# SAMPLING ACTIVITIES REPORT
# FOR
# HOWARD FORK TAILINGS SITE
# OPHIR, SAN MIGUEL COUNTY, COLORADO

**Revision 1**

Prepared for:

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
Region 8
1595 Wynkoop Street
Denver, Colorado 80202

Prepared by:

**WESTON SOLUTIONS, INC.**
1435 Garrison Street, Suite 100
Lakewood, Colorado 80215

| | |
|---|---|
| Date Prepared | May 2020 |
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| U.S. EPA On-Scene Coordinators | Joni Sandoval |
| | Eric Sandusky |

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May 2020

Prepared by: *(Mark Blanchard, for Joe Rudi)* Date: 06/01/2020
Joe Rudi
WESTON START Member

Approved by: Date: 06/01/2020
Robert Reed
WESTON START Project Manager

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# LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| bgs | below ground surface |
| CFR | Code of Federal Regulations |
| CO | Colorado |
| ERRS | Emergency Rapid Response Services |
| in. | inch |
| mg/kg | milligrams per kilogram |
| OSC | On-Scene Coordinator |
| RCRA | Resource Conservation and Recovery Act |
| RSL | Regional Screening Level |
| SAP | Sampling and Analysis Plan |
| START | Superfund Technical Assessment and Response Team |
| TDD | Technical Direction Document |
| U.S. EPA | U.S. Environmental Protection Agency |
| USFS | United States Forest Service |
| XRF | X-ray fluorescence |
| WESTON | Weston Solutions, Inc. |

# 1 INTRODUCTION

The U.S. Environmental Protection Agency (U.S. EPA) tasked Weston Solutions, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START), to assist the U.S. EPA On-Scene Coordinator (OSC) in performing a removal site evaluation at the Howard Fork Tailings site near Ophir, San Miguel County, Colorado (CO) (the Site) (Figure 1). Under Technical Direction Document (TDD) No. 0001/1908-06, U.S. EPA requested that START assist the OSCs with reconnaissance of the Site, collection of soil as directed by the OSCs, and photographic documentation.

# 2 OBJECTIVES

Information obtained during this evaluation is intended to guide future assessment or remedial efforts, as warranted by the U.S. EPA. The removal assessment had the following objectives:

- Identify the source and nature of the release or threat of release by:
  - Conducting sampling of soils suspected to have Resource Conservation and Recovery Act (RCRA) metals contamination;
  - Conducting X-ray fluorescence (XRF) screening on collected samples; and
  - Collecting photographic and field note documentation of the Site and Site activities.
- Evaluate the magnitude of the threat; and
- Determine whether a removal is necessary.

# 3 SITE DESCRIPTION

## 3.1 Site Location and Description

The Howard Fork Tailings site is located at 37.857542° north, 107.861557° west in Ophir, San Miguel County, Colorado (Appendix A, Figure 1). The Site consists of approximately 3 acres of private property at 626 Ophir Road located approximately 0.5 miles west of the Carribeau Mill Site (Appendix A, Figure 2). The Site is comprised of three areas of concern: Primary Tailings Area, Secondary Tailings Area, and Former Pond Area (Appendix A, Figure 3). A portion of the property, on the southwest side of the Primary Tailings Area, is located on United States

Department of Agriculture, Forest Service (USFS)-administered land. The property is primarily in a low-lying marshy area that has water present at or near the surface year-round. According to the USFS representative on-site during the Site reconnaissance, the hydroelectric dam (see Appendix B, Photograph #13) that is no longer in use on the west side of the former pond is located on USFS-administered land and owned by Xcel Energy.

### 3.2 Site History

The U.S. EPA was contacted by the property owner who was concerned with possible tailings discovered on the property. The U.S. EPA initiated the removal site evaluation in response to the notifications from the property owner. Based on observations, the Site appears to have been used as a dumping ground for tailings from an unknown mine in the area. It is unclear how long this operation lasted. However, based on the depth and extent of tailings material, it is assumed to have lasted for decades. The waste appears to have been brought in by wooden flume from the east and deposited in a low-lying area adjacent to Howard Fork of the San Miguel River.

## 4 SITE ACTIVITIES

START performed Site reconnaissance and field sampling activities to identify the source and nature of the release or threat of release, evaluate the threat to human health and/or the environment, evaluate the magnitude of the threat, and determine whether a removal is necessary at the Site. The identification activities included subsurface soil sampling, field XRF screening, photographic and field note documentation, and collection of geospatial data as described in the approved Sampling and Analysis Plan (SAP), *Sampling and Analysis Plan for Howard Fork Tailings, Ophir, San Miguel County, Colorado* (WESTON, 2019).

### 4.1 Site Reconnaissance and Field Sampling Activities

On September 4, 2019 the OSCs, START, and Emergency Rapid Response Services (ERRS) performed the Site reconnaissance visit and met with the USFS and the property owner to identify areas of concern. The property owner identified three areas of concern at the Site where tailings appeared to have been dumped during mining operations from an unknown mine in the area. These areas are referred to as the Primary Tailings Area, the Secondary Tailings Area, and Former Pond

Area (Appendix A, Figure 3). As observed during the Site reconnaissance visit, there was evidence that trespassers had been using this property to access a rock formation for recreational climbing, which included a path that extended from the USFS-administered property across the tailings pile to a rock formation with rope and anchor points attached. The property owner had started building a road to access the climbing areas but had not been able to complete it. With the permission of the property owner, the ERRS contractor began creating a road to access the three areas of concern by following the owner's previous attempt and cleaning/smoothing it out to allow for vehicular access.

Site evaluation activities began on September 4, 2019 with a soil investigation using a hand auger to obtain samples and conduct visual inspections. During the hand auger evaluation, samples were collected from between 2 and 48 inches below ground surface (bgs). Site evaluation activities continued September 5, 2019 with the help of the ERRS contractor using a small excavator. The excavator was used to obtain samples and conduct visual inspections above and below 48 inches bgs. During the excavator evaluation, samples were collected from between 2 and 60 inches bgs. The excavator evaluation advanced to a depth of approximately 120 inches bgs in multiple locations and visual observations were noted in the logbook (Appendix C). This information was further used to generate a 3D stratigraphic model of the three areas to estimate the approximate amount of contaminated material present on the Site (Appendix A, Figure 5).

A representative sample of material was collected from various depths for XRF screening at the locations shown in Figure 4 (Appendix A). Multiple soil types and materials were encountered during the evaluation including topsoil, tailings, grey sludge, black sludge and black sand at various depths throughout the Site. The water table was encountered between approximately 18 inches to 24 inches bgs. A wooden flume was uncovered during excavation that appeared to run from east to west through the Primary Tailings Area.

An adit was also observed on-Site, but the drift was not longer than approximately 15 feet. The adit showed signs of trespassing, including beer cans, food wrappers, and toilet paper rolls that were littered throughout the drift. Photographs of site evaluation activities can be found in the photo log located in Appendix B.

### 4.1.1 XRF Screening

A total of 26 soil samples, and one duplicate, were collected from the three areas of concern as shown in Figure 4 (Appendix A). START prepared and analyzed the soil samples on-Site from September 4-6, 2019. The samples were oven-dried and screened with a 10-mesh sieve to reduce variability in the XRF analysis and to provide a more accurate assessment of contaminant concentrations. The samples were then placed in plastic Ziploc bags and screened using an InnovX XRF analyzer. The soil samples were screened for lead and the results are presented in Table 1 (Appendix D). The XRF screening indicated elevated lead concentrations from samples at various depths across the Site. Concentrations in surface soils (0-6 inches bgs) ranged from 251 to 24,330 milligrams per kilogram (mg/kg).

### 4.1.2 Soil Sampling

Samples were collected using nitrile-gloved hands, disposable scoops, hand augers, and/or an excavator. Soil samples were collected from between 2 to 60 inches bgs. All soil samples were collected in accordance with the approved SAP (WESTON, 2019). Soil samples collected for laboratory analysis were submitted to SGS Accutest Laboratory in Wheat Ridge, CO. The following samples were collected for laboratory analysis:

| Laboratory Sample ID | Depth (inches bgs) |
|---|---|
| HFT-01-SS-06 | 2-6 |
| HFT-91-SS-06 (duplicate) | 2-6 |
| HFT-01-SS-12 | 6-12 |
| HFT-02-SS-12 | 6-12 |
| HFT-04-SS-12 | 6-12 |
| HFT-10-SS-6 | 2-6 |
| HFT-12-SS-6 | 2-6 |
| HFT-16-SS-6 | 2-6 |
| HFT-18-SS-60 | 50-60 |
| HFT-20-SS-30 | 24-30 |

bgs – below ground surface
HFT – Howard Fork Tailings
ID – Identification
SS – Soil Sample

# 5 ANALYTICAL RESULTS

## 5.1 Soil Analysis

For correlation with XRF field screening results, nine samples, and one duplicate sample, were submitted to the laboratory and analyzed for RCRA Metals (arsenic [As], barium [Ba], cadmium [Cd], chromium [Cr], lead [Pb], mercury [Hg], selenium [Se], and silver [Ag]) using U.S. EPA Method 6010C from the *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium* (SW-846). The XRF and laboratory sample correlation is shown in the table below.

| Laboratory Sample ID | XRF Correlation Sample ID |
|---|---|
| HFT-01-SS-06 | HFT-01-0-06 |
| HFT-91-SS-06 (duplicate) | HFT-01-0-06 |
| HFT-01-SS-12 | HFT-01-06-12 |
| HFT-02-SS-12 | HFT-02-06-12 |
| HFT-04-SS-12 | HFT-04-06-12 |
| HFT-10-SS-6 | HFT-10-0-06 |
| HFT-12-SS-6 | HFT-12-0-06 |
| HFT-16-SS-6 | HFT-16-0-06 |
| HFT-18-SS-60 | HFT-18-48-60 |
| HFT-20-SS-30 | HFT-20-18-30 |

HFT – Howard Fork Tailings
ID – Identification
SS – Soil Sample

The XRF field screening results for soil samples collected from the Site are presented in Appendix D, Table 1. Analytical results for the soil samples collected for laboratory analysis are presented in Appendix D, Table 2. Correlation between the XRF readings (average lead concentration of four readings) and the laboratory results for lead are presented in Appendix D, Table 3. The full laboratory report is located in Appendix E and the data validation report is located in Appendix F. The following is a summary of the analytical results:

- Of the ten soil samples submitted for laboratory analysis, metals were detected in all of the samples, including one duplicate sample.

- Arsenic, lead and cadmium were detected at concentrations exceeding U.S. EPA Regional Screening Level (RSL) for residential soil (most conservative) in one or more of the samples collected for laboratory analysis.
- The correlation evaluation indicated generally strong to moderate correlations between the XRF and laboratory results; however, this should not be used to make decisions on the Site due to an insufficient sample size and the correlation factor inconsistencies.

# 6 QUALITY ASSURANCE

The following Quality Assurance (QA)/Quality Control (QC) samples were collected as part of the soil investigation:

- XRF Duplicates – One sample (HFT-16-0-6) was screened twice to simulate a duplicate sample.
- Sample Duplicates – One field duplicate sample: HFT-91-SS-06, duplicate of HFT-01-SS-06, was collected and submitted for laboratory analysis.

Based on the results of the XRF and laboratory QA/QC duplicates, all results reported are considered acceptable. A Stage 2a validation was conducted on the laboratory analytical data; the data validation report is provided as Appendix F. Results of the duplicate samples collected are presented in Appendix D, Tables 1 and 2.

# 7 SUMMARY

From September 4, 2019 through September 6, 2019, the U.S. EPA and START conducted a removal site evaluation at the Howard Fork Tailings site near Ophir, CO. The areas of concern are located on private property and USFS-administered land. START collected 26 soil samples, and one duplicate, from depths ranging between 2 and 60 inches bgs from the privately-owned property for XRF screening. Nine soil samples, and one duplicate sample, were submitted for laboratory analysis of RCRA Metals. Metal concentrations were detected in all ten soil samples (including one duplicate). Concentrations of arsenic were detected above the residential soil RSL (most conservative) in all ten samples; lead was detected above the residential soil RSL in nine of the samples; and cadmium was detected above the residential soil RSL in one of the samples. Within the three areas of evaluation, approximately 5,500 cubic yards of contaminated material are estimated to be present on-Site (Appendix A, Figure 5). There is evidence that trespassers are frequently accessing the property through the contaminated areas. The water table is present in the

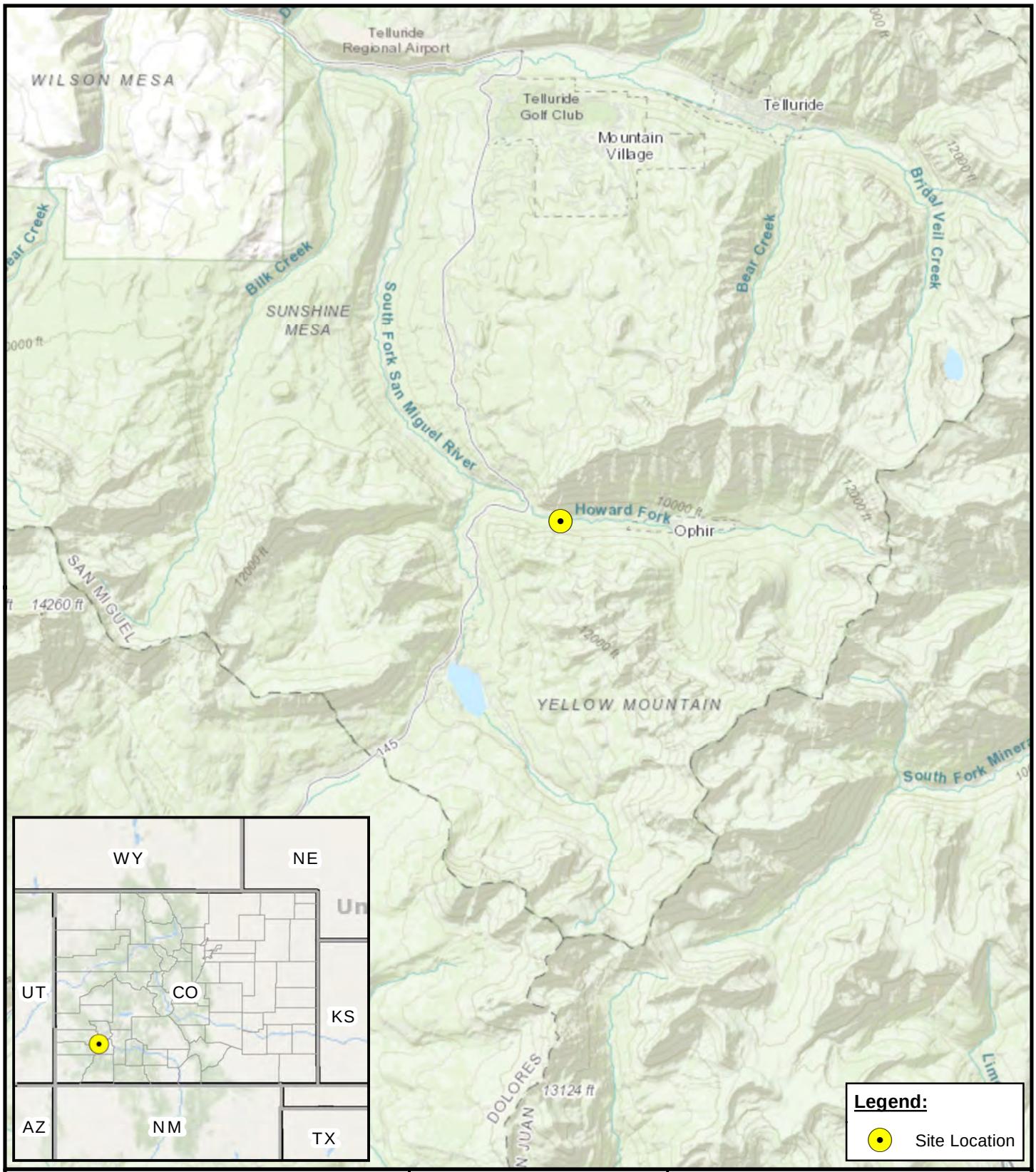
contamination zone and groundwater likely follows the topographic gradient and flows into Howard Fork of the San Miguel River.

# 8 REFERENCES

WESTON, 2019. *Sampling and Analysis Plan for Howard Fork Tailings, Ophir, San Miguel County, CO*. August.

| Citation | Reference Type | Assessment Factor | | | | |
|---|---|---|---|---|---|---|
| | | Soundness | Applicability and Utility | Clarity and Completeness | Uncertainty and Variability | Evaluation and Review |
| WESTON, 2019 | Document | Acceptable | Acceptable | Acceptable | Acceptable | Acceptable |

# APPENDIX A
# FIGURES




Path: Q:\R8START\HowardForkTailings\Maps\Figure 1 Howard Fork Tailings Site Location Map.mxd

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984

**Source:**
Background: ESRI World Topographic Map 2019

0 2.5 5 Miles

N

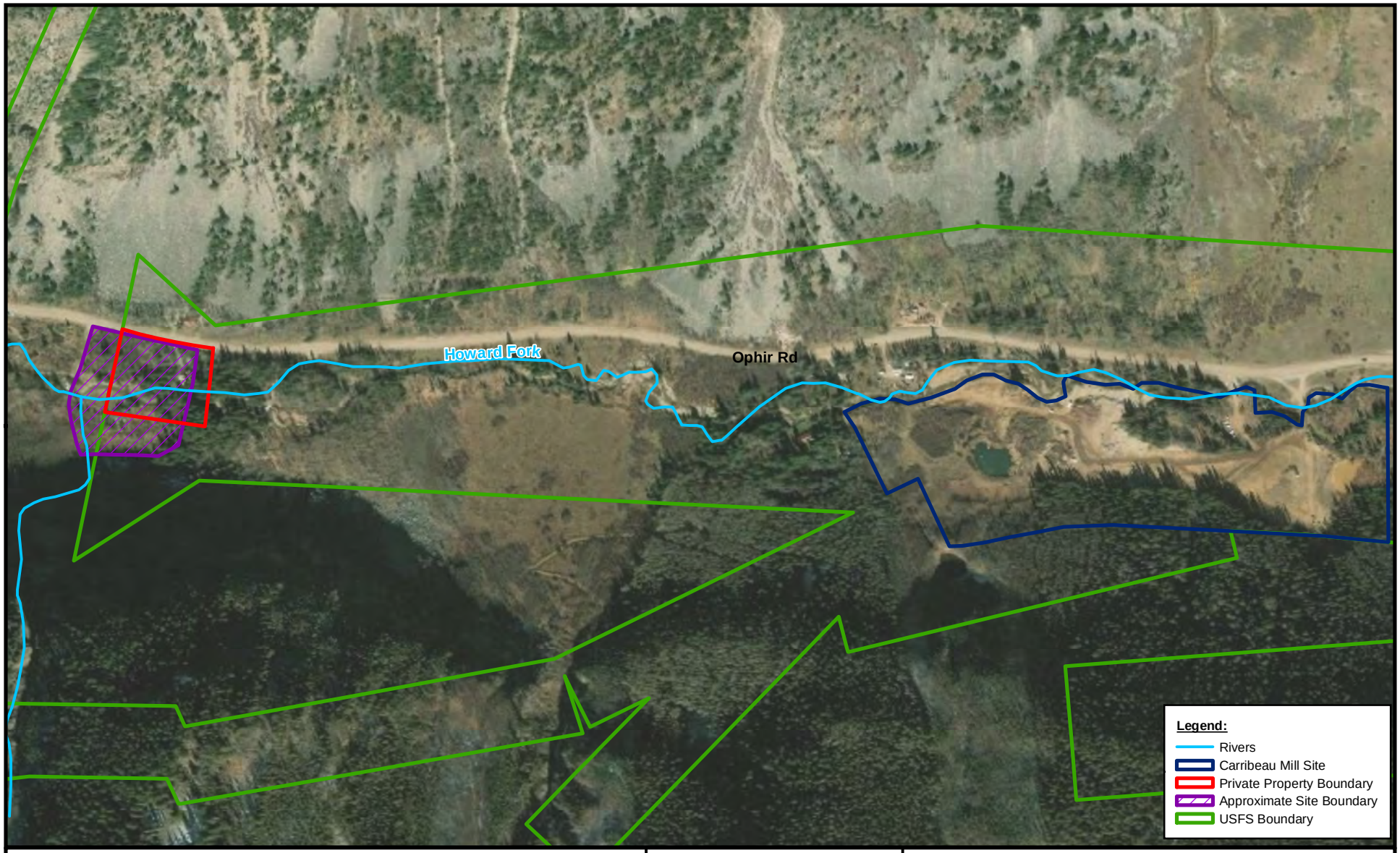
**Prepared for:**
**U.S. EPA - Region 8**

**Contract: EP-S8-13-01**
**TO/TDD: 0001/1908-06**

**Prepared By:**
**Weston Solutions, Inc.**
**START IV**
**Suite 100**
**1435 Garrison St.**
**Lakewood, CO**

# FIGURE 1
## SITE LOCATION MAP
## HOWARD FORK TAILINGS
## OPHIR, SAN MIGUEL COUNTY, COLORADO

Date: 12/9/2019




File: C:\R8Projects\HowardForkTailings\Maps\Figure 2 Howard Fork Tailings Site Vicinity Map.mxd

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
**Source:**
Background: ESRI World Imagery 2019
Parcels: San Miguel County Assessor's Office (2020)
Rivers: National Hydrography Dataset (2020)

0 400 800 1,600 Feet

N

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U.S. EPA - Region 8

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TO/TDD: 0001/1908-06

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Lakewood, CO

# FIGURE 2
## SITE VICINITY MAP
## HOWARD FORK TAILINGS
## OPHIR, SAN MIGUEL COUNTY, COLORADO

Date: 5/29/2020


File: Q:\R8START\HowardForkTailings\Maps\Figure 3 Howard Fork Areas of Concern Map.mxd

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984

**Source:**
Background: ESRI World Imagery 2019

0 125 250 500 Feet

N

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U.S. EPA - Region 8

Contract: EP-S8-13-01
TO/TDD: 0001/1908-06

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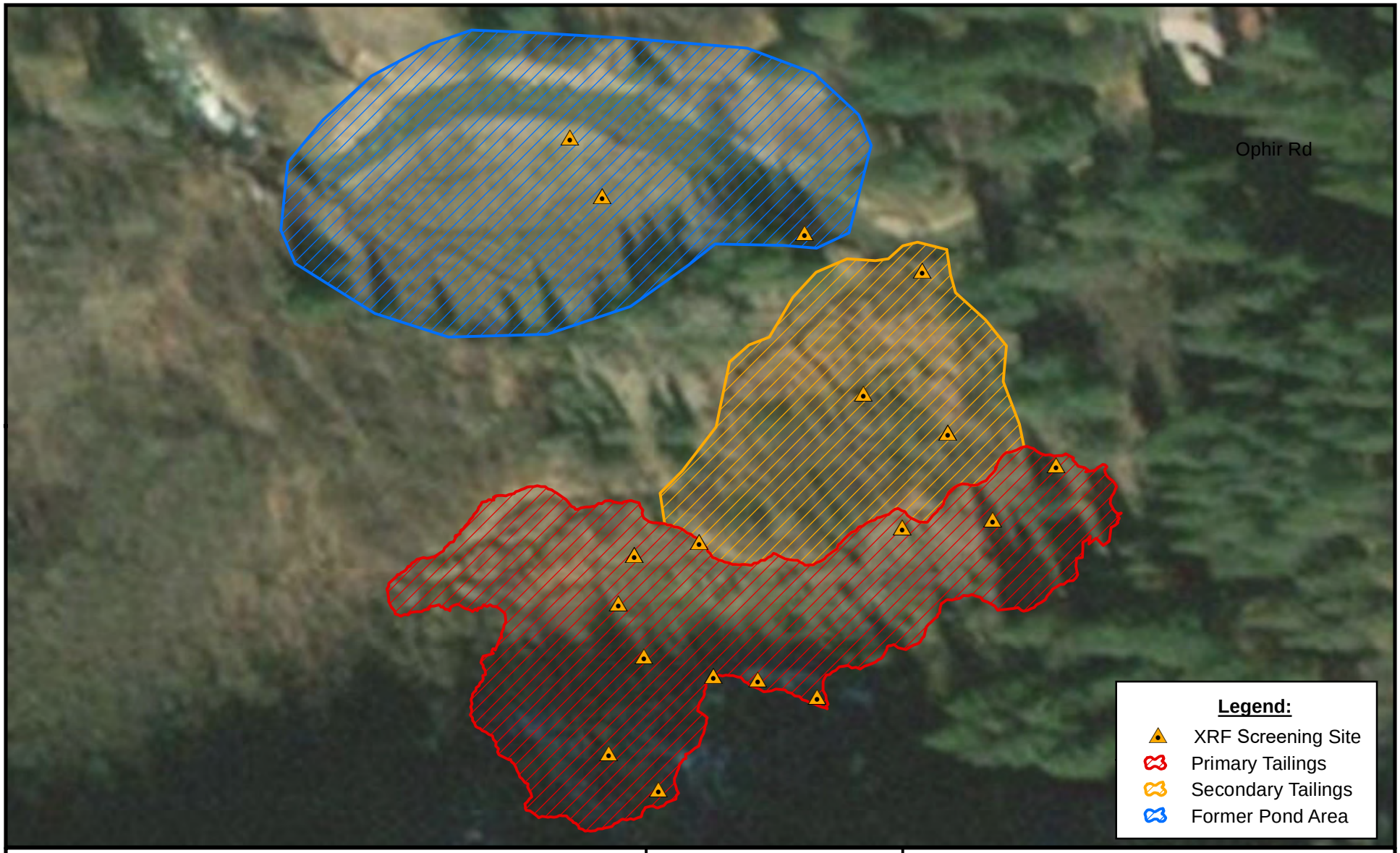
Lakewood, CO

# FIGURE 3
## AREAS OF CONCERN MAP
## HOWARD FORK TAILINGS
## OPHIR, SAN MIGUEL COUNTY, COLORADO

Date: 12/9/2019




File: Q:\R8START\HowardForkTailings\Maps\Figure 4 Howard Fork Tailings XRF Screening Locations Map.mxd

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984

**Source:**
Background: ESRI World Imagery 2019

0 50 100 200 Feet

N

Prepared for:
U.S. EPA - Region 8

Contract: EP-S8-13-01
TO/TDD: 0001/1908-06

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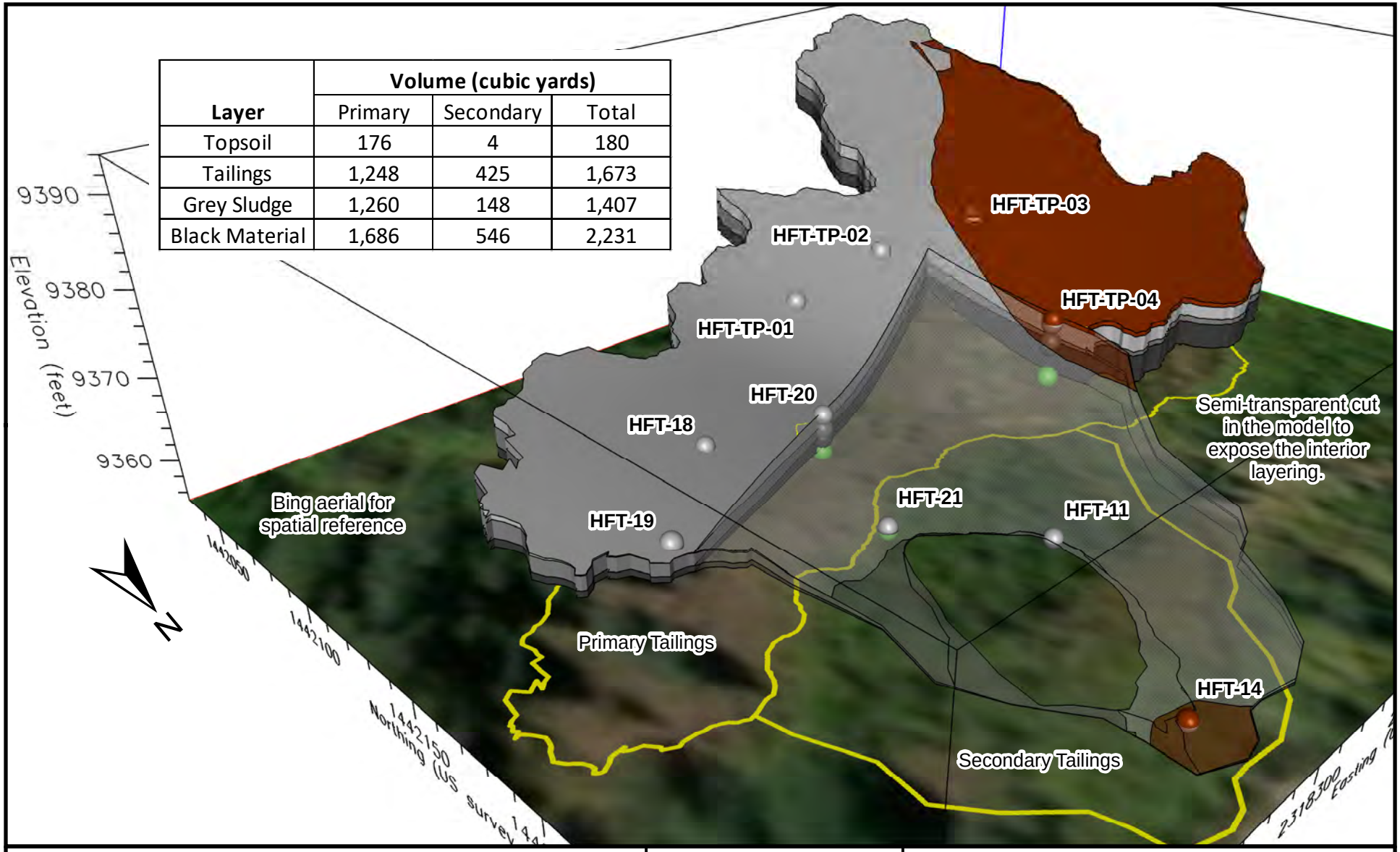
# FIGURE 4
## XRF SCREENING LOCATION MAP HOWARD FORK TAILINGS OPHIR, SAN MIGUEL COUNTY, COLORADO

Date: 12/9/2019

| Layer | Volume (cubic yards) | | |
|---|---|---|---|
| | Primary | Secondary | Total |
| Topsoil | 176 | 4 | 180 |
| Tailings | 1,248 | 425 | 1,673 |
| Grey Sludge | 1,260 | 148 | 1,407 |
| Black Material | 1,686 | 546 | 2,231 |




File: C:\Projects\FAAIGIS\mxd\HowardFork_3D_update.mxd

## Legend

- Topsoil
- Tailings
- Grey Sludge
- Black Material

Notes:
1. Upper surface of model is a 10-meter resolution USGS digital elevation model.
2. Model layers are assumed to conform to the general slope of the ground surface.
3. Model clipped to the primary tailings outline.
4. Model is rendered with three fold vertical exaggeration.
5. Coordinate System: Colorado State Plane, NAD83, feet.

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Lakewood, CO

# FIGURE 5
## 3D STRATIGRAPHIC MODEL
## HOWARD FORK TAILINGS
## OPHIR, COLORADO

Date: 12/13/2019

# APPENDIX B
# PHOTO LOG

# PHOTOGRAPH LOG

| Project Name: | Site Location: | TDD No. |
|---|---|---|
| Howard Fork Tailings | 626 Ophir Rd, Ophir, Colorado. | 0001-1908-06 |

| Photo No. | Date: |
|---|---|
| 1 | 9/4/19 |

**Direction Photo Taken:**

West

**Description:**

General view pf the Primary Tailings area

| Photo No. | Date: |
|---|---|
| 2 | 9/4/19 |

**Direction Photo Taken:**

Down

**Description:**

General view of the Secondary Tailings Area.

# PHOTOGRAPH LOG

| Project Name: | Site Location: | TDD No. |
|---|---|---|
| Howard Fork Tailings | 626 Ophir Rd, Ophir, Colorado. | 0001-1908-06 |

| Photo No. | Date: |
|---|---|
| 3 | 9/4/19 |

**Direction Photo Taken:**

North

**Description:**

General view of the Former Pond Area

| Photo No. | Date: |
|---|---|
| 4 | 9/4/19 |

**Direction Photo Taken:**

North

**Description:**

Hand augering to investigate the possible layers.

# PHOTOGRAPH LOG

| Project Name: | Site Location: | TDD No. |
|---|---|---|
| Howard Fork Tailings | 626 Ophir Rd, Ophir, Colorado. | 0001-1908-06 |

| Photo No. | Date: |
|---|---|
| 5 | 5/5/18 |

**Direction Photo Taken:**

North

**Description:**

Due to the depths of the layers observed during hand auguring, an excavator was used to further investigate the layers.

| Photo No. | Date: |
|---|---|
| 6 | 9/5/19 |

**Direction Photo Taken:**

Southwest

**Description:**

Test Pit showing the different layers of tailings, sludge/slime, and black material. Total depth to 6 feet below ground surface (bgs).

# PHOTOGRAPH LOG

| Project Name: | Site Location: | TDD No. |
|---|---|---|
| Howard Fork Tailings | 626 Ophir Rd, Ophir, Colorado. | 0001-1908-06 |

| Photo No. | Date: |
|---|---|
| 7 | 9/5/19 |

**Direction Photo Taken:**

Down

**Description:**

Test pit showing the various layers and possible cribbing.

| Photo No. | Date: |
|---|---|
| 8 | 9/5/19 |

**Direction Photo Taken:**

East

**Description:**

Various layers including possible cribbing. Groundwater was observed at approximately 4 feet bgs.

# PHOTOGRAPH LOG

| Project Name: | Site Location: | TDD No. |
|---|---|---|
| Howard Fork Tailings | 626 Ophir Rd, Ophir, Colorado. | 0001-1908-06 |

| Photo No. | Date: |
|---|---|
| 9 | 9/5/19 |

**Direction Photo Taken:**

South

**Description:**

Test pit showing the various layers and a possible flume approximately 2 feet bgs.

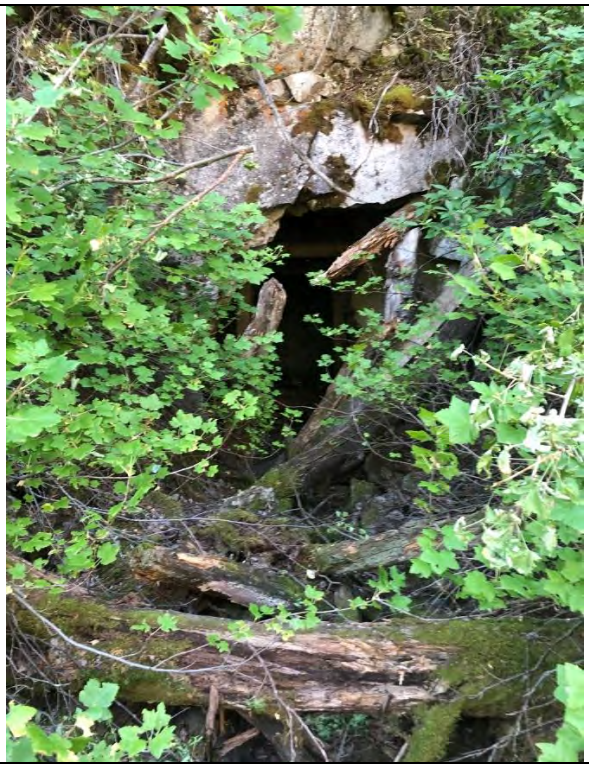
| Photo No. | Date: |
|---|---|
| 10 | 7/25/18 |

**Direction Photo Taken:**

Down

**Description:**

Unknown Adit located south of the Primary Tailings Area



# PHOTOGRAPH LOG

| Project Name: | Site Location: | TDD No. |
|---|---|---|
| Howard Fork Tailings | 626 Ophir Rd, Ophir, Colorado. | 0001-1908-06 |

| Photo No. | Date: |
|---|---|
| 11 | 9/5/19 |

**Direction Photo Taken:**

South

**Description:**

Unknown Adit located south of the Primary Tailings Area

| Photo No. | Date: |
|---|---|
| 12 | 9/5/19 |

**Direction Photo Taken:**

Down

**Description:**

View inside the unknown Adit located south of the Primary Tailings Area

# PHOTOGRAPH LOG

| Project Name: | Site Location: | TDD No. |
|---|---|---|
| Howard Fork Tailings | 626 Ophir Rd, Ophir, Colorado. | 0001-1908-06 |

| Photo No. | Date: |
|---|---|
| 13 | 9/6/19 |

**Direction Photo Taken:**

Down

**Description:**

General view of the Xcel owned power dam

| Photo No. | Date: |
|---|---|
| 14 | 9/6/19 |

**Direction Photo Taken:**

Down

**Description:**

General view of the Penstock

# APPENDIX C
# LOGBOOK

9/4/19 Howard Fork Tailings J. Rudi

0700 - all Hands Safety + Ops Briefing conducted by ERR's + EPA. — JR

EPA OSC: Joni Sandoval (JS) — JR

PPA OSC: Eric Sandusky (ES) — JR

START: Joe Rudi (JR) — JR

HFT 01 - Sample 0-6" GW @ 2.5' Tailings 0-24" TD 4' Black material 2-4' — JR

HFT-02 - Sample 06, Grey — JR

Sludge 06-12 Tailings 0-6" TD 4' Black at 11" — JR

HFT-03 Top Soil 0-6" Tailings 6-18" Grey Sludge 18" Black mat 2.5' TD 4' — JR

HFT-04 Top Soil 0-6" Tailings 6-12", TD 2', Native 12" on — JR

HFT-05 - Refusel 2' — JR

HFT-06 Top Soil 0-20" Grey Sludge @ 20"-26" GW @ 1' River Bed Rock @ 3" — JR

HFT-07 0-2" Top Soil, 2-8" Tailings 8-10" native, Refusal 10" — JR

HFT-08 Top Soil 0-8" Grey Sludge 8-18" Refusel at 18" — JR

HFT-09 - @ 02" Top Soil 2-6" Tail 12 ~~2-5~~ Sludge TD Black 24" — JR



9/4/19 Howard Fork Tailings J. Rudi

Refusel + Native 3.5

HFT-10 Top Soil 0-24 Black Mat 24-42" TD 4.5'

Rite in the Rain

# NOTES

Things To DO
- SHOOT SAMPLES
- GPS PENSTOCK & EXCEL OWNS POWER DAMN
- PHOTOS WITH SURVEY



XRF

| RUN # | SAMPLE | Result |
|---|---|---|
| 1 | STANDARD | 235 |
| 2 | " | 234 |
| 3 | " | 232 |
| 4 | 2711 | 1372 |
| 5 | 2711 | 1313 |
| 6 | 2711 | 1398 |
| 7 | HFT-01-0-6 | 10498 |
| 8 | " | 11098 |
| 9 | " | 11085 |
| 10 | " | 11470 |
| 11 | HFT-01-6-12 | 1348 |
| 12 | " | 1748 |
| 13 | " | 1651 |
| 14 | " | 1689 |
| 15 | HFT-02-0-6 | 7776 |
| 16 | " | 7873 |
| 17 | " | 7536 |
| 18 | " | 9419 |
| 19 | HFT-03-06 | 9267 |
| 20 | " | 8934 |
| 21 | " | 8601 |
| 22 | " | 8572 |

8 9/5/19 HOWARD FORK TAILINGS J. RUDI

XRF Pb

| RUN # | SAMPLE | RESULTS |
|---|---|---|
| 23 | 2711 | 1348 |
| 24 | HFT-04-6-12 | 13482 |
| 25 | " | 14005 |
| 26 | " | 13018 |
| 27 | " | 12232 |
| 28 | 2711 | 1336 |
| 29 | STANDARD | 231 |

9/6/19 HOWARD FORK ~~FORK~~ TAILINGS J. RUDI

HFT-18 TAILINGS 0-18" SLIME/SLUDGE 18-~~36~~48" GW @ 4' SAND 4-5' TD 5'

HFT-19 TAILINGS 0-15" SLUDGE/SLIME 15-40", GW 4'

HFT-20 TAILINGS 0-18" SLUDGE/SLIME 18-30' BLACK SAND 30"-4' GW @ 4'

HFT-21

HFT-TP-01 ODOR AT BOTTOM 0-18" TAILINGS TD 8' POSSIBLE CRIBBING ~2' DOWN, SLUDGE/SLIME 18" - 8'

HFT-TP-02 SAME AS (01) BUT BLACK MATERIAL AT THE BOTTOM. TD 5'

HFT-~~TP~~-~~20~~03 TAILINGS 0-12 (AVERAGE OF 8' OF MATERIAL IN THE LARGE OPEN AREA)

HFT-TP-04 ~~TAILINGS~~ 0-2.5' TOPSOIL BLACK SAND/SLUDGE 2.5'-6' TD 6'

HFT-TP-05. SURFACE SOIL 0-6" TAILINGS 6-8" NATIVE REST OF THE WAY TD 24'

Rite in the Rain

9/6/19 HOWARD FORK Tailings J. Rudi

XRF Pb

| Run # | Sample | Result |
|---|---|---|
| 1 | STANDARD | 229 |
| 2 | " | 226 |
| 3 | " | 228 |
| 4 | 2711A | 1294 |
| 5 | " | |
| 6 | " | |
| 5 | STANDARD | 229 |
| 6 | 2711A | 1342 |
| 7 | " | 1303 |
| 8 | " | 1320 |
| 9 | HFT-02-6-12 | 23062 |
| 10 | " | 22902 |
| 11 | " | 24330 |
| 12 | " | 22511 |
| 13 | HFT-06-0-2 | 7934 |
| 14 | " | 9497 |
| 15 | " | 9316 |
| 16 | " | 8330 |
| 17 | HFT-07-2-6 | 14354 |
| 18 | " | 17536 |
| 19 | " | 17394 |
| 20 | " | 14909 |

Never mind



9/6/19 HOWARD FORK Tailings. J. Rudi

XRF Pb

| Run # | Sample | Results |
|---|---|---|
| 21 | HFT-08-0-6 | 6489 |
| 22 | " | 6693 |
| 23 | " | 7210 |
| 24 | " | 6663 |
| 25 | 2711A | 1337 |
| 26 | HFT-09-2-6 | 7156 |
| 27 | " | 9208 |
| 28 | " | 8209 |
| 29 | " | 7520 |
| 30 | HFT-10-0-6 | 5848 |
| 31 | " | 5805 |
| 32 | " | 6267 |
| 33 | " | 5279 |
| 34 | HFT-11-0-6 | 1586 |
| 35 | " | 1303 |
| 36 | " | 1582 |
| 37 | " | 1542 |
| 38 | 2711A | 1319 |
| 39 | HFT-14-0-6 | 700 |
| 40 | " | 583 |
| 41 | " | 598 |
| 42 | " | 579 |

Rite in the Rain

9/6/19 HOWARD FORK Tailings JKnD

XRF Pb

| RUN # | SAMPLE | RESULT |
|---|---|---|
| 43 | HFT-16-0-6 | 251 |
| 44 | " | 407 |
| 45 | " | 326 |
| 46 | " | 487 |
| 47 | HFT-16-0-6 | 268 |
| 48 | " | 303 |
| 49 | " | 362 |
| 50 | " | 302 |
| 51 | HFT-19-6-12 | 5579 |
| 52 | " | 5100 |
| 53 | " | 5195 |
| 54 | " | 4652 |
| 55 | 2711A | 1297 |
| 56 | " | 1344 |
| 57 | " | 1315 |
| 58 | Standard1 | 228 |
| 59 | " | 228 |
| 60 | " | 230 |



1105 - CALIBRATE HORIBA
PH: 3.99, MS/cm: 5.08, NTU: 0.00
Mg/LDO: 9.99,

1120 - WEST SIDE / LARGE POND
Temp 16.81°C, PH: 6.29, ORP: 231,
MS/cm: 1.15, Mg/LDO: 5.32

1135 - NORTH SIDE small POND
Temp 16.94, PH 6.62, ORP 146, MS/cm 1.22
mg/LDO 4.94

1142 - EAST SIDE / LARGE POND
Temp 17.37, PH: 6.97, ORP 134, MS/cm 1.09
Mg/LDO 4.88.

XRF LAB

| RUN # | SAMPLE ID | RESULT |
|---|---|---|
| 5 | STANDARD | 232 |
| 6 | " | 235 |
| 7 | " | 233 |
| 8 | 2711A | 1307 |
| 9 | " | 1266 |
| 10 | " | 1368 |
| 11 | HFT-15-0-6 | 449 |
| 12 | " | 500 |
| 13 | " | 443 |
| 14 | " | 495 |
| 15 | HFT-20-18-30" | 10073 |
| 16 | " | 9227 |
| 17 | " | 9555 |
| 18 | " | 9665 |
| 19 | HFT-21-18-36" | 117 |
| 20 | " | 134 |
| 21 | " | 157 |
| 22 | " | 142 |
| 23 | HFT-19-42-48 | 1290 |
| 24 | " | 1103 |
| 25 | " | 951 |
| 26 | " | 852 |



| RUN # | SAMPLE ID | RESULTS |
|---|---|---|
| 27 | 2711A | 13 |
| 28 | HFT-21-0-18 | 36599 |
| 29 | " | 3448 |
| 30 | " | 3572 |
| 31 | " | 3364 |
| 32 | HFT-18-0-12 | 11829 |
| 33 | " | 12906 |
| 34 | " | 14205 |
| 35 | " | 12714 |
| 36 | HFT-18-48-60 | 566 |
| 37 | " | 638 |
| 38 | " | 554 |
| 39 | " | 699 |
| 40 | 2711A | 215 |
| 41 | " | 215 |
| 42 | Standard | 231 |
| 43 | 2711A | 1247 |
| 44 | HFT-20-0-18 | 7710 |
| 45 | " | 10373 |
| 46 | " | 9137 |
| 47 | " | 9016 |

9/7/19 Howard Fork Tailings J. Rudi

XRF

| Run # | Sample ID | Results |
|---|---|---|
| 48 | HFT-13-0-6 | 293 |
| 49 | 11 | 267 |
| 50 | 11 | 4 |
| 51 | 11 | 315 |
| 52 | 11 | 351 |
| 53 | HFT-17-0-6 | 13579 |
| 54 | 11 | 15118 |
| 55 | 11 | 12954 |
| 56 | 11 | 11226 |
| 57 | 2711A | 1249 |
| 58 | 11 | 1301 |
| 59 | 11 | 1206 |
| 60 | Standard | 237 |
| 61 | 11 | 233 |
| 62 | 11 | 215 |



Change

adit Photos (move up to adit)
Sample ID to XRF ID
any thing that isnt a test pit

To Do

Draw pond Boundary
Draw secondary Tailings area.
add Rest of XRF Readings
add

# APPENDIX D
# TABLES

# Table 1
## XRF Lead Screening Results

| XRF Sample ID | HFT-01-0-6 | HFT-01-6-12 | HFT-02-0-6 | HFT-02-6-12 | HFT-03-0-6 | HFT-04-6-12 | HFT-06-0-6 | HFT-07-2-6 | HFT-08-0-6 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10498 | 1348 | 7776 | 23062 | 9267 | 13482 | 7934 | 14354 | 6489 |
| 2 | 11098 | 1748 | 7873 | 22902 | 8934 | 14005 | 9497 | 17536 | 6693 |
| 3 | 11085 | 1651 | 7536 | 24330 | 8601 | 13018 | 9316 | 17394 | 7210 |
| 4 | 11470 | 1689 | 9419 | 22511 | 8572 | 12232 | 8330 | 14909 | 6663 |
| Standard Deviation | 3.15 | 9.61 | 9.11 | 2.94 | 3.20 | 4.94 | 7.48 | 8.92 | 3.98 |
| XRF Sample ID | HFT-09-2-6 | HFT-10-0-6 | HFT-11-0-6 | HFT-12-0-6 | HFT-13-0-6 | HFT-14-0-6 | HFT-15-0-6 | HFT-16-0-6 | HFT-16-0-6* |
| 1 | 7156 | 5848 | 1586 | 312 | 293 | 700 | 449 | 251 | 268 |
| 2 | 9208 | 5805 | 1303 | 253 | 267 | 583 | 500 | 407 | 303 |
| 3 | 8209 | 6267 | 1582 | 284 | 351 | 598 | 443 | 326 | 362 |
| 4 | 7520 | 5279 | 1542 | 312 | 315 | 579 | 495 | 487 | 302 |
| Standard Deviation | 9.74 | 6.05 | 7.78 | 8.39 | 10.05 | 8.06 | 5.49 | 23.99 | 10.95 |
| XRF Sample ID | HFT-17-0-6 | HFT-18-0-12 | HFT-18-48-60 | HFT-19-6-12 | HFT-19-42-48 | HFT-20-0-18 | HFT-20-18-30 | HFT-21-0-18 | HFT-21-18-36 |
| 1 | 13579 | 11829 | 566 | 5579 | 1290 | 7710 | 10073 | 3659 | 117 |
| 2 | 15118 | 12906 | 638 | 5100 | 1103 | 10393 | 9227 | 3448 | 134 |
| 3 | 12954 | 14205 | 554 | 5195 | 951 | 9137 | 9555 | 3572 | 157 |
| 4 | 11226 | 12714 | 699 | 4652 | 852 | 9016 | 9665 | 3364 | 142 |
| Standard Deviation | 10.55 | 6.58 | 9.53 | 6.43 | 15.77 | 10.48 | 3.14 | 3.22 | 10.50 |

**Footnotes:**

*Denotes duplicate sample

ID = Identification

HFT = Howard Fork Tailings

XRF = X-Ray Fluorescence

## Table 2
## Soil Sample Laboratory Results

| Client Sample ID: | Units | U.S. EPA RSL - Residential Soil - THQ=1.0 | HFT-01-SS-06 | HFT-91-SS-06 | HFT-01-SS-12 | HFT-02-SS-12 | HFT-04-SS-12 | HFT-10-SS-6 | HFT-12-SS-6 | HFT-16-SS-6 | HFT-18-SS-60 | HFT-20-SS-30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date Sampled: | | | 9/4/2019 | 9/4/2019 | 9/4/2019 | 9/4/2019 | 9/4/2019 | 9/4/2019 | 9/4/2019 | 9/4/2019 | 9/5/2019 | 9/5/2019 |
| Matrix: | | | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil | Soil |
| **RCRA Metals Analysis** | | | | | | | | | | | | |
| Arsenic | mg/kg | 0.68 | **67.4** | **46.5** | **49.2** | **68.9** | **58.4** | **68** | **18.1** | **56.8** | **72.2** | **42.8** |
| Barium | mg/kg | 15000 | **1130** | **1150** | **524** | **1180** | **1100** | **721** | **210** | **554** | **261** | **243** |
| Cadmium | mg/kg | 71 | <12 [a] | **1.9** | <10 [a] | **39.4** | <11 [a] | <13 [a] | **1.4** | <9.8 [a] | **2.6** | **210** |
| Chromium | mg/kg | NE | <12 [a] | **4.5** | <10 [a] | <10 [a] | <11 [a] | <13 [a] | **3.8** | <9.8 [a] | **4.5** | **2.2** |
| Lead | mg/kg | 400 | **18800** | **18300** | **1910** | **24500** | **14600** | **8040** | **201** | **6410** | **625** | **8680** |
| Mercury | mg/kg | 11 | **1** | **1.1** | <0.83 | **1.1** | <0.88 [a] | <1.0 [a] | <0.084 | **0.54** | **0.29** | **0.93** |
| Selenium | mg/kg | 390 | <60 [a] | <6.4 | <51 [a] | <52 [a] | <57 [a] | <65 [a] | <4.4 | <49 [a] | <5.0 | **5.7 J+** |
| Silver | mg/kg | 390 | **78.9** | **49.8** | <31 [a] | **94.5** | **54.5** | <39 [a] | <27 [a] | <29 [a] | **8.5** | **38.1** |

**Footnotes:**

| | |
|---|---|
| **Bold** | = Analyte detected above method detection limit |
| **Bold** | = Analyte detected above RSL Residential Soil limit |
| U.S. EPA | = United States Environmental Protection Agency |
| mg/kg | = milligrams per kilogram |
| NE | = None Established |
| J+ | = Result is an estimated value and may have a potential positive bias |
| RCRA | = Resource Conservation and Recovery Act |
| RSL | = Regional Screening Level |
| a | = Elevated detection limit due to dilution required for possible matrix interference |
| < | = Analyte not detected above method detection limit |

**Table 3**
**XRF Correlation Results**

| Lab Sample<br>XRF Sample | Lab Result<br>XRF Result | Correlation Factor |
|---|---|---|
| HFT-01-SS-06 | 18800 | 0.59 |
| HFT-01-0-6 | 11038 | |
| HFT-91-SS-06 | 18300 | 0.60 |
| HFT-01-0-6 | 11038 | |
| HFT-01-SS-12 | 1910 | 0.84 |
| HFT-01-6-12 | 1609 | |
| HFT-02-SS-12 | 24500 | 0.95 |
| HFT-02-6-12 | 23201 | |
| HFT-04-SS-12 | 14600 | 0.90 |
| HFT-04-6-12 | 13184 | |
| HFT-10-SS-6 | 8040 | 0.72 |
| HFT-10-0-6 | 5800 | |
| HFT-12-SS-6 | 201 | 1.44 |
| HFT-12-0-6 | 290 | |
| HFT-16-SS-6 | 6410 | 0.06 |
| HFT-16-0-6 | 368 | |
| HFT-18-SS-60 | 625 | 0.98 |
| HFT-18-48-60 | 614 | |
| HFT-20-SS-30 | 8680 | 1.11 |
| HFT-20-18-30 | 9630 | |

Footnotes:

=Weak Correlation

=Moderate Correlation

=Strong Correlation

# APPENDIX E
# LABORATORY ANALYTICAL DATA

The results set forth herein are provided by SGS North America Inc.

*e-Hardcopy 2.0*
*Automated Report*

# Technical Report for

## Weston Solutions, Inc.

Howard Fork Tailings

SGS Job Number: DA20130

Sampling Dates: 09/04/19 - 09/05/19

Report to:

Weston Solutions, Inc.
1435 Garrison Street Suite 100
Lakewood, CO 80215
joe.rudi@westonsolutions.com

ATTN: Joe Rudi

Total number of pages in report: **36**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Scott Heideman
Laboratory Director

Client Service contact: Carissa Cumine 303-425-6021

Certifications: CO (CO00049), NE (NE-OS-06-04), ND (R-027), UT (NELAP CO00049) LA (LA150028), TX (T104704511), WY (8TMS-L)

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SGS North America Inc.

# Sample Summary

Weston Solutions, Inc.

Howard Fork Tailings

**Job No:** DA20130

| Sample Number | Collected Date | Time | By | Received | Matrix Code | Type | Client Sample ID |
|---|---|---|---|---|---|---|---|
| DA20130-1 | 09/04/19 | 12:25 | | 09/11/19 | SO | Soil | HFT-01-SS-06 |
| DA20130-2 | 09/04/19 | 12:25 | | 09/11/19 | SO | Soil | HFT-91-SS-06 |
| DA20130-3 | 09/04/19 | 12:30 | | 09/11/19 | SO | Soil | HFT-01-SS-12 |
| DA20130-4 | 09/04/19 | 12:45 | | 09/11/19 | SO | Soil | HFT-02-SS-12 |
| DA20130-5 | 09/04/19 | 13:20 | | 09/11/19 | SO | Soil | HFT-04-SS-12 |
| DA20130-6 | 09/04/19 | 14:10 | | 09/11/19 | SO | Soil | HFT-10-SS-6 |
| DA20130-6M | 09/04/19 | 14:10 | | 09/11/19 | SO | Soil Matrix Spike | HFT-10-SS-6 |
| DA20130-6S | 09/04/19 | 14:10 | | 09/11/19 | SO | Soil Dup/MSD | HFT-10-SS-6 |
| DA20130-7 | 09/04/19 | 14:40 | | 09/11/19 | SO | Soil | HFT-12-SS-6 |
| DA20130-8 | 09/04/19 | 14:55 | | 09/11/19 | SO | Soil | HFT-16-SS-6 |
| DA20130-9 | 09/05/19 | 10:15 | | 09/11/19 | SO | Soil | HFT-18-SS-60 |
| DA20130-10 | 09/05/19 | 11:05 | | 09/11/19 | SO | Soil | HFT-20-SS-30 |

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

# SAMPLE DELIVERY GROUP CASE NARRATIVE

**Client:** Weston Solutions, Inc. **Job No** DA20130

**Site:** Howard Fork Tailings **Report Date** 9/18/2019 7:26:08 PM

10 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were collected on between 09/04/2019 and 09/05/2019 and were received at SGS North America Inc - Orlando on 09/11/2019 properly preserved, at 22 Deg. C and intact. These Samples received an SGS Orlando job number of DA20130. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

## Metals Analysis By Method SW846 6010C

**Matrix:** SO **Batch ID:** MP28953

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) DA20130-6MS, DA20130-6MSD, DA20130-6SDL were used as the QC samples for metals.
- Matrix Spike Recovery(s) for Lead, Selenium are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
- Matrix Spike Duplicate Recovery(s) for Selenium are outside control limits. Probable cause is due to matrix interference.
- Matrix Spike Recovery(s) for Lead are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
- RPD(s) for Serial Dilution for Cadmium, Chromium, Selenium are outside control limits for sample MP28953-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- DA20130-6 for Cadmium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-6 for Selenium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-6 for Silver: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-8 for Selenium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-8 for Chromium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-8 for Cadmium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-7 for Silver: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-3 for Silver: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-1 for Chromium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-1 for Selenium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-4 for Chromium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-5 for Selenium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-1 for Cadmium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-3 for Selenium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-3 for Cadmium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-8 for Silver: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-4 for Selenium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-5 for Cadmium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-6 for Chromium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-5 for Chromium: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-3 for Chromium: Elevated detection limit due to dilution required for possible matrix interference.

## Metals Analysis By Method SW846 7471B

**Matrix:** SO **Batch ID:** MP28954

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) DA20130-6MS, DA20130-6MSD were used as the QC samples for metals.
- Matrix Spike Duplicate Recovery(s) for Mercury are outside control limits. High RPD due to possible sample matrix or nonhomogeneity.
- RPD(s) for MSD for Mercury are outside control limits for sample MP28954-S2. High RPD due to possible sample matrix or nonhomogeneity.
- DA20130-6 for Mercury: Elevated detection limit due to dilution required for possible matrix interference.
- DA20130-5 for Mercury: Elevated detection limit due to dilution required for possible matrix interference.

## General Chemistry By Method SM2540G-2011 M

**Matrix:** SO **Batch ID:** GN48233

- Sample(s) DA20130-10DUP were used as the QC samples for Solids, Percent.

## Manual Integration Summary

| Lab Sample ID | Analysis Type | File ID | Manual Integrations |
|---|---|---|---|

**0 Manual Integrations were found for DA20130**

SGS Orlando certifies that this report meets the project requirements for analytical data produced for the samples as received at SGS Orlando and as stated on the COC. SGS Orlando certifies that the data meets the Data Quality Objectives for precision,accuracy and completeness as specified in the SGS Orlando Quality Manual except as noted above. This report is to be used in its entirety. SGS Orlando is not responsible for any assumptions of data quality if partial data packages are used.

# Summary of Hits

**Job Number:** DA20130
**Account:** Weston Solutions, Inc.
**Project:** Howard Fork Tailings
**Collected:** 09/04/19 thru 09/05/19



| Lab Sample ID / Analyte | Client Sample ID | Result/ Qual | RL | MDL | Units | Method |
|---|---|---|---|---|---|---|
| **DA20130-1** | **HFT-01-SS-06** | | | | | |
| Arsenic | | 67.4 | 30 | | mg/kg | SW846 6010C |
| Barium | | 1130 | 12 | | mg/kg | SW846 6010C |
| Lead | | 18800 | 60 | | mg/kg | SW846 6010C |
| Mercury | | 1.0 | 1.0 | | mg/kg | SW846 7471B |
| Silver | | 78.9 | 36 | | mg/kg | SW846 6010C |
| **DA20130-2** | **HFT-91-SS-06** | | | | | |
| Arsenic | | 46.5 | 3.2 | | mg/kg | SW846 6010C |
| Barium | | 1150 | 13 | | mg/kg | SW846 6010C |
| Cadmium | | 1.9 | 1.3 | | mg/kg | SW846 6010C |
| Chromium | | 4.5 | 1.3 | | mg/kg | SW846 6010C |
| Lead | | 18300 | 64 | | mg/kg | SW846 6010C |
| Mercury | | 1.1 | 1.1 | | mg/kg | SW846 7471B |
| Silver | | 49.8 | 3.8 | | mg/kg | SW846 6010C |
| **DA20130-3** | **HFT-01-SS-12** | | | | | |
| Arsenic | | 49.2 | 26 | | mg/kg | SW846 6010C |
| Barium | | 524 | 10 | | mg/kg | SW846 6010C |
| Lead | | 1910 | 51 | | mg/kg | SW846 6010C |
| **DA20130-4** | **HFT-02-SS-12** | | | | | |
| Arsenic | | 68.9 | 26 | | mg/kg | SW846 6010C |
| Barium | | 1180 | 10 | | mg/kg | SW846 6010C |
| Cadmium | | 39.4 | 10 | | mg/kg | SW846 6010C |
| Lead | | 24500 | 52 | | mg/kg | SW846 6010C |
| Mercury | | 1.1 | 0.84 | | mg/kg | SW846 7471B |
| Silver | | 94.5 | 31 | | mg/kg | SW846 6010C |
| **DA20130-5** | **HFT-04-SS-12** | | | | | |
| Arsenic | | 58.4 | 28 | | mg/kg | SW846 6010C |
| Barium | | 1100 | 11 | | mg/kg | SW846 6010C |
| Lead | | 14600 | 57 | | mg/kg | SW846 6010C |
| Silver | | 54.5 | 34 | | mg/kg | SW846 6010C |
| **DA20130-6** | **HFT-10-SS-6** | | | | | |
| Arsenic | | 68.0 | 33 | | mg/kg | SW846 6010C |
| Barium | | 721 | 13 | | mg/kg | SW846 6010C |
| Lead | | 8040 | 65 | | mg/kg | SW846 6010C |

# Summary of Hits

**Job Number:** DA20130
**Account:** Weston Solutions, Inc.
**Project:** Howard Fork Tailings
**Collected:** 09/04/19 thru 09/05/19



| Lab Sample ID / Analyte | Client Sample ID | Result/ Qual | RL | MDL | Units | Method |
|---|---|---|---|---|---|---|
| **DA20130-7** | **HFT-12-SS-6** | | | | | |
| Arsenic | | 18.1 | 2.2 | | mg/kg | SW846 6010C |
| Barium | | 210 | 8.9 | | mg/kg | SW846 6010C |
| Cadmium | | 1.4 | 0.89 | | mg/kg | SW846 6010C |
| Chromium | | 3.8 | 0.89 | | mg/kg | SW846 6010C |
| Lead | | 201 | 4.4 | | mg/kg | SW846 6010C |
| **DA20130-8** | **HFT-16-SS-6** | | | | | |
| Arsenic | | 56.8 | 24 | | mg/kg | SW846 6010C |
| Barium | | 554 | 9.8 | | mg/kg | SW846 6010C |
| Lead | | 6410 | 49 | | mg/kg | SW846 6010C |
| Mercury | | 0.54 | 0.082 | | mg/kg | SW846 7471B |
| **DA20130-9** | **HFT-18-SS-60** | | | | | |
| Arsenic | | 72.2 | 2.5 | | mg/kg | SW846 6010C |
| Barium | | 261 | 1.0 | | mg/kg | SW846 6010C |
| Cadmium | | 2.6 | 1.0 | | mg/kg | SW846 6010C |
| Chromium | | 4.5 | 1.0 | | mg/kg | SW846 6010C |
| Lead | | 625 | 5.0 | | mg/kg | SW846 6010C |
| Mercury | | 0.29 | 0.084 | | mg/kg | SW846 7471B |
| Silver | | 8.5 | 3.0 | | mg/kg | SW846 6010C |
| **DA20130-10** | **HFT-20-SS-30** | | | | | |
| Arsenic | | 42.8 | 2.5 | | mg/kg | SW846 6010C |
| Barium | | 243 | 1.0 | | mg/kg | SW846 6010C |
| Cadmium | | 210 | 1.0 | | mg/kg | SW846 6010C |
| Chromium | | 2.2 | 1.0 | | mg/kg | SW846 6010C |
| Lead | | 8680 | 5.0 | | mg/kg | SW846 6010C |
| Mercury | | 0.93 | 0.77 | | mg/kg | SW846 7471B |
| Selenium | | 5.7 | 5.0 | | mg/kg | SW846 6010C |
| Silver | | 38.1 | 3.0 | | mg/kg | SW846 6010C |

## Sample Results

Report of Analysis

# Report of Analysis





**Client Sample ID:** HFT-01-SS-06
**Lab Sample ID:** DA20130-1
**Matrix:** SO - Soil
**Project:** Howard Fork Tailings

**Date Sampled:** 09/04/19
**Date Received:** 09/11/19
**Percent Solids:** 74.8

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 67.4 | 30 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Barium | 1130 | 12 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Cadmium [a] | < 12 | 12 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Chromium [a] | < 12 | 12 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Lead | 18800 | 60 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Mercury | 1.0 | 1.0 | mg/kg | 10 | 09/12/19 | 09/12/19 | JM | SW846 7471B [1] | SW846 7471B [4] |
| Selenium [a] | < 60 | 60 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Silver | 78.9 | 36 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |

(1) Instrument QC Batch: MA11794
(2) Instrument QC Batch: MA11799
(3) Prep QC Batch: MP28953
(4) Prep QC Batch: MP28954

(a) Elevated detection limit due to dilution required for possible matrix interference.

RL = Reporting Limit

# Report of Analysis





**Client Sample ID:** HFT-91-SS-06
**Lab Sample ID:** DA20130-2
**Matrix:** SO - Soil
**Project:** Howard Fork Tailings

**Date Sampled:** 09/04/19
**Date Received:** 09/11/19
**Percent Solids:** 74.9

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 46.5 | 3.2 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Barium | 1150 | 13 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [3] | SW846 3050B [4] |
| Cadmium | 1.9 | 1.3 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Chromium | 4.5 | 1.3 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Lead | 18300 | 64 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [3] | SW846 3050B [4] |
| Mercury | 1.1 | 1.1 | mg/kg | 10 | 09/12/19 | 09/12/19 | JM | SW846 7471B [2] | SW846 7471B [5] |
| Selenium | < 6.4 | 6.4 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Silver | 49.8 | 3.8 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |

(1) Instrument QC Batch: MA11791
(2) Instrument QC Batch: MA11794
(3) Instrument QC Batch: MA11799
(4) Prep QC Batch: MP28953
(5) Prep QC Batch: MP28954

RL = Reporting Limit

# Report of Analysis





**Client Sample ID:** HFT-01-SS-12
**Lab Sample ID:** DA20130-3
**Matrix:** SO - Soil
**Project:** Howard Fork Tailings

**Date Sampled:** 09/04/19
**Date Received:** 09/11/19
**Percent Solids:** 90.1

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 49.2 | 26 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Barium | 524 | 10 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Cadmium [a] | < 10 | 10 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Chromium [a] | < 10 | 10 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Lead | 1910 | 51 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Mercury | < 0.83 | 0.83 | mg/kg | 10 | 09/12/19 | 09/12/19 | JM | SW846 7471B [1] | SW846 7471B [4] |
| Selenium [a] | < 51 | 51 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Silver [a] | < 31 | 31 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |

(1) Instrument QC Batch: MA11794
(2) Instrument QC Batch: MA11799
(3) Prep QC Batch: MP28953
(4) Prep QC Batch: MP28954

(a) Elevated detection limit due to dilution required for possible matrix interference.

RL = Reporting Limit

# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | HFT-02-SS-12 | | |
| **Lab Sample ID:** | DA20130-4 | **Date Sampled:** | 09/04/19 |
| **Matrix:** | SO - Soil | **Date Received:** | 09/11/19 |
| | | **Percent Solids:** | 90.3 |
| **Project:** | Howard Fork Tailings | | |

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 68.9 | 26 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Barium | 1180 | 10 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Cadmium | 39.4 | 10 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Chromium [a] | < 10 | 10 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Lead | 24500 | 52 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Mercury | 1.1 | 0.84 | mg/kg | 10 | 09/12/19 | 09/12/19 | JM | SW846 7471B [1] | SW846 7471B [4] |
| Selenium [a] | < 52 | 52 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Silver | 94.5 | 31 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |

(1) Instrument QC Batch: MA11794
(2) Instrument QC Batch: MA11799
(3) Prep QC Batch: MP28953
(4) Prep QC Batch: MP28954

(a) Elevated detection limit due to dilution required for possible matrix interference.

RL = Reporting Limit

# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | HFT-04-SS-12 | | |
| **Lab Sample ID:** | DA20130-5 | **Date Sampled:** | 09/04/19 |
| **Matrix:** | SO - Soil | **Date Received:** | 09/11/19 |
| | | **Percent Solids:** | 87.5 |
| **Project:** | Howard Fork Tailings | | |

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 58.4 | 28 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Barium | 1100 | 11 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Cadmium [a] | < 11 | 11 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Chromium [a] | < 11 | 11 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Lead | 14600 | 57 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Mercury [a] | < 0.88 | 0.88 | mg/kg | 10 | 09/12/19 | 09/12/19 | JM | SW846 7471B [1] | SW846 7471B [4] |
| Selenium [a] | < 57 | 57 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Silver | 54.5 | 34 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |

(1) Instrument QC Batch: MA11794
(2) Instrument QC Batch: MA11799
(3) Prep QC Batch: MP28953
(4) Prep QC Batch: MP28954

(a) Elevated detection limit due to dilution required for possible matrix interference.

RL = Reporting Limit

# Report of Analysis





**Client Sample ID:** HFT-10-SS-6
**Lab Sample ID:** DA20130-6
**Matrix:** SO - Soil
**Project:** Howard Fork Tailings

**Date Sampled:** 09/04/19
**Date Received:** 09/11/19
**Percent Solids:** 75.1

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 68.0 | 33 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Barium | 721 | 13 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Cadmium [a] | < 13 | 13 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Chromium [a] | < 13 | 13 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Lead | 8040 | 65 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Mercury [a] | < 1.0 | 1.0 | mg/kg | 10 | 09/12/19 | 09/12/19 | JM | SW846 7471B [1] | SW846 7471B [4] |
| Selenium [a] | < 65 | 65 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Silver [a] | < 39 | 39 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |

(1) Instrument QC Batch: MA11794
(2) Instrument QC Batch: MA11799
(3) Prep QC Batch: MP28953
(4) Prep QC Batch: MP28954

(a) Elevated detection limit due to dilution required for possible matrix interference.

RL = Reporting Limit

# Report of Analysis





**Client Sample ID:** HFT-12-SS-6
**Lab Sample ID:** DA20130-7
**Matrix:** SO - Soil
**Project:** Howard Fork Tailings

**Date Sampled:** 09/04/19
**Date Received:** 09/11/19
**Percent Solids:** 97.3

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 18.1 | 2.2 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Barium | 210 | 8.9 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [3] | SW846 3050B [4] |
| Cadmium | 1.4 | 0.89 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Chromium | 3.8 | 0.89 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Lead | 201 | 4.4 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Mercury | < 0.084 | 0.084 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 7471B [2] | SW846 7471B [5] |
| Selenium | < 4.4 | 4.4 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [4] |
| Silver [a] | < 27 | 27 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [3] | SW846 3050B [4] |

(1) Instrument QC Batch: MA11791
(2) Instrument QC Batch: MA11794
(3) Instrument QC Batch: MA11799
(4) Prep QC Batch: MP28953
(5) Prep QC Batch: MP28954

(a) Elevated detection limit due to dilution required for possible matrix interference.

RL = Reporting Limit

# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | HFT-16-SS-6 | | |
| **Lab Sample ID:** | DA20130-8 | **Date Sampled:** | 09/04/19 |
| **Matrix:** | SO - Soil | **Date Received:** | 09/11/19 |
| | | **Percent Solids:** | 98.6 |
| **Project:** | Howard Fork Tailings | | |

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 56.8 | 24 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Barium | 554 | 9.8 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Cadmium [a] | < 9.8 | 9.8 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Chromium [a] | < 9.8 | 9.8 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Lead | 6410 | 49 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Mercury | 0.54 | 0.082 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 7471B [1] | SW846 7471B [4] |
| Selenium [a] | < 49 | 49 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |
| Silver [a] | < 29 | 29 | mg/kg | 10 | 09/12/19 | 09/13/19 | MT | SW846 6010C [2] | SW846 3050B [3] |

(1) Instrument QC Batch: MA11794
(2) Instrument QC Batch: MA11799
(3) Prep QC Batch: MP28953
(4) Prep QC Batch: MP28954

(a) Elevated detection limit due to dilution required for possible matrix interference.

RL = Reporting Limit

# Report of Analysis





**Client Sample ID:** HFT-18-SS-60
**Lab Sample ID:** DA20130-9
**Matrix:** SO - Soil
**Project:** Howard Fork Tailings

**Date Sampled:** 09/05/19
**Date Received:** 09/11/19
**Percent Solids:** 99.4

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 72.2 | 2.5 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Barium | 261 | 1.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Cadmium | 2.6 | 1.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Chromium | 4.5 | 1.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Lead | 625 | 5.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Mercury | 0.29 | 0.084 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 7471B [2] | SW846 7471B [4] |
| Selenium | < 5.0 | 5.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Silver | 8.5 | 3.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |

(1) Instrument QC Batch: MA11791
(2) Instrument QC Batch: MA11794
(3) Prep QC Batch: MP28953
(4) Prep QC Batch: MP28954

RL = Reporting Limit

# Report of Analysis





**Client Sample ID:** HFT-20-SS-30
**Lab Sample ID:** DA20130-10
**Matrix:** SO - Soil
**Project:** Howard Fork Tailings

**Date Sampled:** 09/05/19
**Date Received:** 09/11/19
**Percent Solids:** 97.8

**Metals Analysis**

| Analyte | Result | RL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 42.8 | 2.5 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Barium | 243 | 1.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Cadmium | 210 | 1.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Chromium | 2.2 | 1.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Lead | 8680 | 5.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Mercury | 0.93 | 0.77 | mg/kg | 10 | 09/12/19 | 09/12/19 | JM | SW846 7471B [2] | SW846 7471B [4] |
| Selenium | 5.7 | 5.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |
| Silver | 38.1 | 3.0 | mg/kg | 1 | 09/12/19 | 09/12/19 | JM | SW846 6010C [1] | SW846 3050B [3] |

(1) Instrument QC Batch: MA11791
(2) Instrument QC Batch: MA11794
(3) Prep QC Batch: MP28953
(4) Prep QC Batch: MP28954

RL = Reporting Limit

## Misc. Forms

### Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

DA20130

**SGS Analytical**
4665 Paris St. Suite B 200
Denver, CO 80239
303-373-4772

Weston Solutions

## Chain of Custody Record

| Client Contact | Project Manager: Joe Rudi | Site Contact: 907-230-9709 (Joe Rudi) | | COC No: 01 |
|---|---|---|---|---|
| Weston Solutions | Tel/Fax: 907-230-9709 | Lab Contact: | Carrier: | of COCs |
| 1435 Garrison Street | Analysis Turnaround Time | | | Job No. |
| Suite 100 | Calendar ( C ) or Work Days (W) C | | | |
| Lakewood, CO 80215 | TAT if different from Below | | | SDG No. |
| FAX | 2 weeks | | | |
| Project Name: Howard Fork Tailings | 1 week | | | |
| Site: Howard Fork | 2 days | | | |
| P O # | 1 day | | | |

| Sample Identification | Sample Date | Sample Time | Sample Type | Matrix | # of Cont. | Filtered Sample | RCRA Metals | MS/MSD | Sample Specific Notes: |
|---|---|---|---|---|---|---|---|---|---|
| HFT-01-SS-06 | 9/4/2019 | 12:25 | SS | soil | 2 | | X | | 01 |
| HFT-91-SS-06 | 9/4/2019 | 12:25 | SS | soil | 2 | | X | | 02 |
| HFT-01-SS-12 | 9/4/2019 | 12:30 | SS | soil | 2 | | X | | 03 |
| HFT-02-SS-12 | 9/4/2019 | 12:45 | SS | soil | 2 | | X | | 04 |
| HFT-04-SS-12 | 9/4/2019 | 13:20 | SS | soil | 2 | | X | | 05 |
| HFT-10-SS-6 | 9/4/2019 | 14:10 | SS | soil | 3 | | X | X | 06 |
| HFT-12-SS-6 | 9/4/2019 | 14.40 | SS | Soil | 2 | | X | | 07 |
| HFT-16-SS-6 | 9/4/2019 | 14:55 | SS | Soil | 2 | | X | | 08 |
| HFT--18-SS-60 | 9/5/2019 | 10:15 | SS | Soil | 2 | | X | | 09 |
| HFT-20-SS-30 | 9/5/2019 | 11:05 | SS | Soil | 2 | | X | | 10 |
| | | | | | | | | | SR 9/11 |

**Preservation Used:** 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

*Possible Hazard Identification*
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

*Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)*
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

**Special Instructions/QC Requirements & Comments:** Tracking Number #

HM 22.0°C Melt TOD

| Relinquished by: Joe Rudi | Company: Weston | Date/Time: 9/11/19 1300 | Received by: | Company: Weston | Date/Time: 9/11/19 1300 |
|---|---|---|---|---|---|
| Relinquished by: Richard Wadden | Company: | Date/Time: 9/11/19 1430 | Received by: | Company: SGS | Date/Time: 9/11/19 1934 |
| Relinquished by: | Company: | Date/Time: | Received by: | Company: | Date/Time: |

5.1 5

**DA20130: Chain of Custody**
**Page 1 of 2**

## SGS Accutest Sample Receipt Summary

**Job Number:** DA20130 **Client:** WESTON SOLUTIONS **Project:** HOWARD FORK

**Date / Time Received:** 9/11/2019 2:30:00 PM **Delivery Method:** **Airbill #'s:** hd

**Cooler Temps (Initial/Adjusted):** 00

| Cooler Security | Y | or | N | | Y | or | N |
|---|---|---|---|---|---|---|---|
| 1. Custody Seals Present: | ☑ | | ☐ | 3. COC Present: | ☑ | | ☐ |
| 2. Custody Seals Intact: | ☑ | | ☐ | 4. Smpl Dates/Time OK | ☑ | | ☐ |

| Cooler Temperature | Y | or | N |
|---|---|---|---|
| 1. Temp criteria achieved: | ☑ | | ☐ |
| 2. Cooler temp verification: | ; ; | | |
| 3. Cooler media: | Ice (Bag) | | |
| 4. No. Coolers: | 11 | | |

| Quality Control Preservation | Y | or | N | N/A |
|---|---|---|---|---|
| 1. Trip Blank present / cooler: | ☐ | | ☐ | ☑ |
| 2. Trip Blank listed on COC: | ☐ | | ☐ | ☑ |
| 3. Samples preserved properly: | ☑ | | ☐ | |
| 4. VOCs headspace free: | ☐ | | ☐ | ☑ |

| Sample Integrity - Documentation | Y | or | N |
|---|---|---|---|
| 1. Sample labels present on bottles: | ☑ | | ☐ |
| 2. Container labeling complete: | ☑ | | ☐ |
| 3. Sample container label / COC agree: | ☑ | | ☐ |

| Sample Integrity - Condition | Y | or | N |
|---|---|---|---|
| 1. Sample recvd within HT: | ☑ | | ☐ |
| 2. All containers accounted for: | ☑ | | ☐ |
| 3. Condition of sample: | Intact | | |

| Sample Integrity - Instructions | Y | or | N | N/A |
|---|---|---|---|---|
| 1. Analysis requested is clear: | ☑ | | ☐ | |
| 2. Bottles received for unspecified tests | ☐ | | ☑ | |
| 3. Sufficient volume recvd for analysis: | ☑ | | ☐ | |
| 4. Compositing instructions clear: | ☐ | | ☐ | ☑ |
| 5. Filtering instructions clear: | ☐ | | ☐ | ☑ |

Comments

**DA20130: Chain of Custody**
**Page 2 of 2**

## Metals Analysis



### QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 09/12/19

| Metal | RL | IDL | MDL | MB raw | final |
|---|---|---|---|---|---|
| Aluminum | 10 | 4.6 | 1.7 | | |
| Antimony | 3.0 | 1.4 | .82 | | |
| Arsenic | 2.5 | 2.2 | 1 | 0.30 | <2.5 |
| Barium | 1.0 | .03 | .16 | 0.030 | <1.0 |
| Beryllium | 1.0 | .1 | .16 | | |
| Boron | 5.0 | .33 | .29 | | |
| Cadmium | 1.0 | .19 | .1 | 0.010 | <1.0 |
| Calcium | 40 | .66 | 9.6 | | |
| Chromium | 1.0 | .11 | .19 | 0.050 | <1.0 |
| Cobalt | 0.50 | .27 | .12 | | |
| Copper | 1.0 | .46 | .48 | | |
| Iron | 7.0 | .89 | .69 | | |
| Lead | 5.0 | 1.3 | .6 | -0.060 | <5.0 |
| Lithium | 0.50 | .06 | .07 | | |
| Magnesium | 20 | 5 | 3.9 | | |
| Manganese | 0.50 | .05 | .07 | | |
| Molybdenum | 1.0 | .85 | .36 | | |
| Nickel | 3.0 | .62 | .24 | | |
| Phosphorus | 10 | 9.1 | 4.3 | | |
| Potassium | 200 | 8.4 | 6 | | |
| Selenium | 5.0 | 3 | 1 | -0.75 | <5.0 |
| Silicon | 5.0 | 4.1 | .91 | | |
| Silver | 3.0 | .06 | .05 | 0.12 | <3.0 |
| Sodium | 40 | 1.3 | 1.5 | | |
| Strontium | 5.0 | .01 | .03 | | |
| Thallium | 1.0 | 1.7 | .86 | | |
| Tin | 5.0 | 4.1 | 1.2 | | |
| Titanium | 1.0 | .05 | .27 | | |
| Uranium | 5.0 | .39 | .44 | | |
| Vanadium | 1.0 | .09 | .07 | | |
| Zinc | 3.0 | .9 | .35 | | |

Associated samples MP28953: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953 Methods: SW846 6010C
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | RL | IDL | MDL | MB raw | final |
|---|---|---|---|---|---|

(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953 Methods: SW846 6010C
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | DA20130-6 Original | MS | Spikelot ICPALL2 | % Rec | QC Limits |
|---|---|---|---|---|---|
| Aluminum | | | | | |
| Antimony | | | | | |
| Arsenic | 68.0 | 191 | 116 | 106.2 | 75-125 |
| Barium | 721 | 990 | 232 | 116.2 | 75-125 |
| Beryllium | | | | | |
| Boron | | | | | |
| Cadmium | 7.0 | 69.8 | 57.9 | 108.5 | 75-125 |
| Calcium | | | | | |
| Chromium | 2.6 | 61.7 | 57.9 | 102.1 | 75-125 |
| Cobalt | | | | | |
| Copper | | | | | |
| Iron | anr | | | | |
| Lead | 8040 | 7870 | 116 | -146.8(a | 75-125 |
| Lithium | | | | | |
| Magnesium | | | | | |
| Manganese | anr | | | | |
| Molybdenum | | | | | |
| Nickel | | | | | |
| Phosphorus | | | | | |
| Potassium | | | | | |
| Selenium | 14.8 | 169 | 116 | 133.2N(b | 75-125 |
| Silicon | | | | | |
| Silver | 33.7 | 59.2 | 23.2 | 110.1 | 75-125 |
| Sodium | | | | | |
| Strontium | | | | | |
| Thallium | | | | | |
| Tin | | | | | |
| Titanium | | | | | |
| Uranium | | | | | |
| Vanadium | | | | | |
| Zinc | | | | | |

Associated samples MP28953: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953 Methods: SW846 6010C
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | DA20130-6 Original MS | Spikelot ICPALL2 | % Rec | QC Limits |
|---|---|---|---|---|

(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
(b) Spike recovery indicates possible matrix interference.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953 Methods: SW846 6010C
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | DA20130-6 Original | MSD | Spikelot ICPALL2 | % Rec | MSD RPD | QC Limit |
|---|---|---|---|---|---|---|
| Aluminum | | | | | | |
| Antimony | | | | | | |
| Arsenic | 68.0 | 207 | 129 | 107.5 | 8.0 | 20 |
| Barium | 721 | 983 | 259 | 101.3 | 0.7 | 20 |
| Beryllium | | | | | | |
| Boron | | | | | | |
| Cadmium | 7.0 | 78.1 | 64.6 | 110.0 | 11.2 | 20 |
| Calcium | | | | | | |
| Chromium | 2.6 | 70.1 | 64.6 | 104.4 | 12.7 | 20 |
| Cobalt | | | | | | |
| Copper | | | | | | |
| Iron | anr | | | | | |
| Lead | 8040 | 8190 | 129 | 116.0 | 4.0 | 20 |
| Lithium | | | | | | |
| Magnesium | | | | | | |
| Manganese | anr | | | | | |
| Molybdenum | | | | | | |
| Nickel | | | | | | |
| Phosphorus | | | | | | |
| Potassium | | | | | | |
| Selenium | 14.8 | 191 | 129 | 136.3N(a | 12.2 | 20 |
| Silicon | | | | | | |
| Silver | 33.7 | 63.1 | 25.9 | 113.7 | 6.4 | 20 |
| Sodium | | | | | | |
| Strontium | | | | | | |
| Thallium | | | | | | |
| Tin | | | | | | |
| Titanium | | | | | | |
| Uranium | | | | | | |
| Vanadium | | | | | | |
| Zinc | | | | | | |

Associated samples MP28953: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953 Methods: SW846 6010C
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | DA20130-6 Original MSD | Spikelot ICPALL2 % Rec | MSD RPD | QC Limit |
|---|---|---|---|---|

(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 09/12/19

| Metal | BSP Result | Spikelot ICPALL2 | % Rec | QC Limits |
|---|---|---|---|---|
| Aluminum | | | | |
| Antimony | | | | |
| Arsenic | 97.3 | 100 | 97.3 | 80-120 |
| Barium | 187 | 200 | 93.5 | 80-120 |
| Beryllium | | | | |
| Boron | | | | |
| Cadmium | 45.4 | 50 | 90.8 | 80-120 |
| Calcium | | | | |
| Chromium | 46.5 | 50 | 93.0 | 80-120 |
| Cobalt | | | | |
| Copper | | | | |
| Iron | anr | | | |
| Lead | 90.3 | 100 | 90.3 | 80-120 |
| Lithium | | | | |
| Magnesium | | | | |
| Manganese | anr | | | |
| Molybdenum | | | | |
| Nickel | | | | |
| Phosphorus | | | | |
| Potassium | | | | |
| Selenium | 95.9 | 100 | 95.9 | 80-120 |
| Silicon | | | | |
| Silver | 18.2 | 20 | 91.0 | 80-120 |
| Sodium | | | | |
| Strontium | | | | |
| Thallium | | | | |
| Tin | | | | |
| Titanium | | | | |
| Uranium | | | | |
| Vanadium | | | | |
| Zinc | | | | |

Associated samples MP28953: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953 Methods: SW846 6010C
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | BSP Result | Spikelot ICPALL2 | % Rec | QC Limits |
|---|---|---|---|---|

(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 09/12/19

| Metal | DA20130-6 Original | SDL 1:5 | %DIF | QC Limits |
|---|---|---|---|---|
| Aluminum | | | | |
| Antimony | | | | |
| Arsenic | 521 | 485 | 6.9 | 0-10 |
| Barium | 5520 | 5410 | 2.1 | 0-10 |
| Beryllium | | | | |
| Boron | | | | |
| Cadmium | 54.0 | 30.0 | 44.4 (a) | 0-10 |
| Calcium | | | | |
| Chromium | 20.0 | 0.00 | 100.0(a) | 0-10 |
| Cobalt | | | | |
| Copper | | | | |
| Iron | anr | | | |
| Lead | 61600 | 63500 | 3.1 | 0-10 |
| Lithium | | | | |
| Magnesium | | | | |
| Manganese | anr | | | |
| Molybdenum | | | | |
| Nickel | | | | |
| Phosphorus | | | | |
| Potassium | | | | |
| Selenium | 113 | 0.00 | 100.0(a) | 0-10 |
| Silicon | | | | |
| Silver | 258 | 275 | 6.6 | 0-10 |
| Sodium | | | | |
| Strontium | | | | |
| Thallium | | | | |
| Tin | | | | |
| Titanium | | | | |
| Uranium | | | | |
| Vanadium | | | | |
| Zinc | | | | |

Associated samples MP28953: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes

SERIAL DILUTION RESULTS SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28953 Methods: SW846 6010C
Matrix Type: SOLID Units: ug/l

Prep Date: 09/12/19

| | DA20130-6 | | QC |
|---|---|---|---|
| Metal | Original SDL 1:5 | %DIF | Limits |

(*) Outside of QC limits
(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28954 Methods: SW846 7471B
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | RL | IDL | MDL | MB raw | final |
|---|---|---|---|---|---|
| Mercury | 0.083 | .00088 | .007 | -0.0035 | <0.083 |

Associated samples MP28954: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28954 Methods: SW846 7471B
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | DA20130-6 Original | MS | Spikelot HGWSR1 | % Rec | QC Limits |
|---|---|---|---|---|---|
| Mercury | 0.49 | 0.96 | 0.423 | 111.2 | 75-125 |

Associated samples MP28954: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28954 Methods: SW846 7471B
Matrix Type: SOLID Units: mg/kg

Prep Date: 09/12/19

| Metal | DA20130-6 Original | MSD | Spikelot HGWSR1 | % Rec | MSD RPD | QC Limit |
|---|---|---|---|---|---|---|
| Mercury | 0.49 | 0.90 | 0.397 | 10.1N(a) | 41.6 (b) | 20 |

Associated samples MP28954: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.
(b) High RPD due to possible sample matrix or nonhomogeneity.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: DA20130
Account: WESTCOL - Weston Solutions, Inc.
Project: Howard Fork Tailings

QC Batch ID: MP28954
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 09/12/19

| Metal | BSP Result | Spikelot HGWSR1 | % Rec | QC Limits |
|---|---|---|---|---|
| Mercury | 0.27 | 0.333 | 81.0 | 80-120 |

Associated samples MP28954: DA20130-1, DA20130-2, DA20130-3, DA20130-4, DA20130-5, DA20130-6, DA20130-7, DA20130-8, DA20130-9, DA20130-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

# APPENDIX F
# LABORATORY VALIDATION REPORT

# DATA VALIDATION REPORT

## Howard Fork Tailings

SAMPLE DELIVERY GROUP: DA20130

Prepared by

MEC$^X$
12269 East Vassar Drive
Aurora, CO 80014

## I. INTRODUCTION

| | |
|---|---|
| Task Order Title: | Howard Fork Tailings |
| Contract Task Order: | 20408.012.001.0728.00 |
| Sample Delivery Group: | DA20130 |
| EPA Project Manager: | Eric Sandusky |
| Weston Project Manager: | Joe Rudi |
| TDD No.: | 0001-1908-06 |
| Matrix: | Soil |
| QC Level: | Stage 2A |
| No. of Samples: | 10 |
| No. of Reanalyses/Dilutions: | 0 |
| Laboratory: | SGS |

**Table 1. Sample Identification**

| *CLP ID* | *Lab Sample Name* | *Matrix Type* | *Collection Date* | *Method* | *Validation Level* |
|---|---|---|---|---|---|
| HFT-01-SS-06 | DA20130-1 | Soil | 09/04/19 | SW6010C, SW7471B | Stage 2A |
| HFT-01-SS-12 | DA20130-3 | Soil | 09/04/19 | SW6010C, SW7471B | Stage 2A |
| HFT-02-SS-12 | DA20130-4 | Soil | 09/04/19 | SW6010C, SW7471B | Stage 2A |
| HFT-04-SS-12 | DA20130-5 | Soil | 09/04/19 | SW6010C, SW7471B | Stage 2A |
| HFT-10-SS-6 | DA20130-6 | Soil | 09/04/19 | SW6010C, SW7471B | Stage 2A |
| HFT-12-SS-6 | DA20130-7 | Soil | 09/04/19 | SW6010C, SW7471B | Stage 2A |
| HFT-16-SS-6 | DA20130-8 | Soil | 09/04/19 | SW6010C, SW7471B | Stage 2A |
| HFT-18-SS-60 | DA20130-9 | Soil | 09/05/19 | SW6010C, SW7471B | Stage 2A |
| HFT-20-SS-30 | DA20130-10 | Soil | 09/05/19 | SW6010C, SW7471B | Stage 2A |
| HFT-91-SS-06 | DA20130-2 | Soil | 09/04/19 | SW6010C, SW7471B | Stage 2A |

## II. Sample Management

The samples were received at 22°C, meeting temperature requirements for soil samples. The samples were received intact and properly preserved. Custody seals were intact on the coolers upon receipt at the laboratory. The chain-of-custody (COC) was appropriately signed and dated by field and laboratory personnel.

## Data Qualifier Reference Table

| Qualifier | Organics | Inorganics |
|---|---|---|
| U | The analyte was analyzed for but was not detected above the reported sample quantitation limit. | 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 analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. | The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. |
| J+ | Not applicable | The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample, and may have a potential positive bias. |
| J- | Not applicable | The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample, and may have a potential negative bias. |
| UJ | The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. | The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise. |
| N | The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification." | Not applicable. |
| NJ | The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration. | Not applicable. |

| Qualifier | Organics | Inorganics |
|---|---|---|
| R | The data are unusable. The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified. | The data are unusable. The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified. |

## Qualification Code Reference Table

| Qualifier | Organics | Inorganics |
|---|---|---|
| H | Holding times were exceeded. | Holding times were exceeded. |
| S | Surrogate recovery was outside QC limits. | The sequence or number of standards used for the calibration was incorrect |
| C | Calibration %RSD or %D was noncompliant. | Correlation coefficient is <0.995 or calibration was noncompliant. |
| R | Calibration RRF was <0.05. | %R for calibration is not within control limits. |
| B | Presumed contamination as indicated by the preparation (method) blank results. | Presumed contamination as indicated by the preparation (method) or calibration blank results. |
| L | Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits. | Laboratory Control Sample %R was not within control limits. |
| L1 | LCS/LCSD RPD was outside control limits. | LCS/LCSD RPD was outside control limits. |
| Q | MS/MSD recovery was poor. | MS recovery was poor. |
| Q1 | MS/MSD RPD was outside control limits. | MS/MSD RPD was outside control limits. |
| E | Not applicable. | Duplicates showed poor agreement. |
| I | Internal standard performance was unsatisfactory. | ICP ICS results were unsatisfactory. |
| A | Not applicable. | ICP Serial Dilution %D were not within control limits. |
| M | Tuning (BFB or DFTPP) was noncompliant. | ICPMS tune was not compliant. |
| T | Presumed contamination as indicated by the trip blank results. | Not applicable. |
| + | False positive – reported compound was not present. | Not applicable. |
| - | False negative – compound was present but not reported. | Not applicable. |
| F | Presumed contamination as indicated by the FB or ER results. | Presumed contamination as indicated by the FB or ER results. |
| F1 | Field duplicate results were outside the control limit. | Field duplicate results were outside the control limit. |
| $ | Reported result or other information was incorrect. | Reported result or other information was incorrect. |
| ? | TIC identity or reported retention time has been changed. | Not applicable. |

| Qualifier | Organics | Inorganics |
|---|---|---|
| D | The analysis with this flag should not be used because another more technically sound analysis is available. | The analysis with this flag should not be used because another more technically sound analysis is available. |
| P | Instrument performance for pesticides was poor. | Post Digestion Spike recovery was not within control limits. |
| *II, *III | Unusual problems found with the data that have been described in Section II, "Sample Management," or Section III, "Method Analyses." The number following the asterisk (*) will indicate the report section where a description of the problem can be found. | Unusual problems found with the data that have been described in Section II, "Sample Management," or Section III, "Method Analyses." The number following the asterisk (*) will indicate the report section where a description of the problem can be found. |

## III. Method Analyses

### A. Methods 6010C and 7471B—Metals and Mercury

Reviewed By: M. Hilchey
Date Reviewed: May 7, 2020

The samples listed in Table 1 for these analyses were validated based on the guidelines outlined in the *Quality Assurance Project Plan for U. S. EPA Region 8 CERCLA Site Assessment* (Rev. 2015), *United States Environmental Protection Agency Methods 6010C* and *7471B* and the *National Functional Guidelines for Inorganic Superfund Data Review* (2017).

- Holding Times: The analytical holding times, 28 days for mercury and six months for the metals, were met.
- Calibration: Instrument calibration is not reviewed at Stage 2A validation.
- Blanks: No target analytes were reported in the method blanks.
- Interference Check Samples (ICSA/B): ICSA/B data are not reviewed at a Stage 2A validation.
- Laboratory Control Samples (LCS)/Standard Reference Material (SRM): LCS recoveries were within the laboratory control limits of 80-120% for all target analytes.
- Laboratory Duplicates: Laboratory duplicate analyses were not performed on a sample from this SDG.
- Matrix Spike: Matrix spike analyses were performed on sample HFT-10-SS-6 for both methods. Recoveries were not assessed when the parent sample concentrations were more than 4× the spike amount. Recoveries for all target analytes met laboratory control limits of 70-130% for all target analytes except selenium (133.2%/136.3%) The RPDs were ≤20% for all target analytes. The selenium result for sample DA20130-10 was qualified as estimated with potentially high bias (J+). Selenium results for the remaining site samples were nondetect and were not qualified. The laboratory reported the mercury MS/MSD recoveries as 111.2 % and 10.1%; however, the reviewer re-calculated the recoveries. The MSD recovery was actually 103.3% which resulted in an RPD of 7.4% rather than the laboratory reported RPD of 41.6% for mercury. Based upon these re-calculated results, no qualification of the mercury data was required.
- Post Digestion Spike: Post digestion spike analyses were not reported.
- Serial Dilution: Serial dilution analyses were performed on sample HFT-10-SS-6 for Method 6010C. Results were not assessed unless the parent sample concentration was >50× the MDL. The control limit of ≤10% difference (%D) of the original sample results was met for all target analytes.
- Internal Standards: Internal standards are not reviewed for these methods.
- Sample Result Verification: Sample results are not verified at a Stage 2A validation. Nondetects are valid to the reporting limit (RL).

Numerous samples were diluted for both methods for various analytes. Reporting limits were adjusted accordingly.

- Field QC Samples: MEC$^X$ evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC$^X$ used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.
    - Field Blanks and Equipment Blanks: Field blanks and equipment blanks were not identified for this SDG.
    - Field Duplicates: Samples HFT-01-SS-06 / HFT-91-SS-06 were identified as a field duplicate pair, based on collection time. The RPDs for all target analytes met the acceptance limit of ≤50% for soils.

# Validated Sample Result Forms: DA20130

*Analysis Method SW6010C*

**Sample Name** HFT-01-SS-06 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-1 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 67.4 | 30 | 12 | mg/kg | | | |
| Barium | 7440-39-3 | 1130 | 12 | 1.9 | mg/kg | | | |
| Cadmium | 7440-43-9 | 12 | 12 | 1.2 | mg/kg | U | U | |
| Chromium | 7440-47-3 | 12 | 12 | 2.3 | mg/kg | U | U | |
| Lead | 7439-92-1 | 18800 | 60 | 7.2 | mg/kg | | | |
| Selenium | 7782-49-2 | 60 | 60 | 12 | mg/kg | U | U | |
| Silver | 7440-22-4 | 78.9 | 36 | 0.6 | mg/kg | | | |

**Sample Name** HFT-20-SS-30 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-10 **Sample Date:** 09/05/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 42.8 | 2.5 | 1 | mg/kg | | | |
| Barium | 7440-39-3 | 243 | 1 | 0.16 | mg/kg | | | |
| Cadmium | 7440-43-9 | 210 | 1 | 0.1 | mg/kg | | | |
| Chromium | 7440-47-3 | 2.2 | 1 | 0.19 | mg/kg | | | |
| Lead | 7439-92-1 | 8680 | 5 | 0.6 | mg/kg | | | |
| Selenium | 7782-49-2 | 5.7 | 5 | 1 | mg/kg | | J+ | Q |
| Silver | 7440-22-4 | 38.1 | 3 | 0.05 | mg/kg | | | |

**Sample Name** HFT-91-SS-06 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-2 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 46.5 | 3.2 | 1.3 | mg/kg | | | |
| Barium | 7440-39-3 | 1150 | 13 | 2 | mg/kg | | | |
| Cadmium | 7440-43-9 | 1.9 | 1.3 | 0.13 | mg/kg | | | |
| Chromium | 7440-47-3 | 4.5 | 1.3 | 0.24 | mg/kg | | | |
| Lead | 7439-92-1 | 18300 | 64 | 7.6 | mg/kg | | | |
| Selenium | 7782-49-2 | 6.4 | 6.4 | 1.3 | mg/kg | U | U | |
| Silver | 7440-22-4 | 49.8 | 3.8 | 0.064 | mg/kg | | | |

**Sample Name** HFT-01-SS-12 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-3 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 49.2 | 26 | 10 | mg/kg | | | |

*Analysis Method SW6010C*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Barium | 7440-39-3 | 524 | 10 | 1.6 | mg/kg | | |
| Cadmium | 7440-43-9 | 10 | 10 | 1 | mg/kg | U | U |
| Chromium | 7440-47-3 | 10 | 10 | 2 | mg/kg | U | U |
| Lead | 7439-92-1 | 1910 | 51 | 6.2 | mg/kg | | |
| Selenium | 7782-49-2 | 51 | 51 | 10 | mg/kg | U | U |
| Silver | 7440-22-4 | 31 | 31 | 0.51 | mg/kg | U | U |

**Sample Name** HFT-02-SS-12 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-4 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 68.9 | 26 | 10 | mg/kg | | | |
| Barium | 7440-39-3 | 1180 | 10 | 1.7 | mg/kg | | | |
| Cadmium | 7440-43-9 | 39.4 | 10 | 1 | mg/kg | | | |
| Chromium | 7440-47-3 | 10 | 10 | 2 | mg/kg | U | U | |
| Lead | 7439-92-1 | 24500 | 52 | 6.2 | mg/kg | | | |
| Selenium | 7782-49-2 | 52 | 52 | 10 | mg/kg | U | U | |
| Silver | 7440-22-4 | 94.5 | 31 | 0.52 | mg/kg | | | |

**Sample Name** HFT-04-SS-12 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-5 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 58.4 | 28 | 11 | mg/kg | | | |
| Barium | 7440-39-3 | 1100 | 11 | 1.8 | mg/kg | | | |
| Cadmium | 7440-43-9 | 11 | 11 | 1.1 | mg/kg | U | U | |
| Chromium | 7440-47-3 | 11 | 11 | 2.1 | mg/kg | U | U | |
| Lead | 7439-92-1 | 14600 | 57 | 6.8 | mg/kg | | | |
| Selenium | 7782-49-2 | 57 | 57 | 11 | mg/kg | U | U | |
| Silver | 7440-22-4 | 54.5 | 34 | 0.57 | mg/kg | | | |

**Sample Name** HFT-10-SS-6 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-6 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 68 | 33 | 13 | mg/kg | | | |
| Barium | 7440-39-3 | 721 | 13 | 2.1 | mg/kg | | | |
| Cadmium | 7440-43-9 | 13 | 13 | 1.3 | mg/kg | U | U | |
| Chromium | 7440-47-3 | 13 | 13 | 2.5 | mg/kg | U | U | |
| Lead | 7439-92-1 | 8040 | 65 | 7.8 | mg/kg | | | |
| Selenium | 7782-49-2 | 65 | 65 | 13 | mg/kg | U | U | |
| Silver | 7440-22-4 | 39 | 39 | 0.65 | mg/kg | U | U | |

## *Analysis Method SW6010C*

**Sample Name** HFT-12-SS-6 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-7 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 18.1 | 2.2 | 0.89 | mg/kg | | | |
| Barium | 7440-39-3 | 210 | 8.9 | 1.4 | mg/kg | | | |
| Cadmium | 7440-43-9 | 1.4 | 0.89 | 0.089 | mg/kg | | | |
| Chromium | 7440-47-3 | 3.8 | 0.89 | 0.17 | mg/kg | | | |
| Lead | 7439-92-1 | 201 | 4.4 | 0.53 | mg/kg | | | |
| Selenium | 7782-49-2 | 4.4 | 4.4 | 0.89 | mg/kg | U | U | |
| Silver | 7440-22-4 | 27 | 27 | 0.44 | mg/kg | U | U | |

**Sample Name** HFT-16-SS-6 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-8 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 56.8 | 24 | 9.8 | mg/kg | | | |
| Barium | 7440-39-3 | 554 | 9.8 | 1.6 | mg/kg | | | |
| Cadmium | 7440-43-9 | 9.8 | 9.8 | 0.98 | mg/kg | U | U | |
| Chromium | 7440-47-3 | 9.8 | 9.8 | 1.9 | mg/kg | U | U | |
| Lead | 7439-92-1 | 6410 | 49 | 5.9 | mg/kg | | | |
| Selenium | 7782-49-2 | 49 | 49 | 9.8 | mg/kg | U | U | |
| Silver | 7440-22-4 | 29 | 29 | 0.49 | mg/kg | U | U | |

**Sample Name** HFT-18-SS-60 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-9 **Sample Date:** 09/05/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 72.2 | 2.5 | 1 | mg/kg | | | |
| Barium | 7440-39-3 | 261 | 1 | 0.16 | mg/kg | | | |
| Cadmium | 7440-43-9 | 2.6 | 1 | 0.1 | mg/kg | | | |
| Chromium | 7440-47-3 | 4.5 | 1 | 0.19 | mg/kg | | | |
| Lead | 7439-92-1 | 625 | 5 | 0.6 | mg/kg | | | |
| Selenium | 7782-49-2 | 5 | 5 | 1 | mg/kg | U | U | |
| Silver | 7440-22-4 | 8.5 | 3 | 0.05 | mg/kg | | | |

## *Analysis Method SW7471B*

**Sample Name** HFT-01-SS-06 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-1 **Sample Date:** 09/04/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Mercury | 7439-97-6 | 1 | 1 | 0.084 | mg/kg | | | |

*Analysis Method SW7471B*

| Sample Name | HFT-20-SS-30 | | | | | Matrix Type: | Soil | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample Name: | DA20130-10 | | | Sample Date: | 09/05/19 | | | | |
| **Analyte** | **CAS No** | **Result Value** | **Reporting Limit** | **MDL** | **Result Units** | **Lab Qualifier** | **Validation Qualifier** | **Validation Qualifier Comments** | |
| Mercury | 7439-97-6 | 0.93 | 0.77 | 0.065 | mg/kg | | | | |

| Sample Name | HFT-91-SS-06 | | | | | Matrix Type: | Soil | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample Name: | DA20130-2 | | | Sample Date: | 09/04/19 | | | | |
| **Analyte** | **CAS No** | **Result Value** | **Reporting Limit** | **MDL** | **Result Units** | **Lab Qualifier** | **Validation Qualifier** | **Validation Qualifier Comments** | |
| Mercury | 7439-97-6 | 1.1 | 1.1 | 0.09 | mg/kg | | | | |

| Sample Name | HFT-01-SS-12 | | | | | Matrix Type: | Soil | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample Name: | DA20130-3 | | | Sample Date: | 09/04/19 | | | | |
| **Analyte** | **CAS No** | **Result Value** | **Reporting Limit** | **MDL** | **Result Units** | **Lab Qualifier** | **Validation Qualifier** | **Validation Qualifier Comments** | |
| Mercury | 7439-97-6 | 0.83 | 0.83 | 0.07 | mg/kg | U | U | | |

| Sample Name | HFT-02-SS-12 | | | | | Matrix Type: | Soil | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample Name: | DA20130-4 | | | Sample Date: | 09/04/19 | | | | |
| **Analyte** | **CAS No** | **Result Value** | **Reporting Limit** | **MDL** | **Result Units** | **Lab Qualifier** | **Validation Qualifier** | **Validation Qualifier Comments** | |
| Mercury | 7439-97-6 | 1.1 | 0.84 | 0.07 | mg/kg | | | | |

| Sample Name | HFT-04-SS-12 | | | | | Matrix Type: | Soil | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample Name: | DA20130-5 | | | Sample Date: | 09/04/19 | | | | |
| **Analyte** | **CAS No** | **Result Value** | **Reporting Limit** | **MDL** | **Result Units** | **Lab Qualifier** | **Validation Qualifier** | **Validation Qualifier Comments** | |
| Mercury | 7439-97-6 | 0.88 | 0.88 | 0.074 | mg/kg | U | U | | |

| Sample Name | HFT-10-SS-6 | | | | | Matrix Type: | Soil | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample Name: | DA20130-6 | | | Sample Date: | 09/04/19 | | | | |
| **Analyte** | **CAS No** | **Result Value** | **Reporting Limit** | **MDL** | **Result Units** | **Lab Qualifier** | **Validation Qualifier** | **Validation Qualifier Comments** | |
| Mercury | 7439-97-6 | 1 | 1 | 0.086 | mg/kg | U | U | | |

| Sample Name | HFT-12-SS-6 | | | | | Matrix Type: | Soil | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample Name: | DA20130-7 | | | Sample Date: | 09/04/19 | | | | |
| **Analyte** | **CAS No** | **Result Value** | **Reporting Limit** | **MDL** | **Result Units** | **Lab Qualifier** | **Validation Qualifier** | **Validation Qualifier Comments** | |
| Mercury | 7439-97-6 | 0.084 | 0.084 | 0.0071 | mg/kg | U | U | | |

| Sample Name | HFT-16-SS-6 | | | | | Matrix Type: | Soil | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample Name: | DA20130-8 | | | Sample Date: | 09/04/19 | | | | |
| **Analyte** | **CAS No** | **Result Value** | **Reporting Limit** | **MDL** | **Result Units** | **Lab Qualifier** | **Validation Qualifier** | **Validation Qualifier Comments** | |

*Analysis Method SW7471B*

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Mercury | 7439-97-6 | 0.54 | 0.082 | 0.0069 | mg/kg | | | |

**Sample Name** HFT-18-SS-60 **Matrix Type:** Soil

**Lab Sample Name:** DA20130-9 **Sample Date:** 09/05/19

| Analyte | CAS No | Result Value | Reporting Limit | MDL | Result Units | Lab Qualifier | Validation Qualifier | Validation Qualifier Comments |
|---|---|---|---|---|---|---|---|---|
| Mercury | 7439-97-6 | 0.29 | 0.084 | 0.007 | mg/kg | | | |