight (Grams)	38.7673
Sand Fraction: Weight Recovered (Grams)	38.5856
Sand Fraction: Percent Recovery	99.53

Weight as received (Grams)	48.0082
Percent Solids	79.5
Weight Oven-Dried (Grams)	38.1665

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	8.3373	21.84
Gravel, Fine	2.00 mm	10	11.0892	29.05
Sand, Very Coarse	0.850 mm	20	8.5268	22.34
Sand, Coarse	0.425 mm	40	5.2518	13.76
Sand, Medium	0.250 mm	60	2.7755	7.27
Sand, Fine	0.106 mm	140	2.1115	5.53
Sand, Very Fine	0.075 mm	200	0.3616	0.95
Silt			0.6300	1.65
Clay			0.1150	0.30
		Total	39.1987	102.69

JMW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/26/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344225
Lab Code: K1610102-009

Sand Fraction: Weight (Grams)	27.6083
Sand Fraction: Weight Recovered (Grams)	27.4336
Sand Fraction: Percent Recovery	99.37

Weight as received (Grams)	41.9256
Percent Solids	71.1
Weight Oven-Dried (Grams)	29.8091

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	5.6265	18.88
Gravel, Fine	2.00 mm	10	4.3706	14.66
Sand, Very Coarse	0.850 mm	20	4.7996	16.10
Sand, Coarse	0.425 mm	40	4.8676	16.33
Sand, Medium	0.250 mm	60	3.3306	11.17
Sand, Fine	0.106 mm	140	3.0628	10.27
Sand, Very Fine	0.075 mm	200	0.8702	2.92
Silt			2.4700	8.29
Clay			0.4350	1.46
		Total	29.8329	100.08

MW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344235
Lab Code: K1610102-010

Sand Fraction: Weight (Grams)	23.7655
Sand Fraction: Weight Recovered (Grams)	23.7127
Sand Fraction: Percent Recovery	99.78

Weight as received (Grams)	33.5156
Percent Solids	74.5
Weight Oven-Dried (Grams)	24.9691

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	3.8936	15.59
Gravel, Fine	2.00 mm	10	2.8675	11.48
Sand, Very Coarse	0.850 mm	20	3.9875	15.97
Sand, Coarse	0.425 mm	40	4.7299	18.94
Sand, Medium	0.250 mm	60	4.1520	16.63
Sand, Fine	0.106 mm	140	3.4377	13.77
Sand, Very Fine	0.075 mm	200	0.4276	1.71
Silt			0.5500	2.20
Clay			0.0700	0.28
		Total	24.1158	96.57

MW 10/4/16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/26/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344243
Lab Code: K1610102-012

Sand Fraction: Weight (Grams)	16.4589
Sand Fraction: Weight Recovered (Grams)	16.4405
Sand Fraction: Percent Recovery	99.89

Weight as received (Grams)	35.3853
Percent Solids	54.7
Weight Oven-Dried (Grams)	19.3558

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	3.9884	20.61
Gravel, Fine	2.00 mm	10	2.8605	14.78
Sand, Very Coarse	0.850 mm	20	1.3963	7.21
Sand, Coarse	0.425 mm	40	1.8713	9.67
Sand, Medium	0.250 mm	60	2.4786	12.81
Sand, Fine	0.106 mm	140	3.0632	15.83
Sand, Very Fine	0.075 mm	200	0.6044	3.12
Silt			1.0950	5.66
Clay			0.1500	0.77
		Total	17.5077	90.46

JMW 10416

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/26/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344247
Lab Code: K1610102-014

Sand Fraction: Weight (Grams)	3.2687
Sand Fraction: Weight Recovered (Grams)	3.2808
Sand Fraction: Percent Recovery	100.37

Weight as received (Grams)	20.4695
Percent Solids	22.3
Weight Oven-Dried (Grams)	4.5647

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.1498	3.28
Gravel, Fine	2.00 mm	10	0.2593	5.68
Sand, Very Coarse	0.850 mm	20	0.6837	14.98
Sand, Coarse	0.425 mm	40	0.7426	16.27
Sand, Medium	0.250 mm	60	0.5537	12.13
Sand, Fine	0.106 mm	140	0.6246	13.68
Sand, Very Fine	0.075 mm	200	0.1611	3.53
Silt			0.8950	19.61
Clay			0.0600	1.31
		Total	4.1298	90.47

MW 10/4/16

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	08/22/16 - 08/25/16
Sample Matrix:	Water	**Date Received:**	08/30/16
Analysis Method:	SM 4500-S2- D	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Sulfide, Dissolved

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
16344324	K1610102-015	~~ND U~~	0.050 U	0.020	1	08/31/16 20:26	
16344325	K1610102-016	~~ND U~~	0.050	0.020	1	08/31/16 20:26	
16344326	K1610102-017	~~ND U~~	0.050	0.020	1	08/31/16 20:26	
16344327	K1610102-018	~~ND U~~	0.050	0.020	1	08/31/16 20:26	
16344328	K1610102-019	~~ND U~~	0.050	0.020	1	08/31/16 20:26	
16344330	K1610102-020	**0.102**	0.050	0.020	1	08/31/16 20:26	
16344331	K1610102-021	**0.056**	0.050	0.020	1	08/31/16 20:26	
16344332	K1610102-022	**0.042 J** Q	0.050	0.020	1	08/31/16 20:26	
16344333	K1610102-023	~~ND U~~	0.050 U	0.020	1	08/31/16 20:26	
16344334	K1610102-024	~~ND U~~	0.050	0.020	1	08/31/16 20:26	
16344335	K1610102-025	~~ND U~~	0.050	0.020	1	08/31/16 20:26	
16344336	K1610102-026	~~ND U~~	0.050	0.020	1	08/31/16 20:26	
16344338	K1610102-027	~~ND U~~	0.050	0.020	1	08/31/16 20:26	
~~Method Blank~~	~~K1610102-MB~~	~~ND U~~	~~0.050~~	~~0.020~~	~~1~~	~~08/31/16 20:26~~	

MN 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610102
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	08/24/16
Sample Matrix:	Soil	**Date Received:**	08/30/16

Methyl Mercury

Prep Method:	ALS SOP	Units:	ng/g
Analysis Method:	ALS SOP	Basis:	Dry
Test Notes:			

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
16344210	K1610102-001	0.4	0.04	1	09/27/16	09/27/16	2.25	
16344211	K1610102-002	0.4	0.04	1	09/27/16	09/27/16	7.54	
16344212	K1610102-003	0.4	0.04	1	09/27/16	09/27/16	1.34	
16344213	K1610102-004	0.4	0.04	1	09/27/16	09/27/16	9.96	
16344214	K1610102-005	0.4	0.04	1	09/27/16	09/27/16	3.31	
16344216	K1610102-006	2.6	0.26	1	09/27/16	09/27/16	48.9	
16344219	K1610102-007	0.5	0.05	1	09/27/16	09/27/16	0.84	
16344224	K1610102-008	0.5	0.05	1	09/27/16	09/27/16	1.39	
16344225	K1610102-009	0.4	0.04	1	09/27/16	09/27/16	2.60	
16344235	K1610102-010	0.5	0.05	1	09/27/16	09/27/16	2.75	
16344236	K1610102-011	0.4	0.04	1	09/27/16	09/27/16	1.02	
16344243	K1610102-012	0.5	0.05	1	09/27/16	09/27/16	15.0	
16344244	K1610102-013	0.4	0.04	1	09/27/16	09/27/16	0.56	
16344247	K1610102-014	1.2	0.12	1	09/27/16	09/27/16	11.1	
Method Blank 1	K1610102-MB1	0.4	0.04	1	09/27/16	09/27/16	~~ND~~	U
~~Method Blank 2~~	~~K1610102-MB2~~	~~0.4~~	~~0.04~~	~~1~~	~~09/27/16~~	~~09/27/16~~	~~0.09~~	~~J~~ Q
Method Blank 3	K1610102-MB3	0.4	0.04	1	09/27/16	09/27/16	ND	

10-4-16

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MEMORANDUM

DATE: September 21, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Organic Data Validation Memo, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data validation of 11 soil samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Particle Size (ASTM Method D442M) and methyl mercury (EPA Method 1630 Modified/ALS SOP) were performed at ALS Environmental, Inc., Kelso, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16344217	16344218	16344220	16344221	16344222
16344223	16344229	16344233	16344234	16344236
16344246				

1. **Sample Holding Times: Acceptable.**

The samples were maintained at < 6°C. The samples were collected on August 24, 2016, and were analyzed by September 7, 2016.

2. **Initial and Continuing Calibration: Acceptable.**

All initial calibration and ongoing precision and recovery results were within QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results

were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. **Matrix Spike Analysis: Acceptable.**

A matrix spike analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. Spike and spike duplicate recoveries were within the QC limits.

7. **Duplicate Analysis: Acceptable.**

Laboratory duplicate and spike duplicate analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

8. **Laboratory Control Sample Analysis: Acceptable.**

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

9. **Overall Assessment of Data for Use**

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "National Functional Guidelines for Inorganic Superfund Data Review, August 2014". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

JH - The result is an estimated quantity, but the result may be biased high.

JL - The result is an estimated quantity, but the result may be biased low.

JK - The result is an estimated quantity, but the result may have an unknown bias.

JQ - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	08/24/16
Sample Matrix:	Soil	**Date Received:**	08/30/16

Methyl Mercury

Prep Method:	ALS SOP	Units:	ng/g
Analysis Method:	ALS SOP	Basis:	Dry
Test Notes:			

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
16344217	K1610105-001	0.5	0.05	1	09/06/16	09/07/16	0.75	
16344218	K1610105-002	0.4	0.04	1	09/06/16	09/07/16	4.56	
16344220	K1610105-003	0.4	0.04	1	09/06/16	09/07/16	1.57	
16344221	K1610105-004	0.4	0.04	1	09/06/16	09/07/16	0.19	J Q
16344222	K1610105-005	0.4	0.04	1	09/06/16	09/07/16	3.02	
16344223	K1610105-006	0.5	0.05	1	09/06/16	09/07/16	0.25	J Q
16344229	K1610105-007	1.0	0.10	1	09/06/16	09/07/16	17.7	
16344233	K1610105-008	0.4	0.04	1	09/06/16	09/07/16	3.95	
16344234	K1610105-009	0.4	0.04	1	09/06/16	09/07/16	2.26	
16344246	K1610105-011	0.4	0.04	1	09/06/16	09/07/16	1.52	
Method Blank 1	K1610105-MB1	0.4	0.04	1	09/06/16	09/07/16	ND	
Method Blank 2	K1610105-MB2	0.4	0.04	1	09/06/16	09/07/16	ND	
Method Blank 3	K1610105-MB3	0.4	0.04	1	09/06/16	09/07/16	ND	

MW 9-21-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344217
Lab Code: K1610105-001

Sand Fraction: Weight (Grams)	51.1617
Sand Fraction: Weight Recovered (Grams)	51.0805
Sand Fraction: Percent Recovery	99.84

Weight as received (Grams)	61.5117
Percent Solids	81.2
Weight Oven-Dried (Grams)	49.9475

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	17.3319	34.70
Gravel, Fine	2.00 mm	10	10.6617	21.35
Sand, Very Coarse	0.850 mm	20	9.3771	18.77
Sand, Coarse	0.425 mm	40	6.3611	12.74
Sand, Medium	0.250 mm	60	3.5341	7.08
Sand, Fine	0.106 mm	140	3.1185	6.24
Sand, Very Fine	0.075 mm	200	0.4941	0.99
Silt			0.8000	1.60
Clay			0.1150	0.23
		Total	51.7935	103.70

MW 9/28/16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344218
Lab Code: K1610105-002

Sand Fraction: Weight (Grams)	38.2820
Sand Fraction: Weight Recovered (Grams)	38.1458
Sand Fraction: Percent Recovery	99.64

Weight as received (Grams)	54.1039
Percent Solids	75.6
Weight Oven-Dried (Grams)	40.9025

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	6.9587	17.01
Gravel, Fine	2.00 mm	10	11.3608	27.78
Sand, Very Coarse	0.850 mm	20	7.3699	18.02
Sand, Coarse	0.425 mm	40	4.3021	10.52
Sand, Medium	0.250 mm	60	2.8899	7.07
Sand, Fine	0.106 mm	140	3.5444	8.67
Sand, Very Fine	0.075 mm	200	1.0501	2.57
Silt			3.6900	9.02
Clay			1.3050	3.19
		Total	42.4709	103.85

MW 9-2-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344220
Lab Code: K1610105-003

Sand Fraction: Weight (Grams)	37.5982
Sand Fraction: Weight Recovered (Grams)	37.5389
Sand Fraction: Percent Recovery	99.84

Weight as received (Grams)	45.9915
Percent Solids	76.8
Weight Oven-Dried (Grams)	35.3215

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	12.0458	34.10
Gravel, Fine	2.00 mm	10	10.1116	28.63
Sand, Very Coarse	0.850 mm	20	7.5938	21.50
Sand, Coarse	0.425 mm	40	4.8251	13.66
Sand, Medium	0.250 mm	60	1.7905	5.07
Sand, Fine	0.106 mm	140	0.9766	2.76
Sand, Very Fine	0.075 mm	200	0.1503	0.43
Silt			0.2950	0.84
Clay			0.0400	0.11
		Total	37.8287	107.10

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344221
Lab Code: K1610105-004

Sand Fraction: Weight (Grams)	41.5498
Sand Fraction: Weight Recovered (Grams)	41.4893
Sand Fraction: Percent Recovery	99.85

Weight as received (Grams)	52.5382
Percent Solids	79.9
Weight Oven-Dried (Grams)	41.9780

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	11.5888	27.61
Gravel, Fine	2.00 mm	10	14.8069	35.27
Sand, Very Coarse	0.850 mm	20	7.2389	17.24
Sand, Coarse	0.425 mm	40	3.4893	8.31
Sand, Medium	0.250 mm	60	1.8089	4.31
Sand, Fine	0.106 mm	140	1.8092	4.31
Sand, Very Fine	0.075 mm	200	0.5148	1.23
Silt			1.2800	3.05
Clay			0.0800	0.19
		Total	42.6168	101.52

MW 9-28-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344222
Lab Code: K1610105-005

Sand Fraction: Weight (Grams)	37.4843
Sand Fraction: Weight Recovered (Grams)	37.4074
Sand Fraction: Percent Recovery	99.79

Weight as received (Grams)	45.65
Percent Solids	85.4
Weight Oven-Dried (Grams)	38.9851

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	12.1234	31.10
Gravel, Fine	2.00 mm	10	13.2379	33.96
Sand, Very Coarse	0.850 mm	20	7.1564	18.36
Sand, Coarse	0.425 mm	40	2.9268	7.51
Sand, Medium	0.250 mm	60	1.0920	2.80
Sand, Fine	0.106 mm	140	0.7068	1.81
Sand, Very Fine	0.075 mm	200	0.1344	0.34
Silt			0.4050	1.04
Clay			0.0250	0.06
		Total	37.8077	96.98

JMW 9-21-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344223
Lab Code: K1610105-006

Sand Fraction: Weight (Grams)	37.2731
Sand Fraction: Weight Recovered (Grams)	37.1763
Sand Fraction: Percent Recovery	99.74

Weight as received (Grams)	48.915
Percent Solids	79.9
Weight Oven-Dried (Grams)	39.0831

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	10.3530	26.49
Gravel, Fine	2.00 mm	10	10.3037	26.36
Sand, Very Coarse	0.850 mm	20	6.0477	15.47
Sand, Coarse	0.425 mm	40	4.3814	11.21
Sand, Medium	0.250 mm	60	2.8744	7.35
Sand, Fine	0.106 mm	140	2.3219	5.94
Sand, Very Fine	0.075 mm	200	0.6277	1.61
Silt			1.7350	4.44
Clay			0.2000	0.51
		Total	38.8448	99.38

JW 9-21-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344229
Lab Code: K1610105-007

Sand Fraction: Weight (Grams)	1.0870
Sand Fraction: Weight Recovered (Grams)	1.1005
Sand Fraction: Percent Recovery	101.24

Weight as received (Grams)	36.3126
Percent Solids	22.0
Weight Oven-Dried (Grams)	7.9888

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.4086	5.11
Gravel, Fine	2.00 mm	10	0.1236	1.55
Sand, Very Coarse	0.850 mm	20	0.1764	2.21
Sand, Coarse	0.425 mm	40	0.0993	1.24
Sand, Medium	0.250 mm	60	0.0528	0.66
Sand, Fine	0.106 mm	140	0.1009	1.26
Sand, Very Fine	0.075 mm	200	0.0926	1.16
Silt			5.4550	68.28
Clay			1.7300	21.66
		Total	8.2392	103.13

JAW 9/24/16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/23/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344233
Lab Code: K1610105-008

Sand Fraction: Weight (Grams)	47.2207
Sand Fraction: Weight Recovered (Grams)	47.1281
Sand Fraction: Percent Recovery	99.80

Weight as received (Grams)	53.4114
Percent Solids	87.5
Weight Oven-Dried (Grams)	46.7350

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	17.5045	37.45
Gravel, Fine	2.00 mm	10	13.5058	28.90
Sand, Very Coarse	0.850 mm	20	8.9890	19.23
Sand, Coarse	0.425 mm	40	4.4469	9.52
Sand, Medium	0.250 mm	60	1.9132	4.09
Sand, Fine	0.106 mm	140	0.6960	1.49
Sand, Very Fine	0.075 mm	200	0.0627	0.13
Silt			0.1250	0.27
Clay			0.0350	0.07
		Total	47.2781	101.15

MW 9-21-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/23/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344234
Lab Code: K1610105-009

Sand Fraction: Weight (Grams)	33.6029
Sand Fraction: Weight Recovered (Grams)	33.4220
Sand Fraction: Percent Recovery	99.46

Weight as received (Grams)	44.8419
Percent Solids	76.5
Weight Oven-Dried (Grams)	34.3041

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.1851	0.54
Gravel, Fine	2.00 mm	10	4.8690	14.19
Sand, Very Coarse	0.850 mm	20	5.7656	16.81
Sand, Coarse	0.425 mm	40	5.4114	15.77
Sand, Medium	0.250 mm	60	6.8170	19.87
Sand, Fine	0.106 mm	140	8.6977	25.35
Sand, Very Fine	0.075 mm	200	1.3142	3.83
Silt			1.3450	3.92
Clay			0.2000	0.58
		Total	34.6050	100.86

JMW 9/2/16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344236
Lab Code: K1610105-010

Sand Fraction: Weight (Grams)	49.4662
Sand Fraction: Weight Recovered (Grams)	49.3907
Sand Fraction: Percent Recovery	99.85

Weight as received (Grams)	59.4612
Percent Solids	79.9
Weight Oven-Dried (Grams)	47.5095

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	19.4282	40.89
Gravel, Fine	2.00 mm	10	12.8620	27.07
Sand, Very Coarse	0.850 mm	20	8.7164	18.35
Sand, Coarse	0.425 mm	40	4.6717	9.83
Sand, Medium	0.250 mm	60	2.2408	4.72
Sand, Fine	0.106 mm	140	1.2231	2.57
Sand, Very Fine	0.075 mm	200	0.1903	0.40
Silt			0.3950	0.83
Clay			0.0200	0.04
		Total	49.7475	104.70

MW 9-2-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610105
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/24/2016
Sample Matrix:	Soil	**Date Received:**	8/30/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344246
Lab Code: K1610105-011

Sand Fraction: Weight (Grams)	24.4271
Sand Fraction: Weight Recovered (Grams)	24.4718
Sand Fraction: Percent Recovery	100.18

Weight as received (Grams)	36.0782
Percent Solids	65.0
Weight Oven-Dried (Grams)	23.4508

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	8.8183	37.60
Gravel, Fine	2.00 mm	10	5.6209	23.97
Sand, Very Coarse	0.850 mm	20	4.3485	18.54
Sand, Coarse	0.425 mm	40	1.9170	8.17
Sand, Medium	0.250 mm	60	1.4196	6.05
Sand, Fine	0.106 mm	140	1.6730	7.13
Sand, Very Fine	0.075 mm	200	0.4640	1.98
Silt			1.0600	4.52
Clay			0.0650	0.28
		Total	25.3863	108.24

MW 9-7-16

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MEMORANDUM

DATE: October 4, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington

SUBJ: **Organic Data Validation Memo, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data validation of 17 sediment/soil samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Grain Size (ASTM Method D422M) and Methyl Mercury (EPA Method 1630M/ALS SOP) were performed at ALS Environmental, Inc., Kelso, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16344200	16344201	16344202	16344203	16344204
16344205	16344206	16344207	16344208	16344209
16344232	16344238	16344239	16344240	16344241
16344242	16344245			

1. Sample Holding Times: Acceptable.

The samples were maintained at < 6°C. The samples were collected between August 22 and 23, 2016, and were analyzed by September 27, 2016.

2. Initial and Continuing Calibration/Quality Control (QC) Analyses: Acceptable.

All initial calibration and QC analysis recovery results were within QC limits.

3. Blanks: Acceptable.

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks that potentially affected sample results.

4. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

6. Matrix Spike and/or Ongoing Precision and Recovery (OPR) Analysis: Acceptable.

Matrix spike and/or OPR analyses were performed per method per SDG or per matrix per concentration level, whichever was more frequent as applicable. Spike and OPR recoveries were within the QC limits.

7. Duplicate Analysis: Acceptable.

Laboratory spike duplicate analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

8. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

9. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "National Functional Guidelines for Inorganic Superfund Data Review, August 2014". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

JH - The result is an estimated quantity, but the result may be biased high.

JL - The result is an estimated quantity, but the result may be biased low.

JK - The result is an estimated quantity, but the result may have an unknown bias.

JQ - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610171
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/23/2016
Sample Matrix:	Sediment	**Date Received:**	8/31/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344232
Lab Code: K1610171-011

Sand Fraction: Weight (Grams)	35.9075
Sand Fraction: Weight Recovered (Grams)	35.8472
Sand Fraction: Percent Recovery	99.83

Weight as received (Grams)	46.6936
Percent Solids	76.7
Weight Oven-Dried (Grams)	35.8140

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	4.1806	11.67
Gravel, Fine	2.00 mm	10	7.0610	19.72
Sand, Very Coarse	0.850 mm	20	4.5144	12.61
Sand, Coarse	0.425 mm	40	8.0136	22.38
Sand, Medium	0.250 mm	60	6.9963	19.54
Sand, Fine	0.106 mm	140	4.1984	11.72
Sand, Very Fine	0.075 mm	200	0.6708	1.87
Silt			0.8200	2.29
Clay			0.0550	0.15
		Total	36.5101	101.95

MW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610171
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/22/2016
Sample Matrix:	Sediment	**Date Received:**	8/31/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344238
Lab Code: K1610171-012

Sand Fraction: Weight (Grams)	54.5915
Sand Fraction: Weight Recovered (Grams)	54.5872
Sand Fraction: Percent Recovery	99.99

Weight as received (Grams)	63.579
Percent Solids	85.3
Weight Oven-Dried (Grams)	54.2329

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	6.8262	12.59
Gravel, Fine	2.00 mm	10	15.5968	28.76
Sand, Very Coarse	0.850 mm	20	21.4128	39.48
Sand, Coarse	0.425 mm	40	8.5765	15.81
Sand, Medium	0.250 mm	60	1.5829	2.92
Sand, Fine	0.106 mm	140	0.5180	0.96
Sand, Very Fine	0.075 mm	200	0.0658	0.12
Silt			0.0500	0.09
Clay			0.0150	0.03
		Total	54.6440	100.76

MW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610171
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/22/2016
Sample Matrix:	Sediment	**Date Received:**	8/31/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344239
Lab Code: K1610171-013

Sand Fraction: Weight (Grams)	36.9136
Sand Fraction: Weight Recovered (Grams)	36.8564
Sand Fraction: Percent Recovery	99.85

Weight as received (Grams)	48.2681
Percent Solids	76.2
Weight Oven-Dried (Grams)	36.7803

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.3186	0.87
Gravel, Fine	2.00 mm	10	0.5852	1.59
Sand, Very Coarse	0.850 mm	20	6.3491	17.26
Sand, Coarse	0.425 mm	40	15.8220	43.02
Sand, Medium	0.250 mm	60	8.9762	24.40
Sand, Fine	0.106 mm	140	4.2625	11.59
Sand, Very Fine	0.075 mm	200	0.4617	1.26
Silt			0.5750	1.56
Clay			0.0800	0.22
		Total	37.4303	101.77

MW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610171
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/22/2016
Sample Matrix:	Sediment	**Date Received:**	8/31/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344240
Lab Code: K1610171-014

Sand Fraction: Weight (Grams)	52.8059
Sand Fraction: Weight Recovered (Grams)	52.7793
Sand Fraction: Percent Recovery	99.95

Weight as received (Grams)	69.9127
Percent Solids	74.9
Weight Oven-Dried (Grams)	52.3646

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	14.6430	27.96
Gravel, Fine	2.00 mm	10	9.4530	18.05
Sand, Very Coarse	0.850 mm	20	8.9605	17.11
Sand, Coarse	0.425 mm	40	2.1300	4.07
Sand, Medium	0.250 mm	60	2.0328	3.88
Sand, Fine	0.106 mm	140	10.7611	20.55
Sand, Very Fine	0.075 mm	200	3.4205	6.53
Silt			2.8950	5.53
Clay			0.3450	0.66
		Total	54.6409	104.34

JMW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610171
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/23/2016
Sample Matrix:	Sediment	**Date Received:**	8/31/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344241
Lab Code: K1610171-015

Sand Fraction: Weight (Grams)	19.0944
Sand Fraction: Weight Recovered (Grams)	19.0418
Sand Fraction: Percent Recovery	99.72

Weight as received (Grams)	38.273
Percent Solids	53.8
Weight Oven-Dried (Grams)	20.5909

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.3435	1.67
Gravel, Fine	2.00 mm	10	0.4614	2.24
Sand, Very Coarse	0.850 mm	20	1.1228	5.45
Sand, Coarse	0.425 mm	40	2.3860	11.59
Sand, Medium	0.250 mm	60	5.1196	24.86
Sand, Fine	0.106 mm	140	7.6152	36.98
Sand, Very Fine	0.075 mm	200	1.4828	7.20
Silt			1.2900	6.26
Clay			0.3750	1.82
		Total	20.1963	98.07

MW 10/4/16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610171
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/23/2016
Sample Matrix:	Sediment	**Date Received:**	8/31/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344242
Lab Code: K1610171-016

Sand Fraction: Weight (Grams)	44.3585
Sand Fraction: Weight Recovered (Grams)	44.3497
Sand Fraction: Percent Recovery	99.98

Weight as received (Grams)	53.2608
Percent Solids	82.5
Weight Oven-Dried (Grams)	43.9402

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	2.8927	6.58
Gravel, Fine	2.00 mm	10	16.4803	37.51
Sand, Very Coarse	0.850 mm	20	18.7501	42.67
Sand, Coarse	0.425 mm	40	4.0552	9.23
Sand, Medium	0.250 mm	60	1.2939	2.94
Sand, Fine	0.106 mm	140	0.7672	1.75
Sand, Very Fine	0.075 mm	200	0.0855	0.19
Silt			0.2550	0.58
Clay			0.0200	0.05
		Total	44.5999	101.50

MW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610171
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	8/23/2016
Sample Matrix:	Sediment	**Date Received:**	8/31/2016
		Date Analyzed:	9/7/2016

Particle Size Determination
ASTM D422M

Sample Name: 16344245
Lab Code: K1610171-017

Sand Fraction: Weight (Grams)	45.5927
Sand Fraction: Weight Recovered (Grams)	45.5864
Sand Fraction: Percent Recovery	99.99

Weight as received (Grams)	53.193
Percent Solids	83.0
Weight Oven-Dried (Grams)	44.1502

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	9.6792	21.92
Gravel, Fine	2.00 mm	10	12.9207	29.27
Sand, Very Coarse	0.850 mm	20	16.4747	37.32
Sand, Coarse	0.425 mm	40	5.6093	12.71
Sand, Medium	0.250 mm	60	0.7216	1.63
Sand, Fine	0.106 mm	140	0.1639	0.37
Sand, Very Fine	0.075 mm	200	0.0170	0.04
Silt			0.0150	0.03
Clay			0.0250	0.06
		Total	45.6264	103.35

MW 10-4-16

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Ecology And Environment, Incorporated	**Service Request:**	K1610171
Project:	START IV BOA 2016/1004530.0004.158.01	**Date Collected:**	08/23/16
Sample Matrix:	Soil	**Date Received:**	08/31/16

Methyl Mercury

Prep Method:	ALS SOP	Units:	ng/g
Analysis Method:	ALS SOP	Basis:	Dry
Test Notes:			

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
16344200	K1610171-001	0.4	0.04	1	09/26/16	09/27/16	2.94	
16344201	K1610171-002	0.4	0.04	1	09/26/16	09/27/16	0.09	J Q
16344202	K1610171-003	0.4	0.04	1	09/26/16	09/27/16	0.47	
16344203	K1610171-004	0.4	0.04	1	09/26/16	09/27/16	1.57	
16344204	K1610171-005	0.4	0.04	1	09/26/16	09/27/16	1.14	
16344205	K1610171-006	0.4	0.04	1	09/26/16	09/27/16	0.20	J Q
16344206	K1610171-007	0.4	0.04	1	09/26/16	09/27/16	0.63	
16344207	K1610171-008	0.4	0.04	1	09/26/16	09/27/16	0.42	
16344208	K1610171-009	0.4	0.04	1	09/26/16	09/27/16	1.28	
16344209	K1610171-010	0.4	0.04	1	09/26/16	09/27/16	0.70	
16344232	K1610171-011	0.4	0.04	1	09/26/16	09/27/16	1.23	
16344238	K1610171-012	0.4	0.04	1	09/26/16	09/27/16	~~ND~~	U
16344239	K1610171-013	0.5	0.05	1	09/26/16	09/27/16	0.17	J Q
16344240	K1610171-014	0.3	0.03	1	09/26/16	09/27/16	0.15	J Q
16344241	K1610171-015	0.4	0.04	1	09/26/16	09/27/16	2.55	
16344242	K1610171-016	0.4	0.04	1	09/26/16	09/27/16	~~ND~~	U
16344245	K1610171-017	0.4	0.04	1	09/26/16	09/27/16	~~ND~~	U
~~Method Blank 1~~	K1610171-MB1	0.4	0.04	1	09/26/16	09/27/16	ND	
Method Blank 2	K1610171-MB2	0.4	0.04	1	~~09/26/16~~	~~09/27/16~~	ND	
Method Blank 3	K1610171-MB3	0.4	0.04	1	09/26/16	09/27/16	ND	

MW 10/4/16

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700
Seattle, Washington 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 22, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 48 water samples collected from the Cinnabar Integrated Assessment Site located near Yellow Pine, Idaho, has been completed. Analyses for Low Level Mercury (EPA Method 1631E) were performed at the US EPA Region 10 Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16344289	16344290	16344291	16344292	16344293
16344294	16344295	16344296	16344303	16344306
16344307	16344308	16344309	16344310	16344313
16344314	16344315	16344316	16344318	16344319
16344324	16344325	16344326	16344327	16344328
16344330	16344331	16344332	16344333	16344334
16344335	16344336	16344338	16354250	16384150
16384151	16384152	16384153	16384154	16384155
16384156	16384157	16384158	16384159	16384160
16384161	16384162	16384163		

No discrepancies were noted. Sample 16344338 was a rinsate blank with a result of 0.506 ng/L. The result for sample 16384151 was less than five times the rinsate blank result and was qualified as not detected (U) by the secondary data reviewer.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114A

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

Chris Eckley
Office of Environmental Review and Assessment,
USEPA Region 10

I have authorized release of this data package. Attached you will find the Low Level Mercury results for the Cinnabar Mine Integrated Assessment project for the samples received 08/29/2016 through 09/23/2016. For further information regarding the attached data, contact Katie Adams at 360-871-8748.

DEC 2 2 2016

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: December 19, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, US EPA Region 10

From: Theresa McBride, Chemist
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment For Low Level Mercury

Project Code: SFP-114A
Account Code: 2016TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, US EPA Region 10
Renee Nordeen, E & E
Chris Eckley, Office of Environmental Review and Assessment, US EPA Region 10

The following is a quality assurance review of the results of the analysis of 48 samples (40 filtered waters and 8 waters) for Low Level Mercury. These samples were submitted for the Cinnabar Mine Integrated Assessment Project. The analyses were performed by EPA chemists at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

Surface Waters, Filtered:

16344289	16344290	16344291	16344292	16344293	16344294	16344295
16344296	16344303	16344306	16344307	16344308	16344309	16344310
16344313	16344314	16344315	16344316	16344318	16344319	
16384157	16384158	16384159	16384160	16384161	16384162	16384163

Surface Waters, Total:

16354250						
16384150	16384151	16384152	16384153	16384154	16384155	16384156

Pore Waters, Filtered:

16344324	16344325	16344326	16344327	16344328	16344330	16344331
16344332	16344333	16344334	16344335	16344336	16344338	

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "Laboratory/QAPP Criteria Not Met". Additional information which may affect data usage is discussed in

a "*NOTE:*" which concludes the affected section.

For those tests for which the USEPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met.

1. Sample Transport and Receipt -Laboratory/QAPP Criteria Not Met

Refer to the Corrective Action Notices dated 09/13/2016 and 09/23/2016 for a record of observations made during sample receipt that may impact data quality. The findings did not impact Low Level Mercury analysis. No data was qualified on this basis.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review met method holding time recommendations

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The calibration factors generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis -Laboratory/QAPP Criteria Not Met

The method blanks did not contain detectable levels of analyte which would require data qualification.

The method states that values less than or equal to five times the concentration in the field blank are not to be reported.

The field blank sample 16344338 contains 0.506 ng/L mercury (101% of the MRL level). Associated samples 16344318 and 16344336 contain mercury below 5 times this amount, therefore mercury results for these samples are qualified "U".

The field blank sample 16384163 contains 0.434 ng/L mercury (87% of the MRL level). Associated sample 16384158 contains mercury below 5 times this amount, therefore the mercury result for this sample is qualified "U".

7. Duplicate Analysis

Duplicate analysis was performed on samples 16344290, 16344314, 16344328, 16384157, and 16384152. Sample results which were greater than five times the MRL level were within the +/- 20% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on samples 16344313, 16384150, 16384158, 16344289, 16344328. Spike results

were within the 75-125% recovery requirements. No qualification was required based on matrix spike analyses.

NOTE: For some samples, a matrix spike analysis was performed, but not a matrix spike duplicate, due to the low sample volumes provided.

9. Instrument Peak Integrations

No manual integrations were performed.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached. MRL values for some analytes have been elevated to reflect dilutions which were performed to mitigate interferences, or to bring analyte concentrations within the method calibration range.

11. Changes from Preliminary Data

Samples 16344318, 16344336 and 16384158 were qualified "U", due to having results not greater than 5 times the mercury concentration in the associated field blank.
No other changes were made between the preliminary and final data.

12. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL (16354250, 16384156, 16384163, IW101216ABL, IW101216BBL, IW101216CBL, IW101216DBL, IW101216EBL, IW101216FBL, IW102016ABL, IW102016BBL and IW102016CBL).

The (U) qualifier was also applied to all sample results which were not greater than 5 times the mercury concentration in the associated field blank: 16344318, 16344336 and 16384158.

No other qualification was required. The definition for the data qualifier is as follows:

U - The analyte was not detected at or above the reported value.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Katie Adams at the Region 10 Laboratory, phone number (360) 871-8748.

13. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create

the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114A
Site : CINNABAR MINE IA
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): Hg-LL

Analyte: 7439976 - Mercury
Weight Basis : N/A

Prep Method(s): 1631E - Mercury by CVAFS
Analytical Method: 1631E - Mercury by CVAFS

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344289 sam	AD01SWD	Filtered	**68.9**	**ng/L**		10/21/16	1
16344290 sam	AD02SWD	Filtered	**39.1**	**ng/L**		10/21/16	1
16344291 sam	AD03SWD	Filtered	**35.1**	**ng/L**		10/21/16	1
16344292 sam	WF01SWD	Filtered	**70.5**	**ng/L**		10/21/16	1
16344293 sam	WF02SWD	Filtered	**74.2**	**ng/L**		10/21/16	1
16344294 sam	WF03SWD	Filtered	**79.3**	**ng/L**		10/21/16	1
16344295 sam	WF04SWD	Filtered	**79.5**	**ng/L**		10/21/16	1
16344296 sam	WF05SWD	Filtered	**97.9**	**ng/L**		10/21/16	1
16344303 sam	WT01SWD	Filtered	**302**	**ng/L**		10/21/16	10
16344306 sam	CC01SWD	Filtered	**26.9**	**ng/L**		10/18/16	1
16344307 sam	CC02SWD	Filtered	**27.5**	**ng/L**		10/18/16	1
16344308 sam	CC03SWD	Filtered	**36.7**	**ng/L**		10/18/16	1
16344309 sam	CC04SWD	Filtered	**39.0**	**ng/L**		10/18/16	1
16344310 sam	CC05SWD	Filtered	**35.9**	**ng/L**		10/18/16	1
16344313 sam	SC02SWD	Filtered	**9.24**	**ng/L**		10/18/16	1
16344314 sam	SC03SWD	Filtered	**11.0**	**ng/L**		10/18/16	1
16344315 sam	SC04SWD	Filtered	**8.62**	**ng/L**		10/18/16	1
16344316 sam	SC05SWD	Filtered	**7.93**	**ng/L**		10/18/16	1
16344318 sam	BG02SWD	Filtered	0.573	ng/L	U	10/18/16	1
16344319 sam	BG03SWD	Filtered	**19.1**	**ng/L**		10/18/16	1
16344324 sam	WF01PW	Filtered	**25.7**	**ng/L**		10/21/16	3
16344325 sam	WF02PW	Filtered	**45.4**	**ng/L**		10/18/16	1
16344326 sam	WF03PW	Filtered	**78.5**	**ng/L**		10/21/16	1
16344327 sam	WF04PW	Filtered	**57.1**	**ng/L**		10/21/16	3
16344328 sam	WF05PW	Filtered	**816**	**ng/L**		10/21/16	20
16344330 sam	WT01PW	Filtered	**56.8**	**ng/L**		10/21/16	1
16344331 sam	WT02PW	Filtered	**22.7**	**ng/L**		10/21/16	1
16344332 sam	WT03PW	Filtered	**5.25**	**ng/L**		10/21/16	1
16344333 sam	SC01PW	Filtered	**11.1**	**ng/L**		10/18/16	1
16344334 sam	CC02PW	Filtered	**27.4**	**ng/L**		10/21/16	3
16344335 sam	CC04PW	Filtered	**46.5**	**ng/L**		10/21/16	1
16344336 sam	BG02PW	Filtered	1.48	ng/L	U	10/18/16	1
16344338 sam	RI02WT	Filtered	**0.506**	**ng/L**		10/18/16	1
16354250 sam	Blank	Water	0.50	ng/L	U	10/18/16	1

Target Analyte Results (cont.):

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16384150 sam	SC01SW	Water	**25.7**	**ng/L**		10/19/16	1
16384151 sam	BG02SW	Water	**0.665**	**ng/L**	U	10/19/16	1
16384152 sam	WF04SW	Water	**320**	**ng/L**		10/19/16	10
16384153 sam	WF03SW	Water	**143**	**ng/L**		10/19/16	10
16384154 sam	WF03SW	Water	**171**	**ng/L**		10/19/16	10
16384155 sam	WF05SW	Water	**151**	**ng/L**		10/19/16	10
16384156 sam	Blank	Water	0.50	ng/L	U	10/19/16	1
16384157 sam	SC01SWD	Filtered	**7.43**	**ng/L**		10/19/16	1
16384158 sam	BG02SWD	Filtered	0.646	ng/L	U	10/21/16	1
16384159 sam	WF04SWD	Filtered	**40.2**	**ng/L**		10/19/16	1
16384160 sam	WF03SWD	Filtered	**39.9**	**ng/L**		10/19/16	1
16384161 sam	WF03SWD	Filtered	**39.4**	**ng/L**		10/19/16	1
16384162 sam	WF05SWD	Filtered	**43.7**	**ng/L**		10/19/16	1
16384163 sam	Blank	Filtered	0.50	ng/L	U	10/19/16	1
16344290 du	AD02SWD	Filtered	**39.5**	**ng/L**		10/21/16	1
16344314 du	SC03SWD	Filtered	**11.8**	**ng/L**		10/18/16	1
16344328 du	WF05PW	Filtered	**818**	**ng/L**		10/21/16	20
16384152 du	WF04SW	Water	**317**	**ng/L**		10/19/16	10
16384157 du	SC01SWD	Filtered	**7.96**	**ng/L**		10/19/16	1
IW101216ABL blk	Blank	Liquid	0.50	ng/L	U	10/18/16	1
IW101216BBL blk	Blank	Liquid	0.50	ng/L	U	10/18/16	1
IW101216CBL blk	Blank	Liquid	0.50	ng/L	U	10/18/16	1
IW101216DBL blk	Blank	Liquid	0.50	ng/L	U	10/19/16	1
IW101216EBL blk	Blank	Liquid	0.50	ng/L	U	10/19/16	1
IW101216FBL blk	Blank	Liquid	0.50	ng/L	U	10/19/16	1
IW102016ABL blk	Blank	Liquid	0.50	ng/L	U	10/21/16	1
IW102016BBL blk	Blank	Liquid	0.50	ng/L	U	10/21/16	1
IW102016CBL blk	Blank	Liquid	0.50	ng/L	U	10/21/16	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344289 ms	AD01SWD	Filtered	87	%Rec		10/21/16	1
16344313 ms	SC02SWD	Filtered	93	%Rec		10/18/16	1
16344328 ms	WF05PW	Filtered	90	%Rec		10/21/16	20
16384150 ms	SC01SW	Water	102	%Rec		10/19/16	1
16384158 ms	BG02SWD	Filtered	92	%Rec		10/21/16	1
16344313 msd	SC02SWD	Filtered	95	%Rec		10/18/16	1
16344328 msd	WF05PW	Filtered	90	%Rec		10/21/16	20
16384150 msd	SC01SW	Water	102	%Rec		10/19/16	1
16384158 msd	BG02SWD	Filtered	89	%Rec		10/21/16	1
IW101216AL1 lcs	Lab Control Standard	Liquid	99	%Rec		10/18/16	1
IW101216DL1 lcs	Lab Control Standard	Liquid	104	%Rec		10/19/16	1
IW102016AL1 lcs	Lab Control Standard	Liquid	92	%Rec		10/21/16	1
IW101216AL2 lc2	Lab Control Standard Dup.	Liquid	99	%Rec		10/18/16	1
IW101216DL2 lc2	Lab Control Standard Dup.	Liquid	101	%Rec		10/19/16	1
IW102016AL2 lc2	Lab Control Standard Dup.	Liquid	97	%Rec		10/21/16	1

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MEMORANDUM

DATE: January 3, 2017

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 48 water samples collected from the Cinnabar Integrated Assessment Site located near Yellow Pine, Idaho, has been completed. Analyses for Methyl Mercury (EPA Method 1630) were performed at the US EPA Region 10 Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16344289	16344290	16344291	16344292	16344293
16344294	16344295	16344296	16344303	16344306
16344307	16344308	16344309	16344310	16344313
16344314	16344315	16344316	16344318	16344319
16344324	16344325	16344326	16344327	16344328
16344330	16344331	16344332	16344333	16344334
16344335	16344336	16344338	16354250	16384150
16384151	16384152	16384153	16384154	16384155
16384156	16384157	16384158	16384159	16384160
16384161	16384162	16384163		

No discrepancies were noted. The secondary reviewer added bias qualifier (L indicates a low bias) to estimated quantities based on information provided in the quality assurance memorandum.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114A

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

Chris Eckley
Office of Environmental Review and Assessment,
US EPA Region 10

I have authorized release of this data package. Attached you will find the Methyl Mercury results for the Cinnabar Mine Integrated Assessment project for the samples received 08/29/2016 through 09/23/2016. For further information regarding the attached data, contact Katie Adams at 360-871-8748.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: December 23, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, US EPA Region 10

From: Katie Adams, Inorganic Technical Lead
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment For Methyl Mercury

Project Code: SFP-114A
Account Code: 2016TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, US EPA Region 10
Renee Nordeen, E & E
Chris Eckley, Office of Environmental Review and Assessment, US EPA Region 10

The following is a quality assurance review of the results of the analysis of 48 samples (40 filtered waters and 8 waters) for methyl mercury. These samples were submitted for the Cinnabar Mine Integrated Assessment Project. The analyses were performed by EPA chemists at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

Surface Waters, Filtered:

16344289	16344290	16344291	16344292	16344293	16344294	16344295
16344296	16344303	16344306	16344307	16344308	16344309	16344310
16344313	16344314	16344315	16344316	16344318	16344319	
16384157	16384158	16384159	16384160	16384161	16384162	16384163

Surface Waters, Total (Unfiltered):

16354250						
16384150	16384151	16384152	16384153	16384154	16384155	16384156

Pore Waters, Filtered:

16344324	16344325	16344326	16344327	16344328	16344330	16344331
16344332	16344333	16344334	16344335	16344336	16344338	

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "Laboratory/QAPP Criteria Not Met". Additional information which may affect data usage is discussed in

a "*NOTE:*" which concludes the affected section.

For those tests for which the USEPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met.

1. Sample Transport and Receipt -Laboratory/QAPP Criteria Not Met

Refer to the Corrective Action Notices dated 09/13/2016 and 09/23/2016 for a record of observations made during sample receipt that may impact data quality. Per the Corrective Action Notices dated 09/13/2016, samples 16344289, 16344290, 16344291, 16344292, 16344293, 16344294, 16344295, 16344296, 16344303, 16344306, 16344307, 16344308, 16344309, 16344310, 16344313, 16344314, 16344315, 16344316, 16344318 and 16344319 (surface waters received 8/29/2016) were stored at room temperature overnight due to a miscommunication regarding the analyses to be performed on these samples. Per the Corrective Action Notices dated 09/23/2016, samples 16384150, 16384151, 16384152, 16384153, 16384154, 16384155, 16384156, 16384157, 16384158, 16384159, 16384160, 16384161, 16384162, and 16384163 (surface waters received 9/23/2016) were received at elevated temperature. Methyl mercury samples must be stored cold and in the dark, therefore results for these samples were qualified "J", estimated.

No other qualification was required based on sample receipt.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review met method holding time recommendations.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The calibration factors generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples -Laboratory/QAPP Criteria Not Met

All laboratory control sample results met the recovery acceptance criteria for the method (67-133%), except for one of the four laboratory control samples prepared on 10/20/2016 which was low at 2.2% (the other three LCS recoveries were acceptable at 89%, 89% and 85%). Associated samples 16344328 and 16344328DU were not able to be reanalyzed due to insufficient sample volume, so methyl mercury results for these samples were qualified "J", estimated.

No other qualification was required based on laboratory control sample analysis.

6. Blank Analysis -Laboratory/QAPP Criteria Not Met

The method blanks did not contain detectable levels of analyte which would require data qualification.

The method states that values less than or equal to five times the concentration in the field blank are not to be reported.

The field blank sample 16384163 contains methyl mercury at 31% of the MRL level). Associated samples 16384159, 16384159DU, 16384160, 16384161 and 16384162 contain methyl mercury below 5 times this amount, therefore mercury results for these samples are qualified "U" (not detected).

7. Duplicate Analysis

Duplicate analysis was performed on samples 16344291, 16344308, 16344316, 16344328, 16384150 and 16344159. Sample results which were greater than five times the MRL level were within the +/- 35% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on samples 16344296, 16344307, 16344309, 16344328, 16344338, 16384150 and 16384159. Please note that 16344338 is a field blank, which was not noted until after the spike was prepared; it is provided as an extra spike, beyond the number required by the method. Applicable spike results were within the 65-135% recovery requirements. No qualification was required based on matrix spike analyses.

NOTE: For samples 16344296, 16344307, 16344309, 16344328 and 16344338 a matrix spike analysis was performed, but not a matrix spike duplicate, due to the low sample volumes provided.

9. Instrument Peak Integrations

No manual integrations were performed.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached. MRL values for some samples have been elevated to reflect lower sample volumes used for analysis due to the low sample volume provided, or to bring analyte concentrations within the method calibration range.

11. Changes from Preliminary Data

Samples 16344324, 16344327 and 16344334 were reanalyzed after the first set of preliminary results (sent on 10/24/2016) were provided. Updated (not "J" qualified) values were provided with the second set of preliminary results (sent on 11/14/2016). In addition, there is no longer a result provided for the duplicate sample 16344327DU because there was not enough volume to reanalyze this sample.

Samples 16384150, 16384151, 16384152, 16384153, 16384154, 16384155, 16384156, 16384157, 16384158, 16384159, 16384160, 16384161, 16384162, and 16384163 were qualified "J", estimated, as it was noted during review that they were received at elevated temperature.

Samples 16384159, 16384159DU, 16384160, 16384161 and 16384162 were qualified "U", as it was noted that the results for these samples were not greater than 5 times the mercury concentration in the associated field blank.

12. Data Qualifiers

The (U) qualifier was attached to all sample results below the MRL.

The (U) qualifier was also applied to all sample results which were not greater than 5 times the methyl mercury concentration in the associated field blank: 16384159, 16384159DU, 16384160, 16384161 and 16384162.

Samples 16344289, 16344290, 16344291, 16344292, 16344293, 16344294, 16344295, 16344296, 16344303, 16344306, 16344307, 16344308, 16344309, 16344310, 16344313, 16344314, 16344315, 16344316, 16344318, 16344319, 16384150, 16384151, 16384152, 16384153, 16384154, 16384155, 16384156, 16384157, 16384158, 16384159, 16384160, 16384161, 16384162, and 16384163 were qualified "J", estimated, due to sample receipt and/or storage conditions that did not meet method requirements.

Samples 16344328 and 16344328DU were qualified "J", estimated, based on the poor recovery of an associated laboratory control sample.

Below are the definitions for the codes used qualifying data from these analyses. When more than one quality issue was involved, the most restrictive qualifier has been attached to the data.

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; however the reported value is an estimate.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Katie Adams at the Region 10 Laboratory, phone number (360) 871-8748.

13. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114A
Site : CINNABAR MINE IA
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): Methyl-Hg

Analyte: 22967926 - Methylmercury ion
Weight Basis : N/A

Prep Method(s): 1630 - Methyl Mercury in Water by Distillation, Ethylation
Analytical Method: 1630 - Methyl Mercury in Water by Purge and Trap, CVAFS

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344289 sam	AD01SWD	Filtered	0.058	ng/L	UJ L	10/14/16	1
16344290 sam	AD02SWD	Filtered	0.055	ng/L	UJ L	10/14/16	1
16344291 sam	AD03SWD	Filtered	**0.129**	**ng/L**	J L	10/14/16	1
16344292 sam	WF01SWD	Filtered	0.056	ng/L	UJ L	10/14/16	1
16344293 sam	WF02SWD	Filtered	0.056	ng/L	UJ L	10/14/16	1
16344294 sam	WF03SWD	Filtered	**0.100**	**ng/L**	J L	10/14/16	1
16344295 sam	WF04SWD	Filtered	**0.0670**	**ng/L**	J L	10/14/16	1
16344296 sam	WF05SWD	Filtered	**0.0665**	**ng/L**	J L	10/14/16	1
16344303 sam	WT01SWD	Filtered	**1.58**	**ng/L**	J L	10/14/16	1
16344306 sam	CC01SWD	Filtered	**0.0777**	**ng/L**	J L	9/28/16	1
16344307 sam	CC02SWD	Filtered	**0.0618**	**ng/L**	J L	9/28/16	1
16344308 sam	CC03SWD	Filtered	0.050	ng/L	UJ L	9/28/16	1
16344309 sam	CC04SWD	Filtered	0.051	ng/L	UJ L	9/28/16	1
16344310 sam	CC05SWD	Filtered	0.051	ng/L	UJ L	9/28/16	1
16344313 sam	SC02SWD	Filtered	**0.146**	**ng/L**	J L	9/22/16	1
16344314 sam	SC03SWD	Filtered	**0.127**	**ng/L**	J L	9/28/16	1
16344315 sam	SC04SWD	Filtered	**0.121**	**ng/L**	J L	9/22/16	1
16344316 sam	SC05SWD	Filtered	0.051	ng/L	UJ L	9/22/16	1
16344318 sam	BG02SWD	Filtered	0.051	ng/L	UJ L	9/28/16	1
16344319 sam	BG03SWD	Filtered	0.053	ng/L	UJ L	9/28/16	1
16344324 sam	WF01PW	Filtered	**0.150**	**ng/L**		10/28/16	1
16344325 sam	WF02PW	Filtered	**1.14**	**ng/L**		9/30/16	1
16344326 sam	WF03PW	Filtered	**0.182**	**ng/L**		10/18/16	1
16344327 sam	WF04PW	Filtered	**0.0930**	**ng/L**		11/1/16	1
16344328 sam	WF05PW	Filtered	0.076	ng/L	UJ L	10/21/16	1
16344330 sam	WT01PW	Filtered	**2.32**	**ng/L**		10/18/16	1
16344331 sam	WT02PW	Filtered	**6.66**	**ng/L**		10/18/16	1
16344332 sam	WT03PW	Filtered	**0.517**	**ng/L**		10/18/16	1
16344333 sam	SC01PW	Filtered	**0.136**	**ng/L**		9/30/16	1
16344334 sam	CC02PW	Filtered	**0.0932**	**ng/L**		10/28/16	1
16344335 sam	CC04PW	Filtered	**0.108**	**ng/L**		10/18/16	1
16344336 sam	BG02PW	Filtered	0.089	ng/L	U	9/30/16	1
16344338 sam	RI02WT	Filtered	0.078	ng/L	U	9/30/16	1
16354250 sam	Blank	Water	0.051	ng/L	U	9/28/16	1

Target Analyte Results (cont.):

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16384150 sam	SC01SW	Water	**0.114**	**ng/L**	J	10/28/16	1
16384151 sam	BG02SW	Water	0.054	ng/L	UJ	10/28/16	1
16384152 sam	WF04SW	Water	**0.0777**	**ng/L**	J	11/1/16	1
16384153 sam	WF03SW	Water	**0.0832**	**ng/L**	J	11/1/16	1
16384154 sam	WF03SW	Water	**0.0939**	**ng/L**	J	11/1/16	1
16384155 sam	WF05SW	Water	**0.0956**	**ng/L**	J	11/1/16	1
16384156 sam	Blank	Water	0.053	ng/L	UJ	10/28/16	1
16384157 sam	SC01SWD	Filtered	**0.107**	**ng/L**	J	10/28/16	1
16384158 sam	BG02SWD	Filtered	0.054	ng/L	UJ	10/28/16	1
16384159 sam	WF04SWD	Filtered	0.0752	ng/L	UJ	11/1/16	1
16384160 sam	WF03SWD	Filtered	0.0624	ng/L	UJ	10/28/16	1
16384161 sam	WF03SWD	Filtered	0.0682	ng/L	UJ	10/28/16	1
16384162 sam	WF05SWD	Filtered	0.0629	ng/L	UJ	11/1/16	1
16384163 sam	Blank	Filtered	0.053	ng/L	UJ	10/28/16	1
16344291 du	AD03SWD	Filtered	**0.127**	**ng/L**	J	10/14/16	1
16344308 du	CC03SWD	Filtered	0.050	ng/L	UJ	9/28/16	1
16344316 du	SC05SWD	Filtered	0.050	ng/L	UJ	9/22/16	1
16344328 du	WF05PW	Filtered	0.067	ng/L	UJ	10/21/16	1
16384150 du	SC01SW	Water	**0.106**	**ng/L**	J	10/28/16	1
16384159 du	WF04SWD	Filtered	0.0604	ng/L	UJ	11/1/16	1
IW092116ABL blk	Blank	Filtered	0.050	ng/L	U	9/22/16	1
IW092116BBL blk	Blank	Filtered	0.053	ng/L	U	9/22/16	1
IW092116CBL blk	Blank	Filtered	0.050	ng/L	U	9/22/16	1
IW092716ABL blk	Blank	Filtered	0.050	ng/L	U	9/28/16	1
IW092716BBL blk	Blank	Filtered	0.051	ng/L	U	9/28/16	1
IW092716CBL blk	Blank	Filtered	0.051	ng/L	U	9/28/16	1
IW092916ABL blk	Blank	Filtered	0.052	ng/L	U	9/30/16	1
IW092916BBL blk	Blank	Filtered	0.050	ng/L	U	9/30/16	1
IW092916CBL blk	Blank	Filtered	0.052	ng/L	U	9/30/16	1
IW092916DBL blk	Blank	Filtered	0.050	ng/L	U	9/30/16	1
IW101316ABL blk	Blank	Filtered	0.052	ng/L	U	10/14/16	1
IW101316BBL blk	Blank	Filtered	0.053	ng/L	U	10/14/16	1
IW101316CBL blk	Blank	Filtered	0.052	ng/L	U	10/14/16	1
IW101316DBL blk	Blank	Filtered	0.052	ng/L	U	10/14/16	1
IW101716ABL blk	Blank	Filtered	0.051	ng/L	U	10/18/16	1
IW101716BBL blk	Blank	Filtered	0.051	ng/L	U	10/18/16	1
IW101716CBL blk	Blank	Filtered	0.053	ng/L	U	10/18/16	1
IW101716DBL blk	Blank	Filtered	0.051	ng/L	U	10/18/16	1
IW102016ABL blk	Blank	Filtered	0.053	ng/L	U	10/21/16	1
IW102016BBL blk	Blank	Filtered	0.052	ng/L	U	10/21/16	1
IW102016CBL blk	Blank	Filtered	0.052	ng/L	U	10/21/16	1
IW102016DBL blk	Blank	Filtered	0.052	ng/L	U	10/21/16	1
IW102716ABL blk	Blank	Liquid	0.055	ng/L	U	10/28/16	1
IW102716BBL blk	Blank	Liquid	0.054	ng/L	U	10/28/16	1
IW102716CBL blk	Blank	Liquid	0.052	ng/L	U	10/28/16	1
IW103116ABL blk	Blank	Liquid	0.054	ng/L	U	11/1/16	1
IW103116BBL blk	Blank	Liquid	0.054	ng/L	U	11/1/16	1
IW103116CBL blk	Blank	Liquid	0.053	ng/L	U	11/1/16	1
IW103116DBL blk	Blank	Liquid	0.053	ng/L	U	11/1/16	1

Spiked Compounds:

Spiked Compounds (cont.):

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344296 ms	WF05SWD	Filtered	80	%Rec		10/14/16	1
16344307 ms	CC02SWD	Filtered	88	%Rec		9/28/16	1
16344309 ms	CC04SWD	Filtered	103	%Rec		9/28/16	1
16344328 ms	WF05PW	Filtered	90	%Rec		10/21/16	1
16344338 ms	RI02WT	Filtered	90	%Rec		9/30/16	1
16384150 ms	SC01SW	Water	85	%Rec		10/28/16	1
16384159 ms	WF04SWD	Filtered	87	%Rec		11/1/16	1
16384150 msd	SC01SW	Water	92	%Rec		10/28/16	1
16384159 msd	WF04SWD	Filtered	86	%Rec		11/1/16	1
IW092116AL1 lcs	Lab Control Standard	Filtered	85	%Rec		9/22/16	1
IW092716AL1 lcs	Lab Control Standard	Filtered	87	%Rec		9/28/16	1
IW092916AL1 lcs	Lab Control Standard	Filtered	99	%Rec		9/30/16	1
IW092916DL1 lcs	Lab Control Standard	Filtered	91	%Rec		9/30/16	1
IW101316AL1 lcs	Lab Control Standard	Filtered	86	%Rec		10/14/16	1
IW101716AL1 lcs	Lab Control Standard	Filtered	84	%Rec		10/18/16	1
IW101716DL1 lcs	Lab Control Standard	Filtered	90	%Rec		10/18/16	1
IW102016AL1 lcs	Lab Control Standard	Filtered	85	%Rec		10/21/16	1
IW102716AL1 lcs	Lab Control Standard	Liquid	97	%Rec		10/28/16	1
IW103116AL1 lcs	Lab Control Standard	Liquid	85	%Rec		11/1/16	1
IW092116AL2 lc2	Lab Control Standard Dup.	Filtered	83	%Rec		9/22/16	1
IW092716AL2 lc2	Lab Control Standard Dup.	Filtered	79	%Rec		9/28/16	1
IW092916AL2 lc2	Lab Control Standard Dup.	Filtered	91	%Rec		9/30/16	1
IW101316AL2 lc2	Lab Control Standard Dup.	Filtered	94	%Rec		10/14/16	1
IW101716AL2 lc2	Lab Control Standard Dup.	Filtered	82	%Rec		10/18/16	1
IW102016AL2 lc2	Lab Control Standard Dup.	Filtered	89	%Rec		10/21/16	1
IW102716AL2 lc2	Lab Control Standard Dup.	Liquid	90	%Rec		10/28/16	1
IW103116AL2 lc2	Lab Control Standard Dup.	Liquid	94	%Rec		11/1/16	1
IW101316AL3 lc3	Lab Control Standard Trip.	Filtered	75	%Rec		10/14/16	1
IW101716AL3 lc3	Lab Control Standard Trip.	Filtered	86	%Rec		10/18/16	1
IW102016AL3 lc3	Lab Control Standard Trip.	Filtered	2.2	%Rec		10/21/16	1
IW102716AL3 lc3	Lab Control Standard Trip.	Liquid	94	%Rec		10/28/16	1
IW103116AL3 lc3	Lab Control Standard Trip.	Liquid	79	%Rec		11/1/16	1
IW101316AL4 lc4	Lab Control Standard #4	Filtered	82	%Rec		10/14/16	1
IW101716AL4 lc4	Lab Control Standard #4	Filtered	87	%Rec		10/18/16	1
IW102016AL4 lc4	Lab Control Standard #4	Filtered	89	%Rec		10/21/16	1
IW103116AL4 lc4	Lab Control Standard #4	Liquid	92	%Rec		11/1/16	1

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MEMORANDUM

DATE: February 13, 2017

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 26 filtered water samples collected from the Cinnabar Integrated Assessment Site located near Yellow Pine, Idaho, has been completed. Analyses for Methyl Mercury and Low Level Mercury (EPA Methods 1630 and 1631E) were performed at the US EPA Region 10 Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16404407	16404408	16404408	16404410	16404411
16404412	16404419	16404420	16424401	16424402
16424403	16424404	16424405	16424406	16434401
16434402	16434403	16434404	16434405	16434406
16454401	16454402	16454403	16454404	16454405
16454406				

No discrepancies were noted. The secondary reviewer added bias qualifier (L indicates a low bias) to estimated quantities based on information provided in the quality assurance memorandum.

recycled paper

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP/114B

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

Chris Eckley
Office of Environmental Review and Assessment
USEPA Region 10

I have authorized release of this data package. Attached you will find the Low Level Mercury and Methyl Mercury results for the Cinnabar Mine Integrated Assessment project for the samples received 10/05/2016 through 11/10/2016. For further information regarding the attached data, contact Katie Adams at 360-871-8748.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: February 9, 2017

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, Preparedness and Prevention Unit, US EPA Region 10

From: Katie Adams, Chemist
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment Tailings Mesocosm Experiment For Low Level Mercury and Methyl Mercury

Project Code: SFP-114B
Account Code: 2017TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, Emergency Response Unit, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, Assessment and Brownfields Unit, US EPA Region 10
Renee Nordeen, E&E
Chris Eckley, Office of Environmental Review and Assessment, US EPA Region 10

The following is a quality assurance review of the results of the analysis of 26 filtered water samples for Low Level Mercury and Methyl Mercury. These samples were submitted for the Cinnabar Mine Integrated Assessment Tailings Mesocosm Experiment Project. The analyses were performed by EPA chemists at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16404407	16404408	16404409	16404410	16404411	16404412	16404419
16404420						
16424401	16424402	16424403	16424404	16424405	16424406	
16434401	16434402	16434403	16434404	16434405	16434406	
16454401	16454402	16454403	16454404	16454405	16454406	

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "Laboratory/QAPP Criteria Not Met". Additional information which may affect data usage is discussed in a "*NOTE:*" which concludes the affected section.

For those tests for which the USEPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met.

1. Sample Transport and Receipt

Upon sample receipt, all conditions met Laboratory/QAPP requirements for this project.

2. Sample Holding Times - Laboratory/QAPP Criteria Not Met

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples.

The samples covered by this review met method holding time recommendations, with the exception of the total mercury samples collected on 10/5/2016 (16404407, 16404408, 16404409, 16404410, 16404411, 16404412, 16404419, and 16404420). These were analyzed seven days past the 90 day holding time. The total mercury results for these samples were qualified (J), estimated.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for these analytes in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The calibration factors generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method and field blanks did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on samples 16404408, 16424404, 16434403 and 16434405 for low level mercury and 16404407, 16404410, 16424404, 16454402 and 16454404 for methyl mercury. Sample results which were greater than five times the MRL level were within the +/- 20% relative percent difference (RPD) requirement for low level mercury and the +/- 35% relative percent difference (RPD) requirement for methyl mercury. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on samples 16404409, 16424404, 16434401 and 16434405 for low level mercury and 16404420, 16424403 and 16454405 for methyl mercury. Applicable spike results were within the 71-125% recovery requirements for low level mercury and 65-135% recovery requirements for methylmercury. No qualification was required based on matrix spike analyses.

NOTE: For most samples, a matrix spike analysis was performed, but not a matrix spike duplicate, due to the low sample volumes provided.

9. Instrument Peak Integrations

No manual integrations were performed.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached. MRL values for some analytes have been elevated to reflect dilutions which were performed to mitigate interferences, or to bring analyte concentrations within the method calibration range.

11. Changes from Preliminary Data

The following changes were made to the data subsequent to the preliminary report:

Samples 16404407, 16404408, 16404409, 16404410, 16404411, 16404412, 16404419, and 16404420 were qualified (J), estimated, due to holding time exceedance.

The report forms were changed to specify that samples 16404409 and 16434401 were analyzed at a 4X dilution, rather than the 2X dilution described in the preliminary report (note that only the reported dilution factor was incorrect; the calculated result was correct and is unchanged).

Matrix spike recoveries for samples 16404409MS and 16434401MS were miscalculated in the preliminary report. The corrected recoveries are 99% for 16404409MS (original value 49%) and 86% for 16434401MS (original value 43%)

No additional changes were made from the preliminary report.

12. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

The (J) qualifier was attached to samples 16404407, 16404408, 16404409, 16404410, 16404411, 16404412, 16404419, and 16404420 due to holding time exceedance.

Below are the definitions for the codes used qualifying data from these analyses. When more than one quality issue was involved, the most restrictive qualifier has been attached to the data.

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; however, the reported value is an estimate.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Katie Adams at the Region 10 Laboratory, phone number (360) 871-8748.

13. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is

processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114B
Site : CINNABAR MINE IA: Tailings Mesocosm Experiment
Contact : Brooks Stanfield
Account : 2017TR2B10P303DC6101TLA00

Parameter(s): Hg-LL

Analyte: 7439976 - Mercury
Weight Basis : N/A

Prep Method(s): 1631E - Mercury by CVAFS
Analytical Method: 1631E - Mercury by CVAFS

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16404407 sam	Tailings 1-Unamended	Filtered	**164**	**ng/L**	J L	1/10/17	2
16404408 sam	Tailings 2-Unamended	Filtered	**156**	**ng/L**	J L	1/10/17	2
16404409 sam	Tailings 3-Unamended	Filtered	**124**	**ng/L**	J L	1/10/17	4
16404410 sam	Tailings 4-Proganics	Filtered	**3600**	**ng/L**	J L	1/10/17	50
16404411 sam	Tailings 5-Proganics	Filtered	**4250**	**ng/L**	J L	1/10/17	50
16404412 sam	Tailings 6-Proganics	Filtered	**3970**	**ng/L**	J L	1/10/17	50
16404419 sam	Blank	Filtered	0.50	ng/L	UJ L	1/10/17	1
16404420 sam	Leaching Water	Filtered	**3.60**	**ng/L**	J L	1/10/17	2
16424401 sam	Tailings 1-Unamended	Filtered	**55.8**	**ng/L**		1/10/17	2
16424402 sam	Tailings 2-Unamended	Filtered	**62.7**	**ng/L**		1/10/17	2
16424403 sam	Tailings 3-Unamended	Filtered	**238**	**ng/L**		1/10/17	10
16424404 sam	Tailings 4-Proganics	Filtered	**2860**	**ng/L**		1/10/17	50
16424405 sam	Tailings 5-Proganics	Filtered	**2390**	**ng/L**		1/10/17	50
16424406 sam	Tailings 6-Proganics	Filtered	**2620**	**ng/L**		1/10/17	50
16434401 sam	Tailings 1-Unamended	Filtered	**137**	**ng/L**		1/10/17	4
16434402 sam	Tailings 2-Unamended	Filtered	**53.0**	**ng/L**		1/10/17	2
16434403 sam	Tailings 3-Unamended	Filtered	**55.2**	**ng/L**		1/10/17	2
16434404 sam	Tailings 4-Proganics	Filtered	**1340**	**ng/L**		1/10/17	50
16434405 sam	Tailings 5-Proganics	Filtered	**1470**	**ng/L**		1/10/17	50
16434406 sam	Tailings 6-Proganics	Filtered	**1350**	**ng/L**		1/10/17	50
16454401 sam	Tailings 1-Unamended	Filtered	**5490**	**ng/L**		1/10/17	100
16454402 sam	Tailings 2-Unamended	Filtered	**26.0**	**ng/L**		1/10/17	2
16454403 sam	Tailings 3-Unamended	Filtered	**155**	**ng/L**		1/10/17	2
16454404 sam	Tailings 4-Proganics	Filtered	**683**	**ng/L**		1/10/17	50
16454405 sam	Tailings 5-Proganics	Filtered	**1120**	**ng/L**		1/10/17	50
16454406 sam	Tailings 6-Proganics	Filtered	**758**	**ng/L**		1/10/17	50
16404408 du	Tailings 2-Unamended	Filtered	**153**	**ng/L**	J	1/10/17	2
16424404 du	Tailings 4-Proganics	Filtered	**2900**	**ng/L**		1/10/17	50
16434403 du	Tailings 3-Unamended	Filtered	**56.5**	**ng/L**		1/10/17	2
16434405 du	Tailings 5-Proganics	Filtered	**1450**	**ng/L**		1/10/17	50
IW010417ABL blk	Blank	Filtered	0.50	ng/L	U	1/10/17	1
IW010417BBL blk	Blank	Filtered	0.50	ng/L	U	1/10/17	1
IW010417CBL blk	Blank	Filtered	0.50	ng/L	U	1/10/17	1
IW010517ABL blk	Blank	Filtered	0.50	ng/L	U	1/10/17	1

Target Analyte Results (cont.):

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
IW010517BBL blk	Blank	Filtered	0.50	ng/L	U	1/10/17	1
IW010517CBL blk	Blank	Filtered	0.50	ng/L	U	1/10/17	1
IW010517DBL blk	Blank	Filtered	0.50	ng/L	U	1/10/17	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16404409 ms	Tailings 3-Unamended	Filtered	99	%Rec		1/10/17	4
16424404 ms	Tailings 4-Proganics	Filtered	93	%Rec		1/10/17	50
16434401 ms	Tailings 1-Unamended	Filtered	86	%Rec		1/10/17	4
16434405 ms	Tailings 5-Proganics	Filtered	98	%Rec		1/10/17	50
16424404 msd	Tailings 4-Proganics	Filtered	95	%Rec		1/10/17	50
16434405 msd	Tailings 5-Proganics	Filtered	96	%Rec		1/10/17	50
IW010417AL1 lcs	Lab Control Standard	Filtered	99	%Rec		1/10/17	1
IW010517AL1 lcs	Lab Control Standard	Filtered	97	%Rec		1/10/17	1
IW0104l7AL2 lc2	Lab Control Standard Dup.	Filtered	98	%Rec		1/10/17	1
IW010517AL2 lc2	Lab Control Standard Dup.	Filtered	97	%Rec		1/10/17	1

Parameter(s): Methyl-Hg

Analyte: 22967926 - Methylmercury ion
Weight Basis : N/A

Prep Method(s): 1630 - Methyl Mercury in Water by Distillation, Ethylation
Analytical Method: 1630 - Methyl Mercury in Water by Purge and Trap, CVAFS

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16404407 sam	Tailings 1-Unamended	Filtered	**0.0883**	**ng/L**		12/28/16	1
16404408 sam	Tailings 2-Unamended	Filtered	0.066	ng/L	U	12/28/16	1
16404409 sam	Tailings 3-Unamended	Filtered	**0.0821**	**ng/L**		12/28/16	1
16404410 sam	Tailings 4-Proganics	Filtered	**1.08**	**ng/L**		1/12/17	1
16404411 sam	Tailings 5-Proganics	Filtered	**1.21**	**ng/L**		1/5/17	1
16404412 sam	Tailings 6-Proganics	Filtered	**0.960**	**ng/L**		1/5/17	1
16404419 sam	Blank	Filtered	0.051	ng/L	U	12/23/16	1
16404420 sam	Leaching Water	Filtered	0.057	ng/L	U	12/23/16	1
16424401 sam	Tailings 1-Unamended	Filtered	0.067	ng/L	U	12/23/16	1
16424402 sam	Tailings 2-Unamended	Filtered	0.072	ng/L	U	12/23/16	1
16424403 sam	Tailings 3-Unamended	Filtered	0.080	ng/L	U	12/23/16	1
16424404 sam	Tailings 4-Proganics	Filtered	**1.76**	**ng/L**		1/12/17	1
16424405 sam	Tailings 5-Proganics	Filtered	**2.20**	**ng/L**		1/5/17	1
16424406 sam	Tailings 6-Proganics	Filtered	**2.57**	**ng/L**		12/30/16	1
16434401 sam	Tailings 1-Unamended	Filtered	**0.518**	**ng/L**		12/28/16	1
16434402 sam	Tailings 2-Unamended	Filtered	0.071	ng/L	U	12/28/16	1
16434403 sam	Tailings 3-Unamended	Filtered	**0.0980**	**ng/L**		12/28/16	1
16434404 sam	Tailings 4-Proganics	Filtered	**4.56**	**ng/L**		12/30/16	1
16434405 sam	Tailings 5-Proganics	Filtered	**9.06**	**ng/L**		1/5/17	1
16434406 sam	Tailings 6-Proganics	Filtered	**5.97**	**ng/L**		12/30/16	1
16454401 sam	Tailings 1-Unamended	Filtered	**0.991**	**ng/L**		12/28/16	1
16454402 sam	Tailings 2-Unamended	Filtered	**0.0751**	**ng/L**		12/23/16	1
16454403 sam	Tailings 3-Unamended	Filtered	0.077	ng/L	U	12/23/16	1
16454404 sam	Tailings 4-Proganics	Filtered	**8.29**	**ng/L**		12/30/16	1
16454405 sam	Tailings 5-Proganics	Filtered	**13.5**	**ng/L**		1/5/17	1
16454406 sam	Tailings 6-Proganics	Filtered	**17.1**	**ng/L**		1/5/17	1
16404407 du	Tailings 1-Unamended	Filtered	**0.0784**	**ng/L**		12/28/16	1
16404410 du	Tailings 4-Proganics	Filtered	**1.30**	**ng/L**		1/12/17	1
16424404 du	Tailings 4-Proganics	Filtered	**1.73**	**ng/L**		1/12/17	1
16454402 du	Tailings 2-Unamended	Filtered	**0.0832**	**ng/L**		12/23/16	1
16454404 du	Tailings 4-Proganics	Filtered	**8.14**	**ng/L**		12/30/16	1
IW010417ABL blk	Blank	Filtered	0.051	ng/L	U	1/5/17	1
IW010417BBL blk	Blank	Filtered	0.051	ng/L	U	1/5/17	1
IW010417CBL blk	Blank	Filtered	0.051	ng/L	U	1/5/17	1
IW011117ABL blk	Blank	Filtered	0.050	ng/L	U	1/12/17	1
IW011117BBL blk	Blank	Filtered	0.051	ng/L	U	1/12/17	1
IW011117CBL blk	Blank	Filtered	0.051	ng/L	U	1/12/17	1
IW122216ABL blk	Blank	Filtered	0.051	ng/L	U	12/23/16	1
IW122216BBL blk	Blank	Filtered	0.053	ng/L	U	12/23/16	1
IW122216CBL blk	Blank	Filtered	0.050	ng/L	U	12/23/16	1
IW122716ABL blk	Blank	Filtered	0.055	ng/L	U	12/28/16	1
IW122716BBL blk	Blank	Filtered	0.054	ng/L	U	12/28/16	1
IW122716CBL blk	Blank	Filtered	0.053	ng/L	U	12/28/16	1
IW122916ABL blk	Blank	Filtered	0.050	ng/L	U	12/30/16	1

Target Analyte Results (cont.):

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
IW122916BBL blk	Blank	Filtered	0.051	ng/L	U	12/30/16	1
IW122916CBL blk	Blank	Filtered	0.050	ng/L	U	12/30/16	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16404420 ms	Leaching Water	Filtered	90	%Rec		12/23/16	1
16434403 ms	Tailings 3-Unamended	Filtered	87	%Rec		12/28/16	1
16454405 ms	Tailings 5-Proganics	Filtered	87	%Rec		1/5/17	1
IW010417AL1 lcs	Lab Control Standard	Filtered	87	%Rec		1/5/17	1
IW011117AL1 lcs	Lab Control Standard	Filtered	90	%Rec		1/12/17	1
IW122216AL1 lcs	Lab Control Standard	Filtered	76	%Rec		12/23/16	1
IW122716AL1 lcs	Lab Control Standard	Filtered	99	%Rec		12/28/16	1
IW122916AL1 lcs	Lab Control Standard	Filtered	85	%Rec		12/30/16	1
IW010417AL2 lc2	Lab Control Standard Dup.	Filtered	92	%Rec		1/5/17	1
IW011117AL2 lc2	Lab Control Standard Dup.	Filtered	85	%Rec		1/12/17	1
IW122216AL2 lc2	Lab Control Standard Dup.	Filtered	84	%Rec		12/23/16	1
IW122716AL2 lc2	Lab Control Standard Dup.	Filtered	92	%Rec		12/28/16	1
IW122916AL2 lc2	Lab Control Standard Dup.	Filtered	87	%Rec		12/30/16	1
IW010417AL3 lc3	Lab Control Standard Trip.	Filtered	86	%Rec		1/5/17	1
IW011117AL3 lc3	Lab Control Standard Trip.	Filtered	84	%Rec		1/12/17	1
IW122216AL3 lc3	Lab Control Standard Trip.	Filtered	84	%Rec		12/23/16	1
IW122716AL3 lc3	Lab Control Standard Trip.	Filtered	87	%Rec		12/28/16	1
IW122916AL3 lc3	Lab Control Standard Trip.	Filtered	72	%Rec		12/30/16	1

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MEMORANDUM

DATE: January 6, 2017

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 6 soil samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for mercury (EPA Method 7471B) were performed at the EPA Region 10 Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16454407	16454408	16454409	16454410	16454411	16454412

No discrepancies were noted. The secondary reviewer added the bias qualifier "L" to estimated results to indicate a low bias based on comments in the data memorandum.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114B

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

Chris Eckley
Office of Environmental Review and Assessment,
USEPA Region 10

I have authorized release of this data package. Attached you will find the Mercury results for the Cinnabar Mine Integrated Assessment project for the soil samples received on 11/10/2016. For further information regarding the attached data, contact Stephanie Le at 360-871-8715.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: January 5, 2017

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, Preparedness and Prevention Unit, US EPA Region 10

From: Theresa McBride, Chemist
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment Tailings Mesocosm Experiment Samples for Mercury in soils

Project Code: SFP-114B
Account Code: 2017TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, Emergency Response Unit, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, Assessment and Brownfields Unit, US EPA Region 10
Renee Nordeen, E&E
Chris Eckley, Office of Environmental Review and Assessment, US EPA Region 10

The following is a quality assurance review of the results of the analysis of 6 soil samples for mercury. These samples were submitted for the Cinnabar Mine Integrated Assessment Tailings Mesocosm Experiment Project. The analyses were performed by EPA Region 10 ESAT Contractors at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16454407	16454408	16454409	16454410	16454411	16454412

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "Laboratory/QAPP Criteria Not Met". Additional information which may affect data usage is discussed in a "*NOTE:*" which concludes the affected section.

For those tests for which the USEPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met.

1. Sample Transport and Receipt

Upon sample receipt, all conditions met Laboratory/QAPP requirements for this project.

2. Sample Holding Times -Laboratory/QAPP Criteria Not Met

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review did not meet method holding time recommendations due to a miscommunication as to whether holding times would be applied for this project. Mercury results for all samples (16454407, 16454408, 16454409, 16454410, 16454411, 16454412 and 16454412DU) are qualified "J", estimated, on this basis.

NOTE: Samples exceeded holding times by approximately 2 days; it is unlikely that this minor exceedance greatly affected sample results.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The linear regression generated for the initial calibration met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blank did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on sample 16454412. Sample results which were greater than five times the MRL level were within the +/- 20% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on sample 16454412. For results where the spike added was less than one-fourth of the native sample concentration (and thus difficult to effectively evaluate), spike results may be designated "NA" with no numerical value given. Applicable spike results were within the 75-125% recovery requirements. No qualification was required based on matrix spike analyses.

9. Reference Materials

A reference material was prepared and analyzed with these samples. Analytical values for this sample were within the range of acceptable results. No qualification was necessary based on analysis of the reference material.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached. MRL values for some analytes have been elevated to reflect dilutions which were performed to mitigate interferences, or to bring analyte concentrations within the method calibration range.

11. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

The (J) qualifier was attached to all sample results (samples 16454407, 16454408, 16454409, 16454410, 16454411, 16454412 and 16454412DU) due to being analyzed after the holding time.

Below are the definitions for the codes used qualifying data from these analyses. When more than one quality issue was involved, the most restrictive qualifier has been attached to the data.

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; however the reported value is an estimate.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Stephanie Le at the Region 10 Laboratory, phone number (360) 871-8715.

12. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in

the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Reference materials – Samples with analyte values that are homogeneous and well established. This allows the reference material to be used to assess the accuracy of the measurement method.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114B
Site : CINNABAR MINE IA: Tailings Mesocosm Experiment
Contact : Brooks Stanfield
Account : 2017TR2B10P303DC6101TLA00

Parameter(s): Hg

Analyte: 7439976 - Mercury
Weight Basis : Dry

Prep Method(s): 7471B - Mercury: Manual Cold Vapor - Solid/Semisolid Waste, SW-846
Analytical Method: 7471B - Mercury: Manual Cold Vapor - Solid/Semisolid Waste, SW-846

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16454407 sam	Tailings 1-Unamended	Soil	**1270**	**mg/Kg**	J L	12/9/16	5000
16454408 sam	Tailings 2-Unamended	Soil	**1430**	**mg/Kg**	J L	12/9/16	5000
16454409 sam	Tailings 3-Unamended	Soil	**1760**	**mg/Kg**	J L	12/9/16	5000
16454410 sam	Tailings 4-Proganics	Soil	**1160**	**mg/Kg**	J L	12/9/16	5000
16454411 sam	Tailings 5-Proganics	Soil	**1240**	**mg/Kg**	J L	12/9/16	5000
16454412 sam	Tailings 6-Proganics	Soil	**1950**	**mg/Kg**	J L	12/9/16	5000
16454412 du	Tailings 6-Proganics	Soil	**1800**	**mg/Kg**	J	12/9/16	5000
IS120916ABL blk	Blank	Solid	0.010	mg/Kg	U	12/9/16	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16454412 ms	Tailings 6-Proganics	Soil		No Unit	NA	12/9/16	5000
16454412 msd	Tailings 6-Proganics	Soil		No Unit	NA	12/9/16	5000
IS120916ACO std	Control	Solid	102	%Rec		12/9/16	40
IS120916AL1 lcs	Lab Control Standard	Solid	100	%Rec		12/9/16	1
IS120916AL2 lc2	Lab Control Standard Dup.	Solid	99	%Rec		12/9/16	1

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MEMORANDUM

DATE: September 21, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington

SUBJ: **Organic Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data validation of 13 filtered water samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analysis for Non-Purgeable Organic Carbon (Standard Method 5310B) was performed at the Manchester Environmental Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16344324	16344325	16344326	16344327	16344328
16344330	16344331	16344332	16344333	16344334
16344335	16344336	16344338		

No discrepancies were noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine

PROJECT CODE: SFP-114A

FROM: Gerald Dodo, Supervisory Chemist
USEPA Region 10 Laboratory
Office of Environmental Review and Assessment

TO: Brooks Stanfield, QA Manager
USEPA Region 10
Office of Environmental Cleanup

CC: Greg Weigel
USEPA Region 10
Office of Environmental Cleanup

Ken Marcy
USEPA Region 10
Office of Environmental Cleanup

Renee Nordeen
E & E

I have authorized release of this data package. Attached you will find the Organic Carbon (TOC) results for the Cinnabar Mine project for the samples received on 08/29/2016. For further information regarding the attached data, contact Katie Adams at 360-871-8748.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: September 16, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, US EPA Region 10

From: Melissa Billings, Chemist
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine
For Organic Carbon

Project Code: SFP-114A
Account Code: 2016TR2B10P303DC610TL00

CC: Greg Weigel, Office of Environmental Cleanup, US EPA Region 10

Ken Marcy, Office of Environmental Cleanup, US EPA Region 10

Renee Nordeen, E&E

The following is a quality assurance review of the results of the analysis of 13 filtered water samples for Organic Carbon. These samples were submitted for the Cinnabar Mine Project. The analyses were performed by EPA chemists at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16344324	16344325	16344326	16344327	16344328	16344330	16344331
16344332	16344333	16344334	16344335	16344336	16344338	

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). A method excursion was required due to the limited sample volume available. The excursion is discussed in the Matrix Spike/Matrix Spike Duplicate Analysis section below.

All measures of quality control met Laboratory/QAPP criteria.

The Region 10 Laboratory's Quality System has been accredited to the standards of The NELAC Institute (TNI).

1. Sample Transport and Receipt -Laboratory/QAPP Criteria Not Met

Refer to the Corrective Action Notice dated 09/13/2016 for a record of observations made during sample receipt that may impact data quality.

The samples were received in vials which had rubber septa, which is a potentially contaminating source of carbon. Note that sample 16344338, which was a QC blank submitted with this sample set, did not contain Organic Carbon at levels reportable by this method; therefore it does not appear that the septa caused significant contamination.

All samples were preserved in the field with H_2SO_4, except for sample 16344324 which was preserved with HCl. Both are acceptable preservatives for the method; however the QC blank submitted with the samples will not provide information regarding the Organic Carbon content of the HCl.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review method holding time recommendations.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The linear regressions generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blank did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on sample 16344327. Sample results which were greater than five times the MRL level were within the +/- 20% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analysis was performed on sample 16344331. Applicable spike results were within the 75-125% recovery requirements. No qualification was required based on matrix spike analyses.

NOTE: Due to insufficient sample volume, a Matrix Spike Duplicate could not be prepared and analyzed.

9. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached.

10. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

No other qualification was required. The definition for the data qualifier is as follows:

Below are the definitions for the codes used qualifying data from these analyses. When more than one quality issue was involved, the most restrictive qualifier has been attached to the data.

U - The analyte was not detected at or above the reported value.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Katie Adams at the Region 10 Laboratory, phone number (360) 871-8748.

11. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114A
Site : CINNABAR MINE IA
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): TOC

Analyte: *90081 - Non-Purgeable Organic Carbon (NPOC)
Weight Basis : N/A

Prep Method(s): SM5310B - Total Organic Carbon, Combustion-Infrared Method, Standard Methods
Analytical Method: SM5310B - Total Organic Carbon, Combustion-Infrared Method, Standard Methods

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344324 sam	WF01PW	Filtered	**4.01**	**mg/L**		9/10/16	1
16344325 sam	WF02PW	Filtered	**2.68**	**mg/L**		9/10/16	1
16344326 sam	WF03PW	Filtered	**5.86**	**mg/L**		9/10/16	1
16344327 sam	WF04PW	Filtered	**1.54**	**mg/L**		9/10/16	1
16344328 sam	WF05PW	Filtered	**1.41**	**mg/L**		9/10/16	1
16344330 sam	WT01PW	Filtered	**6.48**	**mg/L**		9/10/16	1
16344331 sam	WT02PW	Filtered	**8.71**	**mg/L**		9/10/16	1
16344332 sam	WT03PW	Filtered	**2.96**	**mg/L**		9/10/16	1
16344333 sam	SC01PW	Filtered	**2.82**	**mg/L**		9/10/16	1
16344334 sam	CC02PW	Filtered	**1.58**	**mg/L**		9/10/16	1
16344335 sam	CC04PW	Filtered	**1.69**	**mg/L**		9/10/16	1
16344336 sam	BG02PW	Filtered	**1.02**	**mg/L**		9/10/16	1
16344338 sam	RI02WT	Filtered	1.0	mg/L	U	9/10/16	1
16344327 du	WF04PW	Filtered	**1.33**	**mg/L**		9/10/16	1
IW090916ABL blk	Blank	Liquid	1.0	mg/L	U	9/10/16	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344331 ms	WT02PW	Filtered	87	%Rec		9/10/16	1
IW090916AL1 lcs	Lab Control Standard	Liquid	101	%Rec		9/10/16	1
IW090916AL2 lc2	Lab Control Standard Dup.	Liquid	102	%Rec		9/10/16	1

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MEMORANDUM

DATE: September 30, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 14 water samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Sulfate (EPA Method 300.0) were performed at the Manchester Environmental Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16344266	16344324	16344325	16344326	16344327
16344328	16344330	16344331	16344332	16344333
16344334	16344335	16344336	16344338	

No discrepancies were noted.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114A

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

I have authorized release of this data package. Attached you will find the Sulfate results for the Cinnabar Mine Integrated Assessment project for the samples received on 08/29/2016. For further information regarding the attached data, contact Stephanie Le at 360-871-8715.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: September 27, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, Preparedness and Prevention Unit, US EPA Region 10

From: Stephanie Le, Chemist Stephanie Le
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment Samples For Sulfate

Project Code: SFP-114A
Account Code: 2016TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, Emergency Response Unit, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, Assessment and Brownfields Unit, US EPA Region 10
Renee Nordeen, E&E

The following is a quality assurance review of the results of the analysis of 14 water samples for Sulfate. These samples were submitted for the Cinnabar Mine Integrated Assessment Project. The analysis was performed by EPA Region 10 ESAT Contractors at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16344266						
16344324	16344325	16344326	16344327	16344328	16344330	16344331
16344332	16344333	16344334	16344335	16344336	16344338	

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "Laboratory/QAPP Criteria Not Met".

For those tests for which the USEPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met. The Region 10 Laboratory's Quality System has been accredited to the standards of The NELAC Institute (TNI).

1. Sample Transport and Receipt – Laboratory/QAPP Criteria Not Met

Refer to the Corrective Action Notice dated 09/13/2016 for a record of observations made during sample receipt that may impact data quality. The findings do not pertain to this analysis.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review met method holding time recommendations.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The quadratic regressions generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method and project QAPP. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blank did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on sample 16344328. Sample results which were greater than five times the MRL level were within the +/- 20% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on sample 16344328. Applicable spike results were within the 80-120% recovery requirements. No qualification was required based on matrix spike analyses.

9. Instrument Peak Integrations

No manual integrations were performed.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached.

11. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

No other qualification was required.

The definition for the data qualifier is as follows:
Below are the definitions for the codes used qualifying data from these analyses. When more than one quality issue was involved, the most restrictive qualifier has been attached to the data.

U - The analyte was not detected at or above the reported value.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Stephanie Le at the Region 10 Laboratory, phone number (360) 871-8715.

12. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Internal standards – Compounds used to help evaluate instrument analytical performance for individual samples. Internal standards provide an instrument response for reference to accurately quantify the analytes for all associated instrumental analyses.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Low Range Standard (LRS) – A level (often 5 times the MRL) where it has been demonstrated that the instrument achieves defined levels of accuracy and precision (more stringent than at the MRL), as checked with the Low Range Standard during analysis.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Reference materials – Samples with analyte values that are homogeneous and well established. This allows the reference material to be used to assess the accuracy of the measurement method.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114A
Site : CINNABAR MINE IA
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): Anions

Analyte: 14808798 - Sulfate
Weight Basis : N/A

Prep Method(s): 300.0 - Inorganic Anions, Ion Chromatography
Analytical Method: 300.0 - Inorganic Anions, Ion Chromatography

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344266 sam	AD04SW	Water	**4.61**	**mg/L**		9/12/16	10
16344324 sam	WF01PW	Filtered	**5.71**	**mg/L**		9/12/16	10
16344325 sam	WF02PW	Filtered	**5.41**	**mg/L**		9/12/16	10
16344326 sam	WF03PW	Filtered	**5.84**	**mg/L**		9/12/16	10
16344327 sam	WF04PW	Filtered	**6.42**	**mg/L**		9/12/16	10
16344328 sam	WF05PW	Filtered	**6.22**	**mg/L**		9/12/16	10
16344330 sam	WT01PW	Filtered	**13.3**	**mg/L**		9/12/16	10
16344331 sam	WT02PW	Filtered	**10.9**	**mg/L**		9/12/16	10
16344332 sam	WT03PW	Filtered	**13.8**	**mg/L**		9/12/16	10
16344333 sam	SC01PW	Filtered	**4.43**	**mg/L**		9/12/16	10
16344334 sam	CC02PW	Filtered	**4.81**	**mg/L**		9/12/16	10
16344335 sam	CC04PW	Filtered	**5.50**	**mg/L**		9/12/16	10
16344336 sam	BG02PW	Filtered	**3.94**	**mg/L**		9/12/16	10
16344338 sam	RI02WT	Filtered	0.30	mg/L	U	9/12/16	1
16344328 du	WF05PW	Filtered	**6.21**	**mg/L**		9/12/16	10
IW091216ABL blk	Blank	Liquid	0.30	mg/L	U	9/12/16	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344328 ms	WF05PW	Filtered	99	%Rec		9/12/16	10
16344328 msd	WF05PW	Filtered	99	%Rec		9/12/16	10
IW091216AL1 lcs	Lab Control Standard	Liquid	99	%Rec		9/12/16	1
IW091216AL2 lc2	Lab Control Standard Dup.	Liquid	100	%Rec		9/12/16	1

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Seattle, Washington 98104
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MEMORANDUM

DATE: September 30, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 25 sediment samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Total Organic Carbon (Method PSEP-TOC) were performed at the Manchester Environmental Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16344216	16344217	16344218	16344219	16344220
16344221	16344222	16344223	16344224	16344225
16344229	16344232	16344233	16344234	16344235
16344236	16344238	16344239	16344240	16344241
16344242	16344243	16344245	16344246	16344247

No discrepancies were noted. The secondary reviewer added the bias qualifier "K" to the estimated result in sample 16344247 to indicate an unknown direction of bias.

recycled paper

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114A

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

I have authorized release of this data package. Attached you will find the Total Organic Carbon (TOC) results for the Cinnabar Mine Integrated Assessment project for the samples received on 08/29/2016. For further information regarding the attached data, contact Stephanie Le at 360-871-8715.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: September 27, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, Preparedness and Prevention Unit, US EPA Region 10

From: Stephanie Le, Chemist for Stephanie Le
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment Samples For Total Organic Carbon (TOC)

Project Code: SFP-114A
Account Code: 2016TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, Emergency Response Unit, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, Assessment and Brownfields Unit, US EPA Region 10
Renee Nordeen, E&E

The following is a quality assurance review of the results of the analysis of 25 sediment samples for Total Organic Carbon (TOC). These samples were submitted for the Cinnabar Mine Integrated Assessment Project. The analyses were performed by EPA Region 10 ESAT Contractors at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16344216	16344217	16344218	16344219	16344220	16344221	16344222
16344223	16344224	16344225	16344229	16344232	16344233	16344234
16344235	16344236	16344238	16344239	16344240	16344241	16344242
16344243	16344245	16344246	16344247			

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

The quality control measures which did not meet Laboratory/QAPP criteria are annotated in the title of each affected subsection with "Laboratory/QAPP Criteria Not Met".

For those tests for which the USEPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met. The Region 10 Laboratory's Quality System has been accredited to the standards of The NELAC Institute (TNI).

1. Sample Transport and Receipt – Laboratory/QAPP Criteria Not Met

Refer to the Corrective Action Notice dated 09/13/2016 for a record of observations made during sample receipt that may impact data quality. The findings do not pertain to this analysis.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review met method holding time recommendations.

3. Sample Preparation - Laboratory/QAPP Criteria Not Met

Samples were prepared according to the method outlined in the SOP for these analytes for this type of matrix. Samples 16344247 and 16344247DU were very high in organic carbon content; consequently only a small sample size (less than 3mg) could be used for analysis and remain within the analytical range of the instrument. Results for these samples were qualified (J), estimated, to reflect the uncertainty in weighing these small quantities.

No other qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The linear regression generated for the initial calibration met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blank did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on samples 16344224, 16344229, and 16344247. Sample results which were greater than five times the MRL level were within the +/- 35% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on samples 16344224, 16344229, and 16344247. Sample results were within the 65- 135% recovery and relative percent difference (RPD) requirements. No qualification was required based on matrix spike analyses.

9. Reference Materials

A reference material was prepared and analyzed with these samples. Analytical values for this sample were within the range of acceptable results. No qualification was necessary based on analysis of the reference material.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached.

11. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

Results for samples 16344247 and 16344247DU were qualified (J), estimated, due to the uncertainty in weighing a small size.

No other qualification was required. The definition for the data qualifier is as follows:

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; however the reported value is an estimate

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Stephanie Le at the Region 10 Laboratory, phone number (360) 871-8715.

12. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Reference materials – Samples with analyte values that are homogeneous and well established. This allows the reference material to be used to assess the accuracy of the measurement method.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114A
Site : CINNABAR MINE IA
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): TOC

Analyte: *90064 - Total Organic Carbon
Weight Basis : Dry

Prep Method(s): PSEP-TOC - TOC in sediments by Puget Sound Estuarine Protocols
Analytical Method: PSEP-TOC - TOC in sediments by Puget Sound Estuarine Protocols

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344216 sam	AD01SD	Sediment	**97000**	**mg/Kg**		9/21/16	1
16344217 sam	AD02SD	Sediment	**3040**	**mg/Kg**		9/21/16	1
16344218 sam	AD03SD	Sediment	**6920**	**mg/Kg**		9/21/16	1
16344219 sam	WF01SD	Sediment	**6730**	**mg/Kg**		9/21/16	1
16344220 sam	WF02SD	Sediment	**5970**	**mg/Kg**		9/21/16	1
16344221 sam	WF03SD	Sediment	**10300**	**mg/Kg**		9/21/16	1
16344222 sam	WF04SD	Sediment	**5850**	**mg/Kg**		9/21/16	1
16344223 sam	WF05SD	Sediment	**6450**	**mg/Kg**		9/21/16	1
16344224 sam	WF06SD	Sediment	**9280**	**mg/Kg**		9/15/16	1
16344225 sam	WF07SD	Sediment	**9210**	**mg/Kg**		9/21/16	1
16344229 sam	WT01SD	Sediment	**30000**	**mg/Kg**		9/21/16	1
16344232 sam	CC01SD	Sediment	**4180**	**mg/Kg**		9/15/16	1
16344233 sam	CC02SD	Sediment	**2310**	**mg/Kg**		9/15/16	1
16344234 sam	CC03SD	Sediment	**4990**	**mg/Kg**		9/15/16	1
16344235 sam	CC04SD	Sediment	**6440**	**mg/Kg**		9/15/16	1
16344236 sam	CC05SD	Sediment	**7170**	**mg/Kg**		9/21/16	1
16344238 sam	SC01SD	Sediment	**1250**	**mg/Kg**		9/15/16	1
16344239 sam	SC02SD	Sediment	**1530**	**mg/Kg**		9/15/16	1
16344240 sam	SC03SD	Sediment	**6660**	**mg/Kg**		9/15/16	1
16344241 sam	SC04SD	Sediment	**13500**	**mg/Kg**		9/15/16	1
16344242 sam	SC05SD	Sediment	**2560**	**mg/Kg**		9/15/16	1
16344243 sam	UT01SD	Sediment	**13200**	**mg/Kg**		9/21/16	1
16344245 sam	BG02SD	Sediment	**1120**	**mg/Kg**		9/15/16	1
16344246 sam	BG03SD	Sediment	**31000**	**mg/Kg**		9/21/16	1
16344247 sam	BG04SD	Sediment	**100000**	**mg/Kg**	J K	9/20/16	1
16344224 du	WF06SD	Sediment	**9450**	**mg/Kg**		9/15/16	1
16344229 du	WT01SD	Sediment	**29800**	**mg/Kg**		9/21/16	1
16344247 du	BG04SD	Sediment	**120000**	**mg/Kg**	J	9/20/16	1
IS091516ABL blk	Blank	Solid	500	mg/Kg	U	9/15/16	1
IS092016ABL blk	Blank	Solid	500	mg/Kg	U	9/20/16	1
IS092116ABL blk	Blank	Solid	500	mg/Kg	U	9/21/16	1

Spiked Compounds:

Spiked Compounds (cont.):

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16344224 ms	WF06SD	Sediment	106	%Rec		9/15/16	1
16344229 ms	WT01SD	Sediment	101	%Rec		9/21/16	1
16344247 ms	BG04SD	Sediment	115	%Rec		9/20/16	1
16344224 msd	WF06SD	Sediment	117	%Rec		9/15/16	1
16344229 msd	WT01SD	Sediment	102	%Rec		9/21/16	1
16344247 msd	BG04SD	Sediment	117	%Rec		9/20/16	1
IS091516ACO std	Control	Solid	83	%Rec		9/15/16	1
IS092016ACO std	Control	Solid	99	%Rec		9/20/16	1
IS092116ACO std	Control	Solid	86	%Rec		9/21/16	1
IS091516AL1 lcs	Lab Control Standard	Solid	111	%Rec		9/15/16	1
IS092016AL1 lcs	Lab Control Standard	Solid	101	%Rec		9/20/16	1
IS092116AL1 lcs	Lab Control Standard	Solid	100	%Rec		9/21/16	1
IS091516AL2 lc2	Lab Control Standard Dup.	Solid	111	%Rec		9/15/16	1
IS092016AL2 lc2	Lab Control Standard Dup.	Solid	101	%Rec		9/20/16	1
IS092116AL2 lc2	Lab Control Standard Dup.	Solid	100	%Rec		9/21/16	1

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Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: October 5, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 20 soil/sediment samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Total Metals (EPA CLP SOW ISM02.3) were performed at Chemtex, Inc., Port Arthur, Texas. All sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM).

The samples were numbered:

MJHQE0	MJHQE1	MJHQE2	MJHQE3	MJHQF5
MJHQF6	MJHQF7	MJHQK1	MJHQK2	MJHQK4
MJHQK5	MJHQK6	MJHQL6	MJHQL7	MJHQL8
MJHQL9	MJHQM0	MJHQM1	MJHQM2	MJHQM9

No issues were noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

October 3, 2016

MEMORANDUM

SUBJECT: Data Validation Report for the Cinnabar Mine Removal, Case# 46386, SDG: MJHQE0, Inorganic Analyses

FROM: Don Matheny, Chemist
Environmental Services Unit, OEA

TO: Brooks Stanfield, On-Scene Coordinator
Greg Weigel, On-Scene Coordinator
Office of Environmental Cleanup

CC: Rene Nordeen, Ecology & Environment

The quality assurance (QA) review of the analytical data generated from the analysis of twenty soil/sediment samples collected from the above referenced site has been completed. These samples were analyzed for total metals (including mercury) by Chemtex, located in Port Arthur, TX.

Sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM). The validation was conducted according to the Quality Control Specifications outlined in:

- Cinnabar Mine Site Specific Sampling Plan, E&E, (July, 2016)
- USEPA CLP Statement of Work for Inorganic Superfund Methods (ISM02.3)
- National Functional Guidelines for Inorganic Superfund Data Review (EPA-540-R-10-011)
- Guidance for Labeling Externally Validated Laboratory Analytical Data (EPA-540-R08-005)

Some data may be qualified using the reviewer's professional judgment. The conclusions presented herein are based on the information provided for the review. A summary of samples evaluated in this validation report and the pertinent dates for sample collection, laboratory sample receipt and analyses is attached along with the validated data.

I. QUALITY CONTROL RESULTS SUMMARY

The table below summarizes the major sample quality control (QC) tests, associated test results, criteria for evaluation and identification of outliers. Some criteria for evaluation may be QAPP specific and different from the National Functional Guidelines. Certain QC tests are electronically evaluated the results of which are not summarized in the table below though any excursions of these tests will appear in the *Data Qualifications* section. In addition to the QC tests, calculations from 10% of the samples are verified against the raw data.

QC Results Summary

Quality Control Test[1]	Result Ranges	Outliers[2] (Y or N)	Evaluation Criteria
Preservation / Holding Times	Holding Times met	N	Cool ≤ 6°C Metals 180 Days; Hg 28 Days
MS Tune	Tune criteria met	N	≤ 0.1 amu; ≤ 5% RSD
Instrument Calibration	Calibration criteria met	N	± 30% Difference; Corr. Coeff. ≥ 0.995
Calibration Verification	All checks passed	N	Metals 90 – 110% Recovery Hg 85 – 115% Recovery
Interference Check Std.	89 – 113%	N	80 – 120% Recovery
Lab Blanks	**Significant detects reported**	**Y**	**Not detected or <10% of Sample**
Matrix Spike[3]	**49 - 104%**	**Y**	**75 - 125% Recovery**
Lab Duplicate	≤ 15% or ± 2xCRQL	N	≤ 35% RPD or ± 2xCRQL
LCS (blank spike)	93 - 130%	N	70 - 130% Recovery
Serial Dilution[4]	≤ 8%	N	≤ 10% Difference

[1] Lab QC (matrix spike, lab duplicate, serial dilution) were performed on sample MJHQM9.

[2] See the "*Data Qualifications*" section below for QC excursions and qualification of affected data.

3The native concentrations in the pre-spike sample were too high (> 4x) in comparison to the matrix spike concentrations for Arsenic and Mercury to allow for an evaluation of the spike recovery.

[4] The Serial Dilution results were only evaluated for Aluminum, Antimony, Arsenic, Calcium, Chromium, Copper, Iron, Magnesium, Manganese and Nickel. The native concentrations of the remaining elements were too low for conducting a 1:5 Serial Dilution.

II. DATA QUALIFICATIONS

Summary of Data Validation Qualifiers Applied

After the manual and electronic data review, the following data qualifications were applied:

1. **Blanks** – The following analytes have detected sample results < CRQLs and the associated laboratory blanks were also detected at concentrations < CRQLs.

Data Qualifications: Sample results are qualified U and the values elevated to the CRQLs.	
Qualified Analytical Results:	
Antimony –	MJHQK6
Mercury –	MJHQF7
Silver –	MJHQM9
Thallium -	MJHQE1, MJHQE2, MJHQE3, MJHQF5, MJHQF6, MJHQK5

2. **Matrix Spike Recoveries -** The spike recovery for Selenium was 49% and the post spike recovery (6%) fell below the minimally required 75% post spike recovery range. One Selenium result was detected above the CRQL and qualified JL. Non-detected Selenium results were qualified UJL.

3. **Internal Standard Recoveries** – For the ICP-MS analysis, the following samples were diluted due to poor internal standard recoveries: MJHQE0 and MJHQE3. These sample results have a laboratory applied D qualifier (indicating sample dilution) and elevated CRQLs for Silver and Thallium.

4. **Detection / Quantitation Limits -** The following analytes have positively detected results < CRQLs (below the range of quantitation) and the associated laboratory blanks were not detected.

Data Qualifications: Sample results are qualified JQ with no indication of bias.	
Qualified Analytical Results:	
Beryllium –	MJHQE1, MJHQE2, MJHQE3, MJHQF5, MJHQF6, MJHQF7, MJHQK1, MJHQK2, MJHQK4, MJHQK5, MJHQM1
Cadmium -	MJHQE1, MJHQE2, MJHQE3, MJHQF6, MJHQK6
Cobalt –	MJHQE1, MJHQE2, MJHQF6, MJHQF7, MJHQK1, MJHQM9
Copper -	MJHQE1, MJHQF6, MJHQF7
Nickel -	MJHQE1, MJHQF6, MJHQF7
Selenium –	MJHQE3, MJHQF5, MJHQK2, MJHQK4, MJHQK5, MJHQK6, MJHQL6, MJHQL7, MJHQL8, MJHQL9, MJHQM0, MJHQM1, MJHQM2, MJHQM9
Sodium –	MJHQE0, MJHQE2, MJHQE3, MJHQF5, MJHQF7, MJHQK1, MJHQK2, MJHQK4, MJHQK5, MJHQK6, MJHQL6, MJHQL7, MJHQL8, MJHQL9, MJHQM0, MJHQM2
Vanadium -	MJHQE1, MJHQF7

Data Qualifiers

The data qualifiers and their respective definitions applied to the sample result(s) are provided as follows.

Functional Guidelines Data Qualifiers	
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The associated value is an estimated quantity.
UJ	The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The data are unusable. The analyte may or may not be present in the sample.
Project Specific Data Qualifiers	
L	Low bias.
H	High bias.
K	Unknown Bias.
Q	Detected concentration is below the MRL / CRQL but is above the MDL.

III. SAMPLE INDEX

The sample listing dates of sample collection, laboratory receipt and analysis are provided below.

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis	Mercury Analysis
MJHQE0	Sediment	8/24/2016	8/30/2016	9/6-14/2016	9/6-15/2016	9/9/2016
MJHQE1	Sediment	8/22/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQE2	Sediment	8/22/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQE3	Sediment	8/22/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQF5	Sediment	8/23/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQF6	Sediment	8/23/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQF7	Sediment	8/23/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQK1	Sediment	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQK2	Sediment	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQK4	Sediment	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQK5	Sediment	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQK6	Sediment	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQL6	Soil	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis	Mercury Analysis
MJHQL7	Soil	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQL8	Soil	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQL9	Soil	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQM0	Soil	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQM1	Sediment	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQM2	Sediment	8/24/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016
MJHQM9	Sediment	8/26/2016	8/30/2016	9/6-14/2016	9/6/2016	9/9/2016

Sample Summary Report

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX
Sample Number: LCS165	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	39.9		mg/kg	39.9		1	Yes	S4VEM
Barium	Target	43.5		mg/kg	43.5		1	Yes	S4VEM
Beryllium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Cadmium	Target	1.0		mg/kg	1.0		1	Yes	S4VEM
Calcium	Target	1070		mg/kg	1070		1	Yes	S4VEM
Chromium	Target	2.3		mg/kg	2.3		1	Yes	S4VEM
Cobalt	Target	10.3		mg/kg	10.3		1	Yes	S4VEM
Copper	Target	5.2		mg/kg	5.2		1	Yes	S4VEM
Iron	Target	22.1		mg/kg	22.1		1	Yes	S4VEM
Lead	Target	2.0		mg/kg	2.0		1	Yes	S4VEM
Magnesium	Target	1020		mg/kg	1020		1	Yes	S4VEM
Manganese	Target	2.8		mg/kg	2.8		1	Yes	S4VEM
Nickel	Target	8.4		mg/kg	8.4		1	Yes	S4VEM
Potassium	Target	1030		mg/kg	1030		1	Yes	S4VEM
Selenium	Target	7.7		mg/kg	7.7		1	Yes	S4VEM
Sodium	Target	1050		mg/kg	1050		1	Yes	S4VEM
Vanadium	Target	11.4		mg/kg	11.4		1	Yes	S4VEM
Zinc	Target	12.7		mg/kg	12.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX
Sample Number: LCSD57	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	2.2		mg/kg	2.2		1	Yes	S4VEM
Arsenic	Target	1.3		mg/kg	1.3		1	Yes	S4VEM
Silver	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Thallium	Target	1.0		mg/kg	1.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE0	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	AD01SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:10:00
% Moisture :				% Solids :	10.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	206		mg/kg	206	D	200	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE0	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	AD01SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:10:00
% Moisture :				% Solids :	10.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	8440		mg/kg	8440		1	Yes	S4VEM
Barium	Target	109		mg/kg	109		1	Yes	S4VEM
Beryllium	Target	3.4		mg/kg	3.4		1	Yes	S4VEM
Cadmium	Target	18.2		mg/kg	18.2		1	Yes	S4VEM
Calcium	Target	9390		mg/kg	9390		1	Yes	S4VEM
Chromium	Target	20.9		mg/kg	20.9		1	Yes	S4VEM
Cobalt	Target	38.1		mg/kg	38.1		1	Yes	S4VEM
Copper	Target	25.0		mg/kg	25.0		1	Yes	S4VEM
Iron	Target	40300		mg/kg	40300	D	2	Yes	S4VEM
Lead	Target	7.7		mg/kg	7.7		1	Yes	S4VEM
Magnesium	Target	9790		mg/kg	9790		1	Yes	S4VEM
Manganese	Target	1820		mg/kg	1820	D	2	Yes	S4VEM
Nickel	Target	57.2		mg/kg	57.2		1	Yes	S4VEM
Potassium	Target	1610		mg/kg	1610		1	Yes	S4VEM
Selenium	Target	4.1	JL	mg/kg	4.1	*	1	Yes	S4VEM
Sodium	Target	77.6	JQ	mg/kg	77.6	J	1	Yes	S4VEM
Vanadium	Target	22.5		mg/kg	22.5		1	Yes	S4VEM
Zinc	Target	115		mg/kg	115		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE0	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	AD01SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:10:00
% Moisture :				% Solids :	10.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	9.1		mg/kg	9.1	D	2	Yes	S4VEM
Arsenic	Target	2440		mg/kg	2440	D	20	Yes	S4VEM
Silver	Target	0.98	U	mg/kg	0.98	UD	2	Yes	S4VEM
Thallium	Target	15.7		mg/kg	15.7	D	2	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: MJHQE1	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location: SC01SD	pH:	Sample Date: 08/22/2016	Sample Time: 16:34:00
% Moisture :		% Solids : 78.4	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	2320		mg/kg	2320		1	Yes	S4VEM
Barium	Target	21.8		mg/kg	21.8		1	Yes	S4VEM
Beryllium	Target	0.20	JQ	mg/kg	0.20	J	1	Yes	S4VEM
Cadmium	Target	0.16	JQ	mg/kg	0.16	J	1	Yes	S4VEM
Calcium	Target	653		mg/kg	653		1	Yes	S4VEM
Chromium	Target	2.7		mg/kg	2.7		1	Yes	S4VEM
Cobalt	Target	1.4	JQ	mg/kg	1.4	J	1	Yes	S4VEM
Copper	Target	1.4	JQ	mg/kg	1.4	J	1	Yes	S4VEM
Iron	Target	4990		mg/kg	4990		1	Yes	S4VEM
Lead	Target	3.2		mg/kg	3.2		1	Yes	S4VEM
Magnesium	Target	773		mg/kg	773		1	Yes	S4VEM
Manganese	Target	125		mg/kg	125		1	Yes	S4VEM
Nickel	Target	1.7	JQ	mg/kg	1.7	J	1	Yes	S4VEM
Potassium	Target	697		mg/kg	697		1	Yes	S4VEM
Selenium	Target	3.7	UJL	mg/kg	3.7	U*	1	Yes	S4VEM
Sodium	Target	527	U	mg/kg	527	U	1	Yes	S4VEM
Vanadium	Target	3.8	JQ	mg/kg	3.8	J	1	Yes	S4VEM
Zinc	Target	12.8		mg/kg	12.8		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE1	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	SC01SD	pH:		Sample Date:	08/22/2016	Sample Time:	16:34:00
% Moisture :				% Solids :	78.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	3.3		mg/kg	3.3		1	Yes	S4VEM
Arsenic	Target	55.8		mg/kg	55.8		1	Yes	S4VEM
Silver	Target	0.61	U	mg/kg	0.61	U	1	Yes	S4VEM
Thallium	Target	0.61	U	mg/kg	0.40	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE1	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	SC01SD	pH:		Sample Date:	08/22/2016	Sample Time:	16:34:00
% Moisture :				% Solids :	78.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	8.8		mg/kg	8.8	D	10	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE2	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	SC02SD	pH:		Sample Date:	08/22/2016	Sample Time:	17:35:00
% Moisture :				% Solids :	72.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	2.5		mg/kg	2.5		1	Yes	S4VEM
Arsenic	Target	33.3		mg/kg	33.3		1	Yes	S4VEM
Silver	Target	0.62	U	mg/kg	0.62	U	1	Yes	S4VEM
Thallium	Target	0.62	U	mg/kg	0.36	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE2	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	SC02SD	pH:		Sample Date:	08/22/2016	Sample Time:	17:35:00
% Moisture :				% Solids :	72.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5080		mg/kg	5080		1	Yes	S4VEM
Barium	Target	36.5		mg/kg	36.5		1	Yes	S4VEM
Beryllium	Target	0.23	JQ	mg/kg	0.23	J	1	Yes	S4VEM
Cadmium	Target	0.28	JQ	mg/kg	0.28	J	1	Yes	S4VEM
Calcium	Target	1420		mg/kg	1420		1	Yes	S4VEM
Chromium	Target	6.1		mg/kg	6.1		1	Yes	S4VEM
Cobalt	Target	3.4	JQ	mg/kg	3.4	J	1	Yes	S4VEM
Copper	Target	3.2		mg/kg	3.2		1	Yes	S4VEM
Iron	Target	9510		mg/kg	9510		1	Yes	S4VEM
Lead	Target	3.5		mg/kg	3.5		1	Yes	S4VEM
Magnesium	Target	2090		mg/kg	2090		1	Yes	S4VEM
Manganese	Target	128		mg/kg	128		1	Yes	S4VEM
Nickel	Target	4.5		mg/kg	4.5		1	Yes	S4VEM
Potassium	Target	1120		mg/kg	1120		1	Yes	S4VEM
Selenium	Target	3.8	UJL	mg/kg	3.8	U*	1	Yes	S4VEM
Sodium	Target	71.2	JQ	mg/kg	71.2	J	1	Yes	S4VEM
Vanadium	Target	8.0		mg/kg	8.0		1	Yes	S4VEM
Zinc	Target	26.2		mg/kg	26.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE2	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	SC02SD	pH:		Sample Date:	08/22/2016	Sample Time:	17:35:00
% Moisture :				% Solids :	72.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	10.3		mg/kg	10.3	D	10	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE3	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	SC03SD	pH:		Sample Date:	08/22/2016	Sample Time:	18:20:00
% Moisture :				% Solids :	72.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	5.3		mg/kg	5.3	D	2	Yes	S4VEM
Arsenic	Target	53.0		mg/kg	53.0	D	2	Yes	S4VEM
Silver	Target	1.2	U	mg/kg	1.2	UD	2	Yes	S4VEM
Thallium	Target	1.2	U	mg/kg	0.58	JD	2	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE3	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	SC03SD	pH:		Sample Date:	08/22/2016	Sample Time:	18:20:00
% Moisture :				% Solids :	72.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	9770		mg/kg	9770		1	Yes	S4VEM
Barium	Target	62.5		mg/kg	62.5		1	Yes	S4VEM
Beryllium	Target	0.27	JQ	mg/kg	0.27	J	1	Yes	S4VEM
Cadmium	Target	0.32	JQ	mg/kg	0.32	J	1	Yes	S4VEM
Calcium	Target	3070		mg/kg	3070		1	Yes	S4VEM
Chromium	Target	14.3		mg/kg	14.3		1	Yes	S4VEM
Cobalt	Target	7.0		mg/kg	7.0		1	Yes	S4VEM
Copper	Target	5.2		mg/kg	5.2		1	Yes	S4VEM
Iron	Target	13800		mg/kg	13800		1	Yes	S4VEM
Lead	Target	4.9		mg/kg	4.9		1	Yes	S4VEM
Magnesium	Target	5280		mg/kg	5280		1	Yes	S4VEM
Manganese	Target	147		mg/kg	147		1	Yes	S4VEM
Nickel	Target	10.8		mg/kg	10.8		1	Yes	S4VEM
Potassium	Target	1650		mg/kg	1650		1	Yes	S4VEM
Selenium	Target	0.45	JQ	mg/kg	0.45	J*	1	Yes	S4VEM
Sodium	Target	103	JQ	mg/kg	103	J	1	Yes	S4VEM
Vanadium	Target	14.9		mg/kg	14.9		1	Yes	S4VEM
Zinc	Target	39.5		mg/kg	39.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQE3	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	SC03SD	pH:		Sample Date:	08/22/2016	Sample Time:	18:20:00
% Moisture :				% Solids :	72.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	33.7		mg/kg	33.7	D	25	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQF5	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	SC04SD	pH:		Sample Date:	08/23/2016	Sample Time:	12:49:00
% Moisture :				% Solids :	43.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	6.8		mg/kg	6.8		1	Yes	S4VEM
Arsenic	Target	64.1		mg/kg	64.1		1	Yes	S4VEM
Silver	Target	0.81	U	mg/kg	0.81	U	1	Yes	S4VEM
Thallium	Target	0.81	U	mg/kg	0.69	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQF5	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	SC04SD	pH:		Sample Date:	08/23/2016	Sample Time:	12:49:00
% Moisture :				% Solids :	43.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	12000		mg/kg	12000		1	Yes	S4VEM
Barium	Target	103		mg/kg	103		1	Yes	S4VEM
Beryllium	Target	0.43	JQ	mg/kg	0.43	J	1	Yes	S4VEM
Cadmium	Target	1.3		mg/kg	1.3		1	Yes	S4VEM
Calcium	Target	4610		mg/kg	4610		1	Yes	S4VEM
Chromium	Target	19.8		mg/kg	19.8		1	Yes	S4VEM
Cobalt	Target	11.7		mg/kg	11.7		1	Yes	S4VEM
Copper	Target	11.0		mg/kg	11.0		1	Yes	S4VEM
Iron	Target	21100		mg/kg	21100		1	Yes	S4VEM
Lead	Target	7.0		mg/kg	7.0		1	Yes	S4VEM
Magnesium	Target	6420		mg/kg	6420		1	Yes	S4VEM
Manganese	Target	469		mg/kg	469		1	Yes	S4VEM
Nickel	Target	16.5		mg/kg	16.5		1	Yes	S4VEM
Potassium	Target	2130		mg/kg	2130		1	Yes	S4VEM
Selenium	Target	0.77	JQ	mg/kg	0.77	J*	1	Yes	S4VEM
Sodium	Target	147	JQ	mg/kg	147	J	1	Yes	S4VEM
Vanadium	Target	20.7		mg/kg	20.7		1	Yes	S4VEM
Zinc	Target	51.5		mg/kg	51.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQF5	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	SC04SD	pH:		Sample Date:	08/23/2016	Sample Time:	12:49:00
% Moisture :				% Solids :	43.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	128		mg/kg	128	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQF6	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	SC05SD	pH:		Sample Date:	08/23/2016	Sample Time:	13:46:00
% Moisture :				% Solids :	87.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	6.8		mg/kg	6.8		1	Yes	S4VEM
Arsenic	Target	20.1		mg/kg	20.1		1	Yes	S4VEM
Silver	Target	0.49	U	mg/kg	0.49	U	1	Yes	S4VEM
Thallium	Target	0.49	U	mg/kg	0.15	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQF6	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	SC05SD	pH:		Sample Date:	08/23/2016	Sample Time:	13:46:00
% Moisture :				% Solids :	87.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.48		mg/kg	0.48		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQF6	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	SC05SD	pH:		Sample Date:	08/23/2016	Sample Time:	13:46:00
% Moisture :				% Solids :	87.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	3940		mg/kg	3940		1	Yes	S4VEM
Barium	Target	30.6		mg/kg	30.6		1	Yes	S4VEM
Beryllium	Target	0.32	JQ	mg/kg	0.32	J	1	Yes	S4VEM
Cadmium	Target	0.14	JQ	mg/kg	0.14	J	1	Yes	S4VEM
Calcium	Target	1190		mg/kg	1190		1	Yes	S4VEM
Chromium	Target	6.5		mg/kg	6.5		1	Yes	S4VEM
Cobalt	Target	2.3	JQ	mg/kg	2.3	J	1	Yes	S4VEM
Copper	Target	1.8	JQ	mg/kg	1.8	J	1	Yes	S4VEM
Iron	Target	8690		mg/kg	8690		1	Yes	S4VEM
Lead	Target	4.3		mg/kg	4.3		1	Yes	S4VEM
Magnesium	Target	1490		mg/kg	1490		1	Yes	S4VEM
Manganese	Target	185		mg/kg	185		1	Yes	S4VEM
Nickel	Target	2.6	JQ	mg/kg	2.6	J	1	Yes	S4VEM
Potassium	Target	890		mg/kg	890		1	Yes	S4VEM
Selenium	Target	3.2	UJL	mg/kg	3.2	U*	1	Yes	S4VEM
Sodium	Target	452	U	mg/kg	452	U	1	Yes	S4VEM
Vanadium	Target	7.0		mg/kg	7.0		1	Yes	S4VEM
Zinc	Target	23.1		mg/kg	23.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQF7	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BG02SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:40:00
% Moisture :				% Solids :	88.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	0.94	U	mg/kg	0.94	U	1	Yes	S4VEM
Arsenic	Target	7.3		mg/kg	7.3		1	Yes	S4VEM
Silver	Target	0.47	U	mg/kg	0.47	U	1	Yes	S4VEM
Thallium	Target	0.47	U	mg/kg	0.47	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQF7	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	BG02SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:40:00
% Moisture :				% Solids :	88.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	3690		mg/kg	3690		1	Yes	S4VEM
Barium	Target	24.4		mg/kg	24.4		1	Yes	S4VEM
Beryllium	Target	0.41	JQ	mg/kg	0.41	J	1	Yes	S4VEM
Cadmium	Target	0.51	U	mg/kg	0.51	U	1	Yes	S4VEM
Calcium	Target	1010		mg/kg	1010		1	Yes	S4VEM
Chromium	Target	3.3		mg/kg	3.3		1	Yes	S4VEM
Cobalt	Target	1.5	JQ	mg/kg	1.5	J	1	Yes	S4VEM
Copper	Target	1.8	JQ	mg/kg	1.8	J	1	Yes	S4VEM
Iron	Target	7420		mg/kg	7420		1	Yes	S4VEM
Lead	Target	6.4		mg/kg	6.4		1	Yes	S4VEM
Magnesium	Target	904		mg/kg	904		1	Yes	S4VEM
Manganese	Target	159		mg/kg	159		1	Yes	S4VEM
Nickel	Target	2.2	JQ	mg/kg	2.2	J	1	Yes	S4VEM
Potassium	Target	929		mg/kg	929		1	Yes	S4VEM
Selenium	Target	3.6	UJL	mg/kg	3.6	U*	1	Yes	S4VEM
Sodium	Target	75.4	JQ	mg/kg	75.4	J	1	Yes	S4VEM
Vanadium	Target	4.6	JQ	mg/kg	4.6	J	1	Yes	S4VEM
Zinc	Target	26.0		mg/kg	26.0		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQE0	Lab Code:	CHX

Sample Number:	MJHQF7	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BG02SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:40:00
% Moisture :				% Solids :	88.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.094	U	mg/kg	0.036	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK1	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	WF01SD	pH:		Sample Date:	08/24/2016	Sample Time:	13:04:00
% Moisture :				% Solids :	77.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	19.3		mg/kg	19.3		1	Yes	S4VEM
Arsenic	Target	86.9		mg/kg	86.9		1	Yes	S4VEM
Silver	Target	0.58	U	mg/kg	0.58	U	1	Yes	S4VEM
Thallium	Target	0.63		mg/kg	0.63		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK1	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	WF01SD	pH:		Sample Date:	08/24/2016	Sample Time:	13:04:00
% Moisture :				% Solids :	77.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	37.6		mg/kg	37.6	D	25	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK1	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	WF01SD	pH:		Sample Date:	08/24/2016	Sample Time:	13:04:00
% Moisture :				% Solids :	77.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	3390		mg/kg	3390		1	Yes	S4VEM
Barium	Target	51.8		mg/kg	51.8		1	Yes	S4VEM
Beryllium	Target	0.28	JQ	mg/kg	0.28	J	1	Yes	S4VEM
Cadmium	Target	1.5		mg/kg	1.5		1	Yes	S4VEM
Calcium	Target	7230		mg/kg	7230		1	Yes	S4VEM
Chromium	Target	5.7		mg/kg	5.7		1	Yes	S4VEM
Cobalt	Target	4.3	JQ	mg/kg	4.3	J	1	Yes	S4VEM
Copper	Target	5.8		mg/kg	5.8		1	Yes	S4VEM
Iron	Target	9200		mg/kg	9200		1	Yes	S4VEM
Lead	Target	1.7		mg/kg	1.7		1	Yes	S4VEM
Magnesium	Target	2270		mg/kg	2270		1	Yes	S4VEM
Manganese	Target	122		mg/kg	122		1	Yes	S4VEM
Nickel	Target	9.6		mg/kg	9.6		1	Yes	S4VEM
Potassium	Target	949		mg/kg	949		1	Yes	S4VEM
Selenium	Target	3.4	UJL	mg/kg	3.4	U*	1	Yes	S4VEM
Sodium	Target	77.8	JQ	mg/kg	77.8	J	1	Yes	S4VEM
Vanadium	Target	6.1		mg/kg	6.1		1	Yes	S4VEM
Zinc	Target	27.2		mg/kg	27.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK2	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	WF02SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:04:00
% Moisture :				% Solids :	78.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	4110		mg/kg	4110		1	Yes	S4VEM
Barium	Target	245		mg/kg	245		1	Yes	S4VEM
Beryllium	Target	0.37	JQ	mg/kg	0.37	J	1	Yes	S4VEM
Cadmium	Target	1.6		mg/kg	1.6		1	Yes	S4VEM
Calcium	Target	12400		mg/kg	12400		1	Yes	S4VEM
Chromium	Target	5.7		mg/kg	5.7		1	Yes	S4VEM
Cobalt	Target	19.5		mg/kg	19.5		1	Yes	S4VEM
Copper	Target	7.0		mg/kg	7.0		1	Yes	S4VEM
Iron	Target	8370		mg/kg	8370		1	Yes	S4VEM
Lead	Target	3.0		mg/kg	3.0		1	Yes	S4VEM
Magnesium	Target	4380		mg/kg	4380		1	Yes	S4VEM
Manganese	Target	979		mg/kg	979		1	Yes	S4VEM
Nickel	Target	11.3		mg/kg	11.3		1	Yes	S4VEM
Potassium	Target	964		mg/kg	964		1	Yes	S4VEM
Selenium	Target	0.72	JQ	mg/kg	0.72	J*	1	Yes	S4VEM
Sodium	Target	101	JQ	mg/kg	101	J	1	Yes	S4VEM
Vanadium	Target	8.3		mg/kg	8.3		1	Yes	S4VEM
Zinc	Target	24.0		mg/kg	24.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK2	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	WF02SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:04:00
% Moisture :				% Solids :	78.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	11.0		mg/kg	11.0	D	10	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK2	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	WF02SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:04:00
% Moisture :				% Solids :	78.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	25.5		mg/kg	25.5		1	Yes	S4VEM
Arsenic	Target	223		mg/kg	223		1	Yes	S4VEM
Silver	Target	0.55	U	mg/kg	0.55	U	1	Yes	S4VEM
Thallium	Target	0.80		mg/kg	0.80		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK4	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	CC04SD	pH:		Sample Date:	08/24/2016	Sample Time:	11:43:00
% Moisture :				% Solids :	68.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	468		mg/kg	468	D	200	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK4	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	CC04SD	pH:		Sample Date:	08/24/2016	Sample Time:	11:43:00
% Moisture :				% Solids :	68.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	8230		mg/kg	8230		1	Yes	S4VEM
Barium	Target	68.4		mg/kg	68.4		1	Yes	S4VEM
Beryllium	Target	0.54	JQ	mg/kg	0.54	J	1	Yes	S4VEM
Cadmium	Target	1.6		mg/kg	1.6		1	Yes	S4VEM
Calcium	Target	5610		mg/kg	5610		1	Yes	S4VEM
Chromium	Target	13.8		mg/kg	13.8		1	Yes	S4VEM
Cobalt	Target	25.6		mg/kg	25.6		1	Yes	S4VEM
Copper	Target	13.9		mg/kg	13.9		1	Yes	S4VEM
Iron	Target	16100		mg/kg	16100		1	Yes	S4VEM
Lead	Target	3.3		mg/kg	3.3		1	Yes	S4VEM
Magnesium	Target	5150		mg/kg	5150		1	Yes	S4VEM
Manganese	Target	330		mg/kg	330		1	Yes	S4VEM
Nickel	Target	34.8		mg/kg	34.8		1	Yes	S4VEM
Potassium	Target	1820		mg/kg	1820		1	Yes	S4VEM
Selenium	Target	0.62	JQ	mg/kg	0.62	J*	1	Yes	S4VEM
Sodium	Target	130	JQ	mg/kg	130	J	1	Yes	S4VEM
Vanadium	Target	16.0		mg/kg	16.0		1	Yes	S4VEM
Zinc	Target	61.0		mg/kg	61.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK4	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	CC04SD	pH:		Sample Date:	08/24/2016	Sample Time:	11:43:00
% Moisture :				% Solids :	68.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	14.7		mg/kg	14.7		1	Yes	S4VEM
Arsenic	Target	135		mg/kg	135		1	Yes	S4VEM
Silver	Target	0.73	U	mg/kg	0.73	U	1	Yes	S4VEM
Thallium	Target	1.4		mg/kg	1.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK5	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	CC05SD	pH:		Sample Date:	08/24/2016	Sample Time:	12:12:00
% Moisture :				% Solids :	74.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	14.3		mg/kg	14.3		1	Yes	S4VEM
Arsenic	Target	50.7		mg/kg	50.7		1	Yes	S4VEM
Silver	Target	0.67	U	mg/kg	0.67	U	1	Yes	S4VEM
Thallium	Target	0.67	U	mg/kg	0.45	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK5	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	CC05SD	pH:		Sample Date:	08/24/2016	Sample Time:	12:12:00
% Moisture :				% Solids :	74.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5780		mg/kg	5780		1	Yes	S4VEM
Barium	Target	41.5		mg/kg	41.5		1	Yes	S4VEM
Beryllium	Target	0.43	JQ	mg/kg	0.43	J	1	Yes	S4VEM
Cadmium	Target	2.6		mg/kg	2.6		1	Yes	S4VEM
Calcium	Target	5820		mg/kg	5820		1	Yes	S4VEM
Chromium	Target	9.3		mg/kg	9.3		1	Yes	S4VEM
Cobalt	Target	41.7		mg/kg	41.7		1	Yes	S4VEM
Copper	Target	11.0		mg/kg	11.0		1	Yes	S4VEM
Iron	Target	15200		mg/kg	15200		1	Yes	S4VEM
Lead	Target	3.1		mg/kg	3.1		1	Yes	S4VEM
Magnesium	Target	3250		mg/kg	3250		1	Yes	S4VEM
Manganese	Target	358		mg/kg	358		1	Yes	S4VEM
Nickel	Target	32.5		mg/kg	32.5		1	Yes	S4VEM
Potassium	Target	959		mg/kg	959		1	Yes	S4VEM
Selenium	Target	0.44	JQ	mg/kg	0.44	J*	1	Yes	S4VEM
Sodium	Target	128	JQ	mg/kg	128	J	1	Yes	S4VEM
Vanadium	Target	13.7		mg/kg	13.7		1	Yes	S4VEM
Zinc	Target	48.6		mg/kg	48.6		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQE0	Lab Code:	CHX

Sample Number:	MJHQK5	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	CC05SD	pH:		Sample Date:	08/24/2016	Sample Time:	12:12:00
% Moisture :				% Solids :	74.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	13.2		mg/kg	13.2	D	10	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK6	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	BG03SD	pH:		Sample Date:	08/24/2016	Sample Time:	12:37:00
% Moisture :				% Solids :	59.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	12300		mg/kg	12300		1	Yes	S4VEM
Barium	Target	64.6		mg/kg	64.6		1	Yes	S4VEM
Beryllium	Target	0.76		mg/kg	0.76		1	Yes	S4VEM
Cadmium	Target	0.63	JQ	mg/kg	0.63	J	1	Yes	S4VEM
Calcium	Target	4090		mg/kg	4090		1	Yes	S4VEM
Chromium	Target	19.4		mg/kg	19.4		1	Yes	S4VEM
Cobalt	Target	55.5		mg/kg	55.5		1	Yes	S4VEM
Copper	Target	26.4		mg/kg	26.4		1	Yes	S4VEM
Iron	Target	15800		mg/kg	15800		1	Yes	S4VEM
Lead	Target	3.9		mg/kg	3.9		1	Yes	S4VEM
Magnesium	Target	4290		mg/kg	4290		1	Yes	S4VEM
Manganese	Target	528		mg/kg	528		1	Yes	S4VEM
Nickel	Target	69.1		mg/kg	69.1		1	Yes	S4VEM
Potassium	Target	866		mg/kg	866		1	Yes	S4VEM
Selenium	Target	0.81	JQ	mg/kg	0.81	J*	1	Yes	S4VEM
Sodium	Target	166	JQ	mg/kg	166	J	1	Yes	S4VEM
Vanadium	Target	28.1		mg/kg	28.1		1	Yes	S4VEM
Zinc	Target	108		mg/kg	108		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK6	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BG03SD	pH:		Sample Date:	08/24/2016	Sample Time:	12:37:00
% Moisture :				% Solids :	59.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	2.7		mg/kg	2.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQK6	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BG03SD	pH:		Sample Date:	08/24/2016	Sample Time:	12:37:00
% Moisture :				% Solids :	59.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	1.5	U	mg/kg	0.38	J	1	Yes	S4VEM
Arsenic	Target	46.6		mg/kg	46.6		1	Yes	S4VEM
Silver	Target	0.76	U	mg/kg	0.76	U	1	Yes	S4VEM
Thallium	Target	1.4		mg/kg	1.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL6	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BS01SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:15:00
% Moisture :				% Solids :	99.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	46.7		mg/kg	46.7		1	Yes	S4VEM
Arsenic	Target	222		mg/kg	222		1	Yes	S4VEM
Silver	Target	0.46	U	mg/kg	0.46	U	1	Yes	S4VEM
Thallium	Target	2.4		mg/kg	2.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL6	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BS01SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:15:00
% Moisture :				% Solids :	99.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	664		mg/kg	664	D	500	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: MJHQL6	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location: BS01SS	pH:	Sample Date: 08/24/2016	Sample Time: 11:15:00
% Moisture :		% Solids : 99.0	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	11900		mg/kg	11900		1	Yes	S4VEM
Barium	Target	62.3		mg/kg	62.3		1	Yes	S4VEM
Beryllium	Target	0.56		mg/kg	0.56		1	Yes	S4VEM
Cadmium	Target	1.5		mg/kg	1.5		1	Yes	S4VEM
Calcium	Target	16500		mg/kg	16500		1	Yes	S4VEM
Chromium	Target	27.4		mg/kg	27.4		1	Yes	S4VEM
Cobalt	Target	18.6		mg/kg	18.6		1	Yes	S4VEM
Copper	Target	20.3		mg/kg	20.3		1	Yes	S4VEM
Iron	Target	24000		mg/kg	24000	D	2	Yes	S4VEM
Lead	Target	3.6		mg/kg	3.6		1	Yes	S4VEM
Magnesium	Target	11500		mg/kg	11500		1	Yes	S4VEM
Manganese	Target	720		mg/kg	720		1	Yes	S4VEM
Nickel	Target	27.3		mg/kg	27.3		1	Yes	S4VEM
Potassium	Target	3040		mg/kg	3040		1	Yes	S4VEM
Selenium	Target	0.89	JQ	mg/kg	0.89	J*	1	Yes	S4VEM
Sodium	Target	208	JQ	mg/kg	208	J	1	Yes	S4VEM
Vanadium	Target	24.0		mg/kg	24.0		1	Yes	S4VEM
Zinc	Target	28.2		mg/kg	28.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL7	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BS05SS	pH:		Sample Date:	08/24/2016	Sample Time:	12:06:00
% Moisture :				% Solids :	98.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	83.2		mg/kg	83.2		1	Yes	S4VEM
Arsenic	Target	399		mg/kg	399	D	5	Yes	S4VEM
Silver	Target	0.45	U	mg/kg	0.45	U	1	Yes	S4VEM
Thallium	Target	7.5		mg/kg	7.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL7	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BS05SS	pH:		Sample Date:	08/24/2016	Sample Time:	12:06:00
% Moisture :				% Solids :	98.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	406		mg/kg	406	D	250	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL7	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	BS05SS	pH:		Sample Date:	08/24/2016	Sample Time:	12:06:00
% Moisture :				% Solids :	98.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	9870		mg/kg	9870		1	Yes	S4VEM
Barium	Target	68.1		mg/kg	68.1		1	Yes	S4VEM
Beryllium	Target	0.64		mg/kg	0.64		1	Yes	S4VEM
Cadmium	Target	2.7		mg/kg	2.7		1	Yes	S4VEM
Calcium	Target	8940		mg/kg	8940		1	Yes	S4VEM
Chromium	Target	24.5		mg/kg	24.5		1	Yes	S4VEM
Cobalt	Target	15.8		mg/kg	15.8		1	Yes	S4VEM
Copper	Target	24.4		mg/kg	24.4		1	Yes	S4VEM
Iron	Target	27000		mg/kg	27000	D	2	Yes	S4VEM
Lead	Target	3.8		mg/kg	3.8		1	Yes	S4VEM
Magnesium	Target	8960		mg/kg	8960		1	Yes	S4VEM
Manganese	Target	869		mg/kg	869		1	Yes	S4VEM
Nickel	Target	31.8		mg/kg	31.8		1	Yes	S4VEM
Potassium	Target	2920		mg/kg	2920		1	Yes	S4VEM
Selenium	Target	0.79	JQ	mg/kg	0.79	J*	1	Yes	S4VEM
Sodium	Target	219	JQ	mg/kg	219	J	1	Yes	S4VEM
Vanadium	Target	22.9		mg/kg	22.9		1	Yes	S4VEM
Zinc	Target	34.2		mg/kg	34.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL8	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BS04SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	98.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	29.8		mg/kg	29.8	D	25	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL8	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	BS04SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	98.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	13900		mg/kg	13900		1	Yes	S4VEM
Barium	Target	120		mg/kg	120		1	Yes	S4VEM
Beryllium	Target	0.61		mg/kg	0.61		1	Yes	S4VEM
Cadmium	Target	1.4		mg/kg	1.4		1	Yes	S4VEM
Calcium	Target	5920		mg/kg	5920		1	Yes	S4VEM
Chromium	Target	28.5		mg/kg	28.5		1	Yes	S4VEM
Cobalt	Target	21.3		mg/kg	21.3		1	Yes	S4VEM
Copper	Target	27.8		mg/kg	27.8		1	Yes	S4VEM
Iron	Target	24800		mg/kg	24800	D	2	Yes	S4VEM
Lead	Target	5.5		mg/kg	5.5		1	Yes	S4VEM
Magnesium	Target	7570		mg/kg	7570		1	Yes	S4VEM
Manganese	Target	934		mg/kg	934		1	Yes	S4VEM
Nickel	Target	27.2		mg/kg	27.2		1	Yes	S4VEM
Potassium	Target	2710		mg/kg	2710		1	Yes	S4VEM
Selenium	Target	1.2	JQ	mg/kg	1.2	J*	1	Yes	S4VEM
Sodium	Target	122	JQ	mg/kg	122	J	1	Yes	S4VEM
Vanadium	Target	24.9		mg/kg	24.9		1	Yes	S4VEM
Zinc	Target	37.1		mg/kg	37.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL8	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BS04SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	98.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	74.2		mg/kg	74.2		1	Yes	S4VEM
Arsenic	Target	194		mg/kg	194		1	Yes	S4VEM
Silver	Target	0.48	U	mg/kg	0.48	U	1	Yes	S4VEM
Thallium	Target	1.5		mg/kg	1.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL9	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BS03SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:42:00
% Moisture :				% Solids :	98.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	307		mg/kg	307	D	200	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQL9	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BS03SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:42:00
% Moisture :				% Solids :	98.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	61.1		mg/kg	61.1		1	Yes	S4VEM
Arsenic	Target	267		mg/kg	267	D	2	Yes	S4VEM
Silver	Target	0.39	U	mg/kg	0.39	U	1	Yes	S4VEM
Thallium	Target	2.2		mg/kg	2.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: MJHQL9	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location: BS03SS	pH:	Sample Date: 08/24/2016	Sample Time: 11:42:00
% Moisture :		% Solids : 98.5	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	10000		mg/kg	10000		1	Yes	S4VEM
Barium	Target	58.2		mg/kg	58.2		1	Yes	S4VEM
Beryllium	Target	0.62		mg/kg	0.62		1	Yes	S4VEM
Cadmium	Target	1.8		mg/kg	1.8		1	Yes	S4VEM
Calcium	Target	11900		mg/kg	11900		1	Yes	S4VEM
Chromium	Target	23.2		mg/kg	23.2		1	Yes	S4VEM
Cobalt	Target	13.1		mg/kg	13.1		1	Yes	S4VEM
Copper	Target	16.7		mg/kg	16.7		1	Yes	S4VEM
Iron	Target	18400		mg/kg	18400		1	Yes	S4VEM
Lead	Target	7.5		mg/kg	7.5		1	Yes	S4VEM
Magnesium	Target	9870		mg/kg	9870		1	Yes	S4VEM
Manganese	Target	617		mg/kg	617		1	Yes	S4VEM
Nickel	Target	22.2		mg/kg	22.2		1	Yes	S4VEM
Potassium	Target	2100		mg/kg	2100		1	Yes	S4VEM
Selenium	Target	0.70	JQ	mg/kg	0.70	J*	1	Yes	S4VEM
Sodium	Target	159	JQ	mg/kg	159	J	1	Yes	S4VEM
Vanadium	Target	18.6		mg/kg	18.6		1	Yes	S4VEM
Zinc	Target	24.8		mg/kg	24.8		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM0	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BS02SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:27:00
% Moisture :				% Solids :	99.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	81.5		mg/kg	81.5		1	Yes	S4VEM
Arsenic	Target	320		mg/kg	320	D	2	Yes	S4VEM
Silver	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Thallium	Target	1.7		mg/kg	1.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX
Sample Number: MJHQM0	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location: BS02SS	pH:	Sample Date: 08/24/2016	Sample Time: 11:27:00
% Moisture :		% Solids : 99.3	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	11800		mg/kg	11800		1	Yes	S4VEM
Barium	Target	65.6		mg/kg	65.6		1	Yes	S4VEM
Beryllium	Target	0.67		mg/kg	0.67		1	Yes	S4VEM
Cadmium	Target	2.4		mg/kg	2.4		1	Yes	S4VEM
Calcium	Target	6210		mg/kg	6210		1	Yes	S4VEM
Chromium	Target	28.7		mg/kg	28.7		1	Yes	S4VEM
Cobalt	Target	17.3		mg/kg	17.3		1	Yes	S4VEM
Copper	Target	20.9		mg/kg	20.9		1	Yes	S4VEM
Iron	Target	25600		mg/kg	25600	D	2	Yes	S4VEM
Lead	Target	4.3		mg/kg	4.3		1	Yes	S4VEM
Magnesium	Target	7940		mg/kg	7940		1	Yes	S4VEM
Manganese	Target	620		mg/kg	620		1	Yes	S4VEM
Nickel	Target	30.3		mg/kg	30.3		1	Yes	S4VEM
Potassium	Target	3770		mg/kg	3770		1	Yes	S4VEM
Selenium	Target	0.85	JQ	mg/kg	0.85	J*	1	Yes	S4VEM
Sodium	Target	194	JQ	mg/kg	194	J	1	Yes	S4VEM
Vanadium	Target	26.1		mg/kg	26.1		1	Yes	S4VEM
Zinc	Target	34.6		mg/kg	34.6		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM0	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BS02SS	pH:		Sample Date:	08/24/2016	Sample Time:	11:27:00
% Moisture :				% Solids :	99.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	285		mg/kg	285	D	200	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM1	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	AD02SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:57:00
% Moisture :				% Solids :	80.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	56.2		mg/kg	56.2		1	Yes	S4VEM
Arsenic	Target	158		mg/kg	158		1	Yes	S4VEM
Silver	Target	0.62	U	mg/kg	0.62	U	1	Yes	S4VEM
Thallium	Target	3.9		mg/kg	3.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM1	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	AD02SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:57:00
% Moisture :				% Solids :	80.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	1600		mg/kg	1600	D	1000	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM1	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	AD02SD	pH:		Sample Date:	08/24/2016	Sample Time:	14:57:00
% Moisture :				% Solids :	80.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	3590		mg/kg	3590		1	Yes	S4VEM
Barium	Target	37.7		mg/kg	37.7		1	Yes	S4VEM
Beryllium	Target	0.41	JQ	mg/kg	0.41	J	1	Yes	S4VEM
Cadmium	Target	1.7		mg/kg	1.7		1	Yes	S4VEM
Calcium	Target	2110		mg/kg	2110		1	Yes	S4VEM
Chromium	Target	10.9		mg/kg	10.9		1	Yes	S4VEM
Cobalt	Target	14.8		mg/kg	14.8		1	Yes	S4VEM
Copper	Target	33.9		mg/kg	33.9		1	Yes	S4VEM
Iron	Target	10900		mg/kg	10900		1	Yes	S4VEM
Lead	Target	2.1		mg/kg	2.1		1	Yes	S4VEM
Magnesium	Target	2340		mg/kg	2340		1	Yes	S4VEM
Manganese	Target	306		mg/kg	306		1	Yes	S4VEM
Nickel	Target	16.1		mg/kg	16.1		1	Yes	S4VEM
Potassium	Target	1130		mg/kg	1130		1	Yes	S4VEM
Selenium	Target	0.49	JQ	mg/kg	0.49	J*	1	Yes	S4VEM
Sodium	Target	521	U	mg/kg	521	U	1	Yes	S4VEM
Vanadium	Target	8.3		mg/kg	8.3		1	Yes	S4VEM
Zinc	Target	20.7		mg/kg	20.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM2	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	AD03SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:20:00
% Moisture :				% Solids :	67.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	227		mg/kg	227	D	200	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM2	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	AD03SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:20:00
% Moisture :				% Solids :	67.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5940		mg/kg	5940		1	Yes	S4VEM
Barium	Target	70.5		mg/kg	70.5		1	Yes	S4VEM
Beryllium	Target	0.78		mg/kg	0.78		1	Yes	S4VEM
Cadmium	Target	3.9		mg/kg	3.9		1	Yes	S4VEM
Calcium	Target	2110		mg/kg	2110		1	Yes	S4VEM
Chromium	Target	16.2		mg/kg	16.2		1	Yes	S4VEM
Cobalt	Target	14.1		mg/kg	14.1		1	Yes	S4VEM
Copper	Target	15.1		mg/kg	15.1		1	Yes	S4VEM
Iron	Target	23500		mg/kg	23500		1	Yes	S4VEM
Lead	Target	35.0		mg/kg	35.0		1	Yes	S4VEM
Magnesium	Target	3310		mg/kg	3310		1	Yes	S4VEM
Manganese	Target	512		mg/kg	512		1	Yes	S4VEM
Nickel	Target	20.5		mg/kg	20.5		1	Yes	S4VEM
Potassium	Target	1650		mg/kg	1650		1	Yes	S4VEM
Selenium	Target	0.93	JQ	mg/kg	0.93	J*	1	Yes	S4VEM
Sodium	Target	88.7	JQ	mg/kg	88.7	J	1	Yes	S4VEM
Vanadium	Target	18.5		mg/kg	18.5		1	Yes	S4VEM
Zinc	Target	115		mg/kg	115		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM2	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	AD03SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:20:00
% Moisture :				% Solids :	67.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	70.7		mg/kg	70.7		1	Yes	S4VEM
Arsenic	Target	464		mg/kg	464	D	2	Yes	S4VEM
Silver	Target	0.62	U	mg/kg	0.62	U	1	Yes	S4VEM
Thallium	Target	4.1		mg/kg	4.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM9	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BG04SD	pH:		Sample Date:	08/26/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	22.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	6.4		mg/kg	6.4		1	Yes	S4VEM
Arsenic	Target	92.3		mg/kg	92.3		1	Yes	S4VEM
Silver	Target	0.50	U	mg/kg	0.14	J	1	Yes	S4VEM
Thallium	Target	1.5		mg/kg	1.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM9	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	BG04SD	pH:		Sample Date:	08/26/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	22.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	4310		mg/kg	4310		1	Yes	S4VEM
Barium	Target	39.6		mg/kg	39.6		1	Yes	S4VEM
Beryllium	Target	0.66		mg/kg	0.66		1	Yes	S4VEM
Cadmium	Target	0.78		mg/kg	0.78		1	Yes	S4VEM
Calcium	Target	6990		mg/kg	6990		1	Yes	S4VEM
Chromium	Target	8.1		mg/kg	8.1		1	Yes	S4VEM
Cobalt	Target	2.2	JQ	mg/kg	2.2	J	1	Yes	S4VEM
Copper	Target	13.8		mg/kg	13.8		1	Yes	S4VEM
Iron	Target	6460		mg/kg	6460		1	Yes	S4VEM
Lead	Target	3.6		mg/kg	3.6		1	Yes	S4VEM
Magnesium	Target	2340		mg/kg	2340		1	Yes	S4VEM
Manganese	Target	245		mg/kg	245		1	Yes	S4VEM
Nickel	Target	21.1		mg/kg	21.1		1	Yes	S4VEM
Potassium	Target	718		mg/kg	718		1	Yes	S4VEM
Selenium	Target	2.4	JQ	mg/kg	2.4	J*	1	Yes	S4VEM
Sodium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Vanadium	Target	8.4		mg/kg	8.4		1	Yes	S4VEM
Zinc	Target	19.2		mg/kg	19.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM9	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BG04SD	pH:		Sample Date:	08/26/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	22.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	4.6		mg/kg	4.6	D	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM9A	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	22.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Selenium	Spike	2.0		mg/kg	2.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: MJHQM9D	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 11:57:00
% Moisture :		% Solids : 22.1	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	4240		mg/kg	4240		1	Yes	S4VEM
Barium	Target	40.3		mg/kg	40.3		1	Yes	S4VEM
Beryllium	Target	0.67		mg/kg	0.67		1	Yes	S4VEM
Cadmium	Target	0.78		mg/kg	0.78		1	Yes	S4VEM
Calcium	Target	7080		mg/kg	7080		1	Yes	S4VEM
Chromium	Target	8.2		mg/kg	8.2		1	Yes	S4VEM
Cobalt	Target	2.3	J	mg/kg	2.3	J	1	Yes	S4VEM
Copper	Target	14.0		mg/kg	14.0		1	Yes	S4VEM
Iron	Target	6730		mg/kg	6730		1	Yes	S4VEM
Lead	Target	3.5		mg/kg	3.5		1	Yes	S4VEM
Magnesium	Target	2450		mg/kg	2450		1	Yes	S4VEM
Manganese	Target	246		mg/kg	246		1	Yes	S4VEM
Nickel	Target	21.2		mg/kg	21.2		1	Yes	S4VEM
Potassium	Target	698		mg/kg	698		1	Yes	S4VEM
Selenium	Target	2.4	J	mg/kg	2.4	J	1	Yes	S4VEM
Sodium	Target	114	J	mg/kg	114	J	1	Yes	S4VEM
Vanadium	Target	8.6		mg/kg	8.6		1	Yes	S4VEM
Zinc	Target	19.6		mg/kg	19.6		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: MJHQM9D	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 11:57:00
% Moisture :		% Solids : 22.1	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	6.8		mg/kg	6.8		1	Yes	S4VEM
Arsenic	Target	79.8		mg/kg	79.8		1	Yes	S4VEM
Silver	Target	0.12	J	mg/kg	0.12	J	1	Yes	S4VEM
Thallium	Target	1.4		mg/kg	1.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM9D	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	22.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	4.7		mg/kg	4.7	D	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX
Sample Number: MJHQM9L	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 22.1	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	4530		mg/kg	4530		5	Yes	S4VEM
Barium	Target	41.6	J	mg/kg	41.6	J	5	Yes	S4VEM
Beryllium	Target	0.62	J	mg/kg	0.62	J	5	Yes	S4VEM
Cadmium	Target	0.70	J	mg/kg	0.70	J	5	Yes	S4VEM
Calcium	Target	7280		mg/kg	7280		5	Yes	S4VEM
Chromium	Target	8.5		mg/kg	8.5		5	Yes	S4VEM
Cobalt	Target	25.0	U	mg/kg	25.0	U	5	Yes	S4VEM
Copper	Target	14.3		mg/kg	14.3		5	Yes	S4VEM
Iron	Target	6980		mg/kg	6980		5	Yes	S4VEM
Lead	Target	3.6	J	mg/kg	3.6	J	5	Yes	S4VEM
Magnesium	Target	2500		mg/kg	2500		5	Yes	S4VEM
Manganese	Target	264		mg/kg	264		5	Yes	S4VEM
Nickel	Target	20.5		mg/kg	20.5		5	Yes	S4VEM
Potassium	Target	687	J	mg/kg	687	J	5	Yes	S4VEM
Selenium	Target	2.2	J	mg/kg	2.2	J	5	Yes	S4VEM
Sodium	Target	2500	U	mg/kg	2500	U	5	Yes	S4VEM
Vanadium	Target	8.0	J	mg/kg	8.0	J	5	Yes	S4VEM
Zinc	Target	18.2	J	mg/kg	18.2	J	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: MJHQM9L	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 22.1	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	6.5		mg/kg	6.5		5	Yes	S4VEM
Arsenic	Target	89.1		mg/kg	89.1		5	Yes	S4VEM
Silver	Target	2.5	U	mg/kg	2.5	U	5	Yes	S4VEM
Thallium	Target	1.5	J	mg/kg	1.5	J	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: MJHQM9S	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 11:57:00
% Moisture :		% Solids : 22.1	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Spike	14.3		mg/kg	14.3		1	Yes	S4VEM
Arsenic	Spike	88.5		mg/kg	88.5		1	Yes	S4VEM
Silver	Spike	5.3		mg/kg	5.3		1	Yes	S4VEM
Thallium	Spike	6.2		mg/kg	6.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM9S	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	22.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Spike	5.0		mg/kg	5.0	D	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number:	MJHQM9S	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	11:57:00
% Moisture :				% Solids :	22.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Barium	Spike	449		mg/kg	449		1	Yes	S4VEM
Beryllium	Spike	10.9		mg/kg	10.9		1	Yes	S4VEM
Cadmium	Spike	9.9		mg/kg	9.9		1	Yes	S4VEM
Chromium	Spike	49.9		mg/kg	49.9		1	Yes	S4VEM
Cobalt	Spike	107		mg/kg	107		1	Yes	S4VEM
Copper	Spike	63.8		mg/kg	63.8		1	Yes	S4VEM
Lead	Spike	7.7		mg/kg	7.7		1	Yes	S4VEM
Manganese	Spike	323		mg/kg	323		1	Yes	S4VEM
Nickel	Spike	125		mg/kg	125		1	Yes	S4VEM
Selenium	Spike	12.3		mg/kg	12.3	*	1	Yes	S4VEM
Vanadium	Spike	113		mg/kg	113		1	Yes	S4VEM
Zinc	Spike	124		mg/kg	124		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: PBS165	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	mg/kg	20.0	U	1	Yes	S4VEM
Barium	Target	20.0	U	mg/kg	20.0	U	1	Yes	S4VEM
Beryllium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Cadmium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Calcium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Chromium	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Cobalt	Target	5.0	U	mg/kg	5.0	U	1	Yes	S4VEM
Copper	Target	2.5	U	mg/kg	2.5	U	1	Yes	S4VEM
Iron	Target	10.0	U	mg/kg	-1.5	J	1	Yes	S4VEM
Lead	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Magnesium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Manganese	Target	1.5	U	mg/kg	-.45	J	1	Yes	S4VEM
Nickel	Target	4.0	U	mg/kg	4.0	U	1	Yes	S4VEM
Potassium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Selenium	Target	3.5	U	mg/kg	3.5	U	1	Yes	S4VEM
Sodium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Vanadium	Target	5.0	U	mg/kg	5.0	U	1	Yes	S4VEM
Zinc	Target	6.0	U	mg/kg	6.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX
Sample Number: PBSD57	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Arsenic	Target	0.21	J	mg/kg	0.21	J	1	Yes	S4VEM
Silver	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Thallium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE0	Lab Code: CHX

Sample Number: PBSH45	Method: Mercury by Cold Vapor	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.016	J	mg/kg	0.016	J	1	Yes	S4VEM

Edit History Report

Case No: 46386 Contract: EPW15007 SDG No: MJHQE0 Lab Code: CHX

Method: Mercury by Cold Vapor

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQE0	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE3	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF5	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF7	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK4	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK5	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL7	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL8	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL9	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM0	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9D	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9S	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
PBSH45	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y

Method: Metals by ICP-AES

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCS165	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE0	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE0	Soil	Selenium	Validation Flag	J-	JL	Don Matheny	10/3/16 6:57 PM	
MJHQE0	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:57 PM	
MJHQE1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE1	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:58 PM	
MJHQE1	Soil	Cadmium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:58 PM	
MJHQE1	Soil	Cobalt	Validation Flag	J	JQ	Don Matheny	10/3/16 6:58 PM	
MJHQE1	Soil	Copper	Validation Flag	J	JQ	Don Matheny	10/3/16 6:58 PM	
MJHQE1	Soil	Nickel	Validation Flag	J	JQ	Don Matheny	10/3/16 6:58 PM	
MJHQE1	Soil	Selenium	Validation Flag	UJ	UJL	Don Matheny	10/3/16 6:58 PM	
MJHQE1	Soil	Vanadium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:58 PM	
MJHQE2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE2	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:03 PM	
MJHQE2	Soil	Cadmium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:03 PM	
MJHQE2	Soil	Cobalt	Validation Flag	J	JQ	Don Matheny	10/3/16 7:03 PM	
MJHQE2	Soil	Selenium	Validation Flag	UJ	UJL	Don Matheny	10/3/16 7:03 PM	
MJHQE2	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:03 PM	
MJHQE3	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE3	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQE3	Soil	Cadmium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQE3	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQE3	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQF5	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF5	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:00 PM	
MJHQF5	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 7:00 PM	
MJHQF5	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:00 PM	
MJHQF6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF6	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQF6	Soil	Cadmium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQF6	Soil	Cobalt	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQF6	Soil	Copper	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQF6	Soil	Nickel	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQF6	Soil	Selenium	Validation Flag	UJ	UJL	Don Matheny	10/3/16 7:02 PM	
MJHQF7	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF7	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:56 PM	
MJHQF7	Soil	Cobalt	Validation Flag	J	JQ	Don Matheny	10/3/16 6:56 PM	
MJHQF7	Soil	Copper	Validation Flag	J	JQ	Don Matheny	10/3/16 6:56 PM	
MJHQF7	Soil	Nickel	Validation Flag	J	JQ	Don Matheny	10/3/16 6:56 PM	
MJHQF7	Soil	Selenium	Validation	UJ	UJL	Don	10/3/16 6:56 PM	

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQF7	Soil	Selenium	Flag	UJ	UJL	Matheny	10/3/16 6:56 PM	
MJHQF7	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:56 PM	
MJHQF7	Soil	Vanadium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:56 PM	
MJHQK1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK1	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQK1	Soil	Cobalt	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQK1	Soil	Selenium	Validation Flag	UJ	UJL	Don Matheny	10/3/16 7:02 PM	
MJHQK1	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQK2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK2	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQK2	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQK2	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQK4	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK4	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:57 PM	
MJHQK4	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 6:57 PM	
MJHQK4	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:57 PM	
MJHQK5	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK5	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:59 PM	
MJHQK5	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 6:59 PM	
MJHQK5	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:59 PM	
MJHQK6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK6	Soil	Cadmium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:55 PM	
MJHQK6	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 6:55 PM	
MJHQK6	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:55 PM	
MJHQL6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL6	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQL6	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:02 PM	
MJHQL7	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL7	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 6:56 PM	
MJHQL7	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:56 PM	
MJHQL8	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL8	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQL8	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQL9	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL9	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQL9	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 7:01 PM	
MJHQM0	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM0	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 6:59 PM	
MJHQM0	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:59 PM	
MJHQM1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM1	Soil	Beryllium	Validation	J	JQ	Don	10/3/16 6:59 PM	

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQM1	Soil	Beryllium	Flag	J	JQ	Matheny	10/3/16 6:59 PM	
MJHQM1	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 6:59 PM	
MJHQM2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM2	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 6:58 PM	
MJHQM2	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 6:58 PM	
MJHQM9	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9	Soil	Cobalt	Validation Flag	J	JQ	Don Matheny	10/3/16 6:57 PM	
MJHQM9	Soil	Selenium	Validation Flag	J-	JQ	Don Matheny	10/3/16 6:57 PM	
MJHQM9A	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9D	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9L	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9S	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
PBS165	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
PBS165	Soil	Iron	Validated Result	-1.5	10.0	Don Matheny	10/4/16 11:22 AM	
PBS165	Soil	Iron	Validation Flag		U	Don Matheny	10/4/16 11:22 AM	
PBS165	Soil	Manganese	Validated Result	-.45	1.5	Don Matheny	10/4/16 11:22 AM	
PBS165	Soil	Manganese	Validation Flag		U	Don Matheny	10/4/16 11:22 AM	

Method: Metals by ICP-MS

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCSD57	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE0	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQE3	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF5	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQF7	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK4	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK5	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQK6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL6	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL7	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL8	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQL9	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQM0	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM1	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM2	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9D	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9L	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
MJHQM9S	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y
PBSD57	Soil		Validation Level		S4VEM	Don Matheny	10/4/16 9:45 AM	Y

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MEMORANDUM

DATE: September 30, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 20 water samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Dissolved Metals and Hardness (EPA CLP SOW ISM02.3) were performed at Chemtex, Inc., Port Arthur, Texas. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

MJHQE4	MJHQE9	MJHQF0	MJHQF1	MJHQJ2
MJHQJ3	MJHQJ8	MJHQJ9	MJHQK0	MJHQL0
MJHQL1	MJHQL2	MJHQM3	MJHQM4	MJHQM5
MJHQN3	MJHQN5	MJHQN6	MJHQN7	MJHQP4

No issues were noted.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

September 29, 2016

MEMORANDUM

SUBJECT: Data Validation Report for the Cinnabar Mine Removal, Case# 46386, SDG: MJHQE4, Inorganic Analyses

FROM: Don Matheny, Chemist
Environmental Services Unit, OEA

TO: Brooks Stanfield, On-Scene Coordinator
Greg Weigel, On-Scene Coordinator
Office of Environmental Cleanup

CC: Rene Nordeen, Ecology & Environment

The quality assurance (QA) review of the analytical data generated from the analysis of twenty water samples collected from the above referenced site has been completed. These samples were analyzed for dissolved metals and hardness by Chemtex, located in Port Arthur, TX.

Sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM). The validation was conducted according to the Quality Control Specifications outlined in:

- Cinnabar Mine Site Specific Sampling Plan, E&E, (July, 2016)
- USEPA CLP Statement of Work for Inorganic Superfund Methods (ISM02.3)
- National Functional Guidelines for Inorganic Superfund Data Review (EPA-540-R-10-011)
- Guidance for Labeling Externally Validated Laboratory Analytical Data (EPA-540-R08-005)

Some data may be qualified using the reviewer's professional judgment. The conclusions presented herein are based on the information provided for the review. A summary of samples evaluated in this validation report and the pertinent dates for sample collection, laboratory sample receipt and analyses is attached along with the validated data.

I. QUALITY CONTROL RESULTS SUMMARY

The table below summarizes the major sample quality control (QC) tests, associated test results, criteria for evaluation and identification of outliers. Some criteria for evaluation may be QAPP specific and different from the National Functional Guidelines. Certain QC tests are electronically evaluated the results of which are not summarized in the table below though any excursions of these tests will appear in the *Data Qualifications* section. In addition to the QC tests, calculations from 10% of the samples are verified against the raw data.

QC Results Summary

Quality Control Test[1]	Result Ranges	Outliers[2] (Y or N)	Evaluation Criteria
Preservation / Holding Times	Holding Times met	N	Cool ≤ 6°C, pH < 2 Metals 180 Days
MS Tune	Tune criteria met	N	≤ 0.1 amu; ≤ 5% RSD
Instrument Calibration	Calibration criteria met	N	± 30% Difference; Corr. Coeff. ≥ 0.995
Calibration Verification	All checks passed	N	Metals 90 – 110% Recovery
Interference Check Std.	92 – 112%	N	80 – 120% Recovery
Lab Blanks	No significant detects reported	N	Not detected or <10% of Sample
Matrix Spike	93 - 111%	N	75 - 125% Recovery
Lab Duplicate	± CRQL	N	≤ 20% RPD or ± CRQL
LCS (blank spike)	79 - 122%	N	70 - 130% Recovery
Serial Dilution[3]	N/A	N	≤ 10% Difference

[1] Lab QC (matrix spike, lab duplicate, serial dilution) were performed on samples MJHQN5.

[2] See the "*Data Qualifications*" section below for QC excursions and qualification of affected data.

[3] The concentration of elements was too low for conducting a 1:5 Serial Dilution.

II. DATA QUALIFICATIONS

Summary of Data Validation Qualifiers Applied

After the manual and electronic data review, the following data qualifications were applied:

1. **Detection / Quantitation Limits -** The following analytes have positively detected results < CRQLs (below the range of quantitation) and the associated laboratory blanks were not detected.

Data Qualifications: Sample results are qualified JQ with no indication of bias.	
Qualified Analytical Results:	
Arsenic -	MJHQE9, MJHQF0, MJHQF1, MJHQN3, MJHQN7
Lead -	All samples
Magnesium –	MJHQE4, MJHQE9, MJHQF1, MJHQF0, MJHQJ2, MJHQJ3, MJHQM4, MJHQM5, MJHQN3, MJHQN5
Manganese -	MJHQM3, MJHQM5, MJHQN5
Potassium –	MJHQE4, MJHQE9, MJHQF0, MJHQF1, MJHQJ2, MJHQJ3, MJHQJ8, MJHQJ9, MJHQK0, MJHQL0, MJHQL1, MJHQL2, MJHQM3, MJHQM4, MJHQM5, MJHQN3, MJHQN5, MJHQN6, MJHQN7
Sodium –	MJHQE4, MJHQE9, MJHQF0, MJHQF1, MJHQJ2, MJHQJ3, MJHQJ8, MJHQJ9, MJHQK0, MJHQL2, MJHQM3, MJHQN5, MJHQN7

Data Qualifiers

The data qualifiers and their respective definitions applied to the sample result(s) are provided as follows.

Functional Guidelines Data Qualifiers	
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The associated value is an estimated quantity.
UJ	The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The data are unusable. The analyte may or may not be present in the sample.
Project Specific Data Qualifiers	
L	Low bias.
H	High bias.
K	Unknown Bias.
Q	Detected concentration is below the MRL / CRQL but is above the MDL.

III. SAMPLE INDEX

The sample listing dates of sample collection, laboratory receipt and analysis are provided below.

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis
MJHQE4	Water	8/24/2016	8/30/2016	9/9/2016	9/13/2016
MJHQE9	Water	8/22/2016	8/30/2016	9/9/2016	9/13/2016
MJHQF0	Water	8/22/2016	8/30/2016	9/9/2016	9/13/2016
MJHQF1	Water	8/22/2016	8/30/2016	9/9/2016	9/13/2016
MJHQJ2	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016
MJHQJ3	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016
MJHQJ8	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016
MJHQJ9	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016
MJHQK0	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016
MJHQL0	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016
MJHQL1	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016
MJHQL2	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016
MJHQM3	Water	8/24/2016	8/30/2016	9/9/2016	9/13/2016
MJHQM4	Water	8/24/2016	8/30/2016	9/9/2016	9/13/2016
MJHQM5	Water	8/24/2016	8/30/2016	9/9/2016	9/13/2016
MJHQN3	Water	8/26/2016	8/30/2016	9/9/2016	9/13/2016
MJHQN5	Water	8/26/2016	8/30/2016	9/9/2016	9/13/2016
MJHQN6	Water	8/26/2016	8/30/2016	9/10/2016	9/14/2016
MJHQN7	Water	8/26/2016	8/30/2016	9/9/2016	9/14/2016
MJHQP4	Water	8/26/2016	8/30/2016	9/9/2016	9/14/2016

Sample MJHQP4 is an equipment rinsate blank.

Sample Summary Report

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: LCS167	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	486		ug/L	486		1	Yes	S4VEM
Antimony	Target	121		ug/L	121		1	Yes	S4VEM
Arsenic	Target	21.1		ug/L	21.1		1	Yes	S4VEM
Barium	Target	421		ug/L	421		1	Yes	S4VEM
Beryllium	Target	11.0		ug/L	11.0		1	Yes	S4VEM
Calcium	Target	10900		ug/L	10900		1	Yes	S4VEM
Chromium	Target	23.7		ug/L	23.7		1	Yes	S4VEM
Cobalt	Target	102		ug/L	102		1	Yes	S4VEM
Iron	Target	229		ug/L	229		1	Yes	S4VEM
Magnesium	Target	10100		ug/L	10100		1	Yes	S4VEM
Manganese	Target	32.2		ug/L	32.2		1	Yes	S4VEM
Nickel	Target	82.7		ug/L	82.7		1	Yes	S4VEM
Potassium	Target	10200		ug/L	10200		1	Yes	S4VEM
Sodium	Target	10400		ug/L	10400		1	Yes	S4VEM
Thallium	Target	53.4		ug/L	53.4		1	Yes	S4VEM
Vanadium	Target	116		ug/L	116		1	Yes	S4VEM
Zinc	Target	126		ug/L	126		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: LCSD59	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	44.2		ug/L	44.2		1	Yes	S4VEM
Cadmium	Target	2.0		ug/L	2.0		1	Yes	S4VEM
Calcium	Target	926		ug/L	926		1	Yes	S4VEM
Copper	Target	3.9		ug/L	3.9		1	Yes	S4VEM
Iron	Target	402		ug/L	402		1	Yes	S4VEM
Lead	Target	1.9		ug/L	1.9		1	Yes	S4VEM
Magnesium	Target	995		ug/L	995		1	Yes	S4VEM
Potassium	Target	899		ug/L	899		1	Yes	S4VEM
Selenium	Target	10.2		ug/L	10.2		1	Yes	S4VEM
Silver	Target	2.0		ug/L	2.0		1	Yes	S4VEM
Sodium	Target	794		ug/L	794		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQE4	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: BG03SWD	pH:	Sample Date: 08/24/2016	Sample Time: 12:34:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	12100		ug/L	12100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2680	JQ	ug/L	2680	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	744	JQ	ug/L	744	J	1	Yes	S4VEM
Sodium	Target	1330	JQ	ug/L	1330	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	41.3		mg/L	41.3		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQE4	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	BG03SWD	pH:		Sample Date:	08/24/2016	Sample Time:	12:34:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	7.1		ug/L	7.1		1	Yes	S4VEM
Lead	Target	0.27	JQ	ug/L	0.27	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQE9	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC01SWD	pH:		Sample Date:	08/22/2016	Sample Time:	16:22:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	0.25	JQ	ug/L	0.25	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQE9	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: SC01SWD	pH:	Sample Date: 08/22/2016	Sample Time: 16:22:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	7.4	JQ	ug/L	7.4	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	17700		ug/L	17700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2460	JQ	ug/L	2460	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	914	JQ	ug/L	914	J	1	Yes	S4VEM
Sodium	Target	2550	JQ	ug/L	2550	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	54.2		mg/L	54.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQF0	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC02SWD	pH:		Sample Date:	08/22/2016	Sample Time:	17:22:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	0.23	JQ	ug/L	0.23	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQF0	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: SC02SWD	pH:	Sample Date: 08/22/2016	Sample Time: 17:22:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	5.9	JQ	ug/L	5.9	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	17200		ug/L	17200		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2150	JQ	ug/L	2150	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	866	JQ	ug/L	866	J	1	Yes	S4VEM
Sodium	Target	2680	JQ	ug/L	2680	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	51.9		mg/L	51.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQF1	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:	SC03SWD	pH:		Sample Date:	08/22/2016	Sample Time:	18:06:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	5.1	JQ	ug/L	5.1	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	16700		ug/L	16700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2030	JQ	ug/L	2030	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	817	JQ	ug/L	817	J	1	Yes	S4VEM
Sodium	Target	2620	JQ	ug/L	2620	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	50.2		mg/L	50.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQF1	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC03SWD	pH:		Sample Date:	08/22/2016	Sample Time:	18:06:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.7		ug/L	6.7		1	Yes	S4VEM
Lead	Target	0.24	JQ	ug/L	0.24	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQJ2	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: CC04SWD	pH:	Sample Date: 08/24/2016	Sample Time: 11:23:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	12.5		ug/L	12.5		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	20500		ug/L	20500		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	4120	JQ	ug/L	4120	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1110	JQ	ug/L	1110	J	1	Yes	S4VEM
Sodium	Target	1040	JQ	ug/L	1040	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	68.2		mg/L	68.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQJ2	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC04SWD	pH:		Sample Date:	08/24/2016	Sample Time:	11:23:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.8		ug/L	6.8		1	Yes	S4VEM
Lead	Target	0.25	JQ	ug/L	0.25	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQJ3	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: CC05SWD	pH:	Sample Date: 08/24/2016	Sample Time: 12:07:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	13.0		ug/L	13.0		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	20200		ug/L	20200		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	4080	JQ	ug/L	4080	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1090	JQ	ug/L	1090	J	1	Yes	S4VEM
Sodium	Target	1040	JQ	ug/L	1040	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	67.4		mg/L	67.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQJ3	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC05SWD	pH:		Sample Date:	08/24/2016	Sample Time:	12:07:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.7		ug/L	6.7		1	Yes	S4VEM
Lead	Target	0.23	JQ	ug/L	0.23	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQJ8	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	WF01SWD	pH:		Sample Date:	08/24/2016	Sample Time:	13:02:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	7.0		ug/L	7.0		1	Yes	S4VEM
Lead	Target	0.34	JQ	ug/L	0.34	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQJ8	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF01SWD	pH:	Sample Date: 08/24/2016	Sample Time: 13:02:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	27.0		ug/L	27.0		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	28100		ug/L	28100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5570		ug/L	5570		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1530	JQ	ug/L	1530	J	1	Yes	S4VEM
Sodium	Target	690	JQ	ug/L	690	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	93.0		mg/L	93.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQJ9	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF02SWD	pH:	Sample Date: 08/24/2016	Sample Time: 14:04:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	27.6		ug/L	27.6		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	28200		ug/L	28200		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5620		ug/L	5620		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1720	JQ	ug/L	1720	J	1	Yes	S4VEM
Sodium	Target	760	JQ	ug/L	760	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	93.5		mg/L	93.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQJ9	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF02SWD	pH:	Sample Date: 08/24/2016	Sample Time: 14:04:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	0.23	JQ	ug/L	0.23	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQK0	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WT01SWD	pH:	Sample Date: 08/24/2016	Sample Time: 16:11:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	193		ug/L	193		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	30400		ug/L	30400		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	101		ug/L	101		1	Yes	S4VEM
Magnesium	Target	10800		ug/L	10800		1	Yes	S4VEM
Manganese	Target	41.0		ug/L	41.0		1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	885	JQ	ug/L	885	J	1	Yes	S4VEM
Sodium	Target	711	JQ	ug/L	711	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	120		mg/L	120		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQK0	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	WT01SWD	pH:		Sample Date:	08/24/2016	Sample Time:	16:11:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	7.4		ug/L	7.4		1	Yes	S4VEM
Lead	Target	0.33	JQ	ug/L	0.33	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQL0	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF03SWD	pH:	Sample Date: 08/24/2016	Sample Time: 15:30:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	19.7		ug/L	19.7		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	20100		ug/L	20100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5390		ug/L	5390		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1290	JQ	ug/L	1290	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	72.4		mg/L	72.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQL0	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF03SWD	pH:	Sample Date: 08/24/2016	Sample Time: 15:30:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.7		ug/L	6.7		1	Yes	S4VEM
Lead	Target	0.26	JQ	ug/L	0.26	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQL1	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF04SWD	pH:	Sample Date: 08/24/2016	Sample Time: 16:16:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	0.24	JQ	ug/L	0.24	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQL1	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF04SWD	pH:	Sample Date: 08/24/2016	Sample Time: 16:16:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	20.2		ug/L	20.2		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	20500		ug/L	20500		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5480		ug/L	5480		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1310	JQ	ug/L	1310	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	73.9		mg/L	73.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQL2	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF05SWD	pH:	Sample Date: 08/24/2016	Sample Time: 16:48:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.7		ug/L	6.7		1	Yes	S4VEM
Lead	Target	0.23	JQ	ug/L	0.23	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQL2	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF05SWD	pH:	Sample Date: 08/24/2016	Sample Time: 16:48:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	20.2		ug/L	20.2		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	22100		ug/L	22100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5940		ug/L	5940		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1370	JQ	ug/L	1370	J	1	Yes	S4VEM
Sodium	Target	628	JQ	ug/L	628	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	79.5		mg/L	79.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQM3	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: AD01SWD	pH:	Sample Date: 08/24/2016	Sample Time: 14:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	45.5		ug/L	45.5		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	22700		ug/L	22700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	9480		ug/L	9480		1	Yes	S4VEM
Manganese	Target	3.0	JQ	ug/L	3.0	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1310	JQ	ug/L	1310	J	1	Yes	S4VEM
Sodium	Target	657	JQ	ug/L	657	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	95.7		mg/L	95.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQM3	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: AD01SWD	pH:	Sample Date: 08/24/2016	Sample Time: 14:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	0.22	JQ	ug/L	0.22	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQM4	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	AD02SWD	pH:		Sample Date:	08/24/2016	Sample Time:	14:40:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	0.23	JQ	ug/L	0.23	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQM4	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: AD02SWD	pH:	Sample Date: 08/24/2016	Sample Time: 14:40:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	48.0		ug/L	48.0		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	10700		ug/L	10700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3090	JQ	ug/L	3090	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1060	JQ	ug/L	1060	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	39.4		mg/L	39.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQM5	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: AD03SWD	pH:	Sample Date: 08/24/2016	Sample Time: 16:20:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	26.0		ug/L	26.0		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	12100		ug/L	12100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3630	JQ	ug/L	3630	J	1	Yes	S4VEM
Manganese	Target	4.9	JQ	ug/L	4.9	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	814	JQ	ug/L	814	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	45.2		mg/L	45.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQM5	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: AD03SWD	pH:	Sample Date: 08/24/2016	Sample Time: 16:20:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	0.24	JQ	ug/L	0.24	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQN3	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: BG04SWD	pH:	Sample Date: 08/26/2016	Sample Time: 11:40:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	9.0	JQ	ug/L	9.0	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	7620		ug/L	7620		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3430	JQ	ug/L	3430	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	726	JQ	ug/L	726	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	33.2		mg/L	33.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number:	MJHQN3	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	BG04SWD	pH:		Sample Date:	08/26/2016	Sample Time:	11:40:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	0.27	JQ	ug/L	0.27	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQN5	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: UT01SWD	pH:	Sample Date: 08/26/2016	Sample Time: 09:57:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	0.25	JQ	ug/L	0.25	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQN5	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: UT01SWD	pH:	Sample Date: 08/26/2016	Sample Time: 09:57:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	13.8		ug/L	13.8		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	19200		ug/L	19200		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	1680	JQ	ug/L	1680	J	1	Yes	S4VEM
Manganese	Target	5.5	JQ	ug/L	5.5	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	977	JQ	ug/L	977	J	1	Yes	S4VEM
Sodium	Target	3540	JQ	ug/L	3540	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	54.9		mg/L	54.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQN5D	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 09:57:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	13.9		ug/L	13.9		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	19700		ug/L	19700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	1730	J	ug/L	1730	J	1	Yes	S4VEM
Manganese	Target	5.3	J	ug/L	5.3	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	930	J	ug/L	930	J	1	Yes	S4VEM
Sodium	Target	3610	J	ug/L	3610	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	56.3		mg/L	56.3		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQN5D	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 09:57:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	0.23	J	ug/L	0.23	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQN5L	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM
Copper	Target	7.1	J	ug/L	7.1	J	5	Yes	S4VEM
Lead	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM
Selenium	Target	25.0	U	ug/L	25.0	U	5	Yes	S4VEM
Silver	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQN5L	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	1000	U	ug/L	1000	U	5	Yes	S4VEM
Antimony	Target	300	U	ug/L	300	U	5	Yes	S4VEM
Arsenic	Target	50.0	U	ug/L	50.0	U	5	Yes	S4VEM
Barium	Target	1000	U	ug/L	1000	U	5	Yes	S4VEM
Beryllium	Target	25.0	U	ug/L	25.0	U	5	Yes	S4VEM
Calcium	Target	19800	J	ug/L	19800	J	5	Yes	S4VEM
Chromium	Target	50.0	U	ug/L	50.0	U	5	Yes	S4VEM
Cobalt	Target	250	U	ug/L	250	U	5	Yes	S4VEM
Iron	Target	500	U	ug/L	500	U	5	Yes	S4VEM
Magnesium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Manganese	Target	75.0	U	ug/L	75.0	U	5	Yes	S4VEM
Nickel	Target	200	U	ug/L	200	U	5	Yes	S4VEM
Potassium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Sodium	Target	3560	J	ug/L	3560	J	5	Yes	S4VEM
Thallium	Target	125	U	ug/L	125	U	5	Yes	S4VEM
Vanadium	Target	250	U	ug/L	250	U	5	Yes	S4VEM
Zinc	Target	300	U	ug/L	300	U	5	Yes	S4VEM
Hardness	Derived	56.4		mg/L	56.4		5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQN5S	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 09:57:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Spike	53.0		ug/L	53.0		1	Yes	S4VEM
Copper	Spike	269		ug/L	269		1	Yes	S4VEM
Lead	Spike	18.9		ug/L	18.9		1	Yes	S4VEM
Selenium	Spike	106		ug/L	106		1	Yes	S4VEM
Silver	Spike	50.5		ug/L	50.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQN5S	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 09:57:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Spike	1950		ug/L	1950		1	Yes	S4VEM
Antimony	Spike	94.3		ug/L	94.3		1	Yes	S4VEM
Arsenic	Spike	53.1		ug/L	53.1		1	Yes	S4VEM
Barium	Spike	2040		ug/L	2040		1	Yes	S4VEM
Beryllium	Spike	52.0		ug/L	52.0		1	Yes	S4VEM
Chromium	Spike	222		ug/L	222		1	Yes	S4VEM
Cobalt	Spike	491		ug/L	491		1	Yes	S4VEM
Iron	Spike	1130		ug/L	1130		1	Yes	S4VEM
Manganese	Spike	509		ug/L	509		1	Yes	S4VEM
Nickel	Spike	497		ug/L	497		1	Yes	S4VEM
Thallium	Spike	50.9		ug/L	50.9		1	Yes	S4VEM
Vanadium	Spike	554		ug/L	554		1	Yes	S4VEM
Zinc	Spike	495		ug/L	495		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQN6	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF06SWD	pH:	Sample Date: 08/26/2016	Sample Time: 08:43:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	0.25	JQ	ug/L	0.25	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQN6	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF06SWD	pH:	Sample Date: 08/26/2016	Sample Time: 08:43:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	17.9		ug/L	17.9		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	22900		ug/L	22900		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	6250		ug/L	6250		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1330	JQ	ug/L	1330	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	82.9		mg/L	82.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: MJHQN7	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF07SWD	pH:	Sample Date: 08/26/2016	Sample Time: 11:01:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	6.9	JQ	ug/L	6.9	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	31600		ug/L	31600		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	8060		ug/L	8060		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1610	JQ	ug/L	1610	J	1	Yes	S4VEM
Sodium	Target	697	JQ	ug/L	697	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	112		mg/L	112		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQN7	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF07SWD	pH:	Sample Date: 08/26/2016	Sample Time: 11:01:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.1		ug/L	6.1		1	Yes	S4VEM
Lead	Target	0.25	JQ	ug/L	0.25	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQP4	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: R101SWD	pH:	Sample Date: 08/29/2016	Sample Time: 14:29:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	0.23	JQ	ug/L	0.23	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX

Sample Number: MJHQP4	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: R101SWD	pH:	Sample Date: 08/29/2016	Sample Time: 14:29:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	0.033	U	mg/L	0.033	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: PBW167	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	0.033	U	mg/L	0.028	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE4	Lab Code: CHX
Sample Number: PBWD59	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	12.0	J	ug/L	12.0	J	1	Yes	S4VEM
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Calcium	Target	500	U	ug/L	500	U	1	Yes	S4VEM
Copper	Target	2.0	U	ug/L	2.0	U	1	Yes	S4VEM
Iron	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Magnesium	Target	500	U	ug/L	500	U	1	Yes	S4VEM
Potassium	Target	500	U	ug/L	500	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Sodium	Target	500	U	ug/L	-180	J	1	Yes	S4VEM

Edit History Report

Case No: 46386 Contract: EPW15007 SDG No: MJHQE4 Lab Code: CHX

Method: Metals by ICP-AES

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCS167	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQE4	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQE4	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:53 PM	
MJHQE4	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:53 PM	
MJHQE4	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:53 PM	
MJHQE9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQE9	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/28/16 6:58 PM	
MJHQE9	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:58 PM	
MJHQE9	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:58 PM	
MJHQE9	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:58 PM	
MJHQF0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQF0	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQF0	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQF0	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQF0	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQF1	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQF1	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQF1	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQF1	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQF1	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQJ2	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQJ2	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQJ2	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQJ2	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQJ3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQJ3	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:57 PM	
MJHQJ3	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:57 PM	
MJHQJ3	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:57 PM	
MJHQJ8	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQJ8	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:55 PM	
MJHQJ8	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:55 PM	
MJHQJ9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQJ9	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:53 PM	
MJHQJ9	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:53 PM	
MJHQK0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQK0	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:59 PM	

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQK0	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:59 PM	
MJHQL0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQL0	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:57 PM	
MJHQL1	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQL1	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:53 PM	
MJHQL2	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQL2	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQL2	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQM3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQM3	Water	Manganese	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQM3	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQM3	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:56 PM	
MJHQM4	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQM4	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:55 PM	
MJHQM4	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:55 PM	
MJHQM5	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQM5	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQM5	Water	Manganese	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQM5	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:54 PM	
MJHQN3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN3	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/28/16 6:59 PM	
MJHQN3	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:59 PM	
MJHQN3	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:59 PM	
MJHQN5	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN5	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:57 PM	
MJHQN5	Water	Manganese	Validation Flag	J	JQ	Don Matheny	9/28/16 6:57 PM	
MJHQN5	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:57 PM	
MJHQN5	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:57 PM	
MJHQN5D	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN5L	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN5S	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN6	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN6	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:59 PM	
MJHQN7	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN7	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/28/16 6:58 PM	
MJHQN7	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:58 PM	
MJHQN7	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 6:58 PM	
MJHQP4	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
PBW167	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
PBW167	Water	Hardness	Validated Result	0.028	0.033	Don Matheny	9/29/16 10:43 AM	
PBW167	Water	Hardness	Validation		U	Don	9/29/16 10:43 AM	

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
PBW167	Water	Hardness	Flag		U	Matheny	9/29/16 10:43 AM	

Method: Metals by ICP-MS

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCSD59	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQE4	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQE4	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:11 AM	
MJHQE9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQE9	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:11 AM	
MJHQF0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQF0	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:15 AM	
MJHQF1	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQF1	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:12 AM	
MJHQJ2	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQJ2	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:15 AM	
MJHQJ3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQJ3	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:11 AM	
MJHQJ8	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQJ8	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:15 AM	
MJHQJ9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQJ9	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:11 AM	
MJHQK0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQK0	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:12 AM	
MJHQL0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQL0	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:15 AM	
MJHQL1	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQL1	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:15 AM	
MJHQL2	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQL2	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:14 AM	
MJHQM3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQM3	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:10 AM	
MJHQM4	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQM4	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:11 AM	
MJHQM5	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQM5	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:10 AM	
MJHQN3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN3	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:15 AM	
MJHQN5	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN5	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:11 AM	
MJHQN5D	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN5L	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN5S	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN6	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN6	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:14 AM	
MJHQN7	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQN7	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:12 AM	
MJHQP4	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
MJHQP4	Water	Lead	Validation Flag	J	JQ	Don Matheny	9/29/16 10:15 AM	
PBWD59	Water		Validation Level		S4VEM	Don Matheny	9/29/16 10:16 AM	Y
PBWD59	Water	Sodium	Validated Result	-180	500	Don Matheny	9/29/16 10:26 AM	
PBWD59	Water	Sodium	Validation Flag		U	Don Matheny	9/29/16 10:26 AM	

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MEMORANDUM

DATE: October 5, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 20 water samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Total Metals (EPA CLP SOW ISM02.3) were performed at Chemtex, Inc., Port Arthur, Texas. All sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM).

The samples were numbered:

MJHQE5	MJHQE6	MJHQE7	MJHQE8	MJHQJ0
MJHQJ1	MJHQJ4	MJHQJ5	MJHQJ6	MJHQJ7
MJHQL3	MJHQL4	MJHQL5	MJHQM6	MJHQM7
MJHQM8	MJHQN8	MJHQP0	MJHQP2	MJHQP3

No issues were noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

October 4, 2016

MEMORANDUM

SUBJECT: Data Validation Report for the Cinnabar Mine Removal, Case# 46386, SDG: MJHQE5, Inorganic Analyses

FROM: Don Matheny, Chemist
Environmental Services Unit, OEA

TO: Brooks Stanfield, On-Scene Coordinator
Greg Weigel, On-Scene Coordinator
Office of Environmental Cleanup

CC: Rene Nordeen, Ecology & Environment

The quality assurance (QA) review of the analytical data generated from the analysis of twenty water samples collected from the above referenced site has been completed. These samples were analyzed for total metals (including mercury) and hardness by Chemtex, located in Port Arthur, TX.

Sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM). The validation was conducted according to the Quality Control Specifications outlined in:

- Cinnabar Mine Site Specific Sampling Plan, E&E, (July, 2016)
- USEPA CLP Statement of Work for Inorganic Superfund Methods (ISM02.3)
- National Functional Guidelines for Inorganic Superfund Data Review (EPA-540-R-10-011)
- Guidance for Labeling Externally Validated Laboratory Analytical Data (EPA-540-R08-005)

Some data may be qualified using the reviewer's professional judgment. The conclusions presented herein are based on the information provided for the review. A summary of samples evaluated in this validation report and the pertinent dates for sample collection, laboratory sample receipt and analyses is attached along with the validated data.

I. QUALITY CONTROL RESULTS SUMMARY

The table below summarizes the major sample quality control (QC) tests, associated test results, criteria for evaluation and identification of outliers. Some criteria for evaluation may be QAPP specific and different from the National Functional Guidelines. Certain QC tests are electronically evaluated the results of which are not summarized in the table below though any excursions of these tests will appear in the *Data Qualifications* section. In addition to the QC tests, calculations from 10% of the samples are verified against the raw data.

QC Results Summary

Quality Control Test[1]	Result Ranges	Outliers[2] (Y or N)	Evaluation Criteria
Preservation / Holding Times	Holding Times met	N	Cool ≤ 6°C, pH < 2 Metals 180 Days; Hg 28 Days
MS Tune	Tune criteria met	N	≤ 0.1 amu; ≤ 5% RSD
Instrument Calibration	Calibration criteria met	N	± 30% Difference; Corr. Coeff. ≥ 0.995
Calibration Verification	All checks passed	N	Metals 90 – 110% Recovery Hg 85 – 115% Recovery
Interference Check Std.	94 – 111%	N	80 – 120% Recovery
Lab Blanks	**Detects Reported**	**Y**	**Not detected or <10% of Sample**
Matrix Spike	78 - 113%	N	75 - 125% Recovery
Lab Duplicate	± CRQL	N	≤ 20% RPD or ± CRQL
LCS (blank spike)	91 - 117%	N	70 - 130% Recovery
Serial Dilution[3]	N/A	N	≤ 10% Difference

[1] Lab QC (matrix spike, lab duplicate, serial dilution) were performed on samples MJHQE5.

[2] See the "*Data Qualifications*" section below for QC excursions and qualification of affected data.

[3] The concentration of elements was too low for conducting a 1:5 Serial Dilution.

II. DATA QUALIFICATIONS

Summary of Data Validation Qualifiers Applied

After the manual and electronic data review, the following data qualifications were applied:

1. **Laboratory Blanks** - The following analytes have detected sample results < CRQLs and the associated continuing calibration blanks were also detected at concentrations < CRQLs.

Data Qualifications: Sample results are qualified U and the values elevated to the CRQLs.	
Qualified Analytical Results:	
Manganese –	MJHQJ4, MJHQL3, MJHQL4, MJHQM6, MJHQM8, MJHQN8
Selenium -	MJHQP2

2. **Detection / Quantitation Limits** - The following analytes have positively detected results < CRQLs (below the range of quantitation) and the associated laboratory blanks were not detected.

Data Qualifications: Sample results are qualified JQ with no indication of bias.	
Qualified Analytical Results:	
Aluminum -	MJHQJ1, MJHQJ4, MJHQJ5, MJHQL4, MJHQP2
Arsenic –	MJHQE5, MJHQE6, MJHQE7, MJHQE8, MJHQP0
Barium –	MJHQP2
Cadmium –	MJHQP2
Iron –	MJHQM8
Lead -	MJHQE6, MJHQJ1, MJHQM8, MJHQP3
Magnesium –	MJHQE5, MJHQE6, MJHQE7, MJHQE8, MJHQJ4, MJHQJ5, MJHQJ6, MJHQM7, MJHQM8, MJHQN8, MJHQP2
Potassium –	MJHQE5, MJHQE6, MJHQE7, MJHQE8, MJHQJ0, MJHQJ1, MJHQJ4, MJHQJ5, MJHQJ6, MJHQJ7, MJHQL3, MJHQL4, MJHQL5, MJHQM6, MJHQM7, MJHQM8, MJHQN8, MJHQP0, MJHQP2
Silver -	MJHQP2
Sodium –	MJHQE6, MJHQE7, MJHQE8, MJHQJ0, MJHQJ1, MJHQJ4, MJHQJ5, MJHQJ6, MJHQJ7, MJHQN8, MJHQP0, MJHQP2
Zinc -	MJHQM8, MJHQP2

Data Qualifiers

The data qualifiers and their respective definitions applied to the sample result(s) are provided as follows.

Functional Guidelines Data Qualifiers	
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The associated value is an estimated quantity.
UJ	The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The data are unusable. The analyte may or may not be present in the sample.
Project Specific Data Qualifiers	
L	Low bias.
H	High bias.
K	Unknown Bias.
Q	Detected concentration is below the MRL / CRQL but is above the MDL.

III. SAMPLE INDEX

The sample listing dates of sample collection, laboratory receipt and analysis are provided below.

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis	Mercury Analysis
MJHQE5	Water	8/26/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQE6	Water	8/22/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQE7	Water	8/22/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQE8	Water	8/22/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQJ0	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQJ1	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQJ4	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQJ5	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQJ6	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQJ7	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQL3	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQL4	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQL5	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQM6	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQM7	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis	Mercury Analysis
MJHQM8	Water	8/24/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQN8	Water	8/26/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQP0	Water	8/26/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQP2	Water	8/25/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016
MJHQP3	Water	8/25/2016	8/30/2016	9/10/2016	9/14/2016	9/10/2016

Sample MJHQP3 is an equipment rinsate blank (field blank).

Sample Summary Report

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQE5	Lab Code:	CHX

Sample Number:	LCS168	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:		pH:		Sample Date:		Sample Time:	
% Moisture :				% Solids :	100		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	364		ug/L	364		1	Yes	S4VEM
Antimony	Target	114		ug/L	114		1	Yes	S4VEM
Arsenic	Target	18.4		ug/L	18.4		1	Yes	S4VEM
Barium	Target	391		ug/L	391		1	Yes	S4VEM
Beryllium	Target	10.3		ug/L	10.3		1	Yes	S4VEM
Calcium	Target	10400		ug/L	10400		1	Yes	S4VEM
Chromium	Target	23.3		ug/L	23.3		1	Yes	S4VEM
Cobalt	Target	97.6		ug/L	97.6		1	Yes	S4VEM
Iron	Target	207		ug/L	207		1	Yes	S4VEM
Magnesium	Target	9360		ug/L	9360		1	Yes	S4VEM
Manganese	Target	31.3		ug/L	31.3		1	Yes	S4VEM
Nickel	Target	78.6		ug/L	78.6		1	Yes	S4VEM
Potassium	Target	9630		ug/L	9630		1	Yes	S4VEM
Sodium	Target	9680		ug/L	9680		1	Yes	S4VEM
Thallium	Target	52.0		ug/L	52.0		1	Yes	S4VEM
Vanadium	Target	116		ug/L	116		1	Yes	S4VEM
Zinc	Target	115		ug/L	115		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: LCSD60	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	2.0		ug/L	2.0		1	Yes	S4VEM
Copper	Target	4.2		ug/L	4.2		1	Yes	S4VEM
Lead	Target	1.9		ug/L	1.9		1	Yes	S4VEM
Selenium	Target	10.5		ug/L	10.5		1	Yes	S4VEM
Silver	Target	2.1		ug/L	2.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE5	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	BG04SW	pH:		Sample Date:	08/26/2016	Sample Time:	11:34:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQE5	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: BG04SW	pH:	Sample Date: 08/26/2016	Sample Time: 11:34:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	9.0	JQ	ug/L	9.0	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	7980		ug/L	7980		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3420	JQ	ug/L	3420	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	754	JQ	ug/L	754	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	34.0		mg/L	34.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQE5	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: BG04SW	pH:	Sample Date: 08/26/2016	Sample Time: 11:34:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.7		ug/L	6.7		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQE5D	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 11:34:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.7		ug/L	6.7		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQE5D	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 11:34:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	7.9	J	ug/L	7.9	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	7980		ug/L	7980		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3390	J	ug/L	3390	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	725	J	ug/L	725	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	33.9		mg/L	33.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE5D	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	11:34:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQE5L	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	1000	U	ug/L	1000	U	5	Yes	S4VEM
Antimony	Target	300	U	ug/L	300	U	5	Yes	S4VEM
Arsenic	Target	50.0	U	ug/L	50.0	U	5	Yes	S4VEM
Barium	Target	1000	U	ug/L	1000	U	5	Yes	S4VEM
Beryllium	Target	25.0	U	ug/L	25.0	U	5	Yes	S4VEM
Calcium	Target	7920	J	ug/L	7920	J	5	Yes	S4VEM
Chromium	Target	50.0	U	ug/L	50.0	U	5	Yes	S4VEM
Cobalt	Target	250	U	ug/L	250	U	5	Yes	S4VEM
Iron	Target	500	U	ug/L	500	U	5	Yes	S4VEM
Magnesium	Target	3320	J	ug/L	3320	J	5	Yes	S4VEM
Manganese	Target	75.0	U	ug/L	75.0	U	5	Yes	S4VEM
Nickel	Target	200	U	ug/L	200	U	5	Yes	S4VEM
Potassium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Sodium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Thallium	Target	125	U	ug/L	125	U	5	Yes	S4VEM
Vanadium	Target	250	U	ug/L	250	U	5	Yes	S4VEM
Zinc	Target	300	U	ug/L	300	U	5	Yes	S4VEM
Hardness	Derived	33.4		mg/L	33.4		5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQE5L	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM
Copper	Target	8.2	J	ug/L	8.2	J	5	Yes	S4VEM
Lead	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM
Selenium	Target	25.0	U	ug/L	25.0	U	5	Yes	S4VEM
Silver	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQE5S	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 11:34:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Spike	55.3		ug/L	55.3		1	Yes	S4VEM
Copper	Spike	279		ug/L	279		1	Yes	S4VEM
Lead	Spike	19.0		ug/L	19.0		1	Yes	S4VEM
Selenium	Spike	104		ug/L	104		1	Yes	S4VEM
Silver	Spike	51.9		ug/L	51.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQE5S	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 11:34:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Spike	1860		ug/L	1860		1	Yes	S4VEM
Antimony	Spike	91.6		ug/L	91.6		1	Yes	S4VEM
Arsenic	Spike	46.7		ug/L	46.7		1	Yes	S4VEM
Barium	Spike	1990		ug/L	1990		1	Yes	S4VEM
Beryllium	Spike	51.0		ug/L	51.0		1	Yes	S4VEM
Chromium	Spike	225		ug/L	225		1	Yes	S4VEM
Cobalt	Spike	471		ug/L	471		1	Yes	S4VEM
Iron	Spike	1080		ug/L	1080		1	Yes	S4VEM
Manganese	Spike	498		ug/L	498		1	Yes	S4VEM
Nickel	Spike	473		ug/L	473		1	Yes	S4VEM
Thallium	Spike	49.0		ug/L	49.0		1	Yes	S4VEM
Vanadium	Spike	556		ug/L	556		1	Yes	S4VEM
Zinc	Spike	461		ug/L	461		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE5S	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	11:34:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Spike	0.78		ug/L	0.78		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE6	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC01SW	pH:		Sample Date:	08/22/2016	Sample Time:	16:26:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	0.18	JQ	ug/L	0.18	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQE6	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: SC01SW	pH:	Sample Date: 08/22/2016	Sample Time: 16:26:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	5.8	JQ	ug/L	5.8	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	17100		ug/L	17100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2250	JQ	ug/L	2250	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	803	JQ	ug/L	803	J	1	Yes	S4VEM
Sodium	Target	2270	JQ	ug/L	2270	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	51.9		mg/L	51.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE6	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	SC01SW	pH:		Sample Date:	08/22/2016	Sample Time:	16:26:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE7	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC02SW	pH:		Sample Date:	08/22/2016	Sample Time:	17:33:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQE7	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: SC02SW	pH:	Sample Date: 08/22/2016	Sample Time: 17:33:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	4.8	JQ	ug/L	4.8	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	17600		ug/L	17600		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2080	JQ	ug/L	2080	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	794	JQ	ug/L	794	J	1	Yes	S4VEM
Sodium	Target	2550	JQ	ug/L	2550	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	52.5		mg/L	52.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE7	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	SC02SW	pH:		Sample Date:	08/22/2016	Sample Time:	17:33:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQE8	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: SC03SW	pH:	Sample Date: 08/22/2016	Sample Time: 18:20:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	5.6	JQ	ug/L	5.6	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	17700		ug/L	17700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	1990	JQ	ug/L	1990	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	774	JQ	ug/L	774	J	1	Yes	S4VEM
Sodium	Target	2570	JQ	ug/L	2570	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	52.3		mg/L	52.3		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE8	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC03SW	pH:		Sample Date:	08/22/2016	Sample Time:	18:20:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQE8	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	SC03SW	pH:		Sample Date:	08/22/2016	Sample Time:	18:20:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQJ0	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF02SW	pH:	Sample Date: 08/24/2016	Sample Time: 13:58:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	27.9		ug/L	27.9		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	28700		ug/L	28700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5670		ug/L	5670		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1590	JQ	ug/L	1590	J	1	Yes	S4VEM
Sodium	Target	722	JQ	ug/L	722	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	94.9		mg/L	94.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ0	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	WF02SW	pH:		Sample Date:	08/24/2016	Sample Time:	13:58:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.3		ug/L	6.3		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ0	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	WF02SW	pH:		Sample Date:	08/24/2016	Sample Time:	13:58:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQJ1	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WT01SW	pH:	Sample Date: 08/24/2016	Sample Time: 16:04:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	53.9	JQ	ug/L	53.9	J	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	229		ug/L	229		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	29500		ug/L	29500		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	308		ug/L	308		1	Yes	S4VEM
Magnesium	Target	10400		ug/L	10400		1	Yes	S4VEM
Manganese	Target	47.4		ug/L	47.4		1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	731	JQ	ug/L	731	J	1	Yes	S4VEM
Sodium	Target	643	JQ	ug/L	643	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	117		mg/L	117		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ1	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	WT01SW	pH:		Sample Date:	08/24/2016	Sample Time:	16:04:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.9		ug/L	6.9		1	Yes	S4VEM
Lead	Target	0.28	JQ	ug/L	0.28	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ1	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	WT01SW	pH:		Sample Date:	08/24/2016	Sample Time:	16:04:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ4	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC04SW	pH:		Sample Date:	08/24/2016	Sample Time:	11:33:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.8		ug/L	6.8		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQJ4	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: CC04SW	pH:	Sample Date: 08/24/2016	Sample Time: 11:33:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	87.3	JQ	ug/L	87.3	J	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	13.8		ug/L	13.8		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	20800		ug/L	20800		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	4140	JQ	ug/L	4140	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	2.6	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1050	JQ	ug/L	1050	J	1	Yes	S4VEM
Sodium	Target	1030	JQ	ug/L	1030	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	68.9		mg/L	68.9		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQE5	Lab Code:	CHX

Sample Number:	MJHQJ4	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	CC04SW	pH:		Sample Date:	08/24/2016	Sample Time:	11:33:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ5	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC055SW	pH:		Sample Date:	08/24/2016	Sample Time:	12:03:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQE5	Lab Code:	CHX

Sample Number:	MJHQJ5	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	CC055SW	pH:		Sample Date:	08/24/2016	Sample Time:	12:03:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQJ5	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: CC055SW	pH:	Sample Date: 08/24/2016	Sample Time: 12:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	88.1	JQ	ug/L	88.1	J	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	15.2		ug/L	15.2		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	21200		ug/L	21200		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	4240	JQ	ug/L	4240	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1050	JQ	ug/L	1050	J	1	Yes	S4VEM
Sodium	Target	1050	JQ	ug/L	1050	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	70.3		mg/L	70.3		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQJ6	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: BG03SW	pH:	Sample Date: 08/24/2016	Sample Time: 12:33:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	12000		ug/L	12000		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2510	JQ	ug/L	2510	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	645	JQ	ug/L	645	J	1	Yes	S4VEM
Sodium	Target	1220	JQ	ug/L	1220	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	40.4		mg/L	40.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ6	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	BG03SW	pH:		Sample Date:	08/24/2016	Sample Time:	12:33:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQJ6	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: BG03SW	pH:	Sample Date: 08/24/2016	Sample Time: 12:33:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.9		ug/L	6.9		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ7	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	WF01SW	pH:		Sample Date:	08/24/2016	Sample Time:	13:01:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQJ7	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF01SW	pH:	Sample Date: 08/24/2016	Sample Time: 13:01:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	28.7		ug/L	28.7		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	30200		ug/L	30200		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	6010		ug/L	6010		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1570	JQ	ug/L	1570	J	1	Yes	S4VEM
Sodium	Target	730	JQ	ug/L	730	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	100		mg/L	100		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQJ7	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	WF01SW	pH:		Sample Date:	08/24/2016	Sample Time:	13:01:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQL3	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF03SW	pH:	Sample Date: 08/24/2016	Sample Time: 15:30:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQL3	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	WF03SW	pH:		Sample Date:	08/24/2016	Sample Time:	15:30:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQL3	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF03SW	pH:	Sample Date: 08/24/2016	Sample Time: 15:30:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	21.4		ug/L	21.4		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	21100		ug/L	21100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5610		ug/L	5610		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	4.7	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1220	JQ	ug/L	1220	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	75.7		mg/L	75.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQL4	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF04SW	pH:	Sample Date: 08/24/2016	Sample Time: 16:16:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	97.0	JQ	ug/L	97.0	J	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	20.8		ug/L	20.8		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	21300		ug/L	21300		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5750		ug/L	5750		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	4.0	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1260	JQ	ug/L	1260	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	76.9		mg/L	76.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQL4	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	WF04SW	pH:		Sample Date:	08/24/2016	Sample Time:	16:16:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQL4	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF04SW	pH:	Sample Date: 08/24/2016	Sample Time: 16:16:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.7		ug/L	6.7		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQE5	Lab Code:	CHX

Sample Number:	MJHQL5	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	WF05SW	pH:		Sample Date:	08/24/2016	Sample Time:	16:48:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQL5	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF05SW	pH:	Sample Date: 08/24/2016	Sample Time: 16:48:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	19.9		ug/L	19.9		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	22100		ug/L	22100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5890		ug/L	5890		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1290	JQ	ug/L	1290	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	79.5		mg/L	79.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQL5	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	WF05SW	pH:		Sample Date:	08/24/2016	Sample Time:	16:48:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.8		ug/L	6.8		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQE5	Lab Code:	CHX

Sample Number:	MJHQM6	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	AD01SW	pH:		Sample Date:	08/24/2016	Sample Time:	14:06:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQM6	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:	AD01SW	pH:		Sample Date:	08/24/2016	Sample Time:	14:06:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	43.3		ug/L	43.3		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	22700		ug/L	22700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	8950		ug/L	8950		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	2.9	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1210	JQ	ug/L	1210	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	93.5		mg/L	93.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQM6	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	AD01SW	pH:		Sample Date:	08/24/2016	Sample Time:	14:06:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.2		ug/L	6.2		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQM7	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	AD02SW	pH:		Sample Date:	08/24/2016	Sample Time:	14:55:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQM7	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: AD02SW	pH:	Sample Date: 08/24/2016	Sample Time: 14:55:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	40.3		ug/L	40.3		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	9700		ug/L	9700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2650	JQ	ug/L	2650	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	906	JQ	ug/L	906	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	35.1		mg/L	35.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQM7	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: AD02SW	pH:	Sample Date: 08/24/2016	Sample Time: 14:55:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQM8	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: AD03SW	pH:	Sample Date: 08/24/2016	Sample Time: 16:12:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	32.4		ug/L	32.4		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	12600		ug/L	12600		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	89.0	JQ	ug/L	89.0	J	1	Yes	S4VEM
Magnesium	Target	3560	JQ	ug/L	3560	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	9.3	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	766	JQ	ug/L	766	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	6.8	JQ	ug/L	6.8	J	1	Yes	S4VEM
Hardness	Derived	46.1		mg/L	46.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQM8	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	AD03SW	pH:		Sample Date:	08/24/2016	Sample Time:	16:12:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.8		ug/L	6.8		1	Yes	S4VEM
Lead	Target	0.27	JQ	ug/L	0.27	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQM8	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	AD03SW	pH:		Sample Date:	08/24/2016	Sample Time:	16:12:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQN8	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: UT01SW	pH:	Sample Date: 08/26/2016	Sample Time: 09:54:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	13.3		ug/L	13.3		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	19700		ug/L	19700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	1700	JQ	ug/L	1700	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	4.3	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	779	JQ	ug/L	779	J	1	Yes	S4VEM
Sodium	Target	3610	JQ	ug/L	3610	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	56.2		mg/L	56.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: MJHQN8	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: UT01SW	pH:	Sample Date: 08/26/2016	Sample Time: 09:54:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQN8	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	UT01SW	pH:		Sample Date:	08/26/2016	Sample Time:	09:54:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQP0	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	WF07SW	pH:		Sample Date:	08/26/2016	Sample Time:	11:01:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQP0	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF07SW	pH:	Sample Date: 08/26/2016	Sample Time: 11:01:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	6.3	JQ	ug/L	6.3	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	35500		ug/L	35500		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	8520		ug/L	8520		1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1700	JQ	ug/L	1700	J	1	Yes	S4VEM
Sodium	Target	732	JQ	ug/L	732	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	124		mg/L	124		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQP0	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	WF07SW	pH:		Sample Date:	08/26/2016	Sample Time:	11:01:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQP2	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	AD04SW	pH:		Sample Date:	08/25/2016	Sample Time:	15:40:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	0.27	JQ	ug/L	0.27	J	1	Yes	S4VEM
Copper	Target	10.0		ug/L	10.0		1	Yes	S4VEM
Lead	Target	1.8		ug/L	1.8		1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	1.1	J	1	Yes	S4VEM
Silver	Target	0.27	JQ	ug/L	0.27	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQP2	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	AD04SW	pH:		Sample Date:	08/25/2016	Sample Time:	15:40:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQP2	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: AD04SW	pH:	Sample Date: 08/25/2016	Sample Time: 15:40:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	75.3	JQ	ug/L	75.3	J	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	659		ug/L	659		1	Yes	S4VEM
Barium	Target	55.9	JQ	ug/L	55.9	J	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	15900		ug/L	15900		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	13400		ug/L	13400		1	Yes	S4VEM
Magnesium	Target	4440	JQ	ug/L	4440	J	1	Yes	S4VEM
Manganese	Target	459		ug/L	459		1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1410	JQ	ug/L	1410	J	1	Yes	S4VEM
Sodium	Target	664	JQ	ug/L	664	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	13.6	JQ	ug/L	13.6	J	1	Yes	S4VEM
Hardness	Derived	58.1		mg/L	58.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: MJHQP3	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: RI01WT	pH:	Sample Date: 08/25/2016	Sample Time: 14:29:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	0.033	U	mg/L	0.033	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number:	MJHQP3	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	RI01WT	pH:		Sample Date:	08/25/2016	Sample Time:	14:29:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	0.20	JQ	ug/L	0.20	J	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQE5	Lab Code:	CHX

Sample Number:	MJHQP3	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	RI01WT	pH:		Sample Date:	08/25/2016	Sample Time:	14:29:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: PBW168	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	0.033	U	mg/L	0.033	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX
Sample Number: PBWD60	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	2.0	U	ug/L	2.0	U	1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQE5	Lab Code: CHX

Sample Number: PBWH50	Method: Mercury by Cold Vapor	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Edit History Report

Case No: 46386 Contract: EPW15007 SDG No: MJHQE5 Lab Code: CHX

Method: Metals by ICP-AES

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCS168	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	10/4/16 3:48 PM	
MJHQE5	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:48 PM	
MJHQE5	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:48 PM	
MJHQE5D	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5L	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5S	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE6	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	10/4/16 3:54 PM	
MJHQE6	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:54 PM	
MJHQE6	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:54 PM	
MJHQE6	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:54 PM	
MJHQE7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE7	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	10/4/16 3:52 PM	
MJHQE7	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:52 PM	
MJHQE7	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:52 PM	
MJHQE7	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:52 PM	
MJHQE8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE8	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	10/4/16 3:53 PM	
MJHQE8	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:53 PM	
MJHQE8	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:53 PM	
MJHQE8	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:53 PM	
MJHQJ0	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ0	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:50 PM	
MJHQJ0	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:50 PM	
MJHQJ1	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ1	Water	Aluminum	Validation Flag	J	JQ	Don Matheny	10/4/16 3:53 PM	
MJHQJ1	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:53 PM	
MJHQJ1	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:53 PM	
MJHQJ4	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ4	Water	Aluminum	Validation Flag	J	JQ	Don Matheny	10/4/16 3:47 PM	
MJHQJ4	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:47 PM	
MJHQJ4	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:47 PM	
MJHQJ4	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:47 PM	
MJHQJ5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQJ5	Water	Aluminum	Validation Flag	J	JQ	Don Matheny	10/4/16 3:49 PM	
MJHQJ5	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:49 PM	
MJHQJ5	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:49 PM	
MJHQJ5	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:49 PM	
MJHQJ6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ6	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:50 PM	
MJHQJ6	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:50 PM	
MJHQJ6	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:50 PM	
MJHQJ7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ7	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:49 PM	
MJHQJ7	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:49 PM	
MJHQL3	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL3	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:52 PM	
MJHQL4	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL4	Water	Aluminum	Validation Flag	J	JQ	Don Matheny	10/4/16 3:48 PM	
MJHQL4	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:48 PM	
MJHQL5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL5	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:50 PM	
MJHQM6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM6	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:51 PM	
MJHQM7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM7	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:51 PM	
MJHQM7	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:51 PM	
MJHQM8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM8	Water	Iron	Validation Flag	J	JQ	Don Matheny	10/4/16 3:46 PM	
MJHQM8	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:46 PM	
MJHQM8	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:46 PM	
MJHQM8	Water	Zinc	Validation Flag	J	JQ	Don Matheny	10/4/16 3:46 PM	
MJHQN8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQN8	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:47 PM	
MJHQN8	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:47 PM	
MJHQN8	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:47 PM	
MJHQP0	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP0	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	10/4/16 3:48 PM	
MJHQP0	Water	Potassium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:48 PM	
MJHQP0	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:48 PM	
MJHQP2	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP2	Water	Aluminum	Validation Flag	J	JQ	Don Matheny	10/4/16 3:51 PM	
MJHQP2	Water	Barium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:51 PM	
MJHQP2	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:51 PM	
MJHQP2	Water	Potassium	Validation	J	JQ	Don	10/4/16 3:51 PM	

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQP2	Water	Potassium	Flag	J	JQ	Matheny	10/4/16 3:51 PM	
MJHQP2	Water	Sodium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:51 PM	
MJHQP2	Water	Zinc	Validation Flag	J	JQ	Don Matheny	10/4/16 3:51 PM	
MJHQP3	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
PBW168	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y

Method: Metals by ICP-MS

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCSD60	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5D	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5L	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5S	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE6	Water	Lead	Validation Flag	J	JQ	Don Matheny	10/4/16 3:56 PM	
MJHQE7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ0	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ1	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ1	Water	Lead	Validation Flag	J	JQ	Don Matheny	10/4/16 3:57 PM	
MJHQJ4	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL3	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL4	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM8	Water	Lead	Validation Flag	J	JQ	Don Matheny	10/4/16 3:56 PM	
MJHQN8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP0	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP2	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP2	Water	Cadmium	Validation Flag	J	JQ	Don Matheny	10/4/16 3:55 PM	
MJHQP2	Water	Silver	Validation Flag	J	JQ	Don Matheny	10/4/16 3:55 PM	

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQP3	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP3	Water	Lead	Validation Flag	J	JQ	Don Matheny	10/4/16 3:55 PM	
PBWD60	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y

Method: Mercury by Cold Vapor

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQE5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5D	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE5S	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQE8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ0	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ1	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ4	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQJ7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL3	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL4	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQL5	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM6	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM7	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQM8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQN8	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP0	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP2	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
MJHQP3	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y
PBWH50	Water		Validation Level		S4VEM	Don Matheny	10/4/16 3:57 PM	Y

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MEMORANDUM

DATE: October 6, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 3 soil/sediment samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Total Metals (EPA CLP SOW ISM02.3) were performed at Chemtex, Inc., Port Arthur, Texas. All sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM).

The samples were numbered:

MJHQF2 MJHQF3 MJHQF4

No issues were noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

October 6, 2016

MEMORANDUM

SUBJECT: Revised Data Validation Report for the Cinnabar Mine Removal, Case# 46386, SDG: MJHQF2, Inorganic Analyses

FROM: Don Matheny, Chemist
Environmental Services Unit, OEA

TO: Brooks Stanfield, On-Scene Coordinator
Greg Weigel, On-Scene Coordinator
Office of Environmental Cleanup

CC: Rene Nordeen, Ecology & Environment

This revised quality assurance (QA) review of the analytical data generated from the analysis of three sediment samples collected from the above referenced site has been completed. This revision corrects the sample listing on page 4. No changes to data qualification occurred. These samples were analyzed for total metals (including mercury) by Chemtex, located in Port Arthur, TX.

Sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM). The validation was conducted according to the Quality Control Specifications outlined in:

- Cinnabar Mine Site Specific Sampling Plan, E&E, (July, 2016)
- USEPA CLP Statement of Work for Inorganic Superfund Methods (ISM02.3)
- National Functional Guidelines for Inorganic Superfund Data Review (EPA-540-R-10-011)
- Guidance for Labeling Externally Validated Laboratory Analytical Data (EPA-540-R08-005)

Some data may be qualified using the reviewer's professional judgment. The conclusions presented herein are based on the information provided for the review. A summary of samples evaluated in this validation report and the pertinent dates for sample collection, laboratory sample receipt and analyses is attached along with the validated data.

I. QUALITY CONTROL RESULTS SUMMARY

The table below summarizes the major sample quality control (QC) tests, associated test results, criteria for evaluation and identification of outliers. Some criteria for evaluation may be QAPP specific and different from the National Functional Guidelines. Certain QC tests are electronically evaluated the results of which are not summarized in the table below though any excursions of these tests will appear in the *Data Qualifications* section. In addition to the QC tests, calculations from 10% of the samples are verified against the raw data.

QC Results Summary

Quality Control Test[1]	Result Ranges	Outliers[2] (Y or N)	Evaluation Criteria
Preservation / Holding Times	Holding Times met	N	Cool ≤ 6°C Metals 180 Days; Hg 28 Days
MS Tune	Tune criteria met	N	≤ 0.1 amu; ≤ 5% RSD
Instrument Calibration	Calibration criteria met	N	± 30% Difference; Corr. Coeff. ≥ 0.995
Calibration Verification	All checks passed	N	Metals 90 – 110% Recovery Hg 85 – 115% Recovery
Interference Check Std.	89 – 111%	N	80 – 120% Recovery
Lab Blanks	No significant detects reported	N	Not detected or <10% of Sample
Matrix Spike[3]	**17 - 106%**	**Y**	**75 - 125% Recovery**
Lab Duplicate	≤ 16% or ± 2xCRQL	N	≤ 35% RPD or ± 2xCRQL
LCS (blank spike)	95 - 115%	N	70 - 130% Recovery
Serial Dilution[4]	≤ 5%	N	≤ 10% Difference

[1] Lab QC (matrix spike, lab duplicate, serial dilution) were performed on sample MJHQF2.

[2] See the "*Data Qualifications*" section below for QC excursions and qualification of affected data.

3The native concentrations in the pre-spike sample were too high (> 4x) in comparison to the matrix spike concentrations for Arsenic and Mercury to allow for an evaluation of the spike recovery.

[4] The Serial Dilution results were only evaluated for Aluminum, Antimony, Arsenic, Calcium, Chromium, Iron and Manganese. The native concentrations of the remaining elements were too low for conducting a 1:5 Serial Dilution.

II. DATA QUALIFICATIONS

Summary of Data Validation Qualifiers Applied

After the manual and electronic data review, the following data qualifications were applied:

1. **Matrix Spike Recoveries -** The spike recovery for manganese was 17% and the post spike recovery (73%) fell below the minimally required 75% post spike recovery range. All manganese results were detected above the CRQL and qualified JL.

2. **Detection / Quantitation Limits -** The following analytes have positively detected results < CRQLs (below the range of quantitation) and the associated laboratory blanks were not detected.

Data Qualifications: Sample results are qualified JQ with no indication of bias.	
Qualified Analytical Results:	
Beryllium -	All samples
Selenium -	MJHQF4
Sodium –	All samples
Vanadium –	MJHQF3

Data Qualifiers

The data qualifiers and their respective definitions applied to the sample result(s) are provided as follows.

Functional Guidelines Data Qualifiers	
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The associated value is an estimated quantity.
UJ	The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The data are unusable. The analyte may or may not be present in the sample.
Project Specific Data Qualifiers	
L	Low bias.
H	High bias.
K	Unknown Bias.
Q	Detected concentration is below the MRL / CRQL but is above the MDL.

III. SAMPLE INDEX

The sample listing dates of sample collection, laboratory receipt and analysis are provided below.

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis	Mercury Analysis
MJHQF2	Sediment	8/23/2016	9/2/2016	9/10/2016	9/15/2016	9/10/2016
MJHQF3	Sediment	8/23/2016	9/2/2016	9/10/2016	9/15/2016	9/10/2016
MJHQF4	Sediment	8/23/2016	9/2/2016	9/10/2016	9/15/2016	9/10/2016

Sample Summary Report

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQF2	Lab Code:	CHX
Sample Number:	LCS171	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:		Sample Time:	
% Moisture :				% Solids :	100		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	39.1		mg/kg	39.1		1	Yes	S4VEM
Barium	Target	40.8		mg/kg	40.8		1	Yes	S4VEM
Beryllium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Cadmium	Target	1.0		mg/kg	1.0		1	Yes	S4VEM
Calcium	Target	1100		mg/kg	1100		1	Yes	S4VEM
Chromium	Target	2.3		mg/kg	2.3		1	Yes	S4VEM
Cobalt	Target	10.2		mg/kg	10.2		1	Yes	S4VEM
Copper	Target	5.1		mg/kg	5.1		1	Yes	S4VEM
Iron	Target	21.6		mg/kg	21.6		1	Yes	S4VEM
Lead	Target	2.1		mg/kg	2.1		1	Yes	S4VEM
Magnesium	Target	987		mg/kg	987		1	Yes	S4VEM
Manganese	Target	3.1		mg/kg	3.1		1	Yes	S4VEM
Nickel	Target	8.3		mg/kg	8.3		1	Yes	S4VEM
Potassium	Target	1010		mg/kg	1010		1	Yes	S4VEM
Selenium	Target	7.5		mg/kg	7.5		1	Yes	S4VEM
Sodium	Target	1010		mg/kg	1010		1	Yes	S4VEM
Vanadium	Target	11.4		mg/kg	11.4		1	Yes	S4VEM
Zinc	Target	11.9		mg/kg	11.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: LCSD63	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	1.9		mg/kg	1.9		1	Yes	S4VEM
Arsenic	Target	0.98		mg/kg	0.98		1	Yes	S4VEM
Silver	Target	1.0		mg/kg	1.0		1	Yes	S4VEM
Thallium	Target	0.97		mg/kg	0.97		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQF2	Lab Code:	CHX

Sample Number:	MJHQF2	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	CC01SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:13:00
% Moisture :				% Solids :	72.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	10.1		mg/kg	10.1		1	Yes	S4VEM
Arsenic	Target	113		mg/kg	113		1	Yes	S4VEM
Silver	Target	0.48	U	mg/kg	0.48	U	1	Yes	S4VEM
Thallium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number:	MJHQF2	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	CC01SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:13:00
% Moisture :				% Solids :	72.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5340		mg/kg	5340		1	Yes	S4VEM
Barium	Target	66.0		mg/kg	66.0		1	Yes	S4VEM
Beryllium	Target	0.27	JQ	mg/kg	0.27	J	1	Yes	S4VEM
Cadmium	Target	1.0		mg/kg	1.0		1	Yes	S4VEM
Calcium	Target	3680		mg/kg	3680		1	Yes	S4VEM
Chromium	Target	8.3		mg/kg	8.3		1	Yes	S4VEM
Cobalt	Target	9.5		mg/kg	9.5		1	Yes	S4VEM
Copper	Target	7.5		mg/kg	7.5		1	Yes	S4VEM
Iron	Target	10600		mg/kg	10600		1	Yes	S4VEM
Lead	Target	3.2		mg/kg	3.2		1	Yes	S4VEM
Magnesium	Target	2930		mg/kg	2930		1	Yes	S4VEM
Manganese	Target	211	JL	mg/kg	211	*	1	Yes	S4VEM
Nickel	Target	14.1		mg/kg	14.1		1	Yes	S4VEM
Potassium	Target	1250		mg/kg	1250		1	Yes	S4VEM
Selenium	Target	4.7	U	mg/kg	4.7	U	1	Yes	S4VEM
Sodium	Target	91.3	JQ	mg/kg	91.3	J	1	Yes	S4VEM
Vanadium	Target	9.2		mg/kg	9.2		1	Yes	S4VEM
Zinc	Target	22.7		mg/kg	22.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number:	MJHQF2	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	CC01SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:13:00
% Moisture :				% Solids :	72.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	64.7		mg/kg	64.7	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: MJHQF2A	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:13:00
% Moisture :		% Solids : 72.3	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Manganese	Spike	2450		mg/kg	2450		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number: MJHQF2D	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:13:00
% Moisture :		% Solids : 72.3	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	4680		mg/kg	4680		1	Yes	S4VEM
Barium	Target	58.1		mg/kg	58.1		1	Yes	S4VEM
Beryllium	Target	0.24	J	mg/kg	0.24	J	1	Yes	S4VEM
Cadmium	Target	0.88		mg/kg	0.88		1	Yes	S4VEM
Calcium	Target	3210		mg/kg	3210		1	Yes	S4VEM
Chromium	Target	7.2		mg/kg	7.2		1	Yes	S4VEM
Cobalt	Target	8.2		mg/kg	8.2		1	Yes	S4VEM
Copper	Target	6.6		mg/kg	6.6		1	Yes	S4VEM
Iron	Target	9280		mg/kg	9280		1	Yes	S4VEM
Lead	Target	2.8		mg/kg	2.8		1	Yes	S4VEM
Magnesium	Target	2580		mg/kg	2580		1	Yes	S4VEM
Manganese	Target	185		mg/kg	185		1	Yes	S4VEM
Nickel	Target	12.1		mg/kg	12.1		1	Yes	S4VEM
Potassium	Target	1080		mg/kg	1080		1	Yes	S4VEM
Selenium	Target	0.47	J	mg/kg	0.47	J	1	Yes	S4VEM
Sodium	Target	75.1	J	mg/kg	75.1	J	1	Yes	S4VEM
Vanadium	Target	8.1		mg/kg	8.1		1	Yes	S4VEM
Zinc	Target	19.4		mg/kg	19.4		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQF2	Lab Code:	CHX

Sample Number:	MJHQF2D	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/23/2016	Sample Time:	14:13:00
% Moisture :				% Solids :	72.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	66.6		mg/kg	66.6	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: MJHQF2D	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:13:00
% Moisture :		% Solids : 72.3	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	11.9		mg/kg	11.9		1	Yes	S4VEM
Arsenic	Target	128		mg/kg	128		1	Yes	S4VEM
Silver	Target	0.54	U	mg/kg	0.54	U	1	Yes	S4VEM
Thallium	Target	1.2		mg/kg	1.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: MJHQF2L	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 72.3	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	10.6		mg/kg	10.6		5	Yes	S4VEM
Arsenic	Target	108		mg/kg	108		5	Yes	S4VEM
Silver	Target	2.4	U	mg/kg	2.4	U	5	Yes	S4VEM
Thallium	Target	1.2	J	mg/kg	1.2	J	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: MJHQF2L	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 72.3	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5440		mg/kg	5440		5	Yes	S4VEM
Barium	Target	66.9	J	mg/kg	66.9	J	5	Yes	S4VEM
Beryllium	Target	3.4	U	mg/kg	3.4	U	5	Yes	S4VEM
Cadmium	Target	0.97	J	mg/kg	0.97	J	5	Yes	S4VEM
Calcium	Target	3730		mg/kg	3730		5	Yes	S4VEM
Chromium	Target	8.1		mg/kg	8.1		5	Yes	S4VEM
Cobalt	Target	9.1	J	mg/kg	9.1	J	5	Yes	S4VEM
Copper	Target	8.1	J	mg/kg	8.1	J	5	Yes	S4VEM
Iron	Target	11000		mg/kg	11000		5	Yes	S4VEM
Lead	Target	3.8	J	mg/kg	3.8	J	5	Yes	S4VEM
Magnesium	Target	2990	J	mg/kg	2990	J	5	Yes	S4VEM
Manganese	Target	218		mg/kg	218		5	Yes	S4VEM
Nickel	Target	13.6	J	mg/kg	13.6	J	5	Yes	S4VEM
Potassium	Target	1200	J	mg/kg	1200	J	5	Yes	S4VEM
Selenium	Target	23.5	U	mg/kg	23.5	U	5	Yes	S4VEM
Sodium	Target	3360	U	mg/kg	3360	U	5	Yes	S4VEM
Vanadium	Target	8.5	J	mg/kg	8.5	J	5	Yes	S4VEM
Zinc	Target	21.0	J	mg/kg	21.0	J	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number: MJHQF2S	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:13:00
% Moisture :		% Solids : 72.3	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Spike	19.4		mg/kg	19.4		1	Yes	S4VEM
Arsenic	Spike	119		mg/kg	119		1	Yes	S4VEM
Silver	Spike	4.8		mg/kg	4.8		1	Yes	S4VEM
Thallium	Spike	5.7		mg/kg	5.7		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQF2	Lab Code:	CHX

Sample Number:	MJHQF2S	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/23/2016	Sample Time:	14:13:00
% Moisture :				% Solids :	72.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Spike	106		mg/kg	106	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: MJHQF2S	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:13:00
% Moisture :		% Solids : 72.3	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Barium	Spike	485		mg/kg	485		1	Yes	S4VEM
Beryllium	Spike	11.4		mg/kg	11.4		1	Yes	S4VEM
Cadmium	Spike	11.2		mg/kg	11.2		1	Yes	S4VEM
Chromium	Spike	54.5		mg/kg	54.5		1	Yes	S4VEM
Cobalt	Spike	117		mg/kg	117		1	Yes	S4VEM
Copper	Spike	60.0		mg/kg	60.0		1	Yes	S4VEM
Lead	Spike	6.7		mg/kg	6.7		1	Yes	S4VEM
Manganese	Spike	229		mg/kg	229	*	1	Yes	S4VEM
Nickel	Spike	121		mg/kg	121		1	Yes	S4VEM
Selenium	Spike	20.8		mg/kg	20.8		1	Yes	S4VEM
Vanadium	Spike	126		mg/kg	126		1	Yes	S4VEM
Zinc	Spike	132		mg/kg	132		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number:	MJHQF3	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	CC02SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:55:00
% Moisture :				% Solids :	91.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	3.9		mg/kg	3.9	D	2	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number:	MJHQF3	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	CC02SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:55:00
% Moisture :				% Solids :	91.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	2150		mg/kg	2150		1	Yes	S4VEM
Barium	Target	34.5		mg/kg	34.5		1	Yes	S4VEM
Beryllium	Target	0.21	JQ	mg/kg	0.21	J	1	Yes	S4VEM
Cadmium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Calcium	Target	1310		mg/kg	1310		1	Yes	S4VEM
Chromium	Target	3.3		mg/kg	3.3		1	Yes	S4VEM
Cobalt	Target	5.4		mg/kg	5.4		1	Yes	S4VEM
Copper	Target	2.7		mg/kg	2.7		1	Yes	S4VEM
Iron	Target	7790		mg/kg	7790		1	Yes	S4VEM
Lead	Target	0.95		mg/kg	0.95		1	Yes	S4VEM
Magnesium	Target	670		mg/kg	670		1	Yes	S4VEM
Manganese	Target	67.2	JL	mg/kg	67.2	*	1	Yes	S4VEM
Nickel	Target	7.1		mg/kg	7.1		1	Yes	S4VEM
Potassium	Target	626		mg/kg	626		1	Yes	S4VEM
Selenium	Target	3.1	U	mg/kg	3.1	U	1	Yes	S4VEM
Sodium	Target	56.2	JQ	mg/kg	56.2	J	1	Yes	S4VEM
Vanadium	Target	3.8	JQ	mg/kg	3.8	J	1	Yes	S4VEM
Zinc	Target	10.3		mg/kg	10.3		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number:	MJHQF3	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	CC02SD	pH:		Sample Date:	08/23/2016	Sample Time:	14:55:00
% Moisture :				% Solids :	91.0		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	9.6		mg/kg	9.6		1	Yes	S4VEM
Arsenic	Target	102		mg/kg	102		1	Yes	S4VEM
Silver	Target	0.47	U	mg/kg	0.47	U	1	Yes	S4VEM
Thallium	Target	2.5		mg/kg	2.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number:	MJHQF4	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	CC03SD	pH:		Sample Date:	08/23/2016	Sample Time:	16:43:00
% Moisture :				% Solids :	82.7		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	9.5		mg/kg	9.5		1	Yes	S4VEM
Arsenic	Target	98.4		mg/kg	98.4		1	Yes	S4VEM
Silver	Target	0.54	U	mg/kg	0.54	U	1	Yes	S4VEM
Thallium	Target	1.7		mg/kg	1.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number:	MJHQF4	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	CC03SD	pH:		Sample Date:	08/23/2016	Sample Time:	16:43:00
% Moisture :				% Solids :	82.7		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	223		mg/kg	223	D	250	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: MJHQF4	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location: CC03SD	pH:	Sample Date: 08/23/2016	Sample Time: 16:43:00
% Moisture :		% Solids : 82.7	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5630		mg/kg	5630		1	Yes	S4VEM
Barium	Target	43.0		mg/kg	43.0		1	Yes	S4VEM
Beryllium	Target	0.29	JQ	mg/kg	0.29	J	1	Yes	S4VEM
Cadmium	Target	1.0		mg/kg	1.0		1	Yes	S4VEM
Calcium	Target	4040		mg/kg	4040		1	Yes	S4VEM
Chromium	Target	8.9		mg/kg	8.9		1	Yes	S4VEM
Cobalt	Target	11.9		mg/kg	11.9		1	Yes	S4VEM
Copper	Target	8.3		mg/kg	8.3		1	Yes	S4VEM
Iron	Target	10800		mg/kg	10800		1	Yes	S4VEM
Lead	Target	4.7		mg/kg	4.7		1	Yes	S4VEM
Magnesium	Target	3650		mg/kg	3650		1	Yes	S4VEM
Manganese	Target	187	JL	mg/kg	187	*	1	Yes	S4VEM
Nickel	Target	20.6		mg/kg	20.6		1	Yes	S4VEM
Potassium	Target	1120		mg/kg	1120		1	Yes	S4VEM
Selenium	Target	0.39	JQ	mg/kg	0.39	J	1	Yes	S4VEM
Sodium	Target	64.8	JQ	mg/kg	64.8	J	1	Yes	S4VEM
Vanadium	Target	10.0		mg/kg	10.0		1	Yes	S4VEM
Zinc	Target	28.2		mg/kg	28.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: PBS171	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	mg/kg	20.0	U	1	Yes	S4VEM
Barium	Target	20.0	U	mg/kg	20.0	U	1	Yes	S4VEM
Beryllium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Cadmium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Calcium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Chromium	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Cobalt	Target	5.0	U	mg/kg	5.0	U	1	Yes	S4VEM
Copper	Target	2.5	U	mg/kg	2.5	U	1	Yes	S4VEM
Iron	Target	10.0	U	mg/kg	10.0	U	1	Yes	S4VEM
Lead	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Magnesium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Manganese	Target	1.5	U	mg/kg	1.5	U	1	Yes	S4VEM
Nickel	Target	4.0	U	mg/kg	4.0	U	1	Yes	S4VEM
Potassium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Selenium	Target	3.5	U	mg/kg	3.5	U	1	Yes	S4VEM
Sodium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Vanadium	Target	5.0	U	mg/kg	5.0	U	1	Yes	S4VEM
Zinc	Target	6.0	U	mg/kg	6.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX
Sample Number: PBSD63	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Arsenic	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Silver	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Thallium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQF2	Lab Code: CHX

Sample Number: PBSH47	Method: Mercury by Cold Vapor	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.1	U	mg/kg	-.0063	J	1	Yes	S4VEM

Edit History Report

Case No: 46386 Contract: EPW15007 SDG No: MJHQF2 Lab Code: CHX

Method: Mercury by Cold Vapor

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQF2	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 4:59 PM	
MJHQF2D	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2S	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF3	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF3	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 4:59 PM	
MJHQF4	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF4	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 4:59 PM	
PBSH47	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
PBSH47	Soil	Mercury	Validated Result	-.0063	0.1	Don Matheny	9/29/16 4:54 PM	
PBSH47	Soil	Mercury	Validation Flag		U	Don Matheny	9/29/16 4:54 PM	

Method: Metals by ICP-AES

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCS171	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	9/29/16 4:55 PM	
MJHQF2	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	9/29/16 4:55 PM	
MJHQF2	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 4:55 PM	
MJHQF2A	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2D	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2L	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2S	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF3	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF3	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	9/29/16 4:56 PM	
MJHQF3	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	9/29/16 4:56 PM	
MJHQF3	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 4:56 PM	
MJHQF3	Soil	Vanadium	Validation Flag	J	JQ	Don Matheny	9/29/16 4:56 PM	
MJHQF4	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF4	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	9/29/16 4:55 PM	
MJHQF4	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	9/29/16 4:55 PM	
MJHQF4	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	9/29/16 4:55 PM	
MJHQF4	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 4:55 PM	

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
PBS171	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y

Method: Metals by ICP-MS

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCSD63	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2D	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2L	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF2S	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF3	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
MJHQF4	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y
PBSD63	Soil		Validation Level		S4VEM	Don Matheny	9/29/16 4:57 PM	Y

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MEMORANDUM

DATE: September 30, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 6 water samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Dissolved Metals and Hardness (EPA CLP SOW ISM02.3) were performed at Chemtex, Inc., Port Arthur, Texas. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

MJHQG4 MJHQG5 MJHQG6 MJHQG7 MJHQG8
MJHQG9

No issues were noted.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

September 28, 2016

MEMORANDUM

SUBJECT: Data Validation Report for the Cinnabar Mine Removal, Case# 46386, SDG: MJHQG4, Inorganic Analyses

FROM: Don Matheny, Chemist
Environmental Services Unit, OEA

TO: Brooks Stanfield, On-Scene Coordinator
Greg Weigel, On-Scene Coordinator
Office of Environmental Cleanup

CC: Rene Nordeen, Ecology & Environment

The quality assurance (QA) review of the analytical data generated from the analysis of six water samples collected from the above referenced site has been completed. These samples were analyzed for dissolved metals and hardness by Chemtex, located in Port Arthur, TX.

Sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM). The validation was conducted according to the Quality Control Specifications outlined in:

- Cinnabar Mine Site Specific Sampling Plan, E&E, (July, 2016)
- USEPA CLP Statement of Work for Inorganic Superfund Methods (ISM02.3)
- National Functional Guidelines for Inorganic Superfund Data Review (EPA-540-R-10-011)
- Guidance for Labeling Externally Validated Laboratory Analytical Data (EPA-540-R08-005)

Some data may be qualified using the reviewer's professional judgment. The conclusions presented herein are based on the information provided for the review. A summary of samples evaluated in this validation report and the pertinent dates for sample collection, laboratory sample receipt and analyses is attached along with the validated data.

I. QUALITY CONTROL RESULTS SUMMARY

The table below summarizes the major sample quality control (QC) tests, associated test results, criteria for evaluation and identification of outliers. Some criteria for evaluation may be QAPP specific and different from the National Functional Guidelines. Certain QC tests are electronically evaluated the results of which are not summarized in the table below though any excursions of these tests will appear in the *Data Qualifications* section. In addition to the QC tests, calculations from 10% of the samples are verified against the raw data.

QC Results Summary

Quality Control Test[1]	Result Ranges	Outliers[2] (Y or N)	Evaluation Criteria
Preservation / Holding Times	Holding Times met	N	Cool ≤ 6°C, pH < 2 Metals 180 Days
MS Tune	Tune criteria met	N	≤ 0.1 amu; ≤ 5% RSD
Instrument Calibration	Calibration criteria met	N	± 30% Difference; Corr. Coeff. ≥ 0.995
Calibration Verification	All checks passed	N	Metals 90 – 110% Recovery
Interference Check Std.	94 – 111%	N	80 – 120% Recovery
Lab Blanks	No significant detects reported	N	Not detected or <10% of Sample
Matrix Spike	97 - 115%	N	75 - 125% Recovery
Lab Duplicate	± CRQL	N	≤ 20% RPD or ± CRQL
LCS (blank spike)	90 - 118%	N	70 - 130% Recovery
Serial Dilution[3]	N/A	N	≤ 10% Difference

[1] Lab QC (matrix spike, lab duplicate, serial dilution) were performed on samples MJHQG4.

[2] See the "*Data Qualifications*" section below for QC excursions and qualification of affected data.

[3] The concentration of elements was too low for conducting a 1:5 Serial Dilution.

II. DATA QUALIFICATIONS

Summary of Data Validation Qualifiers Applied

After the manual and electronic data review, the following data qualifications were applied:

1. **Detection / Quantitation Limits -** The following analytes have positively detected results < CRQLs (below the range of quantitation) and the associated laboratory blanks were not detected.

Data Qualifications: Sample results are qualified JQ with no indication of bias.	
Qualified Analytical Results:	
Arsenic -	MJHQG4, MJHQG5
Magnesium -	All samples
Potassium -	MJHQG4, MJHQG5, MJHQG6, MJHQG7, MJHQG8
Sodium -	All samples

Data Qualifiers

The data qualifiers and their respective definitions applied to the sample result(s) are provided as follows.

Functional Guidelines Data Qualifiers	
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The associated value is an estimated quantity.
UJ	The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The data are unusable. The analyte may or may not be present in the sample.
Project Specific Data Qualifiers	
L	Low bias.
H	High bias.
K	Unknown Bias.
Q	Detected concentration is below the MRL / CRQL but is above the MDL.

III. SAMPLE INDEX

The sample listing dates of sample collection, laboratory receipt and analysis are provided below.

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis
MJHQG4	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016
MJHQG5	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016
MJHQG6	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016
MJHQG7	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016
MJHQG8	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016
MJHQG9	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016

Sample Summary Report

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQG4	Lab Code:	CHX
Sample Number:	LCS170	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:		pH:		Sample Date:		Sample Time:	
% Moisture :				% Solids :	100		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	394		ug/L	394		1	Yes	S4VEM
Antimony	Target	120		ug/L	120		1	Yes	S4VEM
Arsenic	Target	19.2		ug/L	19.2		1	Yes	S4VEM
Barium	Target	414		ug/L	414		1	Yes	S4VEM
Beryllium	Target	10.9		ug/L	10.9		1	Yes	S4VEM
Calcium	Target	11100		ug/L	11100		1	Yes	S4VEM
Chromium	Target	23.6		ug/L	23.6		1	Yes	S4VEM
Cobalt	Target	102		ug/L	102		1	Yes	S4VEM
Iron	Target	218		ug/L	218		1	Yes	S4VEM
Magnesium	Target	10000		ug/L	10000		1	Yes	S4VEM
Manganese	Target	31.2		ug/L	31.2		1	Yes	S4VEM
Nickel	Target	82.4		ug/L	82.4		1	Yes	S4VEM
Potassium	Target	10300		ug/L	10300		1	Yes	S4VEM
Sodium	Target	10300		ug/L	10300		1	Yes	S4VEM
Thallium	Target	53.6		ug/L	53.6		1	Yes	S4VEM
Vanadium	Target	116		ug/L	116		1	Yes	S4VEM
Zinc	Target	120		ug/L	120		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: LCSD62	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	2.1		ug/L	2.1		1	Yes	S4VEM
Copper	Target	4.0		ug/L	4.0		1	Yes	S4VEM
Lead	Target	1.8		ug/L	1.8		1	Yes	S4VEM
Selenium	Target	10.2		ug/L	10.2		1	Yes	S4VEM
Silver	Target	2.0		ug/L	2.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number:	MJHQG4	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC04SWD	pH:		Sample Date:	08/23/2016	Sample Time:	12:33:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number:	MJHQG4	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:	SC04SWD	pH:		Sample Date:	08/23/2016	Sample Time:	12:33:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	4.0	JQ	ug/L	4.0	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	17800		ug/L	17800		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2040	JQ	ug/L	2040	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	758	JQ	ug/L	758	J	1	Yes	S4VEM
Sodium	Target	2540	JQ	ug/L	2540	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	52.9		mg/L	52.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: MJHQG4D	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 12:33:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	3.3	J	ug/L	3.3	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	17000		ug/L	17000		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	1930	J	ug/L	1930	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	698	J	ug/L	698	J	1	Yes	S4VEM
Sodium	Target	2420	J	ug/L	2420	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	50.5		mg/L	50.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number: MJHQG4D	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 12:33:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: MJHQG4L	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM
Copper	Target	7.4	J	ug/L	7.4	J	5	Yes	S4VEM
Lead	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM
Selenium	Target	25.0	U	ug/L	25.0	U	5	Yes	S4VEM
Silver	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: MJHQG4L	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	1000	U	ug/L	1000	U	5	Yes	S4VEM
Antimony	Target	300	U	ug/L	300	U	5	Yes	S4VEM
Arsenic	Target	50.0	U	ug/L	50.0	U	5	Yes	S4VEM
Barium	Target	1000	U	ug/L	1000	U	5	Yes	S4VEM
Beryllium	Target	25.0	U	ug/L	25.0	U	5	Yes	S4VEM
Calcium	Target	16800	J	ug/L	16800	J	5	Yes	S4VEM
Chromium	Target	50.0	U	ug/L	50.0	U	5	Yes	S4VEM
Cobalt	Target	250	U	ug/L	250	U	5	Yes	S4VEM
Iron	Target	500	U	ug/L	500	U	5	Yes	S4VEM
Magnesium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Manganese	Target	75.0	U	ug/L	75.0	U	5	Yes	S4VEM
Nickel	Target	200	U	ug/L	200	U	5	Yes	S4VEM
Potassium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Sodium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Thallium	Target	125	U	ug/L	125	U	5	Yes	S4VEM
Vanadium	Target	250	U	ug/L	250	U	5	Yes	S4VEM
Zinc	Target	300	U	ug/L	300	U	5	Yes	S4VEM
Hardness	Derived	49.8		mg/L	49.8		5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number: MJHQG4S	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 12:33:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Spike	1940		ug/L	1940		1	Yes	S4VEM
Antimony	Spike	98.4		ug/L	98.4		1	Yes	S4VEM
Arsenic	Spike	44.1		ug/L	44.1		1	Yes	S4VEM
Barium	Spike	2050		ug/L	2050		1	Yes	S4VEM
Beryllium	Spike	52.2		ug/L	52.2		1	Yes	S4VEM
Chromium	Spike	228		ug/L	228		1	Yes	S4VEM
Cobalt	Spike	498		ug/L	498		1	Yes	S4VEM
Iron	Spike	1110		ug/L	1110		1	Yes	S4VEM
Manganese	Spike	507		ug/L	507		1	Yes	S4VEM
Nickel	Spike	501		ug/L	501		1	Yes	S4VEM
Thallium	Spike	51.0		ug/L	51.0		1	Yes	S4VEM
Vanadium	Spike	563		ug/L	563		1	Yes	S4VEM
Zinc	Spike	488		ug/L	488		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: MJHQG4S	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 12:33:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Spike	57.4		ug/L	57.4		1	Yes	S4VEM
Copper	Spike	270		ug/L	270		1	Yes	S4VEM
Lead	Spike	19.5		ug/L	19.5		1	Yes	S4VEM
Selenium	Spike	106		ug/L	106		1	Yes	S4VEM
Silver	Spike	53.1		ug/L	53.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number:	MJHQG5	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC05SWD	pH:		Sample Date:	08/23/2016	Sample Time:	13:37:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number:	MJHQG5	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:	SC05SWD	pH:		Sample Date:	08/23/2016	Sample Time:	13:37:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	3.3	JQ	ug/L	3.3	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	17700		ug/L	17700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2020	JQ	ug/L	2020	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	710	JQ	ug/L	710	J	1	Yes	S4VEM
Sodium	Target	2510	JQ	ug/L	2510	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	52.5		mg/L	52.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number:	MJHQG6	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC01SWD	pH:		Sample Date:	08/23/2016	Sample Time:	13:57:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: MJHQG6	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: CC01SWD	pH:	Sample Date: 08/23/2016	Sample Time: 13:57:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0		ug/L	10.0		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	23900		ug/L	23900		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3620	JQ	ug/L	3620	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	990	JQ	ug/L	990	J	1	Yes	S4VEM
Sodium	Target	1420	JQ	ug/L	1420	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	74.5		mg/L	74.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number:	MJHQG7	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC02SWD	pH:		Sample Date:	08/23/2016	Sample Time:	14:45:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: MJHQG7	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: CC02SWD	pH:	Sample Date: 08/23/2016	Sample Time: 14:45:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	11.2		ug/L	11.2		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	23500		ug/L	23500		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3550	JQ	ug/L	3550	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	989	JQ	ug/L	989	J	1	Yes	S4VEM
Sodium	Target	1410	JQ	ug/L	1410	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	73.4		mg/L	73.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number:	MJHQG8	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC03SWD	pH:		Sample Date:	08/23/2016	Sample Time:	16:36:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number:	MJHQG8	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:	CC03SWD	pH:		Sample Date:	08/23/2016	Sample Time:	16:36:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	12.0		ug/L	12.0		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	23400		ug/L	23400		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3900	JQ	ug/L	3900	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1070	JQ	ug/L	1070	J	1	Yes	S4VEM
Sodium	Target	1270	JQ	ug/L	1270	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	74.4		mg/L	74.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX

Sample Number: MJHQG9	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: BG02SWD	pH:	Sample Date: 08/23/2016	Sample Time: 14:31:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: MJHQG9	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: BG02SWD	pH:	Sample Date: 08/23/2016	Sample Time: 14:31:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	13700		ug/L	13700		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	1050	JQ	ug/L	1050	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Sodium	Target	3000	JQ	ug/L	3000	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	38.4		mg/L	38.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: PBW170	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	0.033	U	mg/L	0.033	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQG4	Lab Code: CHX
Sample Number: PBWD62	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	2.0	U	ug/L	2.0	U	1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Edit History Report

Case No: 46386 Contract: EPW15007 SDG No: MJHQG4 Lab Code: CHX

Method: Metals by ICP-MS

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCSD62	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG4	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG4D	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG4L	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG4S	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG5	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG6	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG7	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG8	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG9	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
PBWD62	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y

Method: Metals by ICP-AES

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCS170	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG4	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG4	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/28/16 2:25 PM	
MJHQG4	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:25 PM	
MJHQG4	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:25 PM	
MJHQG4	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:25 PM	
MJHQG4D	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG4L	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG4S	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG5	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG5	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
MJHQG5	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
MJHQG5	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
MJHQG5	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
MJHQG6	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG6	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
MJHQG6	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
MJHQG6	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
MJHQG7	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQG7	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:27 PM	
MJHQG7	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:27 PM	
MJHQG7	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:27 PM	
MJHQG8	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG8	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:27 PM	
MJHQG8	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:27 PM	
MJHQG8	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:27 PM	
MJHQG9	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y
MJHQG9	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
MJHQG9	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/28/16 2:26 PM	
PBW170	Water		Validation Level		S4VEM	Don Matheny	9/28/16 2:27 PM	Y

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MEMORANDUM

DATE: October 5, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 18 soil/sediment samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Total Metals (EPA CLP SOW ISM02.3) were performed at Chemtex, Inc., Port Arthur, Texas. All sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM).

The samples were numbered:

MJHQH0	MJHQH1	MJHQH2	MJHQH3	MJHQH4
MJHQH5	MJHQH6	MJHQH7	MJHQH8	MJHQH9
MJHQK3	MJHQK7	MJHQK8	MJHQK9	MJHQN0
MJHQN1	MJHQN2	MJHQP1		

No issues were noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

October 3, 2016

MEMORANDUM

SUBJECT: Data Validation Report for the Cinnabar Mine Removal, Case# 46386, SDG: MJHQH0, Inorganic Analyses

FROM: Don Matheny, Chemist
Environmental Services Unit, OEA

TO: Brooks Stanfield, On-Scene Coordinator
Greg Weigel, On-Scene Coordinator
Office of Environmental Cleanup

CC: Rene Nordeen, Ecology & Environment

The quality assurance (QA) review of the analytical data generated from the analysis of eighteen soil/sediment samples collected from the above referenced site has been completed. These samples were analyzed for total metals (including mercury) by Chemtex, located in Port Arthur, TX.

Sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM). The validation was conducted according to the Quality Control Specifications outlined in:

- Cinnabar Mine Site Specific Sampling Plan, E&E, (July, 2016)
- USEPA CLP Statement of Work for Inorganic Superfund Methods (ISM02.3)
- National Functional Guidelines for Inorganic Superfund Data Review (EPA-540-R-10-011)
- Guidance for Labeling Externally Validated Laboratory Analytical Data (EPA-540-R08-005)

Some data may be qualified using the reviewer's professional judgment. The conclusions presented herein are based on the information provided for the review. A summary of samples evaluated in this validation report and the pertinent dates for sample collection, laboratory sample receipt and analyses is attached along with the validated data.

I. QUALITY CONTROL RESULTS SUMMARY

The table below summarizes the major sample quality control (QC) tests, associated test results, criteria for evaluation and identification of outliers. Some criteria for evaluation may be QAPP specific and different from the National Functional Guidelines. Certain QC tests are electronically evaluated the results of which are not summarized in the table below though any excursions of these tests will appear in the *Data Qualifications* section. In addition to the QC tests, calculations from 10% of the samples are verified against the raw data.

QC Results Summary

Quality Control Test[1]	Result Ranges	Outliers[2] (Y or N)	Evaluation Criteria
Preservation / Holding Times	Holding Times met	N	Cool ≤ 6°C Metals 180 Days; Hg 28 Days
MS Tune	Tune criteria met	N	≤ 0.1 amu; ≤ 5% RSD
Instrument Calibration	Calibration criteria met	N	± 30% Difference; Corr. Coeff. ≥ 0.995
Calibration Verification	All checks passed	N	Metals 90 – 110% Recovery Hg 85 – 115% Recovery
Interference Check Std.	89 – 113%	N	80 – 120% Recovery
Lab Blanks	**Significant detects reported**	**Y**	**Not detected or <10% of Sample**
Matrix Spike[3]	**-146 - 107%**	**Y**	**75 - 125% Recovery**
Lab Duplicate	≤ 16% or ± 2xCRQL	N	≤ 35% RPD or ± 2xCRQL
LCS (blank spike)	87 - 120%	N	70 - 130% Recovery
Serial Dilution[4]	≤ 6%	N	≤ 10% Difference

[1] Lab QC (matrix spike, lab duplicate, serial dilution) were performed on sample MJHQN1.

[2] See the "*Data Qualifications*" section below for QC excursions and qualification of affected data.

3The native concentrations in the pre-spike sample were too high (> 4x) in comparison to the matrix spike concentrations for Arsenic and Mercury to allow for an evaluation of the spike recovery.

[4] The Serial Dilution results were only evaluated for Aluminum, Antimony, Arsenic, Chromium, Cobalt, Copper, Iron, Manganese and Zinc. The native concentrations of the remaining elements were too low for conducting a 1:5 Serial Dilution.

II. DATA QUALIFICATIONS

Summary of Data Validation Qualifiers Applied

After the manual and electronic data review, the following data qualifications were applied:

1. **Blanks** – Thallium was detected at concentrations < CRQLs and the associated laboratory blanks were also detected at concentrations < CRQLs. The following samples were qualified U and the values elevated to the CRQLs for Thallium: MJHQN0, MJHQP1.

2. **Matrix Spike Recoveries -** The spike recovery for Manganese was -146% and the post spike recovery (57%) fell below the minimally required 75% post spike recovery range. All Manganese results were detected above the CRQL and qualified JL.

3. **Internal Standard Recoveries** – For the ICP-MS analysis, the following samples were diluted due to poor internal standard recoveries: MJHQH2, MJHQH4, MJHQH6, MJHQH8 and MJHQN2. These sample results have a laboratory applied D qualifier (indicating sample dilution) and elevated CRQLs.

4. **Detection / Quantitation Limits** - The following analytes have positively detected results < CRQLs (below the range of quantitation) and the associated laboratory blanks were not detected.

Data Qualifications:	Sample results are qualified JQ with no indication of bias.
Qualified Analytical Results:	
Beryllium –	MJHQH0, MJHQK8, MJHQK9, MJHQN0, MJHQN1, MJHQP1
Cobalt –	MJHQN0
Magnesium –	MJHQH1, MJHQH1, MJHQH7
Nickel -	MJHQN0
Selenium –	MJHQH0, MJHQH1, MJHQH2, MJHQH3, MJHQH4, MJHQH5, MJHQH6, MJHQH7, MJHQH8, MJHQH9, MJHQK3, MJHQK7, MJHQK8, MJHQN1, MJHQN2, MJHQP1
Sodium –	MJHQH0, MJHQH5, MJHQH7, MJHQH9, MJHQK7, MJHQN0, MJHQN2, MJHQP1

Data Qualifiers

The data qualifiers and their respective definitions applied to the sample result(s) are provided as follows.

Functional Guidelines Data Qualifiers	
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The associated value is an estimated quantity.
UJ	The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The data are unusable. The analyte may or may not be present in the sample.

Project Specific Data Qualifiers	
L	Low bias.
H	High bias.
K	Unknown Bias.
Q	Detected concentration is below the MRL / CRQL but is above the MDL.

III. SAMPLE INDEX

The sample listing dates of sample collection, laboratory receipt and analysis are provided below.

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis	Mercury Analysis
MJHQH0	Soil	8/23/2016	8/30/2016	9/6-14/2016	9/6/2016	9/10/2016
MJHQH1	Soil	8/23/2016	8/30/2016	9/6-14/2016	9/6/2016	9/10/2016
MJHQH2	Soil	8/23/2016	8/30/2016	9/6-14/2016	9/6-15/2016	9/10/2016
MJHQH3	Soil	8/23/2016	8/30/2016	9/6-14/2016	9/6/2016	9/10/2016
MJHQH4	Soil	8/23/2016	8/30/2016	9/6-14/2016	9/6-15/2016	9/10/2016
MJHQH5	Soil	8/23/2016	8/30/2016	9/6-15/2016	9/6-15/2016	9/10/2016
MJHQH6	Soil	8/23/2016	8/30/2016	9/6-15/2016	9/6-15/2016	9/10/2016
MJHQH7	Soil	8/23/2016	8/30/2016	9/6-15/2016	9/6-15/2016	9/10/2016
MJHQH8	Soil	8/23/2016	8/30/2016	9/6-15/2016	9/6-15/2016	9/10/2016
MJHQH9	Soil	8/23/2016	8/30/2016	9/6-15/2016	9/6/2016	9/10/2016
MJHQK3	Sediment	8/24/2016	8/30/2016	9/6-15/2016	9/6/2016	9/10/2016
MJHQK7	Sediment	8/24/2016	8/30/2016	9/6-15/2016	9/6/2016	9/10/2016
MJHQK8	Sediment	8/24/2016	8/30/2016	9/6-15/2016	9/6/2016	9/10/2016
MJHQK9	Sediment	8/24/2016	8/30/2016	9/6-15/2016	9/6/2016	9/10/2016
MJHQN0	Sediment	8/26/2016	8/30/2016	9/6-15/2016	9/6/2016	9/10/2016
MJHQN1	Sediment	8/26/2016	8/30/2016	9/6-14/2016	9/6/2016	9/10/2016
MJHQN2	Sediment	8/26/2016	8/30/2016	9/6-15/2016	9/6/2016	9/10/2016
MJHQP1	Soil	8/25/2016	8/30/2016	9/6-15/2016	9/6/2016	9/10/2016

Sample Summary Report

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQH0	Lab Code:	CHX
Sample Number:	LCS166	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:		Sample Time:	
% Moisture :				% Solids :	100		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	39.4		mg/kg	39.4		1	Yes	S4VEM
Barium	Target	43.1		mg/kg	43.1		1	Yes	S4VEM
Beryllium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Cadmium	Target	1.0		mg/kg	1.0		1	Yes	S4VEM
Calcium	Target	1010		mg/kg	1010		1	Yes	S4VEM
Chromium	Target	2.3		mg/kg	2.3		1	Yes	S4VEM
Cobalt	Target	10.3		mg/kg	10.3		1	Yes	S4VEM
Copper	Target	5.3		mg/kg	5.3		1	Yes	S4VEM
Iron	Target	21.8		mg/kg	21.8		1	Yes	S4VEM
Lead	Target	2.1		mg/kg	2.1		1	Yes	S4VEM
Magnesium	Target	998		mg/kg	998		1	Yes	S4VEM
Manganese	Target	2.6		mg/kg	2.6		1	Yes	S4VEM
Nickel	Target	8.4		mg/kg	8.4		1	Yes	S4VEM
Potassium	Target	1040		mg/kg	1040		1	Yes	S4VEM
Selenium	Target	8.1		mg/kg	8.1		1	Yes	S4VEM
Sodium	Target	1050		mg/kg	1050		1	Yes	S4VEM
Vanadium	Target	11.5		mg/kg	11.5		1	Yes	S4VEM
Zinc	Target	12.4		mg/kg	12.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX
Sample Number: LCSD58	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	2.2		mg/kg	2.2		1	Yes	S4VEM
Arsenic	Target	1.2		mg/kg	1.2		1	Yes	S4VEM
Silver	Target	1.0		mg/kg	1.0		1	Yes	S4VEM
Thallium	Target	0.94		mg/kg	0.94		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQH0	Lab Code:	CHX

Sample Number:	MJHQH0	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP01SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:13:00
% Moisture :				% Solids :	98.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	27.8		mg/kg	27.8		1	Yes	S4VEM
Arsenic	Target	396		mg/kg	396	D	2	Yes	S4VEM
Silver	Target	0.48	U	mg/kg	0.48	U	1	Yes	S4VEM
Thallium	Target	3.3		mg/kg	3.3		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH0	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP01SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:13:00
% Moisture :				% Solids :	98.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	402		mg/kg	402	D	500	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH0	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP01SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:13:00
% Moisture :				% Solids :	98.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	11400		mg/kg	11400		1	Yes	S4VEM
Barium	Target	74.6		mg/kg	74.6		1	Yes	S4VEM
Beryllium	Target	0.35	JQ	mg/kg	0.35	J	1	Yes	S4VEM
Cadmium	Target	3.0		mg/kg	3.0		1	Yes	S4VEM
Calcium	Target	17000		mg/kg	17000		1	Yes	S4VEM
Chromium	Target	24.1		mg/kg	24.1		1	Yes	S4VEM
Cobalt	Target	13.6		mg/kg	13.6		1	Yes	S4VEM
Copper	Target	29.0		mg/kg	29.0		1	Yes	S4VEM
Iron	Target	28600		mg/kg	28600	D	2	Yes	S4VEM
Lead	Target	12.3		mg/kg	12.3		1	Yes	S4VEM
Magnesium	Target	13300		mg/kg	13300		1	Yes	S4VEM
Manganese	Target	625	JL	mg/kg	625	*	1	Yes	S4VEM
Nickel	Target	29.6		mg/kg	29.6		1	Yes	S4VEM
Potassium	Target	2770		mg/kg	2770		1	Yes	S4VEM
Selenium	Target	0.81	JQ	mg/kg	0.81	J	1	Yes	S4VEM
Sodium	Target	104	JQ	mg/kg	104	J	1	Yes	S4VEM
Vanadium	Target	23.1		mg/kg	23.1		1	Yes	S4VEM
Zinc	Target	186		mg/kg	186		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH1	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP02SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:35:00
% Moisture :				% Solids :	95.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	7150		mg/kg	7150		1	Yes	S4VEM
Barium	Target	110		mg/kg	110		1	Yes	S4VEM
Beryllium	Target	1.0		mg/kg	1.0		1	Yes	S4VEM
Cadmium	Target	6.4		mg/kg	6.4		1	Yes	S4VEM
Calcium	Target	941		mg/kg	941		1	Yes	S4VEM
Chromium	Target	6.0		mg/kg	6.0		1	Yes	S4VEM
Cobalt	Target	15.1		mg/kg	15.1		1	Yes	S4VEM
Copper	Target	7.7		mg/kg	7.7		1	Yes	S4VEM
Iron	Target	15000		mg/kg	15000		1	Yes	S4VEM
Lead	Target	5.7		mg/kg	5.7		1	Yes	S4VEM
Magnesium	Target	217	JQ	mg/kg	217	J	1	Yes	S4VEM
Manganese	Target	94.3	JL	mg/kg	94.3	*	1	Yes	S4VEM
Nickel	Target	11.1		mg/kg	11.1		1	Yes	S4VEM
Potassium	Target	3400		mg/kg	3400		1	Yes	S4VEM
Selenium	Target	0.51	JQ	mg/kg	0.51	J	1	Yes	S4VEM
Sodium	Target	442	U	mg/kg	442	U	1	Yes	S4VEM
Vanadium	Target	5.9		mg/kg	5.9		1	Yes	S4VEM
Zinc	Target	33.9		mg/kg	33.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH1	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP02SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:35:00
% Moisture :				% Solids :	95.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	72.0		mg/kg	72.0		1	Yes	S4VEM
Arsenic	Target	702		mg/kg	702	D	5	Yes	S4VEM
Silver	Target	0.48	U	mg/kg	0.48	U	1	Yes	S4VEM
Thallium	Target	1.5		mg/kg	1.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH1	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP02SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:35:00
% Moisture :				% Solids :	95.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	16.2		mg/kg	16.2	D	25	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH2	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP03SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:50:00
% Moisture :				% Solids :	97.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	51.1		mg/kg	51.1	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH2	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP03SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:50:00
% Moisture :				% Solids :	97.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	11300		mg/kg	11300		1	Yes	S4VEM
Barium	Target	84.1		mg/kg	84.1		1	Yes	S4VEM
Beryllium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Cadmium	Target	3.3		mg/kg	3.3		1	Yes	S4VEM
Calcium	Target	952		mg/kg	952		1	Yes	S4VEM
Chromium	Target	10.1		mg/kg	10.1		1	Yes	S4VEM
Cobalt	Target	11.4		mg/kg	11.4		1	Yes	S4VEM
Copper	Target	8.0		mg/kg	8.0		1	Yes	S4VEM
Iron	Target	12700		mg/kg	12700		1	Yes	S4VEM
Lead	Target	6.3		mg/kg	6.3		1	Yes	S4VEM
Magnesium	Target	465	JQ	mg/kg	465	J	1	Yes	S4VEM
Manganese	Target	377	JL	mg/kg	377	*	1	Yes	S4VEM
Nickel	Target	17.8		mg/kg	17.8		1	Yes	S4VEM
Potassium	Target	3580		mg/kg	3580		1	Yes	S4VEM
Selenium	Target	0.51	JQ	mg/kg	0.51	J	1	Yes	S4VEM
Sodium	Target	477	U	mg/kg	477	U	1	Yes	S4VEM
Vanadium	Target	10.3		mg/kg	10.3		1	Yes	S4VEM
Zinc	Target	35.4		mg/kg	35.4		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQH0	Lab Code:	CHX

Sample Number:	MJHQH2	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP03SS	pH:		Sample Date:	08/23/2016	Sample Time:	12:50:00
% Moisture :				% Solids :	97.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	20.1		mg/kg	20.1	D	2	Yes	S4VEM
Arsenic	Target	561		mg/kg	561	D	5	Yes	S4VEM
Silver	Target	0.83	U	mg/kg	0.83	UD	2	Yes	S4VEM
Thallium	Target	6.3		mg/kg	6.3	D	2	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH3	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP04SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:01:00
% Moisture :				% Solids :	95.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	2470		mg/kg	2470		1	Yes	S4VEM
Barium	Target	84.6		mg/kg	84.6		1	Yes	S4VEM
Beryllium	Target	1.6		mg/kg	1.6		1	Yes	S4VEM
Cadmium	Target	8.4		mg/kg	8.4		1	Yes	S4VEM
Calcium	Target	1210		mg/kg	1210		1	Yes	S4VEM
Chromium	Target	6.9		mg/kg	6.9		1	Yes	S4VEM
Cobalt	Target	12.9		mg/kg	12.9		1	Yes	S4VEM
Copper	Target	15.7		mg/kg	15.7		1	Yes	S4VEM
Iron	Target	21200		mg/kg	21200		1	Yes	S4VEM
Lead	Target	10.4		mg/kg	10.4		1	Yes	S4VEM
Magnesium	Target	772		mg/kg	772		1	Yes	S4VEM
Manganese	Target	731	JL	mg/kg	731	*	1	Yes	S4VEM
Nickel	Target	45.7		mg/kg	45.7		1	Yes	S4VEM
Potassium	Target	758		mg/kg	758		1	Yes	S4VEM
Selenium	Target	0.83	JQ	mg/kg	0.83	J	1	Yes	S4VEM
Sodium	Target	479	U	mg/kg	479	U	1	Yes	S4VEM
Vanadium	Target	9.6		mg/kg	9.6		1	Yes	S4VEM
Zinc	Target	79.5		mg/kg	79.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH3	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP04SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:01:00
% Moisture :				% Solids :	95.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	43.4		mg/kg	43.4		1	Yes	S4VEM
Arsenic	Target	1080		mg/kg	1080	D	10	Yes	S4VEM
Silver	Target	0.35	U	mg/kg	0.35	U	1	Yes	S4VEM
Thallium	Target	32.9		mg/kg	32.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH3	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP04SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:01:00
% Moisture :				% Solids :	95.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	975		mg/kg	975	D	1000	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH4	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP05SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:10:00
% Moisture :				% Solids :	94.7		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	562		mg/kg	562	D	1000	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH4	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP05SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:10:00
% Moisture :				% Solids :	94.7		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	7790		mg/kg	7790		1	Yes	S4VEM
Barium	Target	179		mg/kg	179		1	Yes	S4VEM
Beryllium	Target	1.5		mg/kg	1.5		1	Yes	S4VEM
Cadmium	Target	20.2		mg/kg	20.2		1	Yes	S4VEM
Calcium	Target	1370		mg/kg	1370		1	Yes	S4VEM
Chromium	Target	10.8		mg/kg	10.8		1	Yes	S4VEM
Cobalt	Target	10.7		mg/kg	10.7		1	Yes	S4VEM
Copper	Target	13.9		mg/kg	13.9		1	Yes	S4VEM
Iron	Target	23900		mg/kg	23900		1	Yes	S4VEM
Lead	Target	9.6		mg/kg	9.6		1	Yes	S4VEM
Magnesium	Target	933		mg/kg	933		1	Yes	S4VEM
Manganese	Target	447	JL	mg/kg	447	*	1	Yes	S4VEM
Nickel	Target	40.4		mg/kg	40.4		1	Yes	S4VEM
Potassium	Target	1650		mg/kg	1650		1	Yes	S4VEM
Selenium	Target	0.80	JQ	mg/kg	0.80	J	1	Yes	S4VEM
Sodium	Target	444	U	mg/kg	444	U	1	Yes	S4VEM
Vanadium	Target	12.6		mg/kg	12.6		1	Yes	S4VEM
Zinc	Target	73.7		mg/kg	73.7		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH4	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP05SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:10:00
% Moisture :				% Solids :	94.7		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	45.8		mg/kg	45.8	D	2	Yes	S4VEM
Arsenic	Target	2440		mg/kg	2440	D	20	Yes	S4VEM
Silver	Target	0.90	U	mg/kg	0.90	UD	2	Yes	S4VEM
Thallium	Target	26.2		mg/kg	26.2	D	2	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH5	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP06SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:18:00
% Moisture :				% Solids :	95.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	9440		mg/kg	9440		1	Yes	S4VEM
Barium	Target	72.6		mg/kg	72.6		1	Yes	S4VEM
Beryllium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Cadmium	Target	4.3		mg/kg	4.3		1	Yes	S4VEM
Calcium	Target	1490		mg/kg	1490		1	Yes	S4VEM
Chromium	Target	12.6		mg/kg	12.6		1	Yes	S4VEM
Cobalt	Target	12.9		mg/kg	12.9		1	Yes	S4VEM
Copper	Target	18.9		mg/kg	18.9		1	Yes	S4VEM
Iron	Target	15900		mg/kg	15900		1	Yes	S4VEM
Lead	Target	8.6		mg/kg	8.6		1	Yes	S4VEM
Magnesium	Target	581		mg/kg	581		1	Yes	S4VEM
Manganese	Target	236	JL	mg/kg	236	*	1	Yes	S4VEM
Nickel	Target	15.1		mg/kg	15.1		1	Yes	S4VEM
Potassium	Target	3010		mg/kg	3010		1	Yes	S4VEM
Selenium	Target	0.58	JQ	mg/kg	0.58	J	1	Yes	S4VEM
Sodium	Target	60.3	JQ	mg/kg	60.3	J	1	Yes	S4VEM
Vanadium	Target	10.9		mg/kg	10.9		1	Yes	S4VEM
Zinc	Target	44.4		mg/kg	44.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH5	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP06SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:18:00
% Moisture :				% Solids :	95.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	32.2		mg/kg	32.2	D	2	Yes	S4VEM
Arsenic	Target	563		mg/kg	563	D	5	Yes	S4VEM
Silver	Target	0.81	U	mg/kg	0.81	UD	2	Yes	S4VEM
Thallium	Target	4.9		mg/kg	4.9	D	2	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQH0	Lab Code:	CHX

Sample Number:	MJHQH5	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP06SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:18:00
% Moisture :				% Solids :	95.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	21.6		mg/kg	21.6	D	25	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH6	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP07SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:32:00
% Moisture :				% Solids :	97.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	34.5		mg/kg	34.5	D	2	Yes	S4VEM
Arsenic	Target	2020		mg/kg	2020	D	20	Yes	S4VEM
Silver	Target	0.69	U	mg/kg	0.69	UD	2	Yes	S4VEM
Thallium	Target	11.6		mg/kg	11.6	D	2	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH6	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP07SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:32:00
% Moisture :				% Solids :	97.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	6570		mg/kg	6570		1	Yes	S4VEM
Barium	Target	72.1		mg/kg	72.1		1	Yes	S4VEM
Beryllium	Target	0.70		mg/kg	0.70		1	Yes	S4VEM
Cadmium	Target	13.5		mg/kg	13.5		1	Yes	S4VEM
Calcium	Target	2180		mg/kg	2180		1	Yes	S4VEM
Chromium	Target	8.2		mg/kg	8.2		1	Yes	S4VEM
Cobalt	Target	4.2		mg/kg	4.2		1	Yes	S4VEM
Copper	Target	21.7		mg/kg	21.7		1	Yes	S4VEM
Iron	Target	26700		mg/kg	26700	D	2	Yes	S4VEM
Lead	Target	5.0		mg/kg	5.0		1	Yes	S4VEM
Magnesium	Target	877		mg/kg	877		1	Yes	S4VEM
Manganese	Target	128	JL	mg/kg	128	*	1	Yes	S4VEM
Nickel	Target	12.6		mg/kg	12.6		1	Yes	S4VEM
Potassium	Target	1870		mg/kg	1870		1	Yes	S4VEM
Selenium	Target	0.57	JQ	mg/kg	0.57	J	1	Yes	S4VEM
Sodium	Target	370	U	mg/kg	370	U	1	Yes	S4VEM
Vanadium	Target	7.1		mg/kg	7.1		1	Yes	S4VEM
Zinc	Target	40.4		mg/kg	40.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH6	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP07SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:32:00
% Moisture :				% Solids :	97.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	107		mg/kg	107	D	100	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH7	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP08SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:45:00
% Moisture :				% Solids :	97.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	15.1		mg/kg	15.1	D	10	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH7	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP08SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:45:00
% Moisture :				% Solids :	97.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	14.3		mg/kg	14.3	D	2	Yes	S4VEM
Arsenic	Target	607		mg/kg	607	D	5	Yes	S4VEM
Silver	Target	0.91	U	mg/kg	0.91	UD	2	Yes	S4VEM
Thallium	Target	6.9		mg/kg	6.9	D	2	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH7	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP08SS	pH:		Sample Date:	08/23/2016	Sample Time:	13:45:00
% Moisture :				% Solids :	97.4		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	11600		mg/kg	11600		1	Yes	S4VEM
Barium	Target	66.0		mg/kg	66.0		1	Yes	S4VEM
Beryllium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Cadmium	Target	4.4		mg/kg	4.4		1	Yes	S4VEM
Calcium	Target	1080		mg/kg	1080		1	Yes	S4VEM
Chromium	Target	13.4		mg/kg	13.4		1	Yes	S4VEM
Cobalt	Target	34.5		mg/kg	34.5		1	Yes	S4VEM
Copper	Target	9.7		mg/kg	9.7		1	Yes	S4VEM
Iron	Target	14000		mg/kg	14000		1	Yes	S4VEM
Lead	Target	7.3		mg/kg	7.3		1	Yes	S4VEM
Magnesium	Target	406	JQ	mg/kg	406	J	1	Yes	S4VEM
Manganese	Target	339	JL	mg/kg	339	*	1	Yes	S4VEM
Nickel	Target	18.1		mg/kg	18.1		1	Yes	S4VEM
Potassium	Target	2840		mg/kg	2840		1	Yes	S4VEM
Selenium	Target	0.60	JQ	mg/kg	0.60	J	1	Yes	S4VEM
Sodium	Target	115	JQ	mg/kg	115	J	1	Yes	S4VEM
Vanadium	Target	13.7		mg/kg	13.7		1	Yes	S4VEM
Zinc	Target	32.4		mg/kg	32.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH8	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	TP09SS	pH:		Sample Date:	08/23/2016	Sample Time:	14:06:00
% Moisture :				% Solids :	97.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	60.0		mg/kg	60.0	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH8	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	TP09SS	pH:		Sample Date:	08/23/2016	Sample Time:	14:06:00
% Moisture :				% Solids :	97.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	18.6		mg/kg	18.6	D	2	Yes	S4VEM
Arsenic	Target	1440		mg/kg	1440	D	10	Yes	S4VEM
Silver	Target	0.76	U	mg/kg	0.76	UD	2	Yes	S4VEM
Thallium	Target	11.9		mg/kg	11.9	D	2	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH8	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	TP09SS	pH:		Sample Date:	08/23/2016	Sample Time:	14:06:00
% Moisture :				% Solids :	97.3		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	9470		mg/kg	9470		1	Yes	S4VEM
Barium	Target	77.2		mg/kg	77.2		1	Yes	S4VEM
Beryllium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM
Cadmium	Target	10.4		mg/kg	10.4		1	Yes	S4VEM
Calcium	Target	1080		mg/kg	1080		1	Yes	S4VEM
Chromium	Target	10.5		mg/kg	10.5		1	Yes	S4VEM
Cobalt	Target	6.7		mg/kg	6.7		1	Yes	S4VEM
Copper	Target	11.7		mg/kg	11.7		1	Yes	S4VEM
Iron	Target	25500		mg/kg	25500	D	2	Yes	S4VEM
Lead	Target	5.8		mg/kg	5.8		1	Yes	S4VEM
Magnesium	Target	534		mg/kg	534		1	Yes	S4VEM
Manganese	Target	304	JL	mg/kg	304	*	1	Yes	S4VEM
Nickel	Target	15.4		mg/kg	15.4		1	Yes	S4VEM
Potassium	Target	2690		mg/kg	2690		1	Yes	S4VEM
Selenium	Target	0.64	JQ	mg/kg	0.64	J	1	Yes	S4VEM
Sodium	Target	345	U	mg/kg	345	U	1	Yes	S4VEM
Vanadium	Target	12.5		mg/kg	12.5		1	Yes	S4VEM
Zinc	Target	38.6		mg/kg	38.6		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH9	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	RT01SS	pH:		Sample Date:	08/23/2016	Sample Time:	14:25:00
% Moisture :				% Solids :	99.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	63.7		mg/kg	63.7		1	Yes	S4VEM
Arsenic	Target	433		mg/kg	433	D	2	Yes	S4VEM
Silver	Target	0.49	U	mg/kg	0.49	U	1	Yes	S4VEM
Thallium	Target	4.9		mg/kg	4.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH9	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	RT01SS	pH:		Sample Date:	08/23/2016	Sample Time:	14:25:00
% Moisture :				% Solids :	99.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	7790		mg/kg	7790		1	Yes	S4VEM
Barium	Target	68.5		mg/kg	68.5		1	Yes	S4VEM
Beryllium	Target	0.64		mg/kg	0.64		1	Yes	S4VEM
Cadmium	Target	3.6		mg/kg	3.6		1	Yes	S4VEM
Calcium	Target	18200		mg/kg	18200		1	Yes	S4VEM
Chromium	Target	18.4		mg/kg	18.4		1	Yes	S4VEM
Cobalt	Target	13.0		mg/kg	13.0		1	Yes	S4VEM
Copper	Target	32.3		mg/kg	32.3		1	Yes	S4VEM
Iron	Target	21800		mg/kg	21800		1	Yes	S4VEM
Lead	Target	29.7		mg/kg	29.7		1	Yes	S4VEM
Magnesium	Target	13500		mg/kg	13500		1	Yes	S4VEM
Manganese	Target	568	JL	mg/kg	568	*	1	Yes	S4VEM
Nickel	Target	26.1		mg/kg	26.1		1	Yes	S4VEM
Potassium	Target	1810		mg/kg	1810		1	Yes	S4VEM
Selenium	Target	0.67	JQ	mg/kg	0.67	J	1	Yes	S4VEM
Sodium	Target	85.5	JQ	mg/kg	85.5	J	1	Yes	S4VEM
Vanadium	Target	19.5		mg/kg	19.5		1	Yes	S4VEM
Zinc	Target	224		mg/kg	224		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQH9	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	RT01SS	pH:		Sample Date:	08/23/2016	Sample Time:	14:25:00
% Moisture :				% Solids :	99.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	381		mg/kg	381	D	200	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK3	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	WT01SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:15:00
% Moisture :				% Solids :	25.2		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	491		mg/kg	491	D	500	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK3	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	WT01SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:15:00
% Moisture :				% Solids :	25.2		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	4290		mg/kg	4290		1	Yes	S4VEM
Barium	Target	61.1		mg/kg	61.1		1	Yes	S4VEM
Beryllium	Target	2.3		mg/kg	2.3		1	Yes	S4VEM
Cadmium	Target	13.0		mg/kg	13.0		1	Yes	S4VEM
Calcium	Target	2480		mg/kg	2480		1	Yes	S4VEM
Chromium	Target	15.6		mg/kg	15.6		1	Yes	S4VEM
Cobalt	Target	7.8		mg/kg	7.8		1	Yes	S4VEM
Copper	Target	21.7		mg/kg	21.7		1	Yes	S4VEM
Iron	Target	33700		mg/kg	33700	D	2	Yes	S4VEM
Lead	Target	11.2		mg/kg	11.2		1	Yes	S4VEM
Magnesium	Target	884		mg/kg	884		1	Yes	S4VEM
Manganese	Target	422	JL	mg/kg	422	*	1	Yes	S4VEM
Nickel	Target	66.3		mg/kg	66.3		1	Yes	S4VEM
Potassium	Target	1130		mg/kg	1130		1	Yes	S4VEM
Selenium	Target	1.3	JQ	mg/kg	1.3	J	1	Yes	S4VEM
Sodium	Target	501	U	mg/kg	501	U	1	Yes	S4VEM
Vanadium	Target	19.0		mg/kg	19.0		1	Yes	S4VEM
Zinc	Target	148		mg/kg	148		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK3	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	WT01SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:15:00
% Moisture :				% Solids :	25.2		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	36.4		mg/kg	36.4		1	Yes	S4VEM
Arsenic	Target	1570		mg/kg	1570	D	10	Yes	S4VEM
Silver	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Thallium	Target	36.1		mg/kg	36.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK7	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	WF03SD	pH:		Sample Date:	08/24/2016	Sample Time:	15:51:00
% Moisture :				% Solids :	82.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	46.5		mg/kg	46.5	D	25	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK7	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	WF03SD	pH:		Sample Date:	08/24/2016	Sample Time:	15:51:00
% Moisture :				% Solids :	82.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	19.3		mg/kg	19.3		1	Yes	S4VEM
Arsenic	Target	245		mg/kg	245		1	Yes	S4VEM
Silver	Target	0.55	U	mg/kg	0.55	U	1	Yes	S4VEM
Thallium	Target	6.4		mg/kg	6.4		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK7	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	WF03SD	pH:		Sample Date:	08/24/2016	Sample Time:	15:51:00
% Moisture :				% Solids :	82.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5750		mg/kg	5750		1	Yes	S4VEM
Barium	Target	38.2		mg/kg	38.2		1	Yes	S4VEM
Beryllium	Target	0.45		mg/kg	0.45		1	Yes	S4VEM
Cadmium	Target	2.2		mg/kg	2.2		1	Yes	S4VEM
Calcium	Target	9460		mg/kg	9460		1	Yes	S4VEM
Chromium	Target	12.5		mg/kg	12.5		1	Yes	S4VEM
Cobalt	Target	5.6		mg/kg	5.6		1	Yes	S4VEM
Copper	Target	9.9		mg/kg	9.9		1	Yes	S4VEM
Iron	Target	18900		mg/kg	18900		1	Yes	S4VEM
Lead	Target	2.9		mg/kg	2.9		1	Yes	S4VEM
Magnesium	Target	5570		mg/kg	5570		1	Yes	S4VEM
Manganese	Target	329	JL	mg/kg	329	*	1	Yes	S4VEM
Nickel	Target	14.7		mg/kg	14.7		1	Yes	S4VEM
Potassium	Target	1270		mg/kg	1270		1	Yes	S4VEM
Selenium	Target	0.55	JQ	mg/kg	0.55	J	1	Yes	S4VEM
Sodium	Target	80.8	JQ	mg/kg	80.8	J	1	Yes	S4VEM
Vanadium	Target	11.9		mg/kg	11.9		1	Yes	S4VEM
Zinc	Target	38.5		mg/kg	38.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK8	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	WF04SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:30:00
% Moisture :				% Solids :	93.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	31.9		mg/kg	31.9		1	Yes	S4VEM
Arsenic	Target	167		mg/kg	167		1	Yes	S4VEM
Silver	Target	0.45	U	mg/kg	0.45	U	1	Yes	S4VEM
Thallium	Target	0.74		mg/kg	0.74		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK8	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	WF04SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:30:00
% Moisture :				% Solids :	93.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	131		mg/kg	131	D	100	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK8	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	WF04SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:30:00
% Moisture :				% Solids :	93.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	2390		mg/kg	2390		1	Yes	S4VEM
Barium	Target	235		mg/kg	235		1	Yes	S4VEM
Beryllium	Target	0.25	JQ	mg/kg	0.25	J	1	Yes	S4VEM
Cadmium	Target	0.89		mg/kg	0.89		1	Yes	S4VEM
Calcium	Target	11200		mg/kg	11200		1	Yes	S4VEM
Chromium	Target	2.2		mg/kg	2.2		1	Yes	S4VEM
Cobalt	Target	507		mg/kg	507		1	Yes	S4VEM
Copper	Target	7.7		mg/kg	7.7		1	Yes	S4VEM
Iron	Target	4980		mg/kg	4980		1	Yes	S4VEM
Lead	Target	63.4		mg/kg	63.4		1	Yes	S4VEM
Magnesium	Target	6200		mg/kg	6200		1	Yes	S4VEM
Manganese	Target	1560	JL	mg/kg	1560	D*	2	Yes	S4VEM
Nickel	Target	192		mg/kg	192		1	Yes	S4VEM
Potassium	Target	403		mg/kg	403		1	Yes	S4VEM
Selenium	Target	1.6	JQ	mg/kg	1.6	J	1	Yes	S4VEM
Sodium	Target	355	U	mg/kg	355	U	1	Yes	S4VEM
Vanadium	Target	5.9		mg/kg	5.9		1	Yes	S4VEM
Zinc	Target	29.2		mg/kg	29.2		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQH0	Lab Code:	CHX

Sample Number:	MJHQK9	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	WF05SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:54:00
% Moisture :				% Solids :	71.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	85.2		mg/kg	85.2	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK9	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	WF05SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:54:00
% Moisture :				% Solids :	71.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	25.2		mg/kg	25.2		1	Yes	S4VEM
Arsenic	Target	152		mg/kg	152		1	Yes	S4VEM
Silver	Target	0.65	U	mg/kg	0.65	U	1	Yes	S4VEM
Thallium	Target	1.1		mg/kg	1.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQK9	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	WF05SD	pH:		Sample Date:	08/24/2016	Sample Time:	16:54:00
% Moisture :				% Solids :	71.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5350		mg/kg	5350		1	Yes	S4VEM
Barium	Target	44.3		mg/kg	44.3		1	Yes	S4VEM
Beryllium	Target	0.37	JQ	mg/kg	0.37	J	1	Yes	S4VEM
Cadmium	Target	1.9		mg/kg	1.9		1	Yes	S4VEM
Calcium	Target	1410		mg/kg	1410		1	Yes	S4VEM
Chromium	Target	8.8		mg/kg	8.8		1	Yes	S4VEM
Cobalt	Target	5.1		mg/kg	5.1		1	Yes	S4VEM
Copper	Target	7.8		mg/kg	7.8		1	Yes	S4VEM
Iron	Target	14700		mg/kg	14700		1	Yes	S4VEM
Lead	Target	4.1		mg/kg	4.1		1	Yes	S4VEM
Magnesium	Target	3320		mg/kg	3320		1	Yes	S4VEM
Manganese	Target	245	JL	mg/kg	245	*	1	Yes	S4VEM
Nickel	Target	12.2		mg/kg	12.2		1	Yes	S4VEM
Potassium	Target	1080		mg/kg	1080		1	Yes	S4VEM
Selenium	Target	3.5	U	mg/kg	3.5	U	1	Yes	S4VEM
Sodium	Target	502	U	mg/kg	502	U	1	Yes	S4VEM
Vanadium	Target	9.9		mg/kg	9.9		1	Yes	S4VEM
Zinc	Target	34.5		mg/kg	34.5		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN0	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	UT01SD	pH:		Sample Date:	08/26/2016	Sample Time:	10:06:00
% Moisture :				% Solids :	64.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	6.3		mg/kg	6.3		1	Yes	S4VEM
Arsenic	Target	53.9		mg/kg	53.9		1	Yes	S4VEM
Silver	Target	0.63	U	mg/kg	0.63	U	1	Yes	S4VEM
Thallium	Target	0.63	U	mg/kg	0.62	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN0	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	UT01SD	pH:		Sample Date:	08/26/2016	Sample Time:	10:06:00
% Moisture :				% Solids :	64.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	4620		mg/kg	4620		1	Yes	S4VEM
Barium	Target	36.3		mg/kg	36.3		1	Yes	S4VEM
Beryllium	Target	0.33	JQ	mg/kg	0.33	J	1	Yes	S4VEM
Cadmium	Target	0.75		mg/kg	0.75		1	Yes	S4VEM
Calcium	Target	5520		mg/kg	5520		1	Yes	S4VEM
Chromium	Target	6.4		mg/kg	6.4		1	Yes	S4VEM
Cobalt	Target	3.3	JQ	mg/kg	3.3	J	1	Yes	S4VEM
Copper	Target	4.3		mg/kg	4.3		1	Yes	S4VEM
Iron	Target	9150		mg/kg	9150		1	Yes	S4VEM
Lead	Target	5.1		mg/kg	5.1		1	Yes	S4VEM
Magnesium	Target	3540		mg/kg	3540		1	Yes	S4VEM
Manganese	Target	119	JL	mg/kg	119	*	1	Yes	S4VEM
Nickel	Target	4.9	JQ	mg/kg	4.9	J	1	Yes	S4VEM
Potassium	Target	940		mg/kg	940		1	Yes	S4VEM
Selenium	Target	4.4	U	mg/kg	4.4	U	1	Yes	S4VEM
Sodium	Target	96.8	JQ	mg/kg	96.8	J	1	Yes	S4VEM
Vanadium	Target	7.1		mg/kg	7.1		1	Yes	S4VEM
Zinc	Target	20.2		mg/kg	20.2		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN0	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	UT01SD	pH:		Sample Date:	08/26/2016	Sample Time:	10:06:00
% Moisture :				% Solids :	64.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	71.5		mg/kg	71.5	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number: MJHQN1	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location: WF06SD	pH:	Sample Date: 08/26/2016	Sample Time: 08:52:00
% Moisture :		% Solids : 79.9	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5400		mg/kg	5400		1	Yes	S4VEM
Barium	Target	58.5		mg/kg	58.5		1	Yes	S4VEM
Beryllium	Target	0.40	JQ	mg/kg	0.40	J	1	Yes	S4VEM
Cadmium	Target	1.3		mg/kg	1.3		1	Yes	S4VEM
Calcium	Target	1680		mg/kg	1680		1	Yes	S4VEM
Chromium	Target	5.0		mg/kg	5.0		1	Yes	S4VEM
Cobalt	Target	27.8		mg/kg	27.8		1	Yes	S4VEM
Copper	Target	15.8		mg/kg	15.8		1	Yes	S4VEM
Iron	Target	5700		mg/kg	5700		1	Yes	S4VEM
Lead	Target	3.3		mg/kg	3.3		1	Yes	S4VEM
Magnesium	Target	725		mg/kg	725		1	Yes	S4VEM
Manganese	Target	356	JL	mg/kg	356	*	1	Yes	S4VEM
Nickel	Target	10.3		mg/kg	10.3		1	Yes	S4VEM
Potassium	Target	1370		mg/kg	1370		1	Yes	S4VEM
Selenium	Target	0.37	JQ	mg/kg	0.37	J	1	Yes	S4VEM
Sodium	Target	437	U	mg/kg	437	U	1	Yes	S4VEM
Vanadium	Target	5.1		mg/kg	5.1		1	Yes	S4VEM
Zinc	Target	30.6		mg/kg	30.6		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN1	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	WF06SD	pH:		Sample Date:	08/26/2016	Sample Time:	08:52:00
% Moisture :				% Solids :	79.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	17.2		mg/kg	17.2		1	Yes	S4VEM
Arsenic	Target	195		mg/kg	195		1	Yes	S4VEM
Silver	Target	0.53	U	mg/kg	0.53	U	1	Yes	S4VEM
Thallium	Target	0.73		mg/kg	0.73		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN1	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	WF06SD	pH:		Sample Date:	08/26/2016	Sample Time:	08:52:00
% Moisture :				% Solids :	79.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	6.8		mg/kg	6.8	D	10	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN1A	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	08:52:00
% Moisture :				% Solids :	79.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Manganese	Spike	3590		mg/kg	3590		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN1D	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	08:52:00
% Moisture :				% Solids :	79.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	6.2		mg/kg	6.2	D	10	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX
Sample Number: MJHQN1D	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 08:52:00
% Moisture :		% Solids : 79.9	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5460		mg/kg	5460		1	Yes	S4VEM
Barium	Target	59.4		mg/kg	59.4		1	Yes	S4VEM
Beryllium	Target	0.41	J	mg/kg	0.41	J	1	Yes	S4VEM
Cadmium	Target	1.3		mg/kg	1.3		1	Yes	S4VEM
Calcium	Target	1680		mg/kg	1680		1	Yes	S4VEM
Chromium	Target	5.0		mg/kg	5.0		1	Yes	S4VEM
Cobalt	Target	27.4		mg/kg	27.4		1	Yes	S4VEM
Copper	Target	16.3		mg/kg	16.3		1	Yes	S4VEM
Iron	Target	5800		mg/kg	5800		1	Yes	S4VEM
Lead	Target	3.1		mg/kg	3.1		1	Yes	S4VEM
Magnesium	Target	734		mg/kg	734		1	Yes	S4VEM
Manganese	Target	361		mg/kg	361		1	Yes	S4VEM
Nickel	Target	10.2		mg/kg	10.2		1	Yes	S4VEM
Potassium	Target	1390		mg/kg	1390		1	Yes	S4VEM
Selenium	Target	0.36	J	mg/kg	0.36	J	1	Yes	S4VEM
Sodium	Target	437	U	mg/kg	437	U	1	Yes	S4VEM
Vanadium	Target	5.3		mg/kg	5.3		1	Yes	S4VEM
Zinc	Target	30.1		mg/kg	30.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN1D	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	08:52:00
% Moisture :				% Solids :	79.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	14.7		mg/kg	14.7		1	Yes	S4VEM
Arsenic	Target	170		mg/kg	170		1	Yes	S4VEM
Silver	Target	0.47	U	mg/kg	0.47	U	1	Yes	S4VEM
Thallium	Target	0.66		mg/kg	0.66		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX
Sample Number: MJHQN1L	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 79.9	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5440		mg/kg	5440		5	Yes	S4VEM
Barium	Target	59.3	J	mg/kg	59.3	J	5	Yes	S4VEM
Beryllium	Target	0.32	J	mg/kg	0.32	J	5	Yes	S4VEM
Cadmium	Target	1.2	J	mg/kg	1.2	J	5	Yes	S4VEM
Calcium	Target	1580	J	mg/kg	1580	J	5	Yes	S4VEM
Chromium	Target	5.0		mg/kg	5.0		5	Yes	S4VEM
Cobalt	Target	26.5		mg/kg	26.5		5	Yes	S4VEM
Copper	Target	16.0		mg/kg	16.0		5	Yes	S4VEM
Iron	Target	5880		mg/kg	5880		5	Yes	S4VEM
Lead	Target	3.3	J	mg/kg	3.3	J	5	Yes	S4VEM
Magnesium	Target	741	J	mg/kg	741	J	5	Yes	S4VEM
Manganese	Target	378		mg/kg	378		5	Yes	S4VEM
Nickel	Target	9.7	J	mg/kg	9.7	J	5	Yes	S4VEM
Potassium	Target	1360	J	mg/kg	1360	J	5	Yes	S4VEM
Selenium	Target	15.3	U	mg/kg	15.3	U	5	Yes	S4VEM
Sodium	Target	2190	U	mg/kg	2190	U	5	Yes	S4VEM
Vanadium	Target	4.4	J	mg/kg	4.4	J	5	Yes	S4VEM
Zinc	Target	28.8		mg/kg	28.8		5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number: MJHQN1L	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 79.9	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	16.6		mg/kg	16.6		5	Yes	S4VEM
Arsenic	Target	188		mg/kg	188		5	Yes	S4VEM
Silver	Target	2.7	U	mg/kg	2.7	U	5	Yes	S4VEM
Thallium	Target	0.96	J	mg/kg	0.96	J	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number: MJHQN1S	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 08:52:00
% Moisture :		% Solids : 79.9	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Barium	Spike	418		mg/kg	418		1	Yes	S4VEM
Beryllium	Spike	9.7		mg/kg	9.7		1	Yes	S4VEM
Cadmium	Spike	9.7		mg/kg	9.7		1	Yes	S4VEM
Chromium	Spike	44.8		mg/kg	44.8		1	Yes	S4VEM
Cobalt	Spike	118		mg/kg	118		1	Yes	S4VEM
Copper	Spike	61.7		mg/kg	61.7		1	Yes	S4VEM
Lead	Spike	7.0		mg/kg	7.0		1	Yes	S4VEM
Manganese	Spike	220		mg/kg	220	*	1	Yes	S4VEM
Nickel	Spike	101		mg/kg	101		1	Yes	S4VEM
Selenium	Spike	18.8		mg/kg	18.8		1	Yes	S4VEM
Zinc	Spike	118		mg/kg	118		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number: MJHQN1S	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date: 08/26/2016	Sample Time: 08:52:00
% Moisture :		% Solids : 79.9	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Spike	26.8		mg/kg	26.8		1	Yes	S4VEM
Arsenic	Spike	229		mg/kg	229		1	Yes	S4VEM
Silver	Spike	6.2		mg/kg	6.2		1	Yes	S4VEM
Thallium	Spike	7.0		mg/kg	7.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN1S	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:		pH:		Sample Date:	08/26/2016	Sample Time:	08:52:00
% Moisture :				% Solids :	79.9		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Spike	19.7		mg/kg	19.7	D	10	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN2	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	WF07SD	pH:		Sample Date:	08/26/2016	Sample Time:	11:05:00
% Moisture :				% Solids :	72.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	5860		mg/kg	5860		1	Yes	S4VEM
Barium	Target	209		mg/kg	209		1	Yes	S4VEM
Beryllium	Target	0.86		mg/kg	0.86		1	Yes	S4VEM
Cadmium	Target	2.4		mg/kg	2.4		1	Yes	S4VEM
Calcium	Target	7940		mg/kg	7940		1	Yes	S4VEM
Chromium	Target	13.6		mg/kg	13.6		1	Yes	S4VEM
Cobalt	Target	36.5		mg/kg	36.5		1	Yes	S4VEM
Copper	Target	23.5		mg/kg	23.5		1	Yes	S4VEM
Iron	Target	18500		mg/kg	18500		1	Yes	S4VEM
Lead	Target	7.7		mg/kg	7.7		1	Yes	S4VEM
Magnesium	Target	6270		mg/kg	6270		1	Yes	S4VEM
Manganese	Target	1330	JL	mg/kg	1330	*	1	Yes	S4VEM
Nickel	Target	31.3		mg/kg	31.3		1	Yes	S4VEM
Potassium	Target	1590		mg/kg	1590		1	Yes	S4VEM
Selenium	Target	1.2	JQ	mg/kg	1.2	J	1	Yes	S4VEM
Sodium	Target	65.5	JQ	mg/kg	65.5	J	1	Yes	S4VEM
Vanadium	Target	14.5		mg/kg	14.5		1	Yes	S4VEM
Zinc	Target	30.6		mg/kg	30.6		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQN2	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	WF07SD	pH:		Sample Date:	08/26/2016	Sample Time:	11:05:00
% Moisture :				% Solids :	72.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	24.5		mg/kg	24.5	D	2	Yes	S4VEM
Arsenic	Target	238		mg/kg	238	D	2	Yes	S4VEM
Silver	Target	1.2	U	mg/kg	1.2	UD	2	Yes	S4VEM
Thallium	Target	2.8		mg/kg	2.8	D	2	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQH0	Lab Code:	CHX

Sample Number:	MJHQN2	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	WF07SD	pH:		Sample Date:	08/26/2016	Sample Time:	11:05:00
% Moisture :				% Solids :	72.1		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	99.5		mg/kg	99.5	D	50	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQP1	Method:	Metals by ICP-AES	Matrix:	Soil	MA Number:	
Sample Location:	BG01SS	pH:		Sample Date:	08/25/2016	Sample Time:	12:00:00
% Moisture :				% Solids :	97.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	29200		mg/kg	29200	D	2	Yes	S4VEM
Barium	Target	86.7		mg/kg	86.7		1	Yes	S4VEM
Beryllium	Target	0.26	JQ	mg/kg	0.26	J	1	Yes	S4VEM
Cadmium	Target	0.53		mg/kg	0.53		1	Yes	S4VEM
Calcium	Target	7980		mg/kg	7980		1	Yes	S4VEM
Chromium	Target	31.3		mg/kg	31.3		1	Yes	S4VEM
Cobalt	Target	13.2		mg/kg	13.2		1	Yes	S4VEM
Copper	Target	13.0		mg/kg	13.0		1	Yes	S4VEM
Iron	Target	23400		mg/kg	23400	D	2	Yes	S4VEM
Lead	Target	6.7		mg/kg	6.7		1	Yes	S4VEM
Magnesium	Target	34700		mg/kg	34700		1	Yes	S4VEM
Manganese	Target	595	JL	mg/kg	595	*	1	Yes	S4VEM
Nickel	Target	18.9		mg/kg	18.9		1	Yes	S4VEM
Potassium	Target	1150		mg/kg	1150		1	Yes	S4VEM
Selenium	Target	0.57	JQ	mg/kg	0.57	J	1	Yes	S4VEM
Sodium	Target	60.5	JQ	mg/kg	60.5	J	1	Yes	S4VEM
Vanadium	Target	31.9		mg/kg	31.9		1	Yes	S4VEM
Zinc	Target	38.6		mg/kg	38.6		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQP1	Method:	Mercury by Cold Vapor	Matrix:	Soil	MA Number:	
Sample Location:	BG01SS	pH:		Sample Date:	08/25/2016	Sample Time:	12:00:00
% Moisture :				% Solids :	97.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	1.1		mg/kg	1.1		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number:	MJHQP1	Method:	Metals by ICP-MS	Matrix:	Soil	MA Number:	
Sample Location:	BG01SS	pH:		Sample Date:	08/25/2016	Sample Time:	12:00:00
% Moisture :				% Solids :	97.5		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Target	1.5		mg/kg	1.5		1	Yes	S4VEM
Arsenic	Target	51.3		mg/kg	51.3		1	Yes	S4VEM
Silver	Target	0.46	U	mg/kg	0.46	U	1	Yes	S4VEM
Thallium	Target	0.46	U	mg/kg	0.38	J	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX
Sample Number: PBS166	Method: Metals by ICP-AES	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	mg/kg	20.0	U	1	Yes	S4VEM
Barium	Target	20.0	U	mg/kg	20.0	U	1	Yes	S4VEM
Beryllium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Cadmium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Calcium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Chromium	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Cobalt	Target	5.0	U	mg/kg	5.0	U	1	Yes	S4VEM
Copper	Target	2.5	U	mg/kg	2.5	U	1	Yes	S4VEM
Iron	Target	2.3	J	mg/kg	2.3	J	1	Yes	S4VEM
Lead	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Magnesium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Manganese	Target	1.5	U	mg/kg	-.39	J	1	Yes	S4VEM
Nickel	Target	4.0	U	mg/kg	4.0	U	1	Yes	S4VEM
Potassium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Selenium	Target	3.5	U	mg/kg	3.5	U	1	Yes	S4VEM
Sodium	Target	500	U	mg/kg	500	U	1	Yes	S4VEM
Vanadium	Target	5.0	U	mg/kg	5.0	U	1	Yes	S4VEM
Zinc	Target	6.0	U	mg/kg	6.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number: PBSD58	Method: Metals by ICP-MS	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	2.5	J	mg/kg	2.5	J	1	Yes	S4VEM
Antimony	Target	1.0	U	mg/kg	1.0	U	1	Yes	S4VEM
Arsenic	Target	0.27	J	mg/kg	0.27	J	1	Yes	S4VEM
Silver	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM
Thallium	Target	0.50	U	mg/kg	0.50	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQH0	Lab Code: CHX

Sample Number: PBSH46	Method: Mercury by Cold Vapor	Matrix: Soil	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.10	U	mg/kg	0.10	U	1	Yes	S4VEM

Edit History Report

Case No: 46386 Contract: EPW15007 SDG No: MJHQH0 Lab Code: CHX

Method: Metals by ICP-MS

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCSD58	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH0	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH2	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH3	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH4	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH5	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH6	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH7	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH8	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH9	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK3	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK7	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK8	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK9	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN0	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1D	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1L	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1S	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN2	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQP1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
PBSD58	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y

Method: Mercury by Cold Vapor

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQH0	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH0	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:58 PM	
MJHQH1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH1	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:58 PM	
MJHQH2	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH2	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:57 PM	
MJHQH3	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH3	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
MJHQH4	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH4	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
MJHQH5	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH5	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
MJHQH6	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH6	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:58 PM	
MJHQH7	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH7	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:58 PM	
MJHQH8	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH8	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:58 PM	
MJHQH9	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH9	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
MJHQK3	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK3	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:58 PM	
MJHQK7	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK7	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:58 PM	
MJHQK8	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK8	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:58 PM	
MJHQK9	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK9	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
MJHQN0	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN0	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
MJHQN1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
MJHQN1D	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1S	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN2	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN2	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
MJHQP1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQP1	Soil	Mercury	Validation Flag	J+		Don Matheny	9/29/16 6:59 PM	
PBSH46	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y

Method: Metals by ICP-AES

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCS166	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH0	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH0	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:24 PM	
MJHQH0	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:24 PM	
MJHQH0	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:24 PM	
MJHQH0	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:24 PM	
MJHQH1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH1	Soil	Magnesium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:28 PM	
MJHQH1	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:28 PM	
MJHQH1	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:28 PM	
MJHQH2	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH2	Soil	Magnesium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:23 PM	
MJHQH2	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:23 PM	
MJHQH2	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:23 PM	
MJHQH3	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH3	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:25 PM	
MJHQH3	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:25 PM	
MJHQH4	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH4	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:28 PM	
MJHQH4	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:28 PM	
MJHQH5	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH5	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:27 PM	
MJHQH5	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:27 PM	
MJHQH5	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:27 PM	
MJHQH6	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH6	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:25 PM	
MJHQH6	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:25 PM	
MJHQH7	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH7	Soil	Magnesium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:29 PM	
MJHQH7	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:29 PM	
MJHQH7	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:29 PM	
MJHQH7	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:29 PM	
MJHQH8	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH8	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:26 PM	
MJHQH8	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:26 PM	
MJHQH9	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQH9	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:26 PM	
MJHQH9	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:26 PM	
MJHQH9	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:26 PM	
MJHQK3	Soil		Validation		S4VEM	Don	10/3/16 2:41 PM	Y

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQK3	Soil		Level		S4VEM	Matheny	10/3/16 2:41 PM	Y
MJHQK3	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:29 PM	
MJHQK3	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:29 PM	
MJHQK7	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK7	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:25 PM	
MJHQK7	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:25 PM	
MJHQK7	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:25 PM	
MJHQK8	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK8	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:27 PM	
MJHQK8	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:27 PM	
MJHQK8	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:27 PM	
MJHQK9	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQK9	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:24 PM	
MJHQK9	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:24 PM	
MJHQN0	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN0	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:26 PM	
MJHQN0	Soil	Cobalt	Validation Flag	J	JQ	Don Matheny	10/3/16 1:26 PM	
MJHQN0	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:26 PM	
MJHQN0	Soil	Nickel	Validation Flag	J	JQ	Don Matheny	10/3/16 1:26 PM	
MJHQN0	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:26 PM	
MJHQN1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:28 PM	
MJHQN1	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:28 PM	
MJHQN1	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:28 PM	
MJHQN1A	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1D	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1L	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN1S	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN2	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQN2	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:27 PM	
MJHQN2	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:27 PM	
MJHQN2	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:27 PM	
MJHQP1	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
MJHQP1	Soil	Beryllium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:29 PM	
MJHQP1	Soil	Manganese	Validation Flag	J-	JL	Don Matheny	10/3/16 1:29 PM	
MJHQP1	Soil	Selenium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:29 PM	
MJHQP1	Soil	Sodium	Validation Flag	J	JQ	Don Matheny	10/3/16 1:29 PM	
PBS166	Soil		Validation Level		S4VEM	Don Matheny	10/3/16 2:41 PM	Y
PBS166	Soil	Manganese	Validated Result	-.39	1.5	Don Matheny	9/29/16 6:51 PM	
PBS166	Soil	Manganese	Validation Flag		U	Don Matheny	9/29/16 6:51 PM	

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MEMORANDUM

DATE: September 30, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 7 water samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for Total Metals and Hardness (EPA CLP SOW ISM02.3) were performed at Chemtex, Inc., Port Arthur, Texas. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

MJHQF8	MJHQF9	MJHQG0	MJHQG1	MJHQG2
MJHQG3	MJHQN9			

No issues were noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
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OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

September 29, 2016

MEMORANDUM

SUBJECT: Data Validation Report for the Cinnabar Mine Removal, Case# 46386, SDG: MJHQN9, Inorganic Analyses

FROM: Don Matheny, Chemist
Environmental Services Unit, OEA

TO: Brooks Stanfield, On-Scene Coordinator
Greg Weigel, On-Scene Coordinator
Office of Environmental Cleanup

CC: Rene Nordeen, Ecology & Environment

The quality assurance (QA) review of the analytical data generated from the analysis of seven water samples collected from the above referenced site has been completed. These samples were analyzed for total metals (including mercury) and hardness by Chemtex, located in Port Arthur, TX.

Sample analyses were evaluated following EPA's Stage 4 Data Validation Electronic/Manual Process (S4VEM). The validation was conducted according to the Quality Control Specifications outlined in:

- Cinnabar Mine Site Specific Sampling Plan, E&E, (July, 2016)
- USEPA CLP Statement of Work for Inorganic Superfund Methods (ISM02.3)
- National Functional Guidelines for Inorganic Superfund Data Review (EPA-540-R-10-011)
- Guidance for Labeling Externally Validated Laboratory Analytical Data (EPA-540-R08-005)

Some data may be qualified using the reviewer's professional judgment. The conclusions presented herein are based on the information provided for the review. A summary of samples evaluated in this validation report and the pertinent dates for sample collection, laboratory sample receipt and analyses is attached along with the validated data.

I. QUALITY CONTROL RESULTS SUMMARY

The table below summarizes the major sample quality control (QC) tests, associated test results, criteria for evaluation and identification of outliers. Some criteria for evaluation may be QAPP specific and different from the National Functional Guidelines. Certain QC tests are electronically evaluated the results of which are not summarized in the table below though any excursions of these tests will appear in the *Data Qualifications* section. In addition to the QC tests, calculations from 10% of the samples are verified against the raw data.

QC Results Summary

Quality Control Test[1]	Result Ranges	Outliers[2] (Y or N)	Evaluation Criteria
Preservation / Holding Times	Holding Times met	N	Cool ≤ 6°C, pH < 2 Metals 180 Days; Hg 28 Days
MS Tune	Tune criteria met	N	≤ 0.1 amu; ≤ 5% RSD
Instrument Calibration	Calibration criteria met	N	± 30% Difference; Corr. Coeff. ≥ 0.995
Calibration Verification	All checks passed	N	Metals 90 – 110% Recovery Hg 85 – 115% Recovery
Interference Check Std.	94 – 113%	N	80 – 120% Recovery
Lab Blanks	**Detects Reported**	**Y**	**Not detected or <10% of Sample**
Matrix Spike	87 - 116%	N	75 - 125% Recovery
Lab Duplicate	± CRQL	N	≤ 20% RPD or ± CRQL
LCS (blank spike)	90 - 115%	N	70 - 130% Recovery
Serial Dilution[3]	N/A	N	≤ 10% Difference

[1] Lab QC (matrix spike, lab duplicate, serial dilution) were performed on samples MJHQF8.

[2] See the "*Data Qualifications*" section below for QC excursions and qualification of affected data.

[3] The concentration of elements was too low for conducting a 1:5 Serial Dilution.

II. DATA QUALIFICATIONS

Summary of Data Validation Qualifiers Applied

After the manual and electronic data review, the following data qualifications were applied:

1. **Laboratory Blanks -** The following analytes have detected sample results < CRQLs and the associated continuing calibration blanks were also detected at concentrations < CRQLs.

Data Qualifications: Sample results are qualified U and the values elevated to the CRQLs.
Qualified Analytical Results: **Manganese -** MJHQG3, MJHQG0

2. **Detection / Quantitation Limits -** The following analytes have positively detected results < CRQLs (below the range of quantitation) and the associated laboratory blanks were not detected.

Data Qualifications: Sample results are qualified JQ with no indication of bias.
Qualified Analytical Results: Aluminum - MJHQG1, MJHQN9 Arsenic - MJHQF9, MJHQG1, MJHQG2 Magnesium - MJHQF8, MJHQF9, MJHQG0, MJHQG1, MJHQG2, MJHQG3 Manganese - MJHQG0, MJHQG3, MJHQN9 Nickel - MJHQN9 Potassium - MJHQF8, MJHQF9, MJHQG0, MJHQG1, MJHQG2, MJHQN9 Sodium - MJHQF8, MJHQF9, MJHQG0, MJHQG1, MJHQG2, MJHQG3

Data Qualifiers

The data qualifiers and their respective definitions applied to the sample result(s) are provided as follows.

Functional Guidelines Data Qualifiers	
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The associated value is an estimated quantity.
UJ	The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The data are unusable. The analyte may or may not be present in the sample.
Project Specific Data Qualifiers	
L	Low bias.
H	High bias.
K	Unknown Bias.
Q	Detected concentration is below the MRL / CRQL but is above the MDL.

III. SAMPLE INDEX

The sample listing dates of sample collection, laboratory receipt and analysis are provided below.

Sample Number	Matrix	Sampling Date	Date Received	ICP-AES Analysis	ICP-MS Analysis	Mercury Analysis
MJHQF8	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016	9/10/2016
MJHQF9	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016	9/10/2016
MJHQG0	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016	9/10/2016
MJHQG1	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016	9/10/2016
MJHQG2	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016	9/10/2016
MJHQG3	Water	8/23/2016	9/2/2016	9/10/2016	9/14/2016	9/10/2016
MJHQN9	Water	8/26/2016	8/30/2016	9/15/2016	9/14/2016	9/10/2016

Sample Summary Report

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX

Sample Number:	LCS169	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:		pH:		Sample Date:		Sample Time:	
% Moisture :				% Solids :	100		

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	375		ug/L	375		1	Yes	S4VEM
Antimony	Target	119		ug/L	119		1	Yes	S4VEM
Arsenic	Target	19.6		ug/L	19.6		1	Yes	S4VEM
Barium	Target	398		ug/L	398		1	Yes	S4VEM
Beryllium	Target	10.4		ug/L	10.4		1	Yes	S4VEM
Calcium	Target	10600		ug/L	10600		1	Yes	S4VEM
Chromium	Target	22.9		ug/L	22.9		1	Yes	S4VEM
Cobalt	Target	101		ug/L	101		1	Yes	S4VEM
Iron	Target	211		ug/L	211		1	Yes	S4VEM
Magnesium	Target	9580		ug/L	9580		1	Yes	S4VEM
Manganese	Target	31.5		ug/L	31.5		1	Yes	S4VEM
Nickel	Target	82.3		ug/L	82.3		1	Yes	S4VEM
Potassium	Target	9860		ug/L	9860		1	Yes	S4VEM
Sodium	Target	9870		ug/L	9870		1	Yes	S4VEM
Thallium	Target	54.7		ug/L	54.7		1	Yes	S4VEM
Vanadium	Target	114		ug/L	114		1	Yes	S4VEM
Zinc	Target	120		ug/L	120		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: LCSD61	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	2.1		ug/L	2.1		1	Yes	S4VEM
Copper	Target	4.0		ug/L	4.0		1	Yes	S4VEM
Lead	Target	1.8		ug/L	1.8		1	Yes	S4VEM
Selenium	Target	10.3		ug/L	10.3		1	Yes	S4VEM
Silver	Target	2.0		ug/L	2.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: MJHQF8	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: CC01SW	pH:	Sample Date: 08/23/2016	Sample Time: 14:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX
Sample Number: MJHQF8	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: CC01SW	pH:	Sample Date: 08/23/2016	Sample Time: 14:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.6		ug/L	10.6		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	24100		ug/L	24100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3690	JQ	ug/L	3690	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1030	JQ	ug/L	1030	J	1	Yes	S4VEM
Sodium	Target	1480	JQ	ug/L	1480	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	75.3		mg/L	75.3		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number:	MJHQF8	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	CC01SW	pH:		Sample Date:	08/23/2016	Sample Time:	14:03:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX

Sample Number:	MJHQF8D	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:		pH:		Sample Date:	08/23/2016	Sample Time:	14:03:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: MJHQF8D	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.3		ug/L	10.3		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	24300		ug/L	24300		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3710	J	ug/L	3710	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1020	J	ug/L	1020	J	1	Yes	S4VEM
Sodium	Target	1470	J	ug/L	1470	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	76.0		mg/L	76.0		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: MJHQF8D	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.4		ug/L	6.4		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX
Sample Number: MJHQF8L	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM
Copper	Target	7.6	J	ug/L	7.6	J	5	Yes	S4VEM
Lead	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM
Selenium	Target	25.0	U	ug/L	25.0	U	5	Yes	S4VEM
Silver	Target	5.0	U	ug/L	5.0	U	5	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX
Sample Number: MJHQF8L	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	1000	U	ug/L	1000	U	5	Yes	S4VEM
Antimony	Target	300	U	ug/L	300	U	5	Yes	S4VEM
Arsenic	Target	50.0	U	ug/L	50.0	U	5	Yes	S4VEM
Barium	Target	1000	U	ug/L	1000	U	5	Yes	S4VEM
Beryllium	Target	25.0	U	ug/L	25.0	U	5	Yes	S4VEM
Calcium	Target	24000	J	ug/L	24000	J	5	Yes	S4VEM
Chromium	Target	50.0	U	ug/L	50.0	U	5	Yes	S4VEM
Cobalt	Target	250	U	ug/L	250	U	5	Yes	S4VEM
Iron	Target	500	U	ug/L	500	U	5	Yes	S4VEM
Magnesium	Target	3650	J	ug/L	3650	J	5	Yes	S4VEM
Manganese	Target	75.0	U	ug/L	75.0	U	5	Yes	S4VEM
Nickel	Target	200	U	ug/L	200	U	5	Yes	S4VEM
Potassium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Sodium	Target	25000	U	ug/L	25000	U	5	Yes	S4VEM
Thallium	Target	125	U	ug/L	125	U	5	Yes	S4VEM
Vanadium	Target	250	U	ug/L	250	U	5	Yes	S4VEM
Zinc	Target	300	U	ug/L	300	U	5	Yes	S4VEM
Hardness	Derived	74.8		mg/L	74.8		5	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX

Sample Number:	MJHQF8S	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:		pH:		Sample Date:	08/23/2016	Sample Time:	14:03:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Spike	0.87		ug/L	0.87		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX
Sample Number: MJHQF8S	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Spike	1990		ug/L	1990		1	Yes	S4VEM
Antimony	Spike	98.4		ug/L	98.4		1	Yes	S4VEM
Arsenic	Spike	49.3		ug/L	49.3		1	Yes	S4VEM
Barium	Spike	2090		ug/L	2090		1	Yes	S4VEM
Beryllium	Spike	53.1		ug/L	53.1		1	Yes	S4VEM
Chromium	Spike	232		ug/L	232		1	Yes	S4VEM
Cobalt	Spike	501		ug/L	501		1	Yes	S4VEM
Iron	Spike	1130		ug/L	1130		1	Yes	S4VEM
Manganese	Spike	517		ug/L	517		1	Yes	S4VEM
Nickel	Spike	505		ug/L	505		1	Yes	S4VEM
Thallium	Spike	52.4		ug/L	52.4		1	Yes	S4VEM
Vanadium	Spike	576		ug/L	576		1	Yes	S4VEM
Zinc	Spike	494		ug/L	494		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: MJHQF8S	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date: 08/23/2016	Sample Time: 14:03:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Spike	52.6		ug/L	52.6		1	Yes	S4VEM
Copper	Spike	258		ug/L	258		1	Yes	S4VEM
Lead	Spike	18.9		ug/L	18.9		1	Yes	S4VEM
Selenium	Spike	92.5		ug/L	92.5		1	Yes	S4VEM
Silver	Spike	50.9		ug/L	50.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number:	MJHQF9	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC02SW	pH:		Sample Date:	08/23/2016	Sample Time:	14:50:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.8		ug/L	6.8		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX
Sample Number: MJHQF9	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: CC02SW	pH:	Sample Date: 08/23/2016	Sample Time: 14:50:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	9.4	JQ	ug/L	9.4	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	23500		ug/L	23500		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3570	JQ	ug/L	3570	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	986	JQ	ug/L	986	J	1	Yes	S4VEM
Sodium	Target	1400	JQ	ug/L	1400	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	73.3		mg/L	73.3		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number:	MJHQF9	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	CC02SW	pH:		Sample Date:	08/23/2016	Sample Time:	14:50:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX

Sample Number:	MJHQG0	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	CC03SW	pH:		Sample Date:	08/23/2016	Sample Time:	16:38:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number:	MJHQG0	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	CC03SW	pH:		Sample Date:	08/23/2016	Sample Time:	16:38:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number:	MJHQG0	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:	CC03SW	pH:		Sample Date:	08/23/2016	Sample Time:	16:38:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	12.6		ug/L	12.6		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	22300		ug/L	22300		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	3760	JQ	ug/L	3760	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	3.6	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	1050	JQ	ug/L	1050	J	1	Yes	S4VEM
Sodium	Target	1240	JQ	ug/L	1240	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	71.1		mg/L	71.1		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX
Sample Number:	MJHQG1	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	SC04SW	pH:		Sample Date:	08/23/2016	Sample Time:	12:29:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number:	MJHQG1	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC04SW	pH:		Sample Date:	08/23/2016	Sample Time:	12:29:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number:	MJHQG1	Method:	Metals by ICP-AES	Matrix:	Water	MA Number:	
Sample Location:	SC04SW	pH:		Sample Date:	08/23/2016	Sample Time:	12:29:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	143	JQ	ug/L	143	J	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	3.7	JQ	ug/L	3.7	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	18200		ug/L	18200		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2070	JQ	ug/L	2070	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	700	JQ	ug/L	700	J	1	Yes	S4VEM
Sodium	Target	2610	JQ	ug/L	2610	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	53.9		mg/L	53.9		1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: MJHQG2	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: SC05SW	pH:	Sample Date: 08/23/2016	Sample Time: 13:43:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	4.0	JQ	ug/L	4.0	J	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	18200		ug/L	18200		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	2070	JQ	ug/L	2070	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	740	JQ	ug/L	740	J	1	Yes	S4VEM
Sodium	Target	2600	JQ	ug/L	2600	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	53.9		mg/L	53.9		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX

Sample Number:	MJHQG2	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	SC05SW	pH:		Sample Date:	08/23/2016	Sample Time:	13:43:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number:	MJHQG2	Method:	Metals by ICP-MS	Matrix:	Water	MA Number:	
Sample Location:	SC05SW	pH:		Sample Date:	08/23/2016	Sample Time:	13:43:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.5		ug/L	6.5		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX
Sample Number: MJHQG3	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: BG02SW	pH:	Sample Date: 08/23/2016	Sample Time: 14:20:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.3		ug/L	6.3		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: MJHQG3	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: BG02SW	pH:	Sample Date: 08/23/2016	Sample Time: 14:20:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	13900		ug/L	13900		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	1080	JQ	ug/L	1080	J	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	4.8	J	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Sodium	Target	3090	JQ	ug/L	3090	J	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	39.1		mg/L	39.1		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX

Sample Number:	MJHQG3	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	BG02SW	pH:		Sample Date:	08/23/2016	Sample Time:	14:20:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: MJHQN9	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location: WF06SW	pH:	Sample Date: 08/26/2016	Sample Time: 08:40:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	55.1	JQ	ug/L	55.1	J	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	20.3		ug/L	20.3		1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	24100		ug/L	24100		1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	6470		ug/L	6470		1	Yes	S4VEM
Manganese	Target	6.9	JQ	ug/L	6.9	J	1	Yes	S4VEM
Nickel	Target	5.6	JQ	ug/L	5.6	J	1	Yes	S4VEM
Potassium	Target	1120	JQ	ug/L	1120	J	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	86.8		mg/L	86.8		1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX

Sample Number:	MJHQN9	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:	WF06SW	pH:		Sample Date:	08/26/2016	Sample Time:	08:40:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX

Sample Number: MJHQN9	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: WF06SW	pH:	Sample Date: 08/26/2016	Sample Time: 08:40:00
% Moisture :		% Solids :	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	6.6		ug/L	6.6		1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX
Sample Number: PBW169	Method: Metals by ICP-AES	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Antimony	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Arsenic	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Barium	Target	200	U	ug/L	200	U	1	Yes	S4VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Calcium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Chromium	Target	10.0	U	ug/L	10.0	U	1	Yes	S4VEM
Cobalt	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Iron	Target	100	U	ug/L	100	U	1	Yes	S4VEM
Magnesium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Manganese	Target	15.0	U	ug/L	15.0	U	1	Yes	S4VEM
Nickel	Target	40.0	U	ug/L	40.0	U	1	Yes	S4VEM
Potassium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Sodium	Target	5000	U	ug/L	5000	U	1	Yes	S4VEM
Thallium	Target	25.0	U	ug/L	25.0	U	1	Yes	S4VEM
Vanadium	Target	50.0	U	ug/L	50.0	U	1	Yes	S4VEM
Zinc	Target	60.0	U	ug/L	60.0	U	1	Yes	S4VEM
Hardness	Derived	0.033	U	mg/L	0.033	U	1	Yes	S4VEM

Case No: 46386	Contract: EPW15007	SDG No: MJHQN9	Lab Code: CHX
Sample Number: PBWD61	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Cadmium	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Copper	Target	2.0	U	ug/L	2.0	U	1	Yes	S4VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	Yes	S4VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	Yes	S4VEM

Case No:	46386	Contract:	EPW15007	SDG No:	MJHQN9	Lab Code:	CHX

Sample Number:	PBWH51	Method:	Mercury by Cold Vapor	Matrix:	Water	MA Number:	
Sample Location:		pH:		Sample Date:		Sample Time:	
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.20	U	ug/L	0.20	U	1	Yes	S4VEM

Edit History Report

Case No: 46386 Contract: EPW15007 SDG No: MJHQN9 Lab Code: CHX

Method: Metals by ICP-AES

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCS169	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQF8	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQF8	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQF8D	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8L	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8S	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF9	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/29/16 2:43 PM	
MJHQF9	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:43 PM	
MJHQF9	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:43 PM	
MJHQF9	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:43 PM	
MJHQG0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG0	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQG0	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQG0	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQG1	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG1	Water	Aluminum	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQG1	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQG1	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQG1	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQG1	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:41 PM	
MJHQG2	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG2	Water	Arsenic	Validation Flag	J	JQ	Don Matheny	9/29/16 2:42 PM	
MJHQG2	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:42 PM	
MJHQG2	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:42 PM	
MJHQG2	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:42 PM	
MJHQG3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG3	Water	Magnesium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:39 PM	
MJHQG3	Water	Sodium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:39 PM	
MJHQN9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQN9	Water	Aluminum	Validation Flag	J	JQ	Don Matheny	9/29/16 2:42 PM	
MJHQN9	Water	Manganese	Validation Flag	J	JQ	Don Matheny	9/29/16 2:42 PM	
MJHQN9	Water	Nickel	Validation Flag	J	JQ	Don Matheny	9/29/16 2:42 PM	
MJHQN9	Water	Potassium	Validation Flag	J	JQ	Don Matheny	9/29/16 2:42 PM	

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
PBW169	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y

Method: Metals by ICP-MS

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
LCSD61	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8D	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8L	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8S	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG1	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG2	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQN9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
PBWD61	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y

Method: Mercury by Cold Vapor

Sample	Matrix	Analyte Name	Data Field	Old Value	New Value	User	Edit Date Time	Global
MJHQF8	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8D	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF8S	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQF9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG0	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG1	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG2	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQG3	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
MJHQN9	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y
PBWH51	Water		Validation Level		S4VEM	Don Matheny	9/29/16 2:43 PM	Y

ecology and environment, inc.
Global Environmental Specialists

720 Third Avenue, Suite 1700
Seattle, Washington 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: November 7, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington

SUBJ: **Organic Data Quality Assurance Review, Cinnabar Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data quality assurance review of 1 oil sample collected from the Cinnabar Integrated Assessment Site located near Yellow Pine, Idaho, has been completed. Analyses for Polychlorinated Biphenyls (PCBs, EPA Method 8082) were performed by Analytical Resources, Inc. Seattle, Washington. All sample analyses were evaluated following EPA's Stage 2B and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The sample was numbered: 16384164

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The sample was received at 10.1°C. The sample was collected on September 21, 2016, extracted on October 27, 2016, and was analyzed by October 31, 2016.

2. **Instrument Performance: Acceptable.**

The surrogate retention time percent difference between the initial calibration standards and the remaining standards and samples was ≤ 0.3% for capillary column analyses.

3. **Initial and Continuing Calibration: Satisfactory.**

All initial calibration relative standard deviations (RSDs) were within QC limits. All continuing calibration % differences (% D) were within QC limits except a high Aroclor 1260 recovery in the second source calibration; no actions were taken based on the high outlier as no analytes were detected in the sample.

4. **Error Determination: Not Provided.**

Samples necessary for bias and precision determination were not provided to the laboratory. All samples were flagged RND (Recovery Not Determined) and PND (Precision Not Determined), although the flags are not found on the Form I's.

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5. **Blanks: Acceptable.**

A method blank was prepared at the required frequency of every time samples were extracted for each matrix and for each concentration level, or every 20 samples, whichever is greater, and for each analytical system. No target analytes were detected in any blanks.

6. **Performance Evaluation Samples: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

7. **System Monitoring Compounds (SMCs): Acceptable.**

All recoveries of the SMCs were within the established control limits.

8. **Blank Spikes: Acceptable.**

Recoveries of all spiked analytes were within the appropriate control limits.

9. **Compound Identification: Acceptable.**

All results were dual-column confirmed with differences between the columns less than 25%.

10. **Target Compound Quantitation and Quantitation Limits: Acceptable.**

Sample results and quantitation limits were correctly calculated.

11. **Laboratory Contact**

No laboratory contact was required.

12. **Overall Assessment**

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical method, and, when applicable, the Office of Emergency and Remedial Response Publication "National Functional Guidelines for Superfund Organic Methods Data Review, August 2014". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

<u>Data Qualifiers and Definitions</u>

U - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

JH - The result is an estimated quantity, but the result may be biased high.

JL - The result is an estimated quantity, but the result may be biased low.

JK - The result is an estimated quantity, but the result may have an unknown bias.

JQ - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

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

NJ - The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the sample.

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

C - The target Pesticide or Aroclor analyte identification has been confirmed by Gas Chromatograph/ Mass Spectrometer (GC/MS).

Analytical Resources, Incorporated

Dual Column

ORGANIC ANALYSIS DATA SHEET

EPA 8082A

16384164

Laboratory:	Analytical Resources, Inc.			SDG:	16J0379
Client:	Ecology & Environment, Inc.			Project:	SFP-114B
Matrix:	Oil	Laboratory ID:	16J0379-01	File ID:	16103106.D
Sampled:	09/21/16 11:00	Prepared:	10/27/16 13:00	Analyzed:	10/31/16 08:27
Solids:		Preparation:	EPA 3580A (Waste Dilution)	Initial/Final:	2 g / 100 mL
Batch:	BEJ0830	Sequence:	SEJ0463	Calibration:	ZJ00049
Instrument:	ECD7	Column 1:	ZB5	Column 2:	ZB35

CAS NO.	COMPOUND	Col #	DILUTION	CONC. (ug/kg)	MDL	RL	Q
12674-11-2	Aroclor 1016	1	1	1000	63.0	1000	U
11104-28-2	Aroclor 1221	1	1	1000	63.0	1000	U
11141-16-5	Aroclor 1232	1	1	1000	63.0	1000	U
53469-21-9	Aroclor 1242	1	1	1000	63.0	1000	U
12672-29-6	Aroclor 1248	1	1	1000	63.0	1000	U
11097-69-1	Aroclor 1254	1	1	1000	63.0	1000	U
11096-82-5	Aroclor 1260	1	1	1000	123	1000	U
37324-23-5	Aroclor 1262	1	1	1000	123	1000	U
11100-14-4	Aroclor 1268	1	1	1000	123	1000	U

MW 11-7-16

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Global Environmental Specialists

720 Third Avenue, Suite 1700
Seattle, Washington 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: November 21, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 8 water samples collected from the Cinnabar Integrated Assessment Site located near Yellow Pine, Idaho, has been completed. Analyses for Sulfate (EPA Method 300.0) were performed at the US EPA Region 10 Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16404407	16404408	16404409	16404410	16404411
16404412	16404419	16404420		

No discrepancies were noted.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114B

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

I have authorized release of this data package. Attached you will find the Sulfate results for the Cinnabar Mine Integrated Assessment project for the samples received on 10/05/2016. For further information regarding the attached data, contact Stephanie Le at 360-871-8715.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: November 7, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, Preparedness and Prevention Unit, US EPA Region 10

From: Stephanie Le, Chemist
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment Samples For Sulfate

Project Code: SFP-114B
Account Code: 2017TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, Emergency Response Unit, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, Assessment and Brownfields Unit, US EPA Region 10
Renee Nordeen, E&E

The following is a quality assurance review of the results of the analysis of 8 water samples for Sulfate. These samples were submitted for the Cinnabar Mine Integrated Assessment Project. The analysis was performed by EPA Region 10 ESAT Contractors at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16404407	16404408	16404409	16404410	16404411	16404412	16404419
16404420						

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

All measures of quality control met Laboratory/QAPP criteria.

For those tests for which the USEPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met. The Region 10 Laboratory's Quality System has been accredited to the standards of The NELAC Institute (TNI).

1. Sample Transport and Receipt

Upon sample receipt, all conditions met Laboratory/QAPP requirements for this project for the analysis covered by this memo.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review met method holding time recommendations.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The quadratic regressions generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method and project QAPP. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blank did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on sample 16404412. Sample results which were greater than five times the MRL level were within the +/- 20% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on sample 16404412. Applicable spike results were within the 80-120% recovery requirements. No qualification was required based on matrix spike analyses.

9. Instrument Peak Integrations

No manual integrations were performed.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached.

11. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

No other qualification was required.

The definition for the data qualifier is as follows:

Below are the definitions for the codes used qualifying data from these analyses. When more than one quality issue was involved, the most restrictive qualifier has been attached to the data.

U - The analyte was not detected at or above the reported value.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Stephanie Le at the Region 10 Laboratory, phone number (360) 871-8715.

12. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Internal standards – Compounds used to help evaluate instrument analytical performance for individual samples. Internal standards provide an instrument response for reference to accurately quantify the analytes for all associated instrumental analyses.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Low Range Standard (LRS) – A level (often 5 times the MRL) where it has been demonstrated that the instrument achieves defined levels of accuracy and precision (more stringent than at the MRL), as checked with the Low Range Standard during analysis.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Reference materials – Samples with analyte values that are homogeneous and well established. This allows the reference material to be used to assess the accuracy of the measurement method.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114B
Site : CINNABAR MINE IA: Tailings Mesocosm Experiment
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): Anions

Analyte: 14808798 - Sulfate
Weight Basis : N/A

Prep Method(s): 300.0 - Inorganic Anions, Ion Chromatography
Analytical Method: 300.0 - Inorganic Anions, Ion Chromatography

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16404407 sam	Tailings 1-Unamended	Filtered	**37.4**	**mg/L**		10/12/16	5
16404408 sam	Tailings 2-Unamended	Filtered	**35.2**	**mg/L**		10/12/16	5
16404409 sam	Tailings 3-Unamended	Filtered	**31.5**	**mg/L**		10/12/16	5
16404410 sam	Tailings 4-Proganics	Filtered	**179**	**mg/L**		10/17/16	25
16404411 sam	Tailings 5-Proganics	Filtered	**86.9**	**mg/L**		10/17/16	10
16404412 sam	Tailings 6-Proganics	Filtered	**63.8**	**mg/L**		10/13/16	10
16404419 sam	Blank	Filtered	0.30	mg/L	U	10/12/16	1
16404420 sam	Leaching Water	Filtered	**1.32**	**mg/L**		10/12/16	1
16404412 du	Tailings 6-Proganics	Filtered	**62.6**	**mg/L**		10/13/16	10
IW101216ABL blk	Blank	Liquid	0.30	mg/L	U	10/12/16	1
IW101316ABL blk	Blank	Liquid	0.30	mg/L	U	10/13/16	1
IW101716ABL blk	Blank	Liquid	0.30	mg/L	U	10/17/16	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16404412 ms	Tailings 6-Proganics	Filtered	89	%Rec		10/13/16	10
16404412 msd	Tailings 6-Proganics	Filtered	100	%Rec		10/13/16	10
IW101216AL1 lcs	Lab Control Standard	Liquid	96	%Rec		10/12/16	1
IW101316AL1 lcs	Lab Control Standard	Liquid	97	%Rec		10/13/16	1
IW101716AL1 lcs	Lab Control Standard	Liquid	97	%Rec		10/17/16	1
IW101216AL2 lc2	Lab Control Standard Dup.	Liquid	96	%Rec		10/12/16	1
IW101316AL2 lc2	Lab Control Standard Dup.	Liquid	97	%Rec		10/13/16	1
IW101716AL2 lc2	Lab Control Standard Dup.	Liquid	97	%Rec		10/17/16	1

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Global Environmental Specialists

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Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 13, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Summary Check, Cinnabar Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 18 water samples collected from the Cinnabar Integrated Assessment Site located near Yellow Pine, Idaho, has been completed. Analyses for Sulfate (EPA Method 300.0) were performed at the US EPA Region 10 Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16424401	16424402	16424403	16424404	16424405	16424406
16434401	16434402	16434403	16434404	16434405	16434406
16454401	16454402	16454403	16454404	16454405	16454406

No discrepancies were noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114B

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

I have authorized release of this data package. Attached you will find the Sulfate results for the Cinnabar Mine Integrated Assessment project for the samples received on 10/17/2016, 10/25/2016, and 11/10/2016. For further information regarding the attached data, contact Stephanie Le at 360-871-8715.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: December 8, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, Preparedness and Prevention Unit, US EPA Region 10

From: Stephanie Le, Chemist
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment Samples For Sulfate

Project Code: SFP-114B
Account Code: 2017TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, Emergency Response Unit, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, Assessment and Brownfields Unit, US EPA Region 10
Renee Nordeen, E&E

The following is a quality assurance review of the results of the analysis of 18 water samples for Sulfate. These samples were submitted for the Cinnabar Mine Integrated Assessment Project. The analysis was performed by EPA Region 10 ESAT Contractors at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16424401	16424402	16424403	16424404	16424405	16424406
16434401	16434402	16434403	16434404	16434405	16434406
16454401	16454402	16454403	16454404	16454405	16454406

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

All measures of quality control met Laboratory/QAPP criteria.

For those tests for which the USEPA Region 10 Laboratory has been accredited by The NELAC Institute (TNI), all requirements of the current TNI Standard have been met. The Region 10 Laboratory's Quality System has been accredited to the standards of The NELAC Institute (TNI).

1. Sample Transport and Receipt

Upon sample receipt, all conditions met Laboratory/QAPP requirements for this project for the analysis covered by this memo.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review met method holding time recommendations.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The quadratic regressions generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method and project QAPP. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blank did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on samples 16424405 and 16454404. Sample results which were greater than five times the MRL level were within the +/- 20% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on samples 16424405 and 16454404. Applicable spike results were within the 80-120% recovery requirements. No qualification was required based on matrix spike analyses.

9. Instrument Peak Integrations

No manual integrations were performed.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached.

11. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

No other qualification was required.

The definition for the data qualifier is as follows:

Below are the definitions for the codes used qualifying data from these analyses. When more than one quality issue was involved, the most restrictive qualifier has been attached to the data.

U - The analyte was not detected at or above the reported value.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Stephanie Le at the Region 10 Laboratory, phone number (360) 871-8715.

12. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Internal standards – Compounds used to help evaluate instrument analytical performance for individual samples. Internal standards provide an instrument response for reference to accurately quantify the analytes for all associated instrumental analyses.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Low Range Standard (LRS) – A level (often 5 times the MRL) where it has been demonstrated that the instrument achieves defined levels of accuracy and precision (more stringent than at the MRL), as checked with the Low Range Standard during analysis.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Reference materials – Samples with analyte values that are homogeneous and well established. This allows the reference material to be used to assess the accuracy of the measurement method.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114B
Site : CINNABAR MINE IA: Tailings Mesocosm Experiment
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): Anions

Analyte: 14808798 - Sulfate
Weight Basis : N/A

Prep Method(s): 300.0 - Inorganic Anions, Ion Chromatography
Analytical Method: 300.0 - Inorganic Anions, Ion Chromatography

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16424401 sam	Tailings 1-Unamended	Filtered	**22.4**	**mg/L**		10/27/16	5
16424402 sam	Tailings 2-Unamended	Filtered	**26.7**	**mg/L**		10/27/16	5
16424403 sam	Tailings 3-Unamended	Filtered	**14.5**	**mg/L**		10/27/16	5
16424404 sam	Tailings 4-Proganics	Filtered	**118**	**mg/L**		10/27/16	25
16424405 sam	Tailings 5-Proganics	Filtered	**141**	**mg/L**		10/27/16	25
16424406 sam	Tailings 6-Proganics	Filtered	**150**	**mg/L**		10/28/16	25
16434401 sam	Tailings 1-Unamended	Filtered	**38.9**	**mg/L**		10/27/16	5
16434402 sam	Tailings 2-Unamended	Filtered	**41.8**	**mg/L**		10/27/16	5
16434403 sam	Tailings 3-Unamended	Filtered	**37.7**	**mg/L**		10/27/16	5
16434404 sam	Tailings 4-Proganics	Filtered	**67.0**	**mg/L**		10/27/16	25
16434405 sam	Tailings 5-Proganics	Filtered	**65.6**	**mg/L**		10/27/16	25
16434406 sam	Tailings 6-Proganics	Filtered	**98.0**	**mg/L**		10/27/16	10
16454401 sam	Tailings 1-Unamended	Filtered	**43.0**	**mg/L**		11/16/16	5
16454402 sam	Tailings 2-Unamended	Filtered	**42.4**	**mg/L**		11/16/16	5
16454403 sam	Tailings 3-Unamended	Filtered	**37.1**	**mg/L**		11/16/16	5
16454404 sam	Tailings 4-Proganics	Filtered	**30.4**	**mg/L**		11/16/16	25
16454405 sam	Tailings 5-Proganics	Filtered	**51.6**	**mg/L**		11/16/16	10
16454406 sam	Tailings 6-Proganics	Filtered	**69.4**	**mg/L**		11/16/16	10
16424405 du	Tailings 5-Proganics	Filtered	**144**	**mg/L**		10/27/16	25
16424406 du	Tailings 6-Proganics	Filtered	**147**	**mg/L**		10/28/16	25
16454404 du	Tailings 4-Proganics	Filtered	**31.1**	**mg/L**		11/16/16	25
IW102716ABL blk	Blank	Liquid	0.30	mg/L	U	10/27/16	1
IW102816ABL blk	Blank	Liquid	0.30	mg/L	U	10/28/16	1
IW111616ABL blk	Blank	Liquid	0.30	mg/L	U	11/16/16	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16424405 ms	Tailings 5-Proganics	Filtered	102	%Rec		10/27/16	25
16454404 ms	Tailings 4-Proganics	Filtered	98	%Rec		11/16/16	25
16424405 msd	Tailings 5-Proganics	Filtered	100	%Rec		10/27/16	25
16454404 msd	Tailings 4-Proganics	Filtered	99	%Rec		11/16/16	25
IW102716AL1 lcs	Lab Control Standard	Liquid	100	%Rec		10/27/16	1
IW102816AL1 lcs	Lab Control Standard	Liquid	99	%Rec		10/28/16	1

Spiked Compounds (cont.):

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
IW111616AL1 lcs	Lab Control Standard	Liquid	99	%Rec		11/16/16	1
IW102716AL2 lc2	Lab Control Standard Dup.	Liquid	98	%Rec		10/27/16	1
IW102816AL2 lc2	Lab Control Standard Dup.	Liquid	99	%Rec		10/28/16	1
IW111616AL2 lc2	Lab Control Standard Dup.	Liquid	98	%Rec		11/16/16	1

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MEMORANDUM

DATE: November 3, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Validation Memo, Cinnabar Mine Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data validation of 6 porewater samples collected from the Cinnabar Mine Integrated Assessment site located near Yellow Pine, Idaho, has been completed. Analyses for sulfide (EPA Method 9030B Modified) were performed at ALS Environmental, Inc., Kelso, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16434401 16434402 16434403 16434404 16434405 16434406

1. Sample Holding Times: Acceptable.

The samples were maintained at < 6°C. The samples were collected on October 24, 2016, and were analyzed by October 31, 2016.

2. Continuing Calibration: Acceptable.

All continuing calibration results were within QC limits.

3. Blanks: Acceptable.

A method blank was analyzed for each 20 samples or per matrix per concentration level. There were no detections in any blanks.

4. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

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6. Spike Duplicate Analysis: Acceptable.

Laboratory spike duplicate analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. All spike duplicate results were within QC limits.

7. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

8. Overall Assessment of Data for Use

The samples were received at a pH of 7, outside of the method limit of greater than 9; associated sample results were qualified as estimated quantities with a low bias (UJL).

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "National Functional Guidelines for Inorganic Superfund Data Review, August 2014". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

JH - The result is an estimated quantity, but the result may be biased high.

JL - The result is an estimated quantity, but the result may be biased low.

JK - The result is an estimated quantity, but the result may have an unknown bias.

JQ - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	US Environmental Protection Agency (EPA)	**Service Request:**	K1613206
Project:	SFP-114B	**Date Collected:**	10/24/16
Sample Matrix:	Water	**Date Received:**	10/28/16
Analysis Method:	9030M	**Units:**	mg/L
Prep Method:	EPA 9030B Modified	**Basis:**	NA

Sulfide, Total

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
16434401	K1613206-001	~~ND U~~	0.17 UJL	1	10/31/16 21:31	10/31/16	
16434402	K1613206-002	~~ND U~~	0.21	1	10/31/16 21:31	10/31/16	
16434403	K1613206-003	~~ND U~~	0.18	1	10/31/16 21:31	10/31/16	
16434404	K1613206-004	~~ND U~~	0.13	1	10/31/16 21:31	10/31/16	
16434405	K1613206-005	~~ND U~~	0.14	1	10/31/16 21:31	10/31/16	
16434406	K1613206-006	~~ND U~~ MW	0.19	1	10/31/16 21:31	10/31/16	
~~Method Blank~~	~~K1613206-MB~~	~~ND U~~	0.10	1	~~10/31/16 21:31~~	~~10/31/16~~ MW	

MW 11-3-16

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MEMORANDUM

DATE: December 29, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington

SUBJ: **Organic Data Summary Check, Cinnabar Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 26 water samples collected from the Cinnabar Integrated Assessment Site located near Yellow Pine, Idaho, has been completed. Analyses for Total Organic Carbon (Standard Method 5310B) were performed at the US EPA Region 10 Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16404407	16404408	16404409	16404410	16404411	16404412
16404419	16404420	16424401	16424402	16424403	16424404
16424405	16424406	16434401	16434402	16434403	16434404
16434405	16434406	16454401	16454402	16454403	16454404
16454405	16454406				

No discrepancies were noted.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114B

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

Chris Eckley
Office of Environmental Review & Assessment,
USEPA Region 10

I have authorized release of this data package. Attached you will find the Total Organic Carbon (TOC) results for water samples for the Cinnabar Mine Integrated Assessment project for the samples received 10/05/2016 through 11/09/2016. For further information regarding the attached data, contact Katie Adams at 360-871-8748.

DEC 23 2016

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: December 20, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, Preparedness and Prevention Unit, US EPA Region 10

From: Theresa McBride, Chemist
Office of Environmental Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment Samples
For TOC in water samples

Project Code: SFP-114B
Account Code: 2017TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, Emergency Response Unit, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, Assessment and Brownfields Unit, US EPA Region 10
Renee Nordeen, E&E
Chris Eckley, Office of Environmental Review and Assessment, US EPA Region 10

The following is a quality assurance review of the results of the analyses of 26 water samples for TOC. These samples were submitted for the Cinnabar Mine Integrated Assessment Project. The analyses were performed by EPA chemists at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16404407	16404408	16404409	16404410	16404411	16404412	16404419
16404420						
16424401	16424402	16424403	16424404	16424405	16424406	
16434401	16434402	16434403	16434404	16434405	16434406	
16454401	16454402	16454403	16454404	16454405	16454406	

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

All measures of quality control met Laboratory/QAPP criteria.

The Region 10 Laboratory's Quality System has been accredited to the standards of The NELAC Institute (TNI).

1. Sample Transport and Receipt

Upon sample receipt, all conditions met Laboratory/QAPP requirements for this project.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review met method holding time recommendations.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The linear regressions generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blanks did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on samples 16404407, 16424405 and 16434404. Sample results which were greater than five times the MRL level were within the +/- 20% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on samples 16424405 and 16434404. Sample results were within the 75-125% recovery requirements. No qualification was required based on matrix spike analyses.

9. Instrument Peak Integrations

No manual integrations were performed.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached. MRL values for some analytes have been elevated to reflect dilutions which were performed to mitigate interferences, or to bring analyte concentrations within the method calibration range.)

11. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

No other qualification was required. The definition for the data qualifier is as follows:

U - The analyte was not detected at or above the reported value.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Katie Adams at the Region 10 Laboratory, phone number (360) 871-8748.

12. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114B
Site : CINNABAR MINE IA: Tailings Mesocosm Experiment
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): **TOC**

Analyte: ***90081 - Non-Purgeable Organic Carbon (NPOC)**
Weight Basis : N/A

Prep Method(s): SM5310B - Total Organic Carbon, Combustion-Infrared Method, Standard Methods
Analytical Method: SM5310B - Total Organic Carbon, Combustion-Infrared Method, Standard Methods

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16404407 sam	Tailings 1-Unamended	Filtered	**5.00**	**mg/L**		10/25/16	1
16404408 sam	Tailings 2-Unamended	Filtered	**3.61**	**mg/L**		10/26/16	1
16404409 sam	Tailings 3-Unamended	Filtered	**4.79**	**mg/L**		10/26/16	1
16404410 sam	Tailings 4-Proganics	Filtered	**1030**	**mg/L**		10/26/16	50
16404411 sam	Tailings 5-Proganics	Filtered	**687**	**mg/L**		10/26/16	50
16404412 sam	Tailings 6-Proganics	Filtered	**828**	**mg/L**		10/26/16	50
16404419 sam	Blank	Filtered	**9.34**	**mg/L**		10/26/16	1
16404420 sam	Leaching Water	Filtered	1.0	mg/L	U	10/26/16	1
16424401 sam	Tailings 1-Unamended	Filtered	**7.07**	**mg/L**		10/26/16	1
16424402 sam	Tailings 2-Unamended	Filtered	**7.83**	**mg/L**		10/26/16	1
16424403 sam	Tailings 3-Unamended	Filtered	**2.06**	**mg/L**		10/26/16	1
16424404 sam	Tailings 4-Proganics	Filtered	**392**	**mg/L**		10/26/16	50
16424405 sam	Tailings 5-Proganics	Filtered	**603**	**mg/L**		10/26/16	50
16424406 sam	Tailings 6-Proganics	Filtered	**686**	**mg/L**		10/26/16	50
16434401 sam	Tailings 1-Unamended	Filtered	**2.01**	**mg/L**		11/17/16	1
16434402 sam	Tailings 2-Unamended	Filtered	**2.92**	**mg/L**		11/17/16	1
16434403 sam	Tailings 3-Unamended	Filtered	**12.9**	**mg/L**		11/17/16	1
16434404 sam	Tailings 4-Proganics	Filtered	**329**	**mg/L**		11/17/16	50
16434405 sam	Tailings 5-Proganics	Filtered	**367**	**mg/L**		11/18/16	50
16434406 sam	Tailings 6-Proganics	Filtered	**546**	**mg/L**		11/18/16	50
16454401 sam	Tailings 1-Unamended	Filtered	**3.52**	**mg/L**		11/17/16	1
16454402 sam	Tailings 2-Unamended	Filtered	**3.03**	**mg/L**		11/17/16	1
16454403 sam	Tailings 3-Unamended	Filtered	**2.66**	**mg/L**		11/17/16	1
16454404 sam	Tailings 4-Proganics	Filtered	**432**	**mg/L**		11/18/16	50
16454405 sam	Tailings 5-Proganics	Filtered	**379**	**mg/L**		11/18/16	50
16454406 sam	Tailings 6-Proganics	Filtered	**460**	**mg/L**		11/18/16	50
16404407 du	Tailings 1-Unamended	Filtered	**5.08**	**mg/L**		10/25/16	1
16424405 du	Tailings 5-Proganics	Filtered	**614**	**mg/L**		10/26/16	50
16434404 du	Tailings 4-Proganics	Filtered	**326**	**mg/L**		11/17/16	50
IW102516ABL blk	Blank	Liquid	1.0	mg/L	U	10/25/16	1
IW102616ABL blk	Blank	Liquid	1.0	mg/L	U	10/26/16	1
IW111716ABL blk	Blank	Liquid	1.0	mg/L	U	11/17/16	1

Spiked Compounds:

Spiked Compounds (cont.):

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16424405 ms	Tailings 5-Proganics	Filtered	95	%Rec		10/27/16	50
16434404 ms	Tailings 4-Proganics	Filtered	109	%Rec		11/18/16	50
16424405 msd	Tailings 5-Proganics	Filtered	91	%Rec		10/27/16	50
16434404 msd	Tailings 4-Proganics	Filtered	111	%Rec		11/18/16	50
IW102516AL1 lcs	Lab Control Standard	Liquid	101	%Rec		10/25/16	1
IW102616AL1 lcs	Lab Control Standard	Liquid	101	%Rec		10/26/16	1
IW111716AL1 lcs	Lab Control Standard	Liquid	97	%Rec		11/17/16	1
IW102516AL2 lc2	Lab Control Standard Dup.	Liquid	102	%Rec		10/25/16	1
IW102616AL2 lc2	Lab Control Standard Dup.	Liquid	99	%Rec		10/26/16	1
IW111716AL2 lc2	Lab Control Standard Dup.	Liquid	97	%Rec		11/17/16	1

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MEMORANDUM

DATE: December 13, 2016

TO: Renee Nordeen, START-IV Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington MW

SUBJ: **Organic Data Summary Check, Cinnabar Integrated Assessment Site, Yellow Pine, Idaho**

REF: TDD: 16-07-0002 PAN: 1004530.0004.158.01

The data summary check of 6 sediment samples collected from the Cinnabar Integrated Assessment Site located near Yellow Pine, Idaho, has been completed. Analyses for Total Organic Carbon (PSEP Method) were performed at the US EPA Region 10 Laboratory, Port Orchard, Washington. All sample analyses were evaluated following EPA's Stage 4 Data Validation Manual Process (S4VM).

The samples were numbered:

16454407	16454408	16454409	16454410	16454411	16454412

No discrepancies were noted.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganics Results from the Region 10 USEPA Laboratory

PROJECT NAME: Cinnabar Mine Integrated Assessment

PROJECT CODE: SFP-114B

FROM: Gerald Dodo, Supervisory Chemist
Office of Environmental Review and Assessment
USEPA Region 10 Laboratory

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup,
Preparedness and Prevention Unit , USEPA Region 10

CC: Greg Weigel
Office of Environmental Cleanup,
Emergency Response Unit, USEPA Region 10

Ken Marcy
Office of Environmental Cleanup,
Assessment and Brownfields Unit, USEPA Region 10

Renee Nordeen
E & E

I have authorized release of this data package. Attached you will find the Total Organic Carbon (TOC) results for the Cinnabar Mine Integrated Assessment project for the samples received on 11/10/2016. For further information regarding the attached data, contact Stephanie Le at 360-871-8715.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: December 8, 2016

TO: Brooks Stanfield, Project Manager
Office of Environmental Cleanup, Preparedness and Prevention Unit, US EPA Region 10

From: Stephanie Le, Chemist Stephanie Le
Office of Environmental Review and Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of Cinnabar Mine Integrated Assessment Samples For TOC in Soils

Project Code: SFP-114B
Account Code: 2017TR2B10P303DC6101TLA00

CC: Greg Weigel, Office of Environmental Cleanup, Emergency Response Unit, US EPA Region 10
Ken Marcy, Office of Environmental Cleanup, Assessment and Brownfields Unit, US EPA Region 10
Renee Nordeen, E&E

The following is a quality assurance review of the results of the analyses of 6 sediment samples for TOC. These samples were submitted for the Cinnabar Mine Integrated Assessment Project. The analyses were performed by EPA Region 10 ESAT Contractors at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

16454407	16454408	16454409	16454410	16454411	16454412

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

All measures of quality control met Laboratory/QAPP criteria.

The Region 10 Laboratory's Quality System has been accredited to the standards of The NELAC Institute (TNI).

1. Sample Transport and Receipt

Upon sample receipt, all conditions met Laboratory/QAPP requirements for this project.

2. Sample Holding Times

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. The samples covered by this review met method holding time recommendations.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for this analyte in this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The linear regressions generated for the initial calibrations met method criteria. The Minimum Reporting Level (MRL) of the method is verified on each day of analysis by including it as the low point on the calibration curve, and/or by measuring it as a QC standard. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blank did not contain detectable levels of analyte which would require data qualification.

7. Duplicate Analysis

Duplicate analysis was performed on sample 16454407. Sample results which were greater than five times the MRL level were within the +/- 35% relative percent difference (RPD) requirement. No qualification was required based on duplicate analysis.

8. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on sample 16454407. Sample results were within the 65-135% recovery requirements. No qualification was required based on matrix spike analyses.

9. Instrument Peak Integrations

No manual integrations were performed.

10. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached.

11. Data Qualifiers

The (U) qualifier was attached to all sample results that fall below the MRL.

No other qualification was required. The definition for the data qualifier is as follows:

U - The analyte was not detected at or above the reported value.

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Stephanie Le at the Region 10 Laboratory, phone number (360) 871-8715.

12. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DU), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Laboratory Control Sample (LCS) – a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analyte and the percent recovery of the analyte is determined.

Method Blank – An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) – the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations – The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

US EPA Region 10 Laboratory

Multi-Sample Final Report

Project Code : SFP-114B
Site : CINNABAR MINE IA: Tailings Mesocosm Experiment
Contact : Brooks Stanfield
Account : 2016TR2B10P303DC6101TLA00

Parameter(s): TOC

Analyte: *90064 - Total Organic Carbon
Weight Basis : Dry

Prep Method(s): PSEP-TOC - TOC in sediments by Puget Sound Estuarine Protocols
Analytical Method: PSEP-TOC - TOC in sediments by Puget Sound Estuarine Protocols

Target Analyte Results:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16454407 sam	Tailings 1-Unamended	Soil	**1500**	**mg/Kg**		11/30/16	1
16454408 sam	Tailings 2-Unamended	Soil	**1860**	**mg/Kg**		11/30/16	1
16454409 sam	Tailings 3-Unamended	Soil	**1630**	**mg/Kg**		11/30/16	1
16454410 sam	Tailings 4-Proganics	Soil	**32500**	**mg/Kg**		11/30/16	1
16454411 sam	Tailings 5-Proganics	Soil	**41100**	**mg/Kg**		11/30/16	1
16454412 sam	Tailings 6-Proganics	Soil	**31800**	**mg/Kg**		11/30/16	1
16454407 du	Tailings 1-Unamended	Soil	**1600**	**mg/Kg**		11/30/16	1
IS113016ABL blk	Blank	Solid	500	mg/Kg	U	11/30/16	1

Spiked Compounds:

Sample	Information	Lab Matrix	Result	Unit	Qual.	Analysis Date	Dilution
16454407 ms	Tailings 1-Unamended	Soil	107	%Rec		11/30/16	1
16454407 msd	Tailings 1-Unamended	Soil	102	%Rec		11/30/16	1
IS113016ACO std	Control	Solid	99	%Rec		11/30/16	1
IS113016AL1 lcs	Lab Control Standard	Solid	105	%Rec		11/30/16	1
IS113016AL2 lc2	Lab Control Standard Dup.	Solid	104	%Rec		11/30/16	1

ORIGINAL IN
CASE 46386
SDG MHJQE0

Case# 46386
SDG: MJHQE4
Workorder: 1187

USEPA CLP COC (LAB COPY) — CHAIN OF CUSTODY RECORD — No: 10-082516-130857-0013

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 805356776260

Case # 46386
Cooler #:

Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344216	MHJQE0	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1047 (< 6 C) (1)	AD01SD	08/24/2016 14:10	1185-01
16344319	MJHQE4	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1057 (HNO3 pH<2) (1)	BG03SWD	08/24/2016 12:34	1187-01
16344285	MJHQJ6	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1195 (HNO3 pH<2) (1)	BG03SW	08/24/2016 12:33	1188-01
16344219	MJHQK1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1206 (< 6 C) (1)	WF01SD	08/24/2016 13:04	1185-02
16344220	MJHQK2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1211 (< 6 C) (1)	WF02SD	08/24/2016 14:04	1185-03
16344235	MJHQK4	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1221 (< 6 C) (1)	CC04SD	08/24/2016 11:43	1185-04
16344236	MJHQK5	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1226 (< 6 C) (1)	CC05SD	08/24/2016 12:12	1185-05
16344246	MJHQK6	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1231 (< 6 C) (1)	BG03SD	08/24/2016 12:37	1185-06
16344210	MJHQL6	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1264 (< 6 C) (1)	BS01SS	08/24/2016 11:15	1185-07
16344214	MJHQL7	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1267 (< 6 C) (1)	BS05SS	08/24/2016 12:06	1185-08

Page-0003

Sample(s) to be used for Lab QC: 16344285 Tag 1195	**Shipment for Case Complete? Y**
	Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	08/29/16 12:00	[signature]/CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE 46386
SDG MHJQEO

Case #46386
SDG : MJHQEA
WorkOrder: 1187

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 805356776260

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082516-130857-0013
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344213	MJHQL8	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1270 (< 6 C) (1)	BS04SS	08/24/2016 11:57	Not shiped
16344212	MJHQL9	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1273 (< 6 C) (1)	BS03SS	08/24/2016 11:42	1185-10
16344211	MJHQM0	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1276 (< 6 C) (1)	BS02SS	08/24/2016 11:27	1185-11
16344217	MJHQM1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1278 (< 6 C) (1)	AD02SD	08/24/2016 14:57	1185-12
16344218	MJHQM2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1283 (< 6 C) (1)	AD03SD	08/24/2016 16:20	1185-13
16344289	MJHQM3	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1288 (HNO3 pH<2) (1)	AD01SWD	08/24/2016 14:03	1187-02
16344290	MJHQM4	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1291 (HNO3 pH<2) (1)	AD02SWD	08/24/2016 14:40	1187-03
16344291	MJHQM5	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1294 (HNO3 pH<2) (1)	AD03SWD	08/24/2016 16:20	1187-04
16344256	MJHQM6	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1297 (HNO3 pH<2) (1)	AD01SW	08/24/2016 14:06	1188-02

Page-0004

Sample(s) to be used for Lab QC: 16344256 Tag 1297, 16344257 Tag 1298	**Shipment for Case Complete? Y**
	Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 12:00	[signature] / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE 46386
SDG MJHQE5

Case #46386
SDG: MJHQE4
Workorder: 1187

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 B567 7 6237

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082916-143420-0016
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344286	MJHQE5	Surface Water Total/	Grab	TALMetals+Hard-WTR(21)	1052 (HNO3 pH<2) (2)	BG04SW	08/26/2016 11:34	1188-08
16344320	MJHQN3	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1322 (HNO3 pH<2) (2)	BG04SWD	08/26/2016 11:40	1187-08
16344317	MJHQN5	Surface Water Dissolved/	Grab	TALMetals+Hard-WTR(21)	1328 (HNO3 pH<2) (1)	UT01SWD	08/26/2016 09:57	1187-09
16344298	MJHQN7	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1334 (HNO3 pH<2) (1)	WF07SWD	08/26/2016 11:01	1187-10
16344283	MJHQN8	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1337 (HNO3 pH<2) (1)	UT01SW	08/26/2016 09:54	1188-09
16344265	MJHQP0	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1339 (HNO3 pH<2) (1)	WF07SW	08/26/2016 11:01	1188-10
16344266	MJHQP2	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1413 (HNO3 pH<2) (1)	AD04SW	08/25/2016 15:40	1188-11
16344287	MJHQP3	Surface Water Total/ Chris Eckley	Grab	TALMetals+Hard-WTR(21)	1415 (HNO) (1)	RI01WT	08/25/2016 14:29	1188-12
16344321	MJHQP4	Surface Water Dissolved/ Chris Eckley	Grab	TALMetals+Hard-WTR(21)	1416 (HNO3 pH<2) (1)	R101SWD	08/29/2016 14:29	1187-11

Page-0005

Sample(s) to be used for Lab QC: 16344286 Tag 1052, 16344320 Tag 1322, 16344283 Tag 1337, 16344265 Tag 1339 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? N

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 1200	[signature] / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE 46386
SDG MJHQE5

Case#46386
SDG: MJHQE4
Work Order: 1187

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6307

CHAIN OF CUSTODY RECORD
Case #: ~~44609~~ 46386
Cooler #:

No: 10-082516-105054-0010
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344260	MJHQJ0	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1189 (HNO3 pH<2) (1)	WF02SW	08/24/2016 13:58	1188-13
16344269	MJHQJ1	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1190 (HNO3 pH<2) (1)	WT01SW	08/24/2016 16:04	1188-14
16344293	MJHQJ9	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1200 (HNO3 pH<2) (1)	WF02SWD	08/24/2016 14:04	1187-12
16344303	MJHQK0	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1203 (HNO3 pH<2) (1)	WT01SWD	08/24/2016 16:11	1187-13
16344229	MJHQK3	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1216 (< 6 C) (1)	WT01SD	08/24/2016 16:15	1186-11
16344221	MJHQK7	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1236 (< 6 C) (1)	WF03SD	08/24/2016 15:51	1186-12
16344222	MJHQK8	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1241 (< 6 C) (1)	WF04SD	08/24/2016 16:30	1186-13
16344223	MJHQK9	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1246 (< 6 C) (1)	WF05SD	08/24/2016 16:54	1186-14
16344294	MJHQL0	Surface Water Dissolved/	Grab	TALMetals+Hard-WTR(21)	1251 (HNO3 pH<2) (1)	WF03SWD	08/24/2016 15:30	1187-14

Page-0006

Sample(s) to be used for Lab QC: 16344260 Tag 1189, 16344269 Tag 1190	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody # NA

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	BNorden ~~8/29/16~~ 12 (BN)	8/29/16 1200	[illegible]/CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE 46386
SDG MJHQE5

Case # 46386
SDG: MJHQE4

USEPA CLP COC (LAB COPY) — CHAIN OF CUSTODY RECORD — No: 10-082516-105054-0010

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6307

Case #: ~~44609~~ 46386
Cooler #:

Work Order: 1187

Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344295	MJHQL1	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1254 (HNO3 pH<2) (1)	WF04SWD	08/24/2016 16:16	1187-15
16344296	MJHQL2	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1257 (HNO3 pH<2) (1)	WF05SWD	08/24/2016 16:48	1187-16
16344261	MJHQL3	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1260 (HNO3 pH<2) (1)	WF03SW	08/24/2016 15:30	1188-15
16344262	MJHQL4	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1261 (HNO3 pH<2) (1)	WF04SW	08/24/2016 16:16	1188-16
16344263	MJHQL5	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1262 (HNO3 pH<2) (1)	WF05SW	08/24/2016 16:48	1188-17

KY 08/30/2016

Page-0007

Sample(s) to be used for Lab QC: 16344261 Tag 1260, 16344262 Tag 1261, 16344263 Tag 1262	**Shipment for Case Complete?** N
	Samples Transferred From Chain of Custody # NA

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[illegible]	8/29/16 1200	[illegible] / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE 46386
SDG ~~MJHQN9~~ MJHQE5
KY 09/08/2016

Case # 46386
SDG: MJHQE4
WO/Order: 1187

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEX
AirbillNo:

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082916-131345-0015
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344309	MJHQJ2	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1191 (HNO3 pH<2) (1)	CC04SWD	08/24/2016 11:23	1187-17
16344310	MJHQJ3	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1192 (HNO3 pH<2) (1)	CC05SWD	08/24/2016 12:07	1187-18
16344275	MJHQJ4	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1193 (HNO3 pH<2) (1)	CC04SW	08/24/2016 11:33	1188-18
16344276	MJHQJ5	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1194 (HNO3 pH<2) (1)	CC05SW	08/24/2016 12:03	1188-19
16344259	MJHQJ7	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1196 (HNO3 pH<2) (1)	WF01SW	08/24/2016 13:01	1188-20
16344292	MJHQJ8	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1197 (HNO3 pH<2) (1)	WF01SWD	08/24/2016 13:02	1187-19
16344213	MJHQL8	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1270 (< 6 C) (1)	BS04SS	08/24/2016 11:57	1185-09
16344247	MJHQM9	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1302 (< 6 C) (1)	BG04SD	08/26/2016 11:57	1185-20
16344243	MJHQN0	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1307 (< 6 C) (1)	UT01SD	08/26/2016 10:06	1186-15

Page-0008

Sample(s) to be used for Lab QC: 16344309 Tag 1191, 16344310 Tag 1192, 16344275 Tag 1193, 16344276 Tag 1194, 16344259 Tag 1196, 16344247 Tag 1302, 16344224 Tag 1312 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? N

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	RNorman	8/29/16 1200	Rolety / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE 46386
SDG MJHQN9

Case #46386
SDG: MJHQE4
WorkOrder : 1187

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo:

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082916-131345-0015
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344224	MJHQN1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1312 (< 6 C) (1)	WF06SD	08/26/2016 08:52	1186-16
16344225	MJHQN2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1317 (< 6 C) (1)	WF07SD	08/26/2016 11:05	1186-17
16344297	MJHQN6	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1331 (HNO3 pH<2) (2)	WF06SWD	08/26/2016 08:43	1187-20
16344264	MJHQN9	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1338 (HNO3 pH<2) (2)	WF06SW	08/26/2016 08:40	1189-01
16344244	MJHQP1	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1411 (< 6 C) (1)	BG01SS	08/25/2016 12:00	1186-18

KY 08/30/2016

Sample(s) to be used for Lab QC: 16344224 Tag 1312, 16344297 Tag 1331, 16344264 Tag 1338 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? N

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[illegible]	8/29/16 1200	[illegible] / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Page-0009

ORIGINAL IN
CASE 46386
SDG MJHQH0

Case #46386
SDG: MJHQE4
WorkOrder: 1187

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6270

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082416-154016-0008
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344238	MJHQE1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1078 (< 6 C) (1)	SC01SD	08/22/2016 16:34	1185-14
16344239	MJHQE2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1083 (< 6 C) (1)	SC02SD	08/22/2016 17:35	1185-15
16344240	MJHQE3	Sediment Surface/ EPA	Grab	TALMet+Hg+Hard-Soil(21)	1088 (< 6 C) (1)	SC03SD	08/22/2016 18:20	1185-16
16344278	MJHQE6	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1093 (HNO3 pH<2) (1)	SC01SW	08/22/2016 16:26	1188-05
16344279	MJHQE7	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1094 (HNO3 pH<2) (1)	SC02SW	08/22/2016 17:33	1188-06
16344280	MJHQE8	Surface Water Total/ EPA	Grab	TALMetals+Hard-WTR(21)	1095 (HNO3 pH<2) (1)	SC03SW	08/22/2016 18:20	1188-07
16344312	MJHQE9	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1096 (HNO3 pH<2) (1)	SC01SWD	08/22/2016 16:22	1187-05
16344313	MJHQF0	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1097 (HNO3 pH<2) (1)	SC02SWD	08/22/2016 17:22	1187-06
16344314	MJHQF1	Surface Water Dissolved/ EPA	Grab	TALMetals+Hard-WTR(21)	1098 (HNO3 pH<2) (1)	SC03SWD	08/22/2016 18:06	1187-07

Page-0010

Sample(s) to be used for Lab QC: 16344278 Tag 1093, 16344279 Tag 1094, 16344280 Tag 1095 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? N

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 12:00	[signature]/CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE A6386
SDG MHJQE0

Case #46386

USEPA CLP COC (LAB COPY) CHAIN OF CUSTODY RECORD SDG: MJHQE5 No: 10-082516-130857-0013

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 805356776260

Case # 46386 Workorder 1188
Cooler #:

Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344216	MHJQE0	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1047 (< 6 C) (1)	AD01SD	08/24/2016 14:10	1185-01
16344319	MJHQE4	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1057 (HNO3 pH<2) (1)	BG03SWD	08/24/2016 12:34	1187-01
16344285	MJHQJ6	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1195 (HNO3 pH<2) (1)	BG03SW	08/24/2016 12:33	1188-01
16344219	MJHQK1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1206 (< 6 C) (1)	WF01SD	08/24/2016 13:04	1185-02
16344220	MJHQK2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1211 (< 6 C) (1)	WF02SD	08/24/2016 14:04	1185-03
16344235	MJHQK4	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1221 (< 6 C) (1)	CC04SD	08/24/2016 11:43	1185-04
16344236	MJHQK5	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1226 (< 6 C) (1)	CC05SD	08/24/2016 12:12	1185-05
16344246	MJHQK6	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1231 (< 6 C) (1)	BG03SD	08/24/2016 12:37	1185-06
16344210	MJHQL6	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1264 (< 6 C) (1)	BS01SS	08/24/2016 11:15	1185-07
16344214	MJHQL7	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1267 (< 6 C) (1)	BS05SS	08/24/2016 12:06	1185-08

Page-0003

Sample(s) to be used for Lab QC: 16344285 Tag 1195	Shipment for Case Complete? Y
	Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	08/29/16 12:00	[signature]/CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE 46386
SDG MHJQE0

Case # 46386
SDG : MJHQE5
Work Order : 1188

USEPA CLP COC (LAB COPY) — CHAIN OF CUSTODY RECORD — No: 10-082516-130857-0013

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 805356776260

Case # 46386
Cooler #:

Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344213	MJHQL8	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1270 (< 6 C) (1)	BS04SS	08/24/2016 11:57	Not shiped
16344212	MJHQL9	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1273 (< 6 C) (1)	BS03SS	08/24/2016 11:42	1185-10
16344211	MJHQM0	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1276 (< 6 C) (1)	BS02SS	08/24/2016 11:27	1185-11
16344217	MJHQM1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1278 (< 6 C) (1)	AD02SD	08/24/2016 14:57	1185-12
16344218	MJHQM2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1283 (< 6 C) (1)	AD03SD	08/24/2016 16:20	1185-13
16344289	MJHQM3	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1288 (HNO3 pH<2) (1)	AD01SWD	08/24/2016 14:03	1187-02
16344290	MJHQM4	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1291 (HNO3 pH<2) (1)	AD02SWD	08/24/2016 14:40	1187-03
16344291	MJHQM5	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1294 (HNO3 pH<2) (1)	AD03SWD	08/24/2016 16:20	1187-04
16344256	MJHQM6	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1297 (HNO3 pH<2) (1)	AD01SW	08/24/2016 14:06	1188-02

Page-0004

Sample(s) to be used for Lab QC: 16344256 Tag 1297, 16344257 Tag 1298

Shipment for Case Complete? Y

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 12:00	[signature] / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Case #46386
SDG: ~~MHJQE0~~ MJHQE5
WorkOrder: ~~H85~~ KY 09/06/2016
1188

USEPA CLP COC (LAB COPY)

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 805356776260

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082516-130857-0013

Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344257	MJHQM7	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1298 (HNO3 pH<2) (1)	AD02SW	08/24/2016 14:55	1188-03
16344258	MJHQM8	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1299 (HNO3 pH<2) (1)	AD03SW	08/24/2016 16:12	1188-04

KY 08/30/2016

Sample(s) to be used for Lab QC: 16344257 Tag 1298, 16344258 Tag 1299	**Shipment for Case Complete? Y**
	Samples Transferred From Chain of Custody #

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 12:00	Kotay / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Page-0005

ORIGINAL IN
CASE 46386
SDG MJHQHO E0
KY 08/06/2016

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6270

Case #46386

CHAIN OF CUSTODY RECORD SDG: MJHQ E5

Case # 46386 Workorder: 1188
Cooler #:

No: 10-082416-154016-0008
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344238	MJHQE1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1078 (< 6 C) (1)	SC01SD	08/22/2016 16:34	1185-14
16344239	MJHQE2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1083 (< 6 C) (1)	SC02SD	08/22/2016 17:35	1185-15
16344240	MJHQE3	Sediment Surface/ EPA	Grab	TALMet+Hg+Hard-Soil(21)	1088 (< 6 C) (1)	SC03SD	08/22/2016 18:20	1185-16
16344278	MJHQE6	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1093 (HNO3 pH<2) (1)	SC01SW	08/22/2016 16:26	1188-05
16344279	MJHQE7	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1094 (HNO3 pH<2) (1)	SC02SW	08/22/2016 17:33	1188-06
16344280	MJHQE8	Surface Water Total/ EPA	Grab	TALMetals+Hard-WTR(21)	1095 (HNO3 pH<2) (1)	SC03SW	08/22/2016 18:20	1188-07
16344312	MJHQE9	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1096 (HNO3 pH<2) (1)	SC01SWD	08/22/2016 16:22	1187-05
16344313	MJHQF0	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1097 (HNO3 pH<2) (1)	SC02SWD	08/22/2016 17:22	1187-06
16344314	MJHQF1	Surface Water Dissolved/ EPA	Grab	TALMetals+Hard-WTR(21)	1098 (HNO3 pH<2) (1)	SC03SWD	08/22/2016 18:06	1187-07

Page-0006

Sample(s) to be used for Lab QC: 16344278 Tag 1093, 16344279 Tag 1094, 16344280 Tag 1095 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? N

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 12:00	[signature]/CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Case # 46386

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 B5677 6237`

CHAIN OF CUSTODY RECORD SDG : MJHQE5
Workorder: 1188

Case # 46386
Cooler #:

No: 10-082916-143420-0016
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344286	MJHQE5	Surface Water Total/	Grab	TALMetals+Hard-WTR(21)	1052 (HNO3 pH<2) (2)	BG04SW	08/26/2016 11:34	1188-08
16344320	MJHQN3	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1322 (HNO3 pH<2) (2)	BG04SWD	08/26/2016 11:40	1187-08
16344317	MJHQN5	Surface Water Dissolved/	Grab	TALMetals+Hard-WTR(21)	1328 (HNO3 pH<2) (1)	UT01SWD	08/26/2016 09:57	1187-09
16344298	MJHQN7	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1334 (HNO3 pH<2) (1)	WF07SWD	08/26/2016 11:01	1187-10
16344283	MJHQN8	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1337 (HNO3 pH<2) (1)	UT01SW	08/26/2016 09:54	1188-09
16344265	MJHQP0	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1339 (HNO3 pH<2) (1)	WF07SW	08/26/2016 11:01	1188-10
16344266	MJHQP2	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1413 (HNO3 pH<2) (1)	AD04SW	08/25/2016 15:40	1188-11
16344287	MJHQP3	Surface Water Total/ Chris Eckley	Grab	TALMetals+Hard-WTR(21)	1415 (HNO) (1)	RI01WT	08/25/2016 14:29	1188-12
16344321	MJHQP4	Surface Water Dissolved/ Chris Eckley	Grab	TALMetals+Hard-WTR(21)	1416 (HNO3 pH<2) (1)	R101SWD	08/29/2016 14:29	1187-11

Page-0007

Sample(s) to be used for Lab QC: 16344286 Tag 1052, 16344320 Tag 1322, 16344283 Tag 1337, 16344265 Tag 1339 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.	**Shipment for Case Complete? N** **Samples Transferred From Chain of Custody #** NA
Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness	

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 1200	[signature] / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Case # 46386
SDG: MJHQE5
46386 Workorder: 1188

USEPA CLP COC (LAB COPY)

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6307

CHAIN OF CUSTODY RECORD

Case #: ~~44609~~
Cooler #:

No: 10-082516-105054-0010

Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344260	MJHQJ0	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1189 (HNO3 pH<2) (1)	WF02SW	08/24/2016 13:58	1188-13
16344269	MJHQJ1	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1190 (HNO3 pH<2) (1)	WT01SW	08/24/2016 16:04	1188-14
16344293	MJHQJ9	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1200 (HNO3 pH<2) (1)	WF02SWD	08/24/2016 14:04	1187-12
16344303	MJHQK0	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1203 (HNO3 pH<2) (1)	WT01SWD	08/24/2016 16:11	1187-13
16344229	MJHQK3	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1216 (< 6 C) (1)	WT01SD	08/24/2016 16:15	1186-11
16344221	MJHQK7	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1236 (< 6 C) (1)	WF03SD	08/24/2016 15:51	1186-12
16344222	MJHQK8	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1241 (< 6 C) (1)	WF04SD	08/24/2016 16:30	1186-13
16344223	MJHQK9	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1246 (< 6 C) (1)	WF05SD	08/24/2016 16:54	1186-14
16344294	MJHQL0	Surface Water Dissolved/	Grab	TALMetals+Hard-WTR(21)	1251 (HNO3 pH<2) (1)	WF03SWD	08/24/2016 15:30	1187-14

Page-0008

Sample(s) to be used for Lab QC: 16344260 Tag 1189, 16344269 Tag 1190	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody # NA

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	BNOrder ~~8/29/16~~ 1/7 BN	8/29/16 1200	bdaily/CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Case# 46386
SDG: MJHQE5

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6307

CHAIN OF CUSTODY RECORD
46386 Work Order: 1188
Case #: ~~44609~~
Cooler #:

No: 10-082516-105054-0010
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344295	MJHQL1	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1254 (HNO3 pH<2) (1)	WF04SWD	08/24/2016 16:16	1187-15
16344296	MJHQL2	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1257 (HNO3 pH<2) (1)	WF05SWD	08/24/2016 16:48	1187-16
16344261	MJHQL3	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1260 (HNO3 pH<2) (1)	WF03SW	08/24/2016 15:30	1188-15
16344262	MJHQL4	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1261 (HNO3 pH<2) (1)	WF04SW	08/24/2016 16:16	1188-16
16344263	MJHQL5	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1262 (HNO3 pH<2) (1)	WF05SW	08/24/2016 16:48	1188-17

KY 08/30/2016

Page-0009

Sample(s) to be used for Lab QC: 16344261 Tag 1260, 16344262 Tag 1261, 16344263 Tag 1262	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody # NA

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[illegible]	8/29/16 1200	[illegible] / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Case #46386

SDG: ~~MJHQN9~~ ~~MJHQF8~~ MJHQE5

KY 09/02/2016

USEPA CLP COC (LAB COPY)

DateShipped: 8/29/2016

CarrierName: FedEx

AirbillNo:

CHAIN OF CUSTODY RECORD

Case # 46386

Cooler #:

WO#/Order: ~~1189~~ 1188

KY 09/06/2016

No: 10-082916-131345-0015

Lab: CHEMTEX - Port Arthur

Lab Contact: Jeevan Yeddula

Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344309	MJHQJ2	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1191 (HNO3 pH<2) (1)	CC04SWD	08/24/2016 11:23	1187-17
16344310	MJHQJ3	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1192 (HNO3 pH<2) (1)	CC05SWD	08/24/2016 12:07	1187-18
16344275	MJHQJ4	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1193 (HNO3 pH<2) (1)	CC04SW	08/24/2016 11:33	1188-18
16344276	MJHQJ5	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1194 (HNO3 pH<2) (1)	CC05SW	08/24/2016 12:03	1188-19
16344259	MJHQJ7	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1196 (HNO3 pH<2) (1)	WF01SW	08/24/2016 13:01	1188-20
16344292	MJHQJ8	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1197 (HNO3 pH<2) (1)	WF01SWD	08/24/2016 13:02	1187-19
16344213	MJHQL8	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1270 (< 6 C) (1)	BS04SS	08/24/2016 11:57	1185-09
16344247	MJHQM9	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1302 (< 6 C) (1)	BG04SD	08/26/2016 11:57	1185-20
16344243	MJHQN0	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1307 (< 6 C) (1)	UT01SD	08/26/2016 10:06	1186-15

Page-0010

Sample(s) to be used for Lab QC: 16344309 Tag 1191, 16344310 Tag 1192, 16344275 Tag 1193, 16344276 Tag 1194, 16344259 Tag 1196, 16344247 Tag 1302, 16344224 Tag 1312 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	RNorman	8/29/16 1200	Robotty / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Case #46386
SDG: MJHQF2
Workorder: 1190

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 6577 6281

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082316-121057-0007
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344232	MJHQF2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1102 (< 6 C) (1)	CC01SD	08/23/2016 14:13	1190-01
16344233	MJHQF3	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1107 (< 6 C) (1)	CC02SD	08/23/2016 14:55	1190-02
16344234	MJHQF4	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1112 (< 6 C) (1)	CC03SD	08/23/2016 16:43	1190-03
16344272	MJHQF8	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1132 (HNO3 pH<2) (1)	CC01SW	08/23/2016 14:03	1191-01
16344273	MJHQF9	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1133 (HNO3 pH<2) (1)	CC02SW	08/23/2016 14:50	1191-02
16344274	MJHQG0	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1134 (HNO3 pH<2) (1)	CC03SW	08/23/2016 16:38	1191-03
16344281	MJHQG1	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1135 (HNO3 pH<2) (1)	SC04SW	08/23/2016 12:29	1191-04
16344282	MJHQG2	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1136 (HNO3 pH<2) (1)	SC05SW	08/23/2016 13:43	1191-05
16344284	MJHQG3	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1137 (HNO3 pH<2) (1)	BG02SW	08/23/2016 14:20	1191-06
16344315	MJHQG4	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1138 (HNO3 pH<2) (1)	SC04SWD	08/23/2016 12:33	1192-01

Page-0003

Sample(s) to be used for Lab QC: 16344272 Tag 1132, 16344273 Tag 1133, 16344274 Tag 1134, 16344281 Tag 1135, 16344282 Tag 1136, 16344284 Tag 1137 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? Y

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8-29-16 12:00	[signature]	8-30-16 9:50	
	Kaila Smith ALS	9/1/16 0855	~~Rotary~~ / CHEMTEX	09/02/2016 1022	INTACT
			KY 09/02/2016		

ORIGINAL IN
CASE 46386
SDG MJHQF2

Case#46386
SDG: MJHQG4
WorkOrder: 1192

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 6577 6281

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082316-121057-0007
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344232	MJHQF2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1102 (< 6 C) (1)	CC01SD	08/23/2016 14:13	1190-01
16344233	MJHQF3	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1107 (< 6 C) (1)	CC02SD	08/23/2016 14:55	1190-02
16344234	MJHQF4	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1112 (< 6 C) (1)	CC03SD	08/23/2016 16:43	1190-03
16344272	MJHQF8	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1132 (HNO3 pH<2) (1)	CC01SW	08/23/2016 14:03	1191-01
16344273	MJHQF9	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1133 (HNO3 pH<2) (1)	CC02SW	08/23/2016 14:50	1191-02
16344274	MJHQG0	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1134 (HNO3 pH<2) (1)	CC03SW	08/23/2016 16:38	1191-03
16344281	MJHQG1	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1135 (HNO3 pH<2) (1)	SC04SW	08/23/2016 12:29	1191-04
16344282	MJHQG2	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1136 (HNO3 pH<2) (1)	SC05SW	08/23/2016 13:43	1191-05
16344284	MJHQG3	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1137 (HNO3 pH<2) (1)	BG02SW	08/23/2016 14:20	1191-06
16344315	MJHQG4	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1138 (HNO3 pH<2) (1)	SC04SWD	08/23/2016 12:33	1192-01

Page-0003

Sample(s) to be used for Lab QC: 16344272 Tag 1132, 16344273 Tag 1133, 16344274 Tag 1134, 16344281 Tag 1135, 16344282 Tag 1136, 16344284 Tag 1137 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? Y

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8-29-16 12:00	[signature]	8-30-16 9:50	
	Kaila Smith ALS	9/1/16 0855	Kotahy / CHEMTEX	09/02/2016 1022	INTACT
			KY 09/02/2016		

Case # 46386
SDG: MJHQ~~F2~~G4 YJK 09/06/2016
Workorder: ~~1190~~ 1192 YJK 09/06/2016

USEPA CLP COC (LAB COPY)

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 6577 6281

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082316-121057-0007
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344316	MJHQG5	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1141 (HNO3 pH<2) (1)	SC05SWD	08/23/2016 13:37	1192-02
16344306	MJHQG6	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1144 (HNO3 pH<2) (1)	CC01SWD	08/23/2016 13:57	1192-03
16344307	MJHQG7	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1147 (HNO3 pH<2) (1)	CC02SWD	08/23/2016 14:45	1192-04
16344308	MJHQG8	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1150 (HNO3 pH<2) (1)	CC03SWD	08/23/2016 16:36	1192-05
16344318	MJHQG9	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1153 (HNO3 pH<2) (1)	BG02SWD	08/23/2016 14:31	1192-06

KY 09/02/2016

Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? Y

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8-29-16 12:00	[signature]	8-30-16 ~~10:00~~ 9:50	
	[signature] ALS	9/1/16 0855	[signature] / CHEMTEX	09/02/2016 1022	INTACT
			KY 09/02/2016		

Page-0004

Case # 46386

USEPA CLP COC (LAB COPY)

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6270

CHAIN OF CUSTODY RECORD SDG: MJHQH0

Case # 46386 WorkOrder: 1186
Cooler #:

No: 10-082416-154016-0008

Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344241	MJHQF5	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1117 (< 6 C) (1)	SC04SD	08/23/2016 12:49	1185-17
16344242	MJHQF6	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1122 (< 6 C) (1)	SC05SD	08/23/2016 13:46	1185-18
16344245	MJHQF7	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1127 (< 6 C) (1)	BG02SD	08/23/2016 14:40	1185-19
16344200	MJHQH0	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1045 (< 6 C) (1)	TP01SS	08/23/2016 12:13	1186-01
16344201	MJHQH1	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1157 (< 6 C) (1)	TP02SS	08/23/2016 12:35	1186-02
16344202	MJHQH2	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1160 (< 6 C) (1)	TP03SS	08/23/2016 12:50	1186-03
16344203	MJHQH3	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1163 (< 6 C) (1)	TP04SS	08/23/2016 13:01	1186-04
16344204	MJHQH4	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1166 (< 6 C) (1)	TP05SS	08/23/2016 13:10	1186-05
16344205	MJHQH5	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1169 (< 6 C) (1)	TP06SS	08/23/2016 13:18	1186-06
16344206	MJHQH6	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1172 (< 6 C) (1)	TP07SS	08/23/2016 13:32	1186-07

Page-0003

Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.	**Shipment for Case Complete? N** **Samples Transferred From Chain of Custody #**

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 12:00	[signature] / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

Case # 46386
SDG: MJHQH0
Workorder: 1186

USEPA CLP COC (LAB COPY)

DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6270

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082416-154016-0008

Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344207	MJHQH7	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1175 (< 6 C) (1)	TP08SS	08/23/2016 13:45	1186-08
16344208	MJHQH8	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1178 (< 6 C) (1)	TP09SS	08/23/2016 14:06	1186-09
16344209	MJHQH9	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1181 (< 6 C) (1)	RT01SS	08/23/2016 14:25	1186-10

KY 08/30/2016

Page-0004

Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 12:00	[signature] / CHEMTEX	08/30/2016 0946	INTACT

KY 08/30/2016

ORIGINAL IN
CASE 46386
SDG MJH0E5

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 5677 6307

CHAIN OF CUSTODY RECORD

Case #~~44609~~ 46386
Cooler #:

Case#46386
SDG: MJH0H0
Work Order: 1186

No: 10-082516-105054-0010
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344260	MJHQJ0	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1189 (HNO3 pH<2) (1)	WF02SW	08/24/2016 13:58	1188-13
16344269	MJHQJ1	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1190 (HNO3 pH<2) (1)	WT01SW	08/24/2016 16:04	1188-14
16344293	MJHQJ9	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1200 (HNO3 pH<2) (1)	WF02SWD	08/24/2016 14:04	1187-12
16344303	MJHQK0	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1203 (HNO3 pH<2) (1)	WT01SWD	08/24/2016 16:11	1187-13
16344229	MJHQK3	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1216 (< 6 C) (1)	WT01SD	08/24/2016 16:15	1186-11
16344221	MJHQK7	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1236 (< 6 C) (1)	WF03SD	08/24/2016 15:51	1186-12
16344222	MJHQK8	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1241 (< 6 C) (1)	WF04SD	08/24/2016 16:30	1186-13
16344223	MJHQK9	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1246 (< 6 C) (1)	WF05SD	08/24/2016 16:54	1186-14
16344294	MJHQL0	Surface Water Dissolved/	Grab	TALMetals+Hard-WTR(21)	1251 (HNO3 pH<2) (1)	WF03SWD	08/24/2016 15:30	1187-14

Page-0005

Sample(s) to be used for Lab QC: 16344260 Tag 1189, 16344269 Tag 1190	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	BNorder ~~8/29/16~~ 1177 BN	8/29/16 1200	bdsy/CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

ORIGINAL IN
CASE 46386
SDG ~~MJHQN9~~ MJHQE5
KY 08/06/2016

Case # 46386
SDG: MJHQ40
Workorder: 1186

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo:

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082916-131345-0015
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344309	MJHQJ2	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1191 (HNO3 pH<2) (1)	CC04SWD	08/24/2016 11:23	1187-17
16344310	MJHQJ3	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1192 (HNO3 pH<2) (1)	CC05SWD	08/24/2016 12:07	1187-18
16344275	MJHQJ4	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1193 (HNO3 pH<2) (1)	CC04SW	08/24/2016 11:33	1188-18
16344276	MJHQJ5	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1194 (HNO3 pH<2) (1)	CC05SW	08/24/2016 12:03	1188-19
16344259	MJHQJ7	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1196 (HNO3 pH<2) (1)	WF01SW	08/24/2016 13:01	1188-20
16344292	MJHQJ8	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1197 (HNO3 pH<2) (1)	WF01SWD	08/24/2016 13:02	1187-19
16344213	MJHQL8	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1270 (< 6 C) (1)	BS04SS	08/24/2016 11:57	1185-09
16344247	MJHQM9	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1302 (< 6 C) (1)	BG04SD	08/26/2016 11:57	1185-20
16344243	MJHQN0	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1307 (< 6 C) (1)	UT01SD	08/26/2016 10:06	1186-15

Page-0006

Sample(s) to be used for Lab QC: 16344309 Tag 1191, 16344310 Tag 1192, 16344275 Tag 1193, 16344276 Tag 1194, 16344259 Tag 1196, 16344247 Tag 1302, 16344224 Tag 1312 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	RNorman	8/29/16 1200	Rolety / CHEMTEX	08/30/2016 0946	INTACT
			KY 08/30/2016		

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo:

ORIGINAL IN
CASE 46386
SDG MJHQN9

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

Case# 46386
SDG: MJHQH0
Work Order: 1186

No: 10-082916-131345-0015
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344224	MJHQN1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1312 (< 6 C) (1)	WF06SD	08/26/2016 08:52	1186-16
16344225	MJHQN2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1317 (< 6 C) (1)	WF07SD	08/26/2016 11:05	1186-17
16344297	MJHQN6	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1331 (HNO3 pH<2) (2)	WF06SWD	08/26/2016 08:43	1187-20
16344264	MJHQN9	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1338 (HNO3 pH<2) (2)	WF06SW	08/26/2016 08:40	1189-01
16344244	MJHQP1	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1411 (< 6 C) (1)	BG01SS	08/25/2016 12:00	1186-18

KY 08/30/2016

Page-0007

Sample(s) to be used for Lab QC: 16344224 Tag 1312, 16344297 Tag 1331, 16344264 Tag 1338 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 1200	[signature] / CHEMTEX	08/30/2016 0946	INTACT

KY 08/30/2016

Case # 46386 MJHQN9

USEPA CLP COC (LAB COPY)

CHAIN OF CUSTODY RECORD SDG : ~~MJHQF8~~ KY 09/06/2016 ~~MJHQN9~~ KY 09/02/16 **No: 10-082916-131345-0015**

DateShipped: 8/29/2016

CarrierName: FedEx

AirbillNo:

Case # 46386 Workorder: 1189

Cooler #:

Lab: CHEMTEX - Port Arthur

Lab Contact: Jeevan Yeddula

Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344224	MJHQN1	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1312 (< 6 C) (1)	WF06SD	08/26/2016 08:52	1186-16
16344225	MJHQN2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1317 (< 6 C) (1)	WF07SD	08/26/2016 11:05	1186-17
16344297	MJHQN6	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1331 (HNO3 pH<2) (2)	WF06SWD	08/26/2016 08:43	1187-20
16344264	MJHQN9	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1338 (HNO3 pH<2) (2)	WF06SW	08/26/2016 08:40	1189-01
16344244	MJHQP1	Soil Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1411 (< 6 C) (1)	BG01SS	08/25/2016 12:00	1186-18

KY 08/30/2016

Page-0003

Sample(s) to be used for Lab QC: 16344224 Tag 1312, 16344297 Tag 1331, 16344264 Tag 1338 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness, TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8/29/16 1200	[signature] / CHEMTEX	08/30/2016 0946	INTACT

KY 08/30/2016

ORIGINAL IN
CASE 46386
SDG MJHQF2

Case#46386
SDG: MJHQF8
Workorder: 1191

USEPA CLP COC (LAB COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: 8053 6577 6281

CHAIN OF CUSTODY RECORD

Case # 46386
Cooler #:

No: 10-082316-121057-0007
Lab: CHEMTEX - Port Arthur
Lab Contact: Jeevan Yeddula
Lab Phone: 409-983-4575

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16344232	MJHQF2	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1102 (< 6 C) (1)	CC01SD	08/23/2016 14:13	1190-01
16344233	MJHQF3	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1107 (< 6 C) (1)	CC02SD	08/23/2016 14:55	1190-02
16344234	MJHQF4	Sediment Surface/ USCG	Grab	TALMet+Hg+Hard-Soil(21)	1112 (< 6 C) (1)	CC03SD	08/23/2016 16:43	1190-03
16344272	MJHQF8	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1132 (HNO3 pH<2) (1)	CC01SW	08/23/2016 14:03	1191-01
16344273	MJHQF9	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1133 (HNO3 pH<2) (1)	CC02SW	08/23/2016 14:50	1191-02
16344274	MJHQG0	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1134 (HNO3 pH<2) (1)	CC03SW	08/23/2016 16:38	1191-03
16344281	MJHQG1	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1135 (HNO3 pH<2) (1)	SC04SW	08/23/2016 12:29	1191-04
16344282	MJHQG2	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1136 (HNO3 pH<2) (1)	SC05SW	08/23/2016 13:43	1191-05
16344284	MJHQG3	Surface Water Total/ USCG	Grab	TALMetals+Hard-WTR(21)	1137 (HNO3 pH<2) (1)	BG02SW	08/23/2016 14:20	1191-06
16344315	MJHQG4	Surface Water Dissolved/ USCG	Grab	TALMetals+Hard-WTR(21)	1138 (HNO3 pH<2) (1)	SC04SWD	08/23/2016 12:33	1192-01

Page-0004

Sample(s) to be used for Lab QC: 16344272 Tag 1132, 16344273 Tag 1133, 16344274 Tag 1134, 16344281 Tag 1135, 16344282 Tag 1136, 16344284 Tag 1137 - Special Instructions: ICPAES/ICPMS split for water and soil samples are to be analyzed according to the scheduled elements split per instrument.

Shipment for Case Complete? Y

Samples Transferred From Chain of Custody # NA

Analysis Key: TALMet+Hg+Hard-Soil=Metals ICPMSAgAsSbTl+ICPAES+Mercury, TALMetals+Hard-WTR=Metals ICPMSAgAsSbTl+ICPAES+Hardness

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	[signature]	8-29-16 12:00	[signature]	8-30-16 9:50	
	Kaila Smith ALS	9/1/16 0855	Kotahy / CHEMTEX	09/02/2016 1022	INTACT
			KY 09/02/2016		

16J0379

EPA R10 Lab (MEL) COC (LAB COPY)

DateShipped: 10/21/2016
CarrierName: Hand Delivery
AirbillNo:

CHAIN OF CUSTODY RECORD

Project Code SFP-114B
Cooler #: 1

No: 10-102116-103645-0023

Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
16384164		Soil Surface/ C. Eckley	Grab	PCBs(21)	1777 (4 C) (1)	OS01SS	09/21/2016 11:00	

Sample(s) to be used for Lab QC: 16384164 Tag 1777	**Shipment for Case Complete? Y**
	Samples Transferred From Chain of Custody #
Analysis Key: PCBs=Polychlorinated Biphenyls	

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	RLNordeen START	10/21/16 10/20/16 1403 BM	ARI	10-21-16 1407	Good

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

CORRECTIVE ACTION NOTICE

Project Name:	Cinnabar Mine	Date Received:	9/23/2016
Project Code:	SFP-114A	Sampling Agency	USEPA
Account Code:	2016TR2B10P303DC6101TLA00	Sampler(s):	Chris Eckley
Project Officer:	Brooks Stanfield		
Phone:	206-553-4423	Recorder:	Chris Eckley

Sample Numbers: **16384150-63**

1	**Number of shipping containers received**
0	**Number of shipping containers received with errors**
2	**Number of chains of custody received**
1	**Number of chains of custody received with errors**

# Containers	Description of Shipment/Chain of Custody Container Issues Noted:
0	Shipping Container - Addressed incorrectly (must be addressed to 'Sample Custodian')
0	Shipping Container - Samples improperly packed for shipment
0	Shipping Container - Cooler Return information not provided
0	Custody Seals - Shipping Container received with seals missing/broken
0	Chain of Custody - Missing/Outdated Form
0	Chain of Custody - Missing/Incorrect chain of custody header information

14	**Number of samples received in this shipment**
14	**Number of samples received with critical and/or non-critical errors**
14	**Number of samples received with critical errors**

# Samples	Description of Shipment/Chain of Custody/Sample Container Issues Noted:
0	Chain of Custody - Missing/Incorrect EPA numbers
0	Chain of Custody - No analysis/Incorrect analysis listed for received samples
0	Chain of Custody - Samples listed not included in shipment
0	Unique Container ID* - Missing on COC and/or Not written on the container
0	Unique Container ID* - Incorrectly assigned
0	Sample Container - Labels Missing/Damaged/Illegible
0	Sample Container - EPA Sample Numbers Missing/Incorrect
0	Custody Seals - Criminal Samples received with seals missing/broken
14	Sample Container - Received at elevated temperature (above 6°C) ***See Below***
0	Sample Container - Sample preservation requirements not met
0	Sample Container - Broken/Leaking
0	Sample Container- Insufficient sample volume and/or incorrect sample container
1	Chain of Custody: One of the chains of custody was not signed by the sampler.
0	

* per Region 10 Sample Receiving SOP

Additional Information

*****Sample temperatures exceeded 6C (8-10C)**

Transmitted By:	Karen Norton/ESAT	Date:	9/23/2016
Original:	File		
RSCC Contact:	Jennifer Crawford		
Project Officer:	Brooks Stanfield		
Laboratory Director:	Barry Pepich		
Laboratory Staff	Gerald Dodo, Dana Walker, Katie Adams, Stephanie Le, Theresa McBride, Melissa Billings, Kim Wood		
cc:	Chris Eckley- USEPA		

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

CORRECTIVE ACTION NOTICE

Project Name:	Cinnabar Mine	Date Received:	8/29/2016
Project Code:	SFP-114A	Sampling Agency	E&E
Account Code:	2016TR2B10P303DC610TLA00	Sampler(s):	USCG, Chris Eckley, Renee Nordeen
Project Officer:	Brooks Stanfield		
Phone:	206-553-4423	Recorder:	Kim wood

Sample Numbers: **16344216…96, 16344303…38,**

2	**Number of shipping containers received**
0	**Number of shipping containers received with errors**
8	**Number of chains of custody received**
8	**Number of chains of custody received with errors**

# Containers	Description of Shipment/Chain of Custody Container Issues Noted:
0	Shipping Container - Addressed incorrectly (must be addressed to 'Sample Custodian')
0	Shipping Container - Samples improperly packed for shipment
0	Shipping Container - Cooler Return information not provided
0	Custody Seals - Custody Samples received with seals missing/broken
0	Chain of Custody - Missing/Outdated Form
8	Chain of Custody - Missing/Incorrect chain of custody header information *See Below #1

59	**Number of samples received in this shipment**
59	**Number of samples received with critical and/or non-critical errors**
33	**Number of samples received with critical errors**

# Samples	Description of Shipment/Chain of Custody/Sample Container Issues Noted:
0	Chain of Custody - Missing/Incorrect EPA numbers
0	Chain of Custody - No analysis/Incorrect analysis listed for received samples
0	Chain of Custody - Samples listed not included in shipment
0	Unique Container ID* - Missing on COC and/or Not written on the container
11	Unique Container ID* - Incorrectly assigned *See Below #2
0	Sample Container - Labels Missing/Damaged/Illegible
59	Sample Container - EPA Sample Numbers Missing/Incorrect *See Below # 3
0	Custody Seals - Criminal Samples received with seals missing/broken
0	Sample Container - Received at elevated temperature (above 6°C)
1	Sample Container - Sample preservation requirements not met * See Below #4
0	Sample Container - Broken/Leaking
13	Sample Container- Insufficient sample volume and/or incorrect sample container *See Below #5
20	Sample Container/COC - Samples incorrectly assigned **See Below #6
0	

* per Region 10 Sample Receiving SOP

Additional Information

Please note the following observations:

1. All of the Chains of Custody had incorrect project code on them.
2. Eleven TOC (sediments) had incorrect container ID numbers assigned to them.
3. All of the sample containers had incorrect project codes on the labels.
4. For the Porewater Organic Carbon analysis, one sample (16344324) was preserved with HCl, while all others were preserved with H2SO4. While both acids are acceptable preservatives for TOC, it is ideal to use the same acid for all samples so that the field blank can be used to verify the absence of contamination from all sources, including the preservative.
5.All thirteen Porewater samples for Organic Carbon analysis were received in 40ml amber vials. The lid liners for these specific vials are rubber, which contains carbon. Sample results may be impacted; the field blank result will indicate the degree of impact.
6. Twenty samples arrived indicated only for LLHg analysis. It was later determined that MethylHg should also have been indicated. On arrival at the lab, the samples were stored per method 1631E requirements (room temperature, not shielded from light) instead of method 1630 requirements (<6°C, in the dark). The samples were returned to appropriate custody conditions once it was determined that MethylHg was also required (approximately 21 hours later).

Transmitted By: Kim Wood/ESAT Date: 9/13/2016

Original: File

RSCC Contact: Jennifer Crawford

Project Officer: Brooks Stanfield

Laboratory Director: Barry Pepich

Laboratory Staff Gerald Dodo, Dana Walker, Katie Adams, Stephanie Le, Theresa Mc Bride, Dave Dobb, Mitch Johnson, Jennifer Marsalla, Karen Norton

cc: Chris Eckley, Renee Nordeen E&E

EPA R10 Lab (MEL) COC (LAB COPY)
DateShipped: 8/30/2016
CarrierName: Hand Delivery
AirbillNo:

CHAIN OF CUSTODY RECORD

Project Code SFP-114A
Cooler #:

No: 10-090116-081535-0018
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
~~16344250~~ 16354250		DI Water/ C. Eckley	Grab	LLHg(8 Weeks) Me-Hg	A1 (HCl) (1)	Blank	08/30/2016 15:00	

Sample(s) to be used for Lab QC: ~~16344250~~ 16354250 Tag A1

Shipment for Case Complete? Y

Samples Transferred From Chain of Custody #

Analysis Key: LLHg=Low Level Mercury & Me-Hg

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
			Kim Wood	9/1/16 12:00	good

EPA R10 Lab (MEL) COC (REGION COPY)
DateShipped: 8/29/2016
CarrierName: ~~FedEx~~
AirbillNo: HAND DELIVERY

CHAIN OF CUSTODY RECORD
Cinnabar Mine/ID
Project Code SFP-114B
Cooler #:

No: 10-082516-105922-0011
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344216		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	AD01SD	08/24/2016 14:10	Field Sample
16344217		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1282 (< 6 C) (1)	AD02SD	08/24/2016 14:57	Field Sample
16344218		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1287 (< 6 C) (1)	AD03SD	08/24/2016 16:20	Field Sample
16344219		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1210 (< 6 C) (1)	WF01SD	08/24/2016 13:04	Field Sample
16344220		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1215 (< 6 C) (1)	WF02SD	08/24/2016 14:04	Field Sample
16344221		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1240 (< 6 C) (1)	WF03SD	08/24/2016 15:51	Field Sample
16344222		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1245 (< 6 C) (1)	WF04SD	08/24/2016 16:30	Field Sample
16344223		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1250 (< 6 C) (1)	WF05SD	08/24/2016 16:54	Field Sample
16344229		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1220 (< 6 C) (1)	WT01SD	08/24/2016 16:15	Field Sample
16344232		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	CC01SD	08/23/2016 14:13	Field Sample

Special Instructions:	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #
Analysis Key: TOC=Total Organic Carbon	

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	[signature] Eric	8/29/16 16:25	Kim Wood	8/29/16 16:25	

EPA R10 Lab (MEL) COC (REGION COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: HAND DELIVERY

CHAIN OF CUSTODY RECORD
Cinnabar Mine/ID
Project Code SFP-114A
Cooler #:

No: 10-082516-105922-0011
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344233		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	CC02SD	08/23/2016 14:55	Field Sample
16344234		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	CC03SD	08/23/2016 16:43	Field Sample
16344235		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1225 (< 6 C) (1)	CC04SD	08/24/2016 11:43	Field Sample
16344236		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1230 (< 6 C) (1)	CC05SD	08/24/2016 12:12	Field Sample
16344238		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	SC01SD	08/22/2016 16:34	Field Sample
16344239		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	SC02SD	08/22/2016 17:35	Field Sample
16344240		Sediment Surface/ EPA	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	SC03SD	08/22/2016 18:20	Field Sample
16344241		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	SC04SD	08/23/2016 12:49	Field Sample
16344242		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	SC05SD	08/23/2016 13:46	Field Sample
16344245		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	BG02SD	08/23/2016 14:40	Field Sample

Special Instructions:	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #
Analysis Key: TOC=Total Organic Carbon	

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	EnE	8/29/16 16:25	Kim Wood	8/29/16 16:25	

EPA R10 Lab (MEL) COC (REGION COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: HAND DELIVERY

CHAIN OF CUSTODY RECORD
Cinnabar Mine/ID
Project Code SFP-114~~B~~ A
Cooler #:

No: 10-082516-105922-0011
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344246		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 1235 (< 6 C) (1)	BG03SD	08/24/2016 12:37	Field Sample
16344289		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	AD01SWD	08/24/2016 14:03	Field Sample
16344303		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	WT01SWD	08/24/2016 16:11	Field Sample
16344306		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	CC01SWD	08/23/2016 13:57	Field Sample
16344307		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	CC02SWD	08/23/2016 14:45	Field Sample
16344308		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	CC03SWD	08/23/2016 16:36	Field Sample
16344309		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	CC04SWD	08/24/2016 11:23	Field Sample

Special Instructions:	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #

Analysis Key: TOC=Total Organic Carbon, LLHg=Low Level Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	EMF	8/29/16 16:25	Kim Wood	8/29/16 16:25	

EPA R10 Lab (MEL) COC (REGION COPY)
DateShipped: 8/29/2016
CarrierName: FedEx
AirbillNo: HAND DELIVERY

CHAIN OF CUSTODY RECORD
Cinnabar Mine/ID
Project Code SFP-114A
Cooler #:

No: 10-082516-105922-0011
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344310		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	CC05SWD	08/24/2016 12:07	Field Sample
16344313		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	SC02SWD	08/22/2016 17:22	Field Sample
16344314		Surface Water Dissolved/ EPA	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	SC03SWD	08/22/2016 18:06	Field Sample
16344315		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	SC04SWD	08/23/2016 12:33	Field Sample
16344316		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	SC05SWD	08/23/2016 13:37	Field Sample
16344318		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	BG02SWD	08/23/2016 14:31	Field Sample

Special Instructions:	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #

Analysis Key: TOC=Total Organic Carbon, LLHg=Low Level Mercury

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	ENE	8/29/16 16:22	Kim Wood	8/29/16 16:25	

EPA R10 Lab (MEL) COC (REGION COPY)
DateShipped: 8/29/2016
CarrierName: Hand Delivery
AirbillNo:

CHAIN OF CUSTODY RECORD
Cinnabar Mine/ID
Project Code SFP-114A
Cooler #:

No: 10-082916-145013-0017
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344224		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	WF06SD	08/26/2016 08:52	Field Sample
16344225		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	WF07SD	08/26/2016 11:05	Field Sample
16344243		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	UT01SD	08/26/2016 10:06	Field Sample
16344247		Sediment Surface/ USCG	Grab	TOC(8 Weeks)	N1 (< 6 C) (1)	BG04SD	08/26/2016 11:57	Field Sample
16344266		Surface Water Total/ USCG	Grab	TotalSO4(8 Weeks)	N1 (< 6 C) (1)	AD04SW	08/25/2016 15:40	Field Sample
16344290		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	AD02SWD	08/24/2016 14:40	Field Sample
16344291		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	AD03SWD	08/24/2016 16:20	Field Sample
16344292		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	WF01SWD	08/24/2016 13:02	Field Sample
16344293		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	WF02SWD	08/24/2016 14:04	Field Sample

Sample(s) to be used for Lab QC: 16344224 Tag N1, 16344247 Tag N1	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #
Analysis Key: TOC=Total Organic Carbon, TotalSO4=Sulfate, LLHg=Low Level Mercury	

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	EnE	8/29/16 16:30	Kim Wood	8/29/14 16:30	

EPA R10 Lab (MEL) COC (REGION COPY)
DateShipped: 8/29/2016
CarrierName: Hand Delivery
AirbillNo:

CHAIN OF CUSTODY RECORD
Cinnabar Mine/ID
Project Code SFP-114A
Cooler #:

No: 10-082916-145013-0017
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344294		Surface Water Dissolved/	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	WF03SWD	08/24/2016 15:30	Field Sample
16344295		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	WF04SWD	08/24/2016 16:16	Field Sample
16344296		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (HCl) (1)	WF05SWD	08/24/2016 16:48	Field Sample
16344319		Surface Water Dissolved/ USCG	Grab	LLHg(8 Weeks)	A1 (2.5mLHCl) (1)	BG03SWD	08/24/2016 12:34	Field Sample
16344324		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~HG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (1mL HCl), A2 (HCl to pH<2), N1 (None) (3)	WF01PW	08/24/2016 13:50	Field Sample
16344325		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~HG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	WF02PW	08/24/2016 13:30	Field Sample
16344326		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~HG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	WF03PW	08/24/2016 17:20	Field Sample

Special Instructions:	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #

Analysis Key: TOC=Total Organic Carbon, TotalSO4=Sulfate, LLHg=Low Level Mercury, FilteredHG+MeHg=Filtered Mercury+Methylmercury, FilteredOC=Filtered Organic Carbon, SO4=Filtered Sulfate

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	[signature] ENE	8/29/16 16:30	Kim Wood	8/29/14 16:30	

EPA R10 Lab (MEL) COC (REGION COPY)
DateShipped: 8/29/2016
CarrierName: Hand Delivery
AirbillNo:

CHAIN OF CUSTODY RECORD
Cinnabar Mine/ID
Project Code SFP-114~~B~~A
Cooler #:

No: 10-082916-145013-0017
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344327		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~LLHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	WF04PW	08/24/2016 17:00	Field Sample
16344328		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~LLHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), A2 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (4)	WF05PW	08/24/2016 09:30	Field Sample
16344330		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~LLHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	WT01PW	08/25/2016 12:00	Field Sample
16344331		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~LLHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	WT02PW	08/25/2016 10:45	Field Sample
16344332		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~LLHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	WT03PW	08/24/2016 11:30	Field Sample
16344333		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~LLHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	SC01PW	08/22/2016 16:45	Field Sample
16344334		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~LLHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	CC02PW	08/23/2016 16:00	Field Sample

Sample(s) to be used for Lab QC: 16344328 Tag A1, 16344328 Tag A2, 16344328 Tag D1, 16344328 Tag N1	**Shipment for Case Complete? N**
	Samples Transferred From Chain of Custody #

Analysis Key: TOC=Total Organic Carbon, TotalSO4=Sulfate, LLHg=Low Level Mercury, FilteredHG+MeHg=Filtered Mercury+Methylmercury, FilteredOC=Filtered Organic Carbon, SO4=Filtered Sulfate

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	[signature] ENE	8/29/16 16:30	Kim Wood	8/29/14 16:30	

EPA R10 Lab (MEL) COC (REGION COPY)
DateShipped: 8/29/2016
CarrierName: Hand Delivery
AirbillNo:

CHAIN OF CUSTODY RECORD
Cinnabar Mine/ID
Project Code SFP-114~~B~~ A
Cooler #:

No: 10-082916-145013-0017
Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Renee Nordeen
Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344335		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~ UHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	CC04PW	08/24/2016 11:30	Field Sample
16344336		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~ UHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	BG02PW	08/24/2016 14:15	Field Sample
16344338		Porewater Filtered/ Chris Eckley	Grab	~~Filtered~~ UHG+MeHg(4 Weeks), FilteredOC(8 Weeks), SO4(8 Weeks)	A1 (HCl), D1 (H2SO4 pH<2), N1 (< 6 C) (3)	RI02WT	08/25/2016 14:00	QC Blank - Rinsate/Equipment

Special Instructions:

Shipment for Case Complete? N
Samples Transferred From Chain of Custody #

Analysis Key: TOC=Total Organic Carbon, TotalSO4=Sulfate, LLHg=Low Level Mercury, FilteredHG+MeHg=Filtered Mercury+Methylmercury, FilteredOC=Filtered Organic Carbon, SO4=Filtered Sulfate

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	ENE	8/29/16 16:30	Kim Wood	8/29/16 16:30	

EPA R10 Lab (MEL) COC (REGION COPY)

DateShipped: 9/28/2016
CarrierName: Hand Delivery
AirbillNo: NA

CHAIN OF CUSTODY RECORD

Cinnabar Mine/ID
Project Code SFP-114A
Cooler #:

No: 10-092316-144615-0020

Account Number 2016TR2B10P303DC6101TLA00
Contact Name: Chris Eckley
Contact Phone: 206-553-0510

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16344339		Tailings Surface/ USCG	Grab	MESOCOSM TAIL(8 Weeks)	N1 (None), N2 (None), N3 (None) (3)	YT01	08/24/2016 12:00	Field Sample
16344340		Surface Water/ C. Eckley	Grab	MESOCOSM WTR(8 Weeks)	N1 (None), N2 (None), N3 (None) (3)	BG01SS	08/25/2016 11:00	Field Sample

Special Instructions: Samples/material for mesocosm experiment only. Generated aliquots from experiment will need to be added to scribe once complete.

Shipment for Case Complete? Y

Samples Transferred From Chain of Custody #

Analysis Key: MESOCOSM TAIL=Mesocosm Experiment Tailings, MESOCOSM WTR=Mesocosm Experiment Leachate Water

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
Ship	Chris Eckley EPA	07:00 9/28/2016	[illegible]	9/28/16 10:00	

EPA R10 Lab (MEL) COC (REGION COPY)

DateShipped: 9/15/2016

CarrierName:

AirbillNo:

CHAIN OF CUSTODY RECORD

Cinnabar Mine/ID

Project Code SFP-114A

Cooler #:

No: 10-091316-110730-0019

Account Number 2016TR2B10P303DC6101TLA00

Contact Name: Renee Nordeen

Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16384150		Surface Water Total/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	SC01SW	2016/09/21 10:00	Field Sample
16384151		Surface Water Total/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	BG02SW	2016/09/21 12:00	Field Sample
16384152		Surface Water Total/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	~~WF01SW~~ WF04SW	2016/09/21 14:00	Field Sample
16384153		Surface Water Total/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	WF03SW	2016/09/21 13:30	Field Sample
16384154		Surface Water Total/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	WF03SW	2016/09/21 13:30	Field Duplicate
16384155		Surface Water Total/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	WF05SW	2016/09/21 14:30	Field Sample
16384156		Surface Water Total/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	Blank	2016/09/21 8:30	QC Blank - Field
16384157		Surface Water Dissolved/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	SC01SWD	2016/09/21 10:00	Field Sample
16384158		Surface Water Dissolved/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	BG02SWD	2016/09/21 12:00	Field Sample

Special Instructions:

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: LLHg=Low Level Mercury, LL MeHg=Low Level MeHg

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
SMP	[illegible] EPA	9/22/2016 8:00	Kim Wood	9/23/16 12:00	Good

EPA R10 Lab (MEL) COC (REGION COPY)

DateShipped: 9/15/2016

CarrierName:

AirbillNo:

CHAIN OF CUSTODY RECORD

Cinnabar Mine/ID

Project Code SFP-114A

Cooler #:

No: 10-091316-110730-0019

Account Number 2016TR2B10P303DC6101TLA00

Contact Name: Renee Nordeen

Contact Phone: 206-419-9782

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
16384159		Surface Water Dissolved/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	~~WF01SWD~~ WF04SWD	2016/09/21 14:00	Field Sample
16384160		Surface Water Dissolved/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	WF03SWD	2016/09/21 13:30	Field Sample
16384161		Surface Water Dissolved/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	WF03SWD	2016/09/21 13:30	Field Duplicate
16384162		Surface Water Dissolved/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	WF05SWD	2016/09/21 14:30	Field Sample
16384163		Surface Water Dissolved/ C. Eckley	Grab	LLHg(8 Weeks), LL MeHg(8 Weeks)	A1 (HCl), A2 (HCl) (2)	Blank	2016/09/21 8:30	QC Blank - Field

Special Instructions:

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: LLHg=Low Level Mercury, LL MeHg=Low Level MeHg

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
			Kurt Wood	9/22/16 12:00	Good