FREEPORT-McMoRan

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April 30, 2021

Certified Mail #7018 2290 0001 6073 7047

Ms. Rebecca Roose, Director
Water Protection Division
New Mexico Environment Department
P.O. Box 5469
Santa Fe, New Mexico 87502

Dear Ms.Roose:

Re: Revised B Ranch IRA Completion Report
Smelter Tailing Soils Investigation Unit - Chino AOC

Freeport-McMoRan Chino Mines Company (Chino) submits under separate cover the revised *Completion Report for the B Ranch Area Interim Removal Action (IRA), Smelter Tailing Soil Investigation Unit* (STSIU) under the Chino Administrative Order on Consent (AOC). The report was revised in response to comments received from the New Mexico Environment Department (NMED) in a letter dated March 31, 2021. The completion report and a document presenting responses to NMED comments were submitted today to Mr. David Mercer.

Please contact Ms. Pam Pinson at (575) 912-5213 with any questions or comments concerning this completion report.

Sincerely,

Sherry Burt-Kested
Manager, Environmental Services

SBK:pp
20210426-001

c: (via email}
Joseph Fox, NMED
David Mercer, NMED
Petra Sanchez, US EPA
Mike Steward, FCX

Freeport-McMoRan Chino Mines Company – Administrative Order on Consent
Response to New Mexico Environment Department Comments dated March 31, 2021
B Ranch Interim Remedial Action Completion Report (STSIU)
April 30, 2021

This document presents Freeport-McMoRan Chino Mines Company's (Chino's) response to comments from the New Mexico Environment Department (NMED) on the B Ranch Interim Remedial Action Completion Report for the Smelter/Tailing Soils Investigation Unit (STSIU) Amendment Plots, dated August 2020. The comments were received from NMED in a letter dated March 31, 2021. The B Ranch Interim Remedial Action Completion Report was prepared in accordance with the Scope of Work associated with the Administrative Order on Consent (AOC) between Chino and NMED. The B Ranch Interim Remedial Action Completion Report has been revised to address NMED comments. This letter is organized to present a response to each comment received from NMED. NMED comments are reproduced below in **bold text**, followed by Chino's response to each comment in *italics*.

Comments and Responses:

1. Section 2.1.3 and Section 3.4. In both sections, the report mentions the use of the STSIU pre-FS RAC of 1,600 mg/kg copper in soils as a 'vertical removal target guide'. However, there is no clear indication in the report as to how the 'target guide' was utilized in deciding removal depth. In the first full paragraph on Page 10, the text says: "Although 1600 ppm was applied as a vertical removal target guide where possible, the variability for soil removal depths determined how deep to remove soils below 4,500 ppm in order to control final grade." Please clarify how the 1,600 mg/kg pre-FS RAC was used to make decisions on soil removal depth.

Response: The below revision has been made to Section 3.4 to make the additional clarification as requested:

> *"Post-confirmation samples with copper concentrations above 1,600 ppm account for 190 of the 440 post- removal sample sites with 5 of those sites having copper concentrations above 4,500 ppm. Of the 440 sample sites collected from the B Ranch IRA, 250 were below 1,600 ppm (Table 2). Although a target 1,600 ppm was applied where possible as a vertical removal target guide, the soil horizon variability determined removal depth for soils with concentrations below 4,500 ppm due to presence of bedrock or the requirement to control final grade. Historically, impacted soils and water moving down gradient on the site resulted in varying depths of copper concentrations in those soils, and onto the exposed bedrock areas. Of the remaining 190 sites with copper concentrations above 1,600 ppm, 50 were left due to residual copper remaining on bedrock. Due to the steep slope gradient and to control soil erosion and accretion, no further soil was removed in order to control grade for the remaining 140 sites following soil removal below 4,500 ppm copper concentrations. For some areas, due to deep soil removals, clean backfill was applied to maintain positive slope contours to support drainage. The B Ranch IRA was unlike the adjacent Golf Course IRA, where ground was more level and windblown copper concentrate did not migrate with depth through the soil profile. Removal of the top 3 inches within the Golf Course IRA resulted in concentrations that averaged 1,000 ppm copper*

and removing soils at the human health risk concentration inherently also removed lower concentrations which incidentally addressed potential avian ecological risk. For the B Ranch IRA, 250 sample sites are now below 1,600 ppm copper levels. For those sample sites where equipment soil removal activity did not incidentally address avian criteria, the 1,600 ppm avian risk level was used as a vertical guide for the B Ranch IRA. Soils were analyzed under the same methods applied for the 4,500 ppm criteria as discussed in this section above with the exception that a correction factor (Section 3.4) was not used. Since the avian risk criteria was not the driver for the IRA, quality control for determining 1,600 ppm copper by sending duplicate samples to be analyzed at the lab was not performed as was done for the human health criteria of 4,500 ppm copper. The areas that exceed 1,600 ppm will be addressed under the STSIU Feasibility Study which will incorporate this IRA completion report results."

2. Section 3. It is unclear how the area to be excavated was determined. The text only discusses sampling conducted during the removal to guide depth but provides no detail regarding how the areas selected for removal were determined prior to the removal action. There is some discussion in Section 1 and Section 3.4, but a clear discussion of the pre-removal decision for determining which soils were to be removed at the Site would be helpful to the reader.

Response: The following was added at the beginning of Section 3.3, First Paragraph:

"The excavation area was considered all surface soils within the B-Ranch area bordered by Hurley Operations and the remediated slag pile to the south, the site access road to the west, limits of 2009 Golf Course IRA to the north, and the boundary with HWCIU the east. Areas that had designated in 2009 as having sensitive cultural resources or exposed bedrock were also excluded from excavation activities."

3. Section 3.4, Page 9. Please provide a reference for the equation used to convert copper in the 2,000 µm size fraction to the 250 µm size fraction.

Response: The equation was developed for the HWCIU Residual Risk Assessment (Arcadis 2021) utilizing the analytical sample dataset collected as part of the HWCIU Interim Removal Action and reported in the HWCIU Interim Removal Action Completion Report (Arcadis 2020). A citation has been added to the Last Sentence of the Third Paragraph of Section 3.4 and the reference has been added to the reference section.

4. Section 3.4, Page 10. A brief discussion of the findings of the lab/XRF split sample analyses presented in Appendix H should be provided in this section. This discussion should include information about the accuracy and precision of the XRF sampling and any effect that may have on interpreting the results of the post-remediation XRF data. A summary of this information should also be added to the first bullet in Section 4.

Response 1: The following has been added to Section 3.4, Third Paragraph:

> *"As described in Appendix H, the results of the split sample laboratory results and their corresponding XRF measurements were compared to each other using linear regression to evaluate how well the XRF results can predict the laboratory results. The linear regression analysis resulted in a correlation coefficient of 0.98. Of the 60 comparisons, all but six results occur within the True Negative or True Positive quadrants, indicating that the XRF result resulted in the same decisions as that SVL results. The six exceptions all occurred in the Type II Error (False Negative) quadrant, which means that the XRF result incorrectly indicated that the decision criteria were exceeded when the SVL result indicated that the decision criteria were not exceeded. The decisions made from these errors would be to remediate when remediation was potentially not needed and thus, the 4,500 ppm XRF value employed in the field yielded a reliably conservative decision result."*

Note the following sentence was removed from the document: "See Golder's Quality Assurance Report under Appendix H."

Response 2: The following was added to Section 4, First Bullet, after the Second to Last sentence:

> *"As described in Section 3.4, a regression analysis was completed using the split sample laboratory results and their corresponding XRF measurements to evaluate how the XRF results correlated with the laboratory results. This analysis indicated that the 4,500 ppm XRF value employed in the field yielded a reliably conservative decision result."*

5. Section 5. 1st Bullet. Please provide information about why the remedial boundaries were expanded.

Response: The following has been added after the First Sentence of the First Bullet:

> *"In the FIP, the remedial boundaries were determined based on extents presented in final designs from the Golf Course IRA Completion Report. Preliminary field reconnaissance revealed areas along the northern boundary of the B-Ranch area that had not been remediated during the Golf Course IRA and did not have sensitive cultural resources or exposed bedrock. The decision was made to include these areas within the B-Ranch IRA remedial boundaries in order to ensure that all impacted areas were remediated.*

6. Section 5. 2nd Bullet. This is the first mention of an operational landfill in the document. A discussion of the landfill and information related to the determination that it did not require excavation should be provided in the document. In addition, Figures 2, 3, and 4 do not appear to have a landfill noted as discussed in the bullet point.

Response: Chino notes that the bullet and supporting figure may cause some confusion. The landfill falls within and is part of Hurley Operations Area, and should have been noted as such to avoid inference that it was a separate infrastructure. The Chino AOC addresses non-operational areas for potential risk to health and the environment, whereas mine support sites such as the Hurley Operations Area are addressed under different regulatory venues that provides for any needed remedial action for infrastructure that is no longer supporting operations. To address better labeling and characterization of the area, the Second Bullet under Section 5 "FIELD IMPLEMENTATION PLAN DEVIATION" has been revised to read as per below:

> *"As denoted on Figure 2 and in the FIP, the Hurley Operations Area extends into the B Ranch site and is excluded from the IRA. A correction was made to the IRA site demarcation to exclude additional areas when it was found that the Hurley Operations Area boundary was further out than first determined. In Section 3.4, the fourth paragraph, there is an example of how the adjustment was made to include more area into the operations boundary."*

7. Appendix D. Section 3.0. The final sentence of Section 3.0 says: "The following summarizes the sample collection and analyses:", but no text follows the colon. Was a further summary in that section intended or do Sections 3.1 and 3.2 include the summary?

Response: Appendix C to Appendix H has been edited so that the final sentence of Section 3.0 has been removed. The sentence was removed because it was in error and irrelevant to the sections that followed. Sample collection and analysis are discussed in the main text of the Quality Assurance Report (Golder 2020) (Appendix H).

Freeport-McMoRan – Chino Mines Company

FINAL COMPLETION REPORT

B RANCH AREA

Interim Remedial Action Smelter/Tailing Soils Investigation Unit Chino Administrative Order on Consent

April 30, 2021

FINAL COMPLETION REPORT B RANCH AREA

Interim Remedial Action Smelter/Tailing Soils Investigation Unit Chino Administrative Order On Consent

April 30, 2021

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Acronyms and Abbreviations

µ	microns
AOC	Administrative Order on Consent
Arcadis	Arcadis U.S., Inc.
BMP	best management practice
CCP	Closure/Closeout Plan
CGP	Construction General Stormwater Permit
Chino	Freeport-McMoRan Chino Mines Company
CR	Completion Report
Cu	copper
DP	Discharge Permit
FIP	Field Implementation Plan
GIS	geographic information system
HWC	Hanover and Upper Whitewater Creek
IRA	Interim Remedial Action
IRAWP	Interim Remedial Action Work Plan
IU	investigation unit
mg/kg	milligrams per kilogram
NMED	New Mexico Environmental Department
NPDES	National Pollutant Discharge Elimination System
ppm	parts per million
Pre-FS RAC	pre- feasibility study remedial action criteria
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
RI	Remedial Investigation
SOP	Standard Operating Procedure
STSIU	Smelter/Tailing Soil Investigation Unit
SWPPP	Stormwater Pollution Prevention Plan
the site	B Ranch Area, Hurley, New Mexico
TMDL	total maximum daily load

USA	USA Environment, L.P.
USEPA	United States Environmental Protection Agency
VSP	Visual Sample Plan
XRF	x-ray fluorescence

1 INTRODUCTION

Freeport-McMoRan Chino Mines Company (Chino) conducted an interim remedial action (IRA) within the Smelter/Tailing Soil Investigation Unit (STSIU) north of Lake One and west of Whitewater Creek as part of an Administrative Order on Consent (AOC, 1994) with the New Mexico Environment Department (NMED) This area is referred to as the B Ranch Area and is located northeast of Hurley, New Mexico (the site; Figure 1). Arcadis U.S., Inc. (Arcadis) prepared this IRA Completion Report (CR) on behalf of Chino to describe remediation of the IRA for the B Ranch Area.

The B Ranch IRA follows the work plan previously prepared under the AOC STSIU Interim Remedial Action Work Plan (IRAWP; Arcadis 2007). NMED provided approval to perform the IRA under the existing IRAWP in an email dated May 15, 2019 as a continuation of the soil removal construction effort being performed under the Hanover/Whitewater Creek IU IRA. The B Ranch area was previously a part of the Hurley Operational Area and therefore excluded in the STSIU IRAWP. In 2019 it was determined that B Ranch was no longer necessary for operations and thus removed from operations. The B Ranch area is bounded by and adjacent to the 2008 “Golf Course” IRA and to the Hurley Soils IU IRA, as well as the closed and reclaimed Lake One and Slag Pile (2014) under Discharge Permit 1340 (DP 1340) (Figure 2). As part of the gradient effect from windblown concentrate as described in the IRAWP, the B Ranch area was inferred to have had similar operational impacts as the Golf Course and Hurley. With the DP 1340 closures per above, the area no longer fell within the footprint of the Hurley Operational Area and therefore has integrated into the STSIU. This CR describes removal of windblown concentrate impacted soil within the B Ranch Area where surface soil copper (Cu) concentrations were greater than 5,000 parts per million (ppm). This was based on criteria established in the IRAWP (Arcadis 2007) and later formalized under the pre- feasibility study remedial action criteria (Pre-FS RAC) for the STSIU. To address horizontal delineation of copper concentrations at the site, the residential copper criteria of 5,000 ppm established as pre-FS RAC for the Hurley Soils Investigation Unit as well as the STSIU, was applied. Additionally, based on the NMED pre-FS RAC following the Golf Course IRA, and used in the follow-up Hurley Railroad and Razorback Ridge IRAs, a copper criteria for ecological risk of 1,600 milligrams per kilogram (mg/kg) was utilized to guide vertical removal of soil where possible (NMED 2010, 2011). The B Ranch IRA was performed between June 19, 2019 and July 29, 2019 in accordance with procedures established under the IRAWP (Arcadis 2007).

1.1 Document Organization

The remaining sections of this CR are organized as follows:

- Section 2 – Project Background. This section discusses the site setting and history.
- Section 3 – Interim Remedial Action Summary. This section summarizes IRA construction activities.
- Section 4 – Construction Documentation and Quality Assurance. This section references the figures showing the final limits and extents of the work. This section also summarizes construction documentation and air and water quality monitoring results.
- Section 5 – Field Implementation Plan Deviations. This section discusses any deviations in construction from what was documented in the Field Implementation Plan (FIP; Appendix A).
- Section 6 – Construction Summary. This section discusses the total volume of soil removed during excavation, achievement of cleanup goals, and provides a summary of future inspections required.
- Section 7 – References. This section provides references for documents cited within this CR.

2 PROJECT BACKGROUND

This section describes the site and focuses on the STSIU including the B Ranch Area. The site is described in detail in the Remedial Investigation Background Report - Chino Mine Investigation Area (Chino 1995). This site description was updated in the AOC Remedial Investigation Report Smelter/Tailing Soils Investigation Unit (SRK 2008 Revision). The following description of the site is adapted from these sources, particularly the remedial investigation (RI) report.

Multiple investigation units (IUs) associated with historical mineral processing operations at the site were designated in the AOC. These included the Lampbright IU, Hanover Creek Channel IU, Whitewater Creek Channel IU, Smelter Soils IU, Hurley Soil IU, and the Tailing Impacted Soils IU. The Hanover and Whitewater Creeks IUs as well as the Smelter and Tailing Impacted Soils IUs have been combined to form the HWCIU and STSIU, respectively. Figure 1 presents a Site Location Map and Figure 1-2 provides the location of the discussed IUs above.

The IRA specifically addresses surface soil impacts in the STSIU. The STSIU includes the former copper smelter, ancillary facilities, and the tailings disposal facilities. The AOC defines the tailings area as all soils adjacent to the Chino tailings ponds and those soils shown to be potentially affected by the tailings.

The former Hurley Smelter and Hurley Concentrator are located in Hurley, New Mexico. The old concentrator was decommissioned in 1982 with the startup of the newer Ivanhoe Concentrator in Vanadium, NM. The former smelter ceased operations in 2002. The former smelter site is bounded by the Town of Hurley to the west, Whitewater Creek to the northeast, Lake One to the east, and the tailings impoundments to the south. Current land uses adjacent to the former smelter include residential in the Towns of Hurley and North Hurley, tailings disposal south of the former smelter, and livestock grazing elsewhere. With the exception for private residential areas, Chino owns most of the land within the STSIU. Most of this IU is located east of Highway 180 and west of Whitewater Creek, which is currently leased for livestock grazing.

2.1 Smelter Investigation Unit

As described in the AOC, the Smelter IU included land adjacent to the Hurley operational area but excluded the Hurley Soils IU and the Tailing Impacted Soils IU (NMED 1994). The original investigation area for the Smelter IU extended approximately 5.5 miles to the east of the smelter and approximately 1.5 miles to the west of the smelter, with a limited area to the north of the smelter (Chino 1995). Historical sources in the Smelter IU are smelter emissions and historical material handling operations.

Historical smelter emissions consisted of stack emissions and historical fugitive gas/dust emissions from smelting and refining of copper-bearing materials. Historical stack emissions began with the start of smelting activity in 1939. The stack functioned as a vent for off-gases from furnace and converter operations. Following promulgation of state and federal air quality permit programs in the 1970s, Chino implemented pollution controls within the smelter facility to meet regulatory requirements. Initiated in 1910, the Hurley concentrator ceased operations in 1982 and was dismantled in 1988. The Hurley Smelter ceased operations in 2002 and was demolished in 2007.

In 2008, Chino performed an IRA on a 170-acre area north of Hurley that had formerly been utilized as a golf course. The aim of the Golf Course IRA was to remove soil in which copper concentrations were greater than 5,000 ppm, as applied per the NMED-approved residential remedial action criteria for the Hurley Soils IU. Where surface copper concentrations exceeded 5,000 ppm, soil was vertically excavated until concentrations in the soil did not exceed 2,700 ppm copper (Arcadis 2009).

2.2 Tailings Investigation Unit

As described in the AOC, the Tailing Impacted Soils IU included soils surrounding the Chino tailings impoundments or ponds southwest of Hurley that have potentially been impacted by operations at the tailings ponds (NMED 1994). These impoundments and ancillary support facilities for water storage and recycling (e.g., Axiflo Lake) are the primary facilities operated by Chino within the Tailings portion of the STSIU.

Wind erosion of material from the tailings impoundments and subsequent deposition is the main source identified for the Tailing Impacted Soils IU. This release mechanism is primarily historical because the older tailings ponds have been reclaimed with a vegetated soil cap by 2014, which prevents wind erosion.

Tailings have been transported and deposited in tailings impoundments south of Hurley since 1911. These impoundments occupy an area that stretches 5.3 miles to the south-southeast of Hurley. The estimated area of the tailings impoundments was 3.9 square miles (about 2,500 acres; Chino 1995). The old tailings areas (including Lake One, Tailings Ponds 1, 2, B, C, 4, 6E, and 6W) are now reclaimed as of 2014 under DP 1340. Currently, tailing generated by the Ivanhoe Concentrator is pumped to Tailings Pond 7. Tailings deposition is regulated by NMED under DP 484.

2.3 B Ranch Area

The B Ranch Area consists of 22 acres bounded to the south by the smelter facility, to the east by Hanover/Whitewater Creek, to the north by the Golf Course IRA site, and to the west by the Town of Hurley (Figure 2). Until recently, as discussed in Section 1.0, the area was considered a part of the Hurley Operational Area and therefore was excluded from the previous removal action at the Golf Course and other lands north of Hurley. Consequently, it was not included previously in the STSIU IRAWP. However, it has since ceased to be a part of the Hurley Operational Area and therefore has integrated into the STSIU. Because the B Ranch Area now falls under the AOC, the IRA was performed following procedures established for the Golf Course IRA (Arcadis 2009) with the goal of removing surface soil in which soil copper concentrations were greater than the STSIU pre-FS RAC of 5,000 ppm to be protective for human risk exposure. Section 3.4 discusses how the 5,000 ppm criteria objective was met and the confirmation sample results. Additionally, based on the NMED pre-FS RAC following the Golf Course IRA, a copper criteria for ecological risk of 1,600 mg/kg was utilized to guide vertical removal of soil where feasible (NMED 2010, 2011).

3 INTERIM REMEDIAL ACTION SUMMARY

This section describes completed construction activities associated with the IRA.

3.1 Remedial Action Implementation Team

The following parties fulfilled the requirements of the project roles and responsibilities:

- Owner: Chino as the Owner managed the construction contracts.
- Design Engineer: Arcadis was the Design Engineer.
- Field & Quality Assurance (QA) Engineer: Golder was on site as the Field Engineer.
- X-Ray Fluorescence (XRF) Technician: Golder provided the XRF Technician.
- Quality Assurance Lab: SVL Analytical was used for processing split samples.
- Remedial Contractor: USA Environment, L.P. (USA) was the Remedial Contractor.

3.2 Pre-Excavation Activities

A construction equipment staging area and supply laydown areas were established before beginning excavation. Wheel decontamination areas employed dry decontamination methods for vehicles exiting the site that may have been in contact with impacted soils. Large boulders and vegetation were cleared and grubbed from the work area before commencing excavation. As per the IRAWP, vegetation was stockpiled as a burn pile in a central location with BMP controls, in order to recover copper impacted soils from the root systems.

3.2.1 Permitting Activities

Chino Mines Blue Stake performed a utility locate to identify any buried utilities in the proposed excavation areas and a cultural resources survey was performed concurrently to demarcate any sites of historic or cultural significance. Additionally, a biological survey (presented in Appendix B) was performed by Gila Biological Consulting before construction to evaluate the area which found no sensitive plant or animal species and did not identify any active bird nests.

Pursuant to Discharge Permit (DP) 526, Condition No. 5, Chino requested permission from NMED on June 14, 2019 to place excavated material from B Ranch on the West Stockpile; NMED approved this request on June 21, 2019. Additionally, NMED's Ground Water Quality Bureau AOC Group provided approval of these activities as continuation of the Hanover/Whitewater Creek IU IRA on May 15, 2019.

In accordance with the National Pollutant Discharge Elimination System (NPDES) Construction General Stormwater Permit (CGP), site activities complied with the Chino Operations Stormwater Pollution Prevention Plan (SWPPP) (NMR050000). Before, during, and after the work, perimeter best management practices (BMPs) were installed, inspected, and managed to meet total maximum daily load (TMDL) requirements as described in the FIP (Figure 3).

3.3 Excavation Activities

The excavation area was considered all surface soils within the B Ranch area bordered by Hurley Operations Area and the remediated slag pile to the south, the site access road to the west, limits of 2009 Golf Course IRA to the north, and the boundary with HWCIU the east. Areas that were designated in 2009 as having sensitive cultural

resources or exposed bedrock were excluded from excavation activities. Excavation of mine-impacted soils was accomplished using heavy equipment to scrape and remove surficial soils. In accordance with the STSIU IRAWP (Arcadis 2007), topsoil was to be removed in 2-inch intervals until XRF results were observed to be within the removal criteria, however due to equipment limitations soil was removed in 2-to-6-inch intervals. Areas where resistance (caliche or bedrock) was encountered within the top 4 inches of soil were not excavated further; these areas were documented by the Field and QA Engineer in the Daily Reports (Appendix C) and XRF Results (Table 2). Excavation areas were graded to promote positive drainage (i.e., no sinks or low points). The Remedial Contractor used Caterpillar 730 articulated haul trucks for the work, with a capacity of 23 cubic yards each. Approximately 16,000 bank cubic yards of soil were removed from the 22-acre investigation area, with removal depths ranging from 2 to 24 inches. Soil removed during the excavation was staged with the Upper Whitewater Creek Interim Removal Action material at the temporary stockpile located at Mile Marker 4 off of the Lake One Road and both IRA materials were later removed with larger capacity Haul Trucks to the West Stockpile location designated for these soils under DP 526 as discussed in the previous section.

The Remedial Contractor minimized visible dust produced by excavation utilizing water trucks to spray the excavation area, temporary stockpiles, and haul roads during soil removal to control wind erosion and dust generation.

Where direct-loading of excavated material was not implemented, material was temporarily stockpiled within the work area. These stockpiled soils were wetted as necessary to limit dust generation. In addition, the Remedial Contractor applied magnesium chloride dust suppressant to stockpiles to minimize dust when additional measures were needed.

3.4 Post-Removal Confirmation Sampling

Following the STSIU IRAWP (Arcadis 2007), a grid sample pattern was adopted for confirmation sampling. As discussed in the Introduction Section, the B Ranch soil removal site was defined by its boundaries with all of the completed IRAs and operational reclamation units (Figure 2), and its anticipated soil copper concentrations based on those characterized windblown copper concentrate gradient effects. For example, the B Ranch IRA site bounds the operational boundary, thus closer to the source area than the “Golf Course” IRA. The grid spacing was determined following the United States Environmental Protection Agency (USEPA) guidance document Methods for Evaluating the Attainment of Cleanup Standards. See Figure 4 for the resulting sampling grid using this guidance, which determined that a minimum of 384 samples were required to demonstrate that 95 percent of the area sampled will be below the target clean up concentration for copper (USEPA 1989).

The formula and input parameters used to derive minimum sample size are shown in Table 1. To achieve 384 samples, a grid with spacing of 46.3 feet was generated in geographic information system (GIS) using the Visual Sample Plan (VSP) software package (VSP Development Team 2019). A random point was selected for the initial grid location and subsequent grid sample locations were evenly spaced from the initially selected grid location. The B Ranch remedial area is presented on Figure 2 and additionally Figure 4 provides the confirmation sampling grid as well as the site outline.

The removal target criteria is the pre-FS RAC copper concentration of 5,000 ppm or greater to address human health risk, where under the Hurley Soils IU IRA, soil removal was used for the remediation and was applied to the STSIU as well. Golder Associates conducted confirmation sampling using XRF to confirm that removal of copper at concentrations in excess of 5,000 ppm was achieved to be protective of residential human health. In the actual application of removing concentrations of 5,000 ppm and above, post-removal sampling utilized an XRF unit and due to the significant amounts of sampling for the Hurley IU IRA, it was determined that a correction

factor of plus/minus 500 ppm should be applied to the screening criteria, thus reducing it to 4,500 ppm to be conservative in removing risk. To ensure and achieve levels below the human health copper concentration criteria of 5,000 ppm were removed, a target level of 4,500 ppm was used to account for the XRF tolerances. As described in Appendix H, the results of the split sample laboratory results and their corresponding XRF measurements were compared to each other using linear regression. to evaluate how well the XRF results can predict the laboratory results. The linear regression analysis resulted in a correlation coefficient of 0.98. Of the 60 comparisons, all but six results occur within the True Negative or True Positive quadrants, indicating that the XRF result resulted in the same decisions as that SVL results. The six exceptions all occurred in the Type II Error (False Negative) quadrant, which means that the XRF result incorrectly indicated that the decision criteria were exceeded when the SVL result indicated that the decision criteria were not exceeded. The decisions made from these errors would be to remediate when remediation was potentially not needed and thus, the 4,500 ppm XRF value employed in the field yielded a reliably conservative decision result. This practice was standardized starting with the 2008 Hurley Soils IU IRA and used for meeting copper criteria concentrations in all of the following IRAs. Where samples exceeded the target cleanup level of 4,500 ppm, an additional 2 to 4 inches of soil was scraped, followed by another round of confirmation sampling at the same grid node as the original sample (Arcadis 2007). This procedure continued until all sample results were below the target cleanup level of 5,000 ppm (4,500 ppm under XRF calibration testing limits); results are shown in Figure 4 and presented in Table 2, and discussed in Appendix H. In Table 2, sample sites that required only one pass of the removal equipment to meet the human health risk criteria, have only one value in the confirmation value concentration columns. If it took more than one pass, the first pass post removal concentration is provided and the last pass post removal/confirmation is provided in the next column. Since the field confirmation samples were screened to and analyzed at 2,000 microns (µm), an additional column is included with the calculated copper concentration at the 250 µm size utilized for human health exposure. The larger 2,000 µm fraction was used in the field to expedite results in order not to have equipment on stand-by due to the more limited removal surface area of the B Ranch project as compared to other earlier larger IRA sites. The calculation to adjust sieved 2,000 µm soil fraction copper concentrations to the human health risk size fraction of 250 µm (Appendix C, Arcadis 2021):

- Cu Concentration at 250 µm=$e^{0.624}$*[Cu concentration at 2,000 µm]$^{0.925}$

In Figure 4, it is noted that 5 sample confirmation sites are above 4,500 ppm in which 3 of them are on bedrock and the remaining two are inaccessible to the equipment. Areas where bedrock was encountered or where sites were in accessible with copper concentrations (calculated for the 250 µm soil fraction) remaining above 4,500 ppm, are listed below:

- Bedrock encountered at B-216, B-217, and B-389, areas were swept until no soil remained. Thus, no final soil confirmation sampling. Prior to sweeping, concentration were, respectively, 6,864 ppm, 7,842 ppm, and 7,573 ppm.
- Inaccessible areas encountered at B-23 and B-119 with concentrations of 6,436 ppm and 5,076 ppm, respectively, were not addressed. Both sites are on the operational boundary and encountered infrastructure.

Post-confirmation samples with copper concentrations above 1,600 ppm account for 190 of the 440 post- removal sample sites with 5 of those sites having copper concentrations above 4,500 ppm. Of the 440 sample sites collected from the B Ranch IRA, 250 were below 1,600 ppm (Table 2). Although a target 1,600 ppm was applied where possible as a vertical removal target guide, the soil horizon variability determined removal depth for soils with concentrations below 4,500 ppm due to presence of bedrock or the requirement to control final grade. Historically, impacted soils and water moving down gradient on the site resulted in varying depths of

copper concentrations in those soils, and onto the exposed bedrock areas. Of the remaining 190 sites with copper concentrations above 1,600 ppm, 50 were left due to residual copper remaining on bedrock. Due to the steep slope gradient and to control soil erosion and accretion, no further soil was removed in order to control grade for the remaining 140 sites following soil removal below 4,500 ppm copper concentrations. For some areas, due to deep soil removals, clean backfill was applied to maintain positive slope contours to support drainage. The B Ranch IRA was unlike the adjacent Golf Course IRA, where ground was more level and windblown copper concentrate did not migrate with depth through the soil profile. Removal of the top 3 inches within the Golf Course IRA resulted in concentrations that averaged 1,000 ppm copper and removing soils at the human health risk concentration inherently also removed lower concentrations which incidentally addressed potential avian ecological risk. For the B Ranch IRA, 250 sample sites are now below 1,600 ppm copper levels. For those sample sites where equipment soil removal activity did not incidentally address avian criteria, the 1,600 ppm avian risk level was used as a vertical guide for the B Ranch IRA. Soils were analyzed under the same methods applied for the 4,500 ppm criteria as discussed in this section above with the exception that a correction factor (Section 3.4) was not used. Since the avian risk criteria was not the driver for the IRA, quality control for determining 1,600 ppm copper by sending duplicate samples to be analyzed at the lab was not performed as was done for the human health criteria of 4,500 ppm copper. The areas that exceed 1,600 ppm will be addressed under the STSIU Feasibility Study which will incorporate this IRA completion report results.

Field sampling was conducted in accordance with the XRF Standard Operating Procedure (SOP) and the methodology presented in the STSIU IRA Work Plan (Arcadis 2007), as well as discussed in the Appendix H Quality Assurance Report. XRF and confirmation laboratory sampling was conducted in accordance with the policy, functional activities, and quality assurance/quality control (QA/QC) protocols, which are specifically stated in the RI Quality Assurance Plan (QAP; Chino 1997). Split sample results are presented in Table 3. A discussion of the split sample results provided by the SVL Laboratory is provided in Appendix H. Additionally, data packages are provided in Appendix D.

3.5 Post-Excavation Activities

The disturbed areas were reseeded in accordance with the SWPPP to limit erosion and provide dust control. Reseeding was completed via drill seeding using the approved seed mix for use under the Closure/Closeout Plan (CCP; Chino 2007) and presented in Table 4. The restored areas will be monitored following final grading, restoration, and establishment of vegetation per the CCP (Chino 2007). Quarterly inspections will be conducted for 4 years following seeding to confirm that vegetation is sufficiently established for erosion and dust suppression. After the fourth year of monitoring, Chino will submit a vegetation monitoring report to NMED with recommendations to either continue or cease monitoring, based on vegetation success.

In areas where the work area crossed or included an existing drainage feature, straw bales were placed across the drainage feature to limit sedimentation during storm events. Erosion control mats were installed following excavation on slopes equal to or greater than 3:1 and in areas where concentrated flow was likely to occur, as directed by the Engineer. The mats were secured using metal or wooden stakes as specified by the manufacturer. Straw wattles were installed on slopes and spaced approximately every 50 feet vertically. BMPs will be inspected monthly and, once 80-percent regrowth is established, may be removed. Restoration BMPs are presented in the Photographic Log in Appendix E.

4 CONSTRUCTION DOCUMENTATION AND QUALITY ASSURANCE

The following Construction Documentation and Quality Assurance components utilized during the project are provided below.

- Golder conducted XRF sampling according to the X-Ray Fluorescence On-Site Measurement Standard Operating Procedure 23, approved for the entire AOC. This procedure was used to determine surface concentrations and subsequently resampled after excavation until target concentrations were achieved. For quality assurance, 10 percent of the samples were sent to SVL Laboratory for testing. Results of laboratory testing are presented in Table 3 and data packages are provided in Appendix D. As described in Section 3.4, a regression analysis was completed using the split sample laboratory results and their corresponding XRF measurements to evaluate how the XRF results correlated with the laboratory results. This analysis indicated that the 4,500 ppm XRF value employed in the field yielded a reliably conservative decision result. Appendix H provides Golder's Quality Assurance Report.
- In an email to NMED dated May 3, 2019 seeking approval, Chino provided a preliminary scope of proposed acres in a figure map which would be the first step for a FIP. The FIP was then developed to guide construction activities at the B Ranch Remedial Area. The FIP is provided in Appendix A.
- A photographic log was prepared using photographs taken before and after construction. The construction photographic log is presented in Appendix E.
- Daily reports were provided by Golder to summarize current removal volumes and work completed throughout the construction phase. The daily reports are included as Appendix C.
- Final contours are shown in Figure 5.
- Air quality monitoring performed to ensure compliance with air quality limits provided in the HASP is documented in Appendix F; Water truck source water quality data is provided in Appendix G.

5 FIELD IMPLEMENTATION PLAN DEVIATIONS

Construction was conducted in accordance with the FIP with the following deviations:

- Remedial area boundaries were expanded along the north and west edges, resulting in an increase in the remediation area from what was presented in the FIP. In the FIP, the remedial boundaries were determined based on extents presented in final designs in the Golf Course IRA Completion Report. Preliminary field reconnaissance revealed areas along the northern boundary of the B Ranch area that had not been remediated during the Golf Course IRA and did not have sensitive cultural resources or exposed bedrock. The decision was made to include these areas within the B Ranch IRA remedial boundaries in order to ensure that all impacted areas were remediated.

- As denoted on Figure 2 and in the FIP, the Hurley Operations Area extends into the B Ranch site and is excluded from the IRA. A correction was made to the IRA site demarcation to exclude additional areas when it was found that the Hurley Operations Area boundary was further out than first determined. In Section 3.4, the fourth paragraph, there is an example of how the adjustment was made to include more area into the operations boundary.

6 POST-CONSTRUCTION MONITORING

Quarterly inspections will be conducted for 4 years following seeding to confirm that vegetation is sufficiently established for erosion and dust suppression. After the fourth year of monitoring, Chino will submit a vegetation monitoring report to NMED with recommendations to either continue or cease monitoring, based on vegetation success.

7 REFERENCES

Arcadis U.S., Inc. (Arcadis). 2007. Administrative Order on Consent Interim Removal Action Work Plan, Smelter/Tailing Soil Investigation Unit. Chino Mines Company, Hurley, New Mexico. November.

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Tables

Table 1
Input Parameters for Sample Size Determination
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Parameter	Value	Description	Note
A	0.05	False positive rate, gives 95% confidence.	5% chance of concluding area is clean when it is really still contaminated.
B	0.2	False negative rate.	80% chance of concluding area is clean when it is really is clean.
P_0	0.05	Target percentage goal.	Conclude area is clean if less than 5% of samples exceed 4,500 mg/kg.
P_1	0.025	Assumed achieved percentage.	Assumed percent of samples exceeding goal of 4,500 mg/kg achieved after excavation.
n_d	**386**	**Minimum number of samples required.**	**Calculated value.**

NOTES:

Calculated using Equation 7.1 from USEPA Guidance Document: Methods for Evaluating the Attainment of Cleanup Standards. Volume 1 (USEPA 1989) as shown below. For Table A.2, please consult USEPA 1989.

$$n_d = \left\{ \frac{z_{1-\beta}\sqrt{P_1(1-P_1)} + z_{1-\alpha}\sqrt{P_0(1-P_0)}}{P_0 - P_1} \right\}^2 \qquad (7.1)$$

where $z_{1-\beta}$ and $z_{1-\alpha}$ are the critical values for the normal distribution with probabilities of $1-\alpha$ and $1-\beta$ (Table A.2).

mg/kg = milligrams per kilogram.
USEPA = United States Environmental Protection Agency

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-001	6,746	907	1,016	26,635	14,942
B-002	18,211	333	402	34,997	28,110
B-003	#	1,571	1,688		25,469
B-004	14,445	1,301	1,418	30,769	21,333
B-005	31,567	508	594	43,567	20,066
B-006	#	2,111	2,219		29,007
B-007	11,253	204	256	29,697	23,114
B-008	16,506	1,912	2,025	22,577	27,896
B-009	16,958	237	294	37,267	18,321
B-010	8,148	3,886	3,902	27,891	20,132
B-012	#	1,564	1,681		17,679
B-013	#	2,400	2,499		27,442
B-014	#	3,047	3,116		23,203
B-015	#	2,182	2,288		27,328
B-016	#	186	235		34,795
B-018	#	3,036	3,105		29,726
B-019	8,212	4,388	4,366	31,494	25,154
B-020	7,162	316	383	34,229	28,730
B-021	#	60	82		16,867
B-022	#	701	800		31,858
B-023 [1]	#	**6,675**	**6,436**		37,453
B-024	#	1,544	1,661		19,632
B-025	#	267	328		8,681
B-026	#	241	298		32,762
B-027	#	476	559		17,688
B-028	5,953	62	85	22,334	22,660
B-029	#	1,738	1,854		22,071
B-030	#	138	178		17,150
B-031	#	3,842	3,861		25,177
B-032	#	1,145	1,260		21,530
B-033	#	190	239		16,198
B-034	#	2,115	2,223		26,171
B-035	#	1,880	1,993		27,433
B-036	4,940	694	793	28,384	23,657
B-037	#	1,777	1,892		26,800
B-038	#	1,593	1,710		30,578
B-039	#	179	226		11,124

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-040	6,620	131	170	27,162	24,302
B-042	#	4,203	4,196		25,701
B-043	#	3,649	3,681		22,288
B-044	#	2,556	2,648		21,321
B-045	**10,829**	2,498	2,593	24,919	25,124
B-046	**5,688**	1,549	1,666	27,710	30,349
B-047	#	1,526	1,644		29,413
B-048	#	2,240	2,344		19,662
B-049	#	4,376	4,355		21,760
B-050	**12,525**	3,648	3,680	32,583	22,980
B-051	#	1,179	1,295		28,661
B-052	#	1,144	1,259		19,326
B-053	**7,215**	703	802	29,534	27,198
B-059	**6,693**	2,135	2,242	29,645	24,591
B-060	#	279	341		15,731
B-061	**4,729**	889	997	25,703	13,272
B-062	**4,824**	1,162	1,277	22,189	22,707
B-063	#	2,559	2,651		25,113
B-064	#	2,111	2,219		25,914
B-065	#	3,795	3,817		23,987
B-073	#	2,830	2,910		26,808
B-074	**5,552**	4,409	4,385	26,531	26,728
B-075	#	2,578	2,670		20,363
B-076	**6,373**	578	670	22,891	19,742
B-077	#	3,757	3,782		30,877
B-078	#	436	516		22,118
B-079	**5,537**	3,646	3,679	24,320	29,299
B-080	**10,511**	3,896	3,911	24,445	28,496
B-086	#	4,348	4,329		24,563
B-087	#	81	109		21,643
B-088	#	134	173		26,787
B-089	#	666	763		24,277
B-090	**12,642**	999	1,111	36,328	27,205
B-091	#	1,851	1,965		25,272
B-092	#	35	50		27,842
B-093	#	53	73		31,547
B-094	#	48	67		23,506
B-097	**6,950**	3,092	3,158	29,784	25,176
B-098	**6,775**	2,680	2,767	26,567	34,095
B-099	**9,597**	2,750	2,834	30,652	22,858
B-105	#	565	656		22,462

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-106	**7,891**	542	631	31,226	18,442
B-107	#	174	221		27,810
B-108	**5,247**	2,483	2,578	30,188	39,344
B-109	#	2,181	2,287		20,618
B-110	**6,380**	408	485	47,242	30,242
B-115	#	777	880		37,613
B-116	**4,857**	392	468	29,394	9,736
B-117	#	529	617		32,935
B-118	**10,442**	4,140	4,137	30,035	31,094
B-119 [1]	#	**5,164**	**5,076**		27,153
B-123	**11,356**	4,216	4,208	36,339	25,075
B-124	**7,579**	755	857	26,491	19,218
B-125	#	3,396	3,445		26,923
B-126	**7,263**	70	95	30,981	15,236
B-127	**8,051**	447	528	30,943	11,357
B-128	**9,462**	134	173	31,701	16,943
B-129	**16,050**	98	130	30,275	6,509
B-130	**10,996**	3,539	3,579	44,067	23,726
B-132	**7,826**	2,961	3,034	31,249	27,472
B-133	#	1,976	2,087		34,019
B-134	**4,762**	3,717	3,745	33,270	30,045
B-135	#	4,080	4,082		34,072
B-136	#	860	967		44,212
B-137	#	791	895		37,577
B-138	#	1,003	1,115		38,930
B-139	#	2,146	2,253		26,998
B-140	#	4,080	4,082		29,172
B-141	#	1,918	2,031		26,591
B-142	**5,374**	2,582	2,673	30,456	25,297
B-145	**6,487**	2,386	2,485	19,729	17,670
B-146	#	602	695		17,827
B-147	#	2,874	2,952		19,109
B-148	**8,846**	2,527	2,621	31,917	24,934
B-149	**6,238**	97	128	27,188	12,093
B-150	**8,852**	1,999	2,110	32,869	28,621
B-151	**6,849**	1,579	1,696	32,826	14,608
B-152	#	2,473	2,569		31,815
B-153	#	2,614	2,704		31,484
B-154	#	1,910	2,023		25,719
B-155	#	995	1,107		22,315
B-156	#	1,362	1,479		18,789
B-157	#	398	474		20,819
B-158	#	356	428		19,016
B-159	#	3,545	3,584		20,876
B-161	#	2,238	2,342		27,236

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-162	#	3,371	3,421		31,374
B-163	#	2,299	2,401		30,480
B-164	#	3,435	3,481		29,376
B-166	#	1,221	1,337		22,650
B-167	#	1,317	1,434		25,626
B-168	#	934	1,044		23,142
B-169	**4,615**	1,949	2,061	30,021	28,157
B-170	**7,550**	220	274	29,693	26,189
B-174	**5,649**	179	226	23,812	6,362
B-175	**12,687**	3,624	3,658	37,508	20,322
B-176	#	604	697		19,051
B-177	#	1,514	1,632		17,635
B-178	#	1,382	1,500		16,477
B-179	**8,218**	2,641	2,730	26,171	26,930
B-180	**11,398**	2,056	2,165	31,774	26,896
B-181	**11,598**	319	386	36,787	27,803
B-182	**7,606**	2,026	2,136	37,277	26,234
B-183	**6,995**	2,655	2,743	34,027	28,468
B-184	**13,709**	1,702	1,818	41,449	18,778
B-185	#	1,073	1,187		20,206
B-186	#	2,708	2,794		18,925
B-187	#	1,661	1,778		34,869
B-188	#	608	702		20,343
B-189	#	691	790		23,081
B-190	#	2,528	2,622		26,923
B-191	#	2,087	2,196		23,430
B-194	#	4,251	4,240		29,525
B-195	**4,740**	3,244	3,302	28,060	29,077
B-196	#	164	209		17,772
B-197	#	702	801		15,145
B-198	#	1,516	1,634		26,710
B-199	#	1,798	1,913		27,357
B-200	**16,792**	4,369	4,349	25,649	24,014
B-201	**26,163**	272	333	30,987	32,214
B-202	**11,911**	521	608	35,874	31,347
B-203	#	389	464		26,973
B-206	**15,901**	3,850	3,869	38,078	17,913
B-207	#	444	525		13,406
B-208	#	1,036	1,149		20,770
B-209	#	1,293	1,410		16,204
B-210	**13,220**	4,007	4,014	26,319	16,759
B-211	**8,802**	316	383	32,135	28,204
B-212	#	4,172	4,167		34,949
B-213	#	2,140	2,247		25,365

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-214	#	825	931		22,540
B-215	#	4,249	4,238		26,119
B-216 [2]	**8,525**	**7,156**	**6,864**	24,319	21,081
B-217 [2]	**10,160**	**8,265**	**7,842**	19,603	17,226
B-218	#	1,550	1,667		19,453
B-219	#	659	756		22,590
B-220	#	327	395		19,417
B-221	#	3,350	3,401		26,744
B-222	**6,313**	1,463	1,581	18,126	18,326
B-223	#	4,037	4,042		34,022
B-226	#	3,140	3,204		27,510
B-227	#	142	183		30,398
B-228	#	2,318	2,420		29,520
B-229	#	1,821	1,935		30,779
B-230	#	1,205	1,321		21,558
B-231	**9,155**	156	199	31,176	27,389
B-232	#	422	501		25,752
B-233	**5,119**	980	1,091	32,961	28,235
B-234	#	746	848		23,179
B-237	#	2,263	2,366		25,183
B-238	#	2,392	2,491		29,550
B-239	#	2,962	3,035		29,890
B-240	#	275	337		24,143
B-241	**21,250**	1,430	1,548	25,334	18,374
B-242	#	1,449	1,567		25,142
B-243	#	1,247	1,364		23,186
B-244	#	2,966	3,039		29,390
B-245	#	155	198		15,010
B-246	**25,200**	348	419	52,617	27,443
B-247	**4,552**	131	170	25,978	24,605
B-248	#	4,364	4,344		24,344
B-249	#	1,114	1,228		25,726
B-250	#	2,887	2,964		20,279
B-251	#	2,349	2,449		20,107
B-252	**10,902**	3,304	3,358	30,258	22,401
B-253	#	2,682	2,769		23,644
B-254	#	3,554	3,593		23,735
B-255	#	2,774	2,857		39,223
B-256	#	2,473	2,569		26,156
B-257	#	838	944		30,547
B-258	#	136	176		15,830
B-259	#	798	902		27,326
B-260	#	1,169	1,284		19,572
B-261	**5,705**	2,171	2,277	32,282	18,448
B-262	#	2,083	2,192		34,068

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-263	#	1,636	1,753		12,991
B-264	#	1,921	2,034		24,390
B-265	#	2,223	2,328		31,182
B-266	#	3,845	3,864		33,597
B-267	#	106	139		29,502
B-268	#	214	267		21,124
B-269	**4,918**	913	1,022	28,400	24,128
B-270	**9,853**	1,447	1,565	26,263	27,115
B-271	#	2,751	2,835		21,871
B-272	#	1,075	1,189		22,675
B-273	#	1,282	1,399		26,012
B-274	#	4,221	4,212		28,895
B-275	**7,866**	4,122	4,121	33,534	34,807
B-276	**6,606**	3,277	3,333	34,619	28,323
B-277	**4,880**	2,565	2,657	28,413	27,798
B-278	#	1,326	1,443		29,221
B-279	#	2,213	2,318		24,694
B-280	#	2,604	2,694		25,697
B-281	#	1,441	1,559		23,789
B-282	#	3,468	3,512		22,629
B-283	#	2,818	2,899		29,039
B-284	#	2,120	2,228		23,451
B-285	#	1,127	1,242		23,036
B-286	#	530	618		11,125
B-287	#	1,113	1,227		26,484
B-288	#	1,089	1,203		27,576
B-289	#	973	1,084		28,649
B-290	#	2,672	2,759		35,704
B-291	#	703	802		28,794
B-292	#	1,936	2,048		32,425
B-293	#	1,427	1,545		30,925
B-294	#	1,377	1,495		31,655
B-295	#	2,827	2,907		38,029
B-296	#	997	1,109		18,274
B-297	#	1,368	1,486		19,996
B-298	#	615	709		23,558
B-299	#	1,089	1,203		22,885
B-300	#	1,023	1,135		26,008
B-301	#	1,035	1,148		22,945
B-302	#	1,314	1,431		24,786
B-303	**5,491**	378	452	30,191	24,504

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-304	#	224	279		26,964
B-305	#	2,868	2,946		21,611
B-306	#	3,534	3,574		22,802
B-308	**4,666**	1,998	2,109	29,258	22,715
B-309	#	1,936	2,048		27,387
B-310	#	4,098	4,099		29,712
B-311	**6,517**	1,823	1,937	35,468	35,205
B-312	#	4,280	4,267		27,375
B-313	#	1,929	2,041		21,843
B-314	#	2,535	2,628		27,916
B-315	#	827	933		35,249
B-316	#	2,760	2,843		30,076
B-317	#	1,232	1,348		29,341
B-318	#	3,183	3,244		30,439
B-319	**4,727**	2,013	2,124	28,226	29,644
B-320	#	3,367	3,417		24,845
B-321	**5,703**	3,760	3,785	28,929	30,511
B-322	#	3,752	3,777		25,804
B-323	**7,643**	341	411	29,826	23,984
B-324	#	3,648	3,680		29,195
B-325	#	4,068	4,071		28,120
B-326	**6,442**	1,488	1,606	30,850	25,910
B-327	**5,195**	2,273	2,376	26,904	26,117
B-328	#	3,516	3,557		24,513
B-329	#	141	182		29,939
B-330	**9,534**	2,623	2,713	32,598	30,706
B-331	#	2,185	2,291		26,056
B-332	#	1,268	1,385		21,089
B-333	#	2,052	2,162		25,938
B-334	#	865	972		39,017
B-335	#	702	801		21,633
B-336	#	417	495		30,552
B-337	#	785	889		33,718
B-338	#	3,646	3,679		19,601
B-339	#	3,109	3,174		22,671
B-340	#	2,822	2,902		29,308
B-341	#	3,189	3,250		29,549
B-342	#	4,048	4,052		29,259
B-343	#	349	420		20,201
B-344	#	1,017	1,129		22,545
B-345	#	1,017	1,129		22,184
B-346	#	1,789	1,904		23,325
B-347	#	1,394	1,512		24,492
B-348	#	2,194	2,300		31,341

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-349	**4,961**	800	904	20,199	17,444
B-350	**4,603**	2,589	2,680	21,445	23,123
B-351	**4,636**	316	383	33,024	30,662
B-352	#	2,886	2,963		28,643
B-353	#	3,523	3,564		29,705
B-354	#	2,163	2,269		23,728
B-355	#	803	908		20,974
B-356	#	1,322	1,439		23,391
B-357	#	1,215	1,331		23,053
B-358	#	875	983		21,445
B-359	#	165	210		16,512
B-360	#	3,777	3,801		19,912
B-361	#	2,356	2,456		22,093
B-362	#	463	545		22,120
B-363	#	1,214	1,330		29,344
B-364	#	1,575	1,692		28,772
B-365	#	1,751	1,867		26,179
B-366	#	1,795	1,910		24,681
B-367	#	1,270	1,387		21,564
B-368	#	947	1,057		21,834
B-369	#	782	886		33,709
B-370	#	495	580		21,176
B-371	#	3,480	3,523		20,577
B-372	#	3,959	3,970		23,343
B-373	#	401	477		30,698
B-374	**5,063**	356	428	33,907	28,179
B-375	**4,749**	3,166	3,228	30,131	32,549
B-376	**4,560**	1,523	1,641	26,321	26,464
B-377	**7,133**	1,528	1,646	30,308	28,488
B-378	**5,526**	842	948	33,212	26,292
B-379	#	1,784	1,899		26,974
B-380	#	3,342	3,394		19,523
B-381	#	2,419	2,517		16,921
B-382	**4,731**	2,826	2,906	22,809	20,889
B-383	**4,647**	785	889	19,339	20,886
B-384	**7,312**	2,889	2,966	20,814	20,417
B-385	#	394	470		18,104
B-386	#	2,019	2,129		17,331
B-387	#	694	793		18,638
B-388	#	258	318		15,071
B-389 [2]	**9,168**	**7,959**	**7,573**	21,569	20,915
B-390	**6,611**	186	235	13,526	16,683
B-391	#	1,371	1,489		22,365
B-393	**4,591**	1,252	1,369	16,019	15,532

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
B-394	#	659	756		18,370
B-395	**5,289**	2,812	2,893	18,110	16,709
B-396	#	793	897		19,245
B-397	**4,741**	1,539	1,657	32,315	23,948
B-398	**14,620**	2,557	2,649	26,348	19,200
B-399	#	1,152	1,267		30,772
B-400	**5,540**	269	330	32,113	26,650
B-401	**20,894**	4,138	4,136	48,219	28,879
B-402	#	832	938		23,791
B-403	#	1,135	1,250		33,404
B-404	#	284	347		37,851
B-405	#	3,391	3,440		22,224
B-406	#	2,433	2,530		22,980
B-407	**7,541**	635	730	35,439	33,564
B-408	#	4,334	4,316		31,293
B-409	#	2,212	2,317		26,255
B-410	**10,695**	818	923	31,682	20,923
B-411	#	1,128	1,243		33,123
B-412	**5,148**	1,001	1,113	32,408	34,730
B-413	**24,324**	247	305	47,856	33,764
B-414	**24,102**	148	190	47,402	32,232
B-415	#	2,122	2,230		27,834
B-416	**6,477**	99	131	28,729	23,211
B-417	#	2,230	2,334		22,444
B-418	#	3,075	3,142		18,303
BX-038 [3]	**7,644**	451	532	21,901	20,484
BX-063 [3]	#	1,398	1,516		23,045
BX-065 [3]	**29,454**	2,681	2,768	67,325	28,134
BX-066 [3]	#	1,631	1,748		20,940
BX-070 [3]	#	1,986	2,097		28,469
BX-071 [3]	#	3,389	3,438		20,579
BX-077 [3]	#	522	609		27,180
BX-079 [3]	#	44	62		29,157
BX-087 [3]	#	1,230	1,346		38,696
BX-098 [3]	#	1,974	2,085		26,372
BX-111 [3]	**4,651**	3,965	3,975	15,477	19,407
BX-116 [3]	#	3,529	3,569		15,037
BX-120 [3]	#	2,616	2,706		19,256
BX-121 [3]	#	4,245	4,234		20,938
BX-122 [3]	#	2,478	2,574		18,669
BX-134 [3]	#	1,267	1,384		33,937

Table 2
XRF Results Summary
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Analyte	Copper		Calculated Copper*	Iron	
Soil Fraction	2000 um		250 um*	2000 um	
Criteria	4,500		4,500	100,000	
Units	mg/kg		mg/kg	mg/kg	
Sample Location ID	Initial Result (R1)	Final Result (RX[a])	Final Result (RX[a])	Initial Result (R1)	Final Result (RX[a])
BX-169 [3]	**11,648**	244	302	36,120	31,105
BX-171 [3]	**8,081**	3,010	3,081	36,672	30,794
BX-172 [3]	**14,447**	2,216	2,321	38,192	30,669
BX-175 [3]	**12,789**	230	285	37,535	16,575
BX-188 [3]	**14,367**	1,282	1,399	36,515	27,613
BX-195 [3]	**8,957**	938	1,048	33,715	33,506

Notes:

[a] XRF sampling repeated until results were below cleanup level or excavation was stopped for reasons described below. Final round of XRF sampling shown.

>4,500	= Analytical results exceeded cleanup level
1	Excavation not accessible.
2	Excavation occurred until bedrock was encountered. Remaining material swept off.
3	Location added due to change in project boundary.
--	= Not applicable
#	R1 is the same as RX - Final Sample

mg/kg = milligrams per kilogram
XRF = x-ray fluorescence

* Calculation to adjust sieved 2000 micron (um) soil fraction copper concentrations to to the human health risk size fraction of 250 um: y=EXP(0.624)x[Cu]^0.925

Table 3
Split Sample Results
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Location ID	Laboratory Sample ID	Sample Date	Copper SVL	Copper XRF	Copper RPD	Iron SVL	Iron XRF	Iron RPD
			mg/kg	mg/kg		mg/kg	mg/kg	
B-001	B-001 R2	7/1/2019	5790	5647	2.5%	21600	25350	17.4%
B-005	B-005 R3	7/2/2019	230	508	120.9%	10000	20066	100.7%
B-008	B-008 R1	6/27/2019	13300	16506	24.1%	17400	22577	29.8%
B-009	B-009 R2	7/1/2019	3240	5249	62.0%	17600	28839	63.9%
B-013	B-013 R1	6/27/2019	2000	2400	20.0%	15900	27442	72.6%
B-016	B-016 R1	7/16/2019	156	186	19.2%	24800	34795	40.3%
B-027	B-027 R1	7/16/2019	303	476	57.1%	10900	17688	62.3%
B-050	B-050 R1	7/10/2019	10500	12525	19.3%	23000	32583	41.7%
B-098	B-098 R2	6/17/2019	6120	7368	20.4%	23200	27649	19.2%
B-099	B-099 R3	6/18/2019	2280	2750	20.6%	18400	22858	24.2%
B-105	B-105 R1	7/23/2019	580	565	2.6%	14600	22462	53.8%
B-106	B-106 R2	7/10/2019	7030	7832	11.4%	23500	31986	36.1%
B-117	B-117 R1	6/15/2019	325	529	62.8%	19000	32935	73.3%
B-124	B-124 R5	7/19/2019	502	755	50.4%	13200	19218	45.6%
B-130	B-130 R3	7/10/2019	6750	7116	5.4%	27000	28762	6.5%
B-134	B-134 R3	6/28/2019	2410	3717	54.2%	18900	30045	59.0%
B-142	B-142 R4	6/18/2019	2060	2582	25.3%	20400	25297	24.0%
B-145	B-145 R2	7/15/2019	3780	6248	65.3%	15900	18459	16.1%
B-146	B-146 R1	7/15/2019	4970	602	87.9%	17800	17827	0.2%
B-148	B-148 R1	7/9/2019	6010	8846	47.2%	18500	31917	72.5%
B-149	B-149 R4	7/10/2019	71.8	97	35.1%	7880	12093	53.5%
B-151	B-151 R2	7/10/2019	2300	1579	31.3%	11500	14608	27.0%
B-162	B-162 R1	6/26/2019	2390	3371	41.0%	23700	31374	32.4%
B-174	B-174 R1	7/15/2019	4370	5649	29.3%	19200	23812	24.0%
B-180	B-180 R1	7/9/2019	8490	11398	34.3%	20800	31774	52.8%
B-181	B-181 R2	7/11/2019	4040	5846	44.7%	21600	35338	63.6%
B-186	B-186 R1	6/24/2019	2260	2708	19.8%	14000	18925	35.2%
B-197	B-197 R1	6/14/2019	588	702	19.4%	9650	15145	56.9%
B-203	B-203 R1	6/17/2019	452	389	13.9%	15500	26973	74.0%
B-206	B-206 R2	7/15/2019	3860	3850	0.3%	15100	17913	18.6%
B-213	B-213 R1	6/21/2019	2180	2140	1.8%	20700	25365	22.5%
B-218	B-218 R1	6/21/2019	2070	1550	25.1%	14900	19453	30.6%
B-231	B-231 R1	6/20/2019	8320	9155	10.0%	20900	31176	49.2%
B-247	B-247 R4	6/21/2019	4920	7857	59.7%	15200	20525	35.0%
B-248	B-248 R1	6/21/2019	3810	4364	14.5%	17400	24344	39.9%
B-256	B-256 R1	7/18/2019	2110	2473	17.2%	19500	26156	34.1%
B-265	B-265 R1	6/20/2019	1630	2223	36.4%	18000	31182	73.2%
B-298	B-298 R1	6/20/2019	497	615	23.7%	11400	23558	106.6%
B-312	B-312 R1	6/14/2019	3730	4280	14.7%	22800	27375	20.1%

Table 3
Split Sample Results
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Location ID	Laboratory Sample ID	Sample Date	Copper SVL	Copper XRF	Copper RPD	Iron SVL	Iron XRF	Iron RPD
			mg/kg	mg/kg		mg/kg	mg/kg	
B-314	B-314 R1	6/15/2019	2200	2535	15.2%	18900	27916	47.7%
B-324	B-324 R1	6/21/2019	3880	3648	6.0%	18400	29195	58.7%
B-326	B-326 R4	6/24/2019	1410	1488	5.5%	20100	25910	28.9%
B-333	B-333 R1	6/15/2019	1440	2052	42.5%	14100	25938	84.0%
B-338	B-338 R1	6/25/2019	2300	3646	58.5%	12500	19601	56.8%
B-349	B-349 R2	6/26/2019	909	800	12.0%	12600	17444	38.4%
B-353	B-353 R1	6/17/2019	2690	3523	31.0%	19400	29705	53.1%
B-359	B-359 R1	6/17/2019	166	165	0.6%	10300	16512	60.3%
B-361	B-361 R1	6/25/2019	1700	2356	38.6%	17100	22093	29.2%
B-375	B-375 R2	6/18/2019	2780	3166	13.9%	21900	32549	48.6%
B-377	B-377 R1	6/17/2019	5650	7133	26.2%	25100	30308	20.7%
B-386	B-386 R1	7/2/2019	1400	2019	44.2%	9800	17331	76.8%
B-393	B-393 R1	6/24/2019	3240	4591	41.7%	13200	16019	21.4%
B-398	B-398 R1	6/15/2019	13100	14620	11.6%	22000	26348	19.8%
B-412	B-412 R1	6/15/2019	4780	5148	7.7%	25600	32408	26.6%
BX-065	BX-065 R1	7/9/2019	24000	29454	22.7%	61900	67325	8.8%
BX-079	BX-079 R1	7/2/2019	25.9	44	69.9%	15600	29157	86.9%
BX-098	BX-098 R1	6/24/2019	1740	1974	13.4%	19800	26372	33.2%
BX-111	BX-111 R1	6/26/2019	3110	4651	49.5%	13700	15477	13.0%
BX-111	BX-111 R2	6/27/2019	3770	3965	5.2%	17000	19407	14.2%
BX-169	BX-169 R2	7/9/2019	580	244	57.9%	24300	31105	28.0%
Summary Statistics								
		Minimum			0.3%	--	--	0.2%
		Maximum			120.9%	--	--	106.6%
		Average			30.4%	--	--	42.7%
		Median			23.9%	--	--	37.3%
		Number of RPDs above 20%			35	--	--	20

Notes:
mg/kg = milligrams per kilogram
ID = identification
SVL = SVL Analytical Lab
XRF = x-ray fluorescence
RPD = relative percentage difference

Table 4
Seed Mix
B Ranch Interim Remedial Action
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Common Name	Percent Pure
Seed Mix Type 1	
Sideoats Grama	28.74%
Indian Ricegrass	22.99%
Saltbush, Fourwing	13.04%
Clover, Purple Prairie	5.69%
Clover, White Prarie	4.60%
Coneflower, Yellow Prairie	4.55%
Blue Flax	3.49%
Green Sprangletop	3.39%
True Mountain Mahogany	2.37%
Fairyduster	2.21%
Total	**91.07%**
Seed Mix Type 2	
Winterfat	36.50%
Sand Dropseed	16.73%
Alkali Sacaton	15.14%
James' Galleta	5.52%
Rabbitbrush, Rubber	3.97%
Blue Grama	3.42%
Desert-Willow	1.40%
Total	**82.68%**

Notes:
1) In addition to the seed types listed, seed mixtures contained inert matter, weed seed, and other crops not specified.

Figures

OFFICE: LAKEWOOD DB: MEB PM: MEB PIC: AT
PROJECT# 30006788 - B0063543.0023
Z:\GISProjects_ENV\Chino\2020\MXD\BRanch\Fig1_BRanch_IRACR_SiteOverview_021020.mxd

N

152

356

SANTA CLARA

BAYARD

HURLEY

SILVER CITY
GRANT COUNTY
AIRPORT

WEST
STOCKPILE

SANTA RITA
OPEN PIT

SOUTH
STOCKPILE

LAMBRIGHT
STOCKPILE

HANOVER-WHITEWATER CREEK

LA [illegible] DRAIN

B Ranch Interim Remedial Action Area

TAILING
POND
B

TAILING
POND
4

TAILING
POND
6E

TAILING
POND
6W

TAILING POND 7

NEW MEXICO

Area
Enlarged

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- B RANCH INTERIM REMEDIAL ACTION AREA
- HANOVER-WHITEWATER CREEK CENTERLINE
- STOCKPILES
- CITY AREAS
- MAJOR ROADS
- RAILROAD
- TOWN ROADS

0 0.25 0.5 0.75 1 MILES

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

B RANCH INTERIM REMEDIAL ACTION COMPLETION REPORT

SITE OVERVIEW

ARCADIS

FIGURE
1

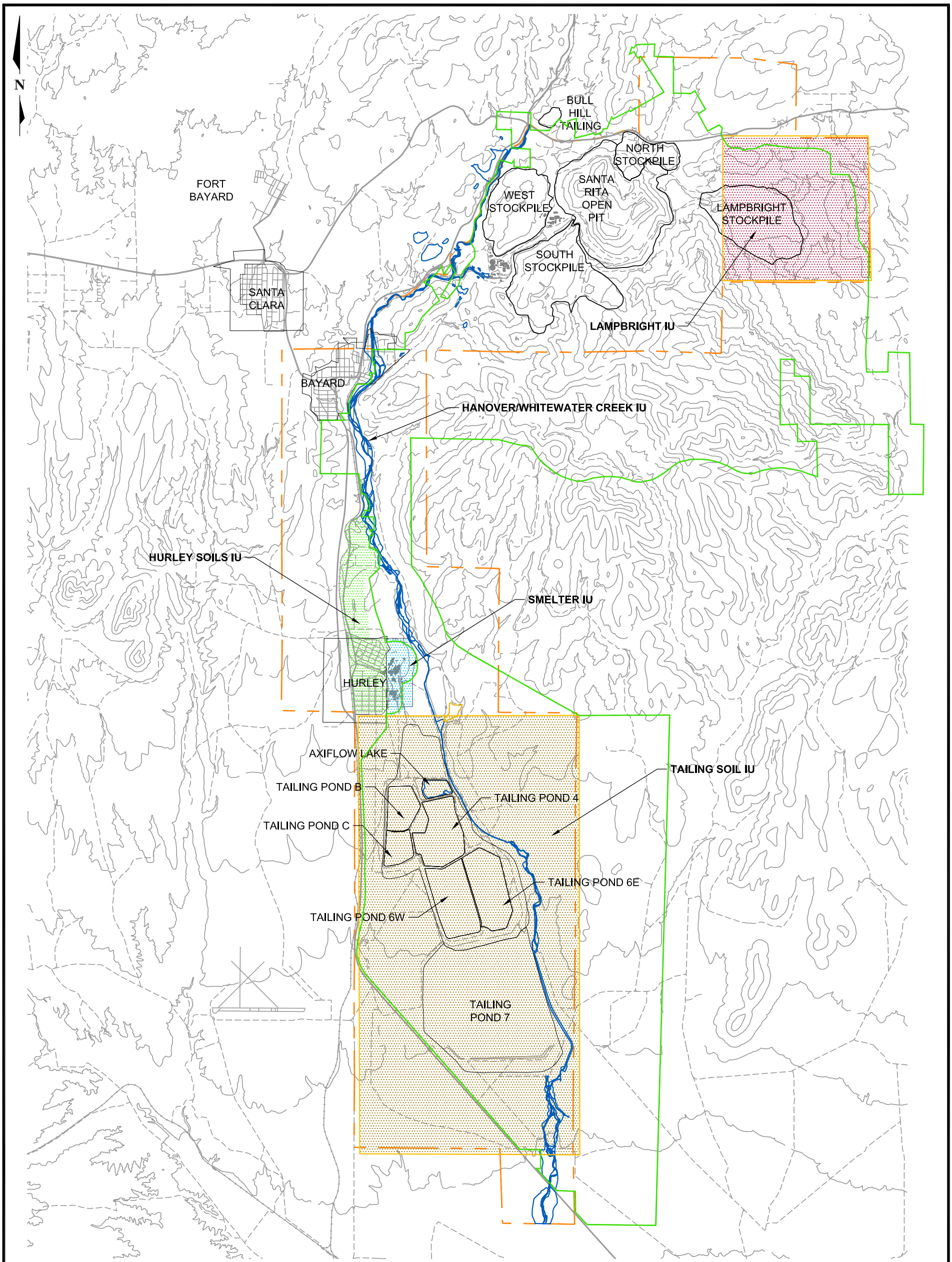


Figure 2-1

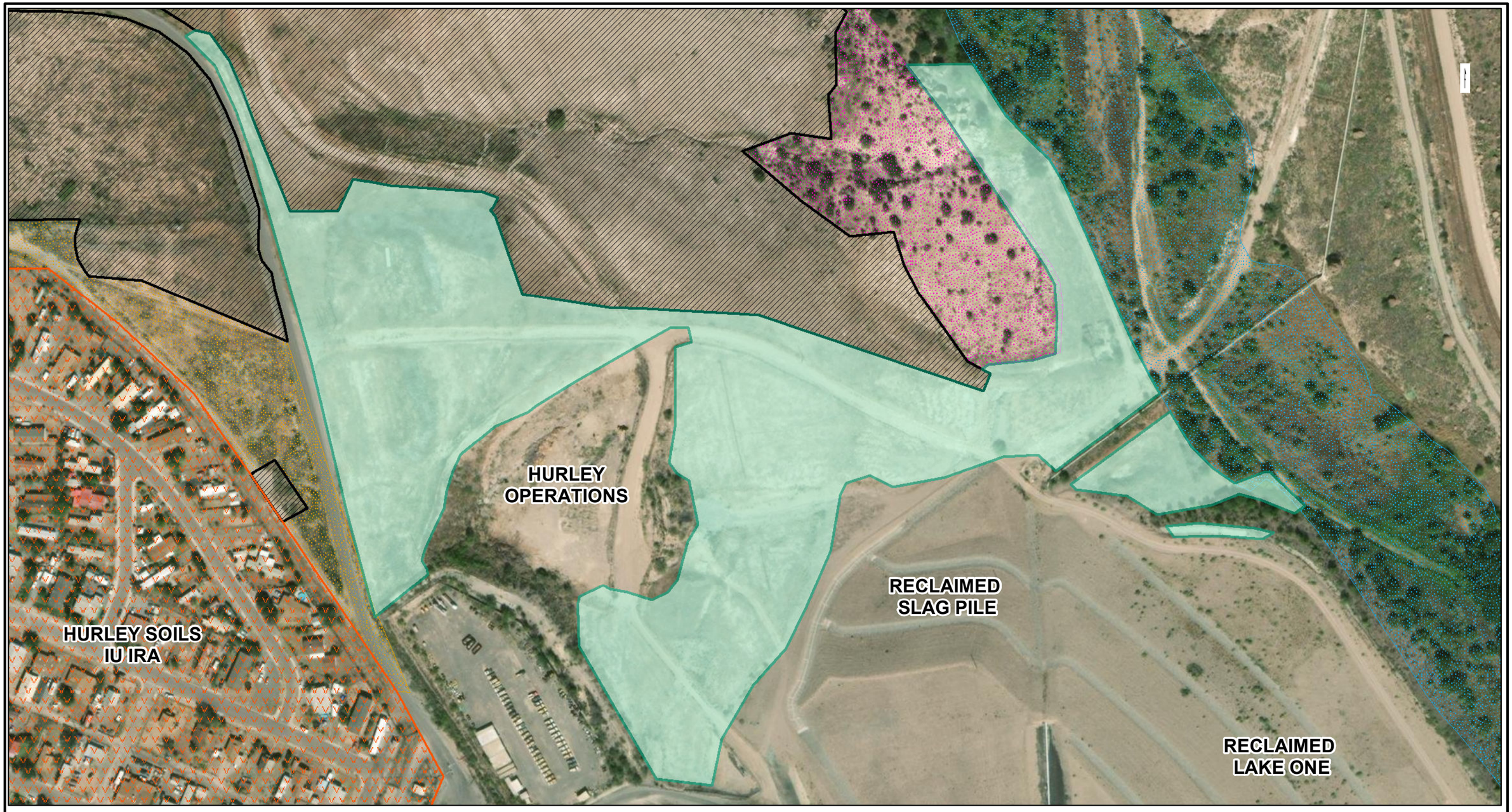
FIGURE **1-2**

AOC INVESTIGATION AREA

CHINO/HURLEY COMPLETION REPORT/NM

K:\CAD\Projects\2007\07392553\05\100\073_92553_05_100_F1-2.dwg | Layout1 | Mod: 11/05/2007, 11:10 | Plotted: 11/15/2007, 08:52 | KNewby

Golder Associates



LEGEND

- B RANCH INTERIM REMEDIAL ACTION AREA
- EXCAVATION LIMITS FROM GOLF COURSE IRA (2009)
- HANOVER-WHITEWATER CREEK
- HURLEY SOILS INVESTIGATION UNIT IRA
- ADDITIONAL DELINEATION SAMPLES COLLECTED IN THIS AREA WITH LIMITED EXCAVATION
- LIMITED EXCAVATION DUE TO BEDROCK/CALICHE AT SURFACE OR AREA DETERMINED TO BE ARCHAEOLOGICALLY SIGNIFICANT

GRAPHIC SCALE

0 250 500

Scale in Feet

Layers: Arcadis. 2009. Chino Mines Company Smelter/Tailings Soil Investigation Unit Interim Removal Action Completion Report. March 10, 2009

Aerial, 2020: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

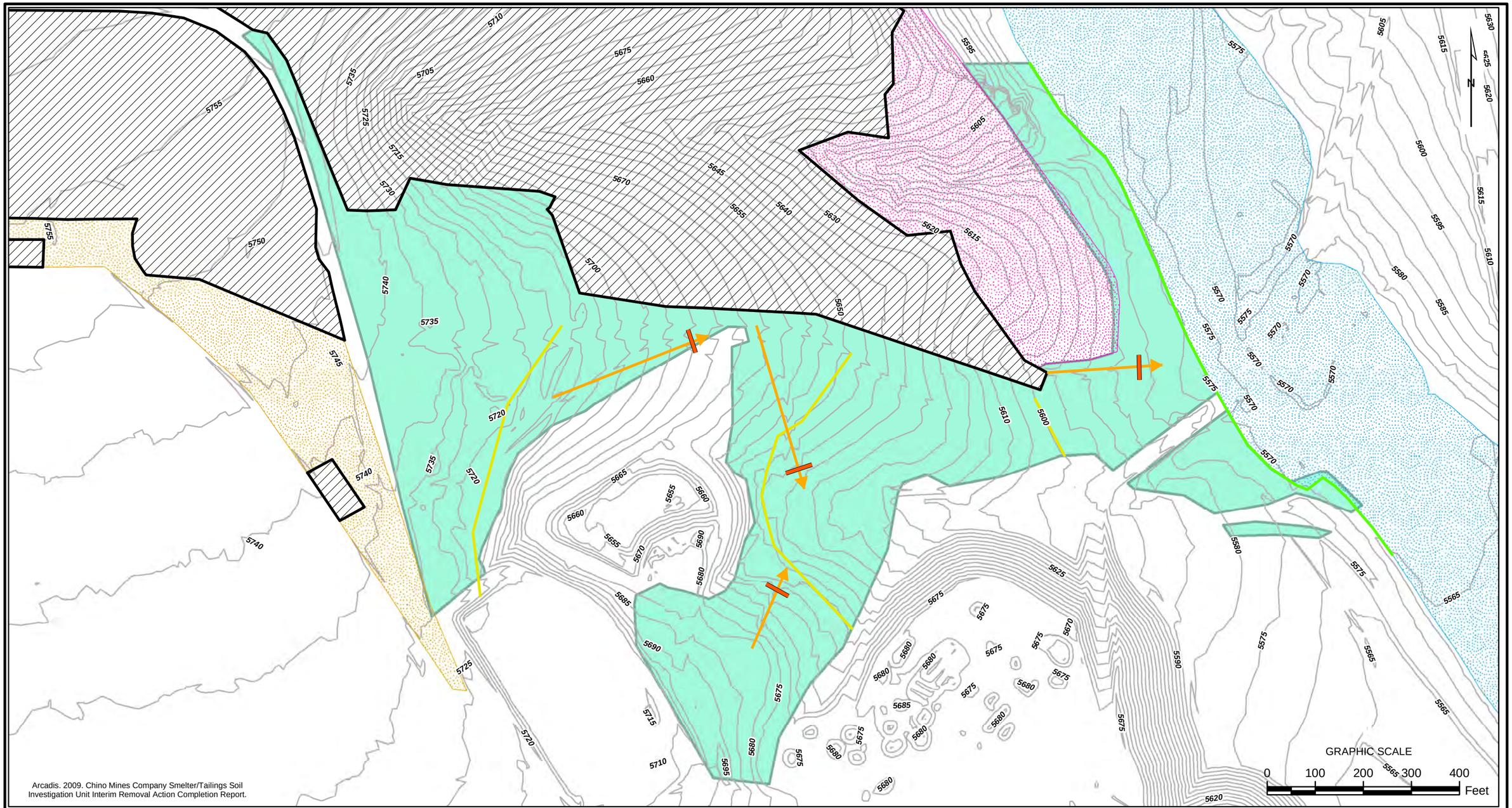
FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
B RANCH INTERIM REMEDIAL ACTION COMPLETION REPORT

B RANCH INTERIM REMEDIAL ACTION AREA

ARCADIS

FIGURE 2

CITY: Broomfield PIC: AT PM: MEB TM: TR: MEB
Project #B0063543.0023
Document Path: T:_ENV\Chino\2021\MXD\Fig2_BRanch_SiteLoc_042321.mxd



Arcadis. 2009. Chino Mines Company Smelter/Tailings Soil Investigation Unit Interim Removal Action Completion Report.

LEGEND

- EXCAVATION BMP: SILT FENCE ALONG DOWNGRADIENT PERIMETER
- RESTORATION BMP: STRAW WATTLES PLACED EVERY 50' VERTICAL
- RESTORATION BMP: DRAINAGE, INSTALL STRAW BALES ACROSS BOTTOM OF DRAINAGE
- B RANCH INTERIM REMEDIAL ACTION AREA
- EXCAVATION LIMITS FROM GOLF COURSE IRA (2009)
- HANOVER-WHITEWATER CREEK
- ADDITIONAL DELINEATION SAMPLES COLLECTED IN THIS AREA WITH LIMITED EXCAVATION
- LIMITED EXCAVATION DUE TO BEDROCK/CALICHE AT SURFACE OR AREA DETERMINED TO BE ARCHAEOLOGICALLY SIGNIFICANT

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VANADIUM, NEW MEXICO
B RANCH INTERIM REMEDIAL ACTION COMPLETION REPORT

PRE-EXCAVATION TOPOGRAPHIC MAP AND BMP PLACEMENT

ARCADIS

FIGURE 3

CITY: Broomfield PIC: AT PM: MEB TM: TR: MEB
Project #B0063543.0023
Document Path: Z:\GISProjects_ENVChino\2020\MXD\BRanch\Fig3_B-Ranch_Topo_BMPs_021020.mxd

Arcadis. 2009. Chino Mines Company Smelter/Tailings Soil Investigation Unit Interim Removal Action Completion Report.

LEGEND

COPPER - FINAL CONFIRMATION SAMPLES (XRF)

- < 100 ppm
- 101 - 1000 ppm
- 1001 - 1600 ppm
- 1601 - 4500 ppm
- 4501 - 8265 ppm

B RANCH INTERIM REMEDIAL ACTION AREA

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VANADIUM, NEW MEXICO
B RANCH INTERIM REMEDIAL ACTION COMPLETION REPORT

XRF CONFIRMATION SAMPLING

ARCADIS

FIGURE 4

CITY: Broomfield PIC: AT PM: MEB TM: TR: MEB
Project #B0063543.0023
Document Path: Z:\GISProjects_ENV\Chino\2020\MXD\BRanch\Fig4_B-Ranch_XRF_021120.mxd

Chino. 2019. UAS Survey. November 7, 2019

GRAPHIC SCALE
0 100 200 300 400 Feet

LEGEND

- B RANCH INTERIM REMEDIAL ACTION AREA
- EXCAVATION LIMITS FROM GOLF COURSE IRA (2009)
- HANOVER-WHITEWATER CREEK
- ADDITIONAL DELINEATION SAMPLES COLLECTED IN THIS AREA WITH LIMITED EXCAVATION
- LIMITED EXCAVATION DUE TO BEDROCK/CALICHE AT SURFACE OR AREA DETERMINED TO BE ARCHAEOLOGICALLY SIGNIFICANT

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
B RANCH INTERIM REMEDIAL ACTION COMPLETION REPORT

POST-EXCAVATION TOPOGRAPHIC MAP

ARCADIS

FIGURE 5

CITY: Broomfield PIC: AT PM: MEB TM: TR: MEB
Project #B0063543.0023
Document Path: Z:\GISProjects_ENVChino\2020\MXD\BRanch\Fig5_B-Ranch_FinalTopo_021020.mxd

Appendix A

Field Implementation Plan

MEMO

ARCADIS Design & Consultancy for natural and built assets

To:

Michael Steward, Freeport-McMoRan, Inc.

Pam Pinson, Freeport-McMoRan, Inc.

From:

Rebecca Lindeman, P.E.

Copy:

File

Arcadis U.S., Inc.
11001 West 120th Avenue
Suite 200
Broomfield
Colorado 80021
Tel 303 544 0043
Fax 720 887 6051

Date:

May 30, 2019

Arcadis Project No.:

B0063543

Subject:

B-Ranch Investigation Area Field Implementation Plan

Introduction

Arcadis has prepared this Field Implementation Plan (FIP) to guide excavation activities at the B-Ranch Investigation Area, as shown on Figure 1. This plan follows the work plan previously prepared under the Administrative Order on Consent Smelter/Tailing Soil Investigation Unit (STSIU) Interim Remedial Action Work Plan (IRAWP) (Arcadis 2007). The area covered under this FIP was previously a part of the Chino Operational Area and therefore not included previously in the STSIU IRAWP. The area has since ceased to be a part of the Chino Operational Area and therefore has integrated into the STSIU.

The objective of this excavation is to remove areas where soil copper concentrations are greater than 5,000 parts per million (ppm), which is the NMED pre-feasibility study remedial action criteria considered to be protective of residential human health.

Pre-Excavation Activities

Prior to commencement of excavation activity, an archaeological survey will be performed by WestLand Resources, Inc. to identify and demark any sites of historical or cultural significance. Identified sites will be delineated using GPS and flagging placed to communicate to the construction staff protected areas where no excavation will occur. At least one week prior to excavation activities, the areas will be cleared for utilities through the Chino Blue Stake permit process. A biological survey will also be performed to evaluate the area for any potential sensitive plant or animal species and identify active bird nests.

Construction equipment staging area and supply laydown area will be designated and vehicle wheel decontamination areas will be established at investigation area exit points as needed. Wheel decontamination areas will employ dry decontamination methods for vehicles in contact with impacted soils existing the site. Shaker plates or rock exit will be utilized for tracking control of haul vehicles. Additional gates and fencing may be installed, as determined by the Removal Contractor, for additional security if needed. Clearing and grubbing the work area may be necessary prior to excavation to remove physical obstacles (bounders, large mesquite shrubs). Any cleared materials will be stockpiled along the perimeter of the work area in locations determined in the field and documented in the Completion Report.

Perimeter BMPs shall be installed per Figure 2. Silt fencing should be installed as perimeter BMP at the downhill side of the removal areas. Contractor shall follow the Chino Operations Stormwater Pollution Protection Plan (SWPPP) prior to and during work activities.

Excavation Activities

Excavation will be accomplished via soil scraping with heavy equipment. In accordance with the STSIU Interim Action Work Plan (BBL 2006), the top three to six inches of soil will be removed from the investigation area, which is the assumed depth of remediation necessary for protection of human health. No excavation will occur in areas where caliche or bedrock (refusal) are found within 4 inches or less of the surface, and these areas will be documented as they are encountered. Excavation in and near drainage features will be performed so as to minimize impacts and changes to the drainage feature and the excavation areas will be final graded to promote positive drainage (i.e, no sinks or low points). Approximate volume of soil to be removed is 15,311 bank cubic yards, based on the approximately 19-acre investigation area excavated to a depth of 6 inches. Soil removed during the excavation will be hauled to the Hanover-Whitewater Creek Removal Action temporary stockpile located at Mile Marker 4 on the Lake One Haul Road.

The removal contractor will be responsible for minimizing visible dust produced by excavation activities. One or more water trucks will be utilized as necessary during excavation and soil movement activities to reduce wind erosion and dust generation during these activities. Haul areas will be wetted periodically to reduce fugitive dust along the designated haul routes.

Where direct-loading of excavated material is not implemented, material will be stockpiled within the work area. Stockpiled soils will be wetted as necessary to limit dust generation. In addition, the Removal Contractor will adequately hydrate stockpiles until they are moved (e.g., magnesium chloride, Gorilla Snot, calcium Chloride, Duraloc 50A, Road Loc Calcium Lig) to minimize dust. Stockpiles that will remain in place over night within the B-Ranch area will be covered at the completion of the workday. Stockpiles will be uncovered at the time of loading for haulage to the temporary stockpile at Mile Marker 4 on the Lake One haul road. At completion, the materials in the temporary stockpile will be transferred to the West Stockpile.

Either silt fences or straw wattles will be installed at the downgradient perimeter of the excavated areas, as shown on Figure 2.

Post-removal Confirmation Sampling

Golder Associates will conduct Confirmation sampling using X-Ray Florescence (XRF) to confirm that the excavation achieves the target maximum copper concentration 4,500 ppm that is protective of residential human health. Field sampling methods will follow the XRF Standard Operating Procedure (SOP) (Arcadis

2007). The assumed error during field XRF sampling will be +/- 10% of the sample result. If a confirmation sample exceeds the target cleanup level of 4,500 ppm copper, an additional 2-4 inches of soil will be scraped, followed by another round of confirmation sampling at the same grid node as the original sample (BBL 2006). This procedure will continue until all samples are below the target cleanup level or resistance is encountered. A sample size of 348 sampling points was determined using Equation 7.1 in the US Environmental Protection Agency (USEPA) guidance, "Methods for Evaluating the Attainment of Cleanup Standards" such that 95% of the area sampled will be below the cleanup target of 4,500 ppm copper (EPA, 1989). The 386 samples locations were generated in GIS using the Visual Sample Plan (VSP) software package (VSP Development Team 2019) which provides sampling locations above the minimum sample size to account for sample locations that are not sampled due to the presence of non-soil. A random point was selected for the initial grid location and subsequent grid sample locations were evenly spaced from the initially selected grid location. Sampling locations that fall on a non-soil (e.g., caliche) location will not be sampled, and documented as such. Confirmation sample locations are arranged throughout the investigation area in a grid with spacing of 46.3 feet. Figure 3 provides the sample grid points and Table 1 provides the coordinates for each point.

One sample in every 10 XRF samples (10%) will be collected as a field quality assurance (QA) sample and sent offsite for laboratory analysis by Silver Valley Laboratories (SVL) in Kellogg, Idaho. For each selected QA sample, the same sample fraction analyzed by XRF will be sent to the laboratory and analyzed for total copper using EPA Method 200.7 and soil paste pH using ASA Method Monograph 9. XRF and confirmation laboratory sampling will be conducted in accordance with the policy, functional activities, and quality assurance/quality control (QA/QC) protocols, which are specifically stated in the RI Quality Assurance Plan (QAP) (Chino 1997). The QAP defines how site-wide QA/QC activities will be implemented during field sampling events. The objective of the QAP is to ensure that data are of adequate quality for its intended use. SOPs have been developed as part of the QAP and are incorporated by reference in this work plan. SOPs are attached as Appendix A in STSIU IRAWP (Arcadis 2007).

All sample locations will be surveyed for coordinate position and elevation using Global Positioning Systems (GPS). Sample locations will be located in the field using GPS and will be noted in field logbooks and/or soil sampling logs until they are sampled. Figure 3 provides the sample grid points. Field sampling methods shall be consistent with methodology presented in the STSIU IRAWP (Arcadis 2007). Deviations from locations specified in this FIP will be documented in the Completion Report.

Post-excavation Activities

Site Restoration

Revegetation of the disturbed areas will serve the purpose of a BMP to limit erosion and provide for dust control within the disturbed areas. Disturbed areas will be vegetated by Rocky Mountain Reclamation using drill seeding with the proposed seed mix presented in Table 2 as per the Closure/Closeout Plan. This contractor will scarify, complete drill seeding, followed by application of mulch and then crimping. The restored areas will be monitored periodically following final grading and restoration and establishment of vegetation per the Closure/Closeout Plan. Quarterly inspections will be conducted to review the density of vegetation that has reestablished within the areas for one year following the completion of the excavation. Once 80-percent regrowth is established, BMPs may be removed. A vegetation survey will be completed after 5-years following completion of the revegetation of the B-Ranch area.

Table 1. Proposed seed mix and application rates

Species	Life-Form	Duration	Seasonality	Rate
Blue grama (*Bouteloua gracilis*)	Grass	Per	Warm	0.25
Sideoats grama (*Bouteloua curtipendula*)	Grass	Per	Warm	1.25
Black grama (*Bouteloua eripoda*)	Grass	Per	Warm	0.10
Green sprangletop (*Leptochloa dubia*)	Grass	Per	Warm	0.15
Plains lovegrass (*Eragrostis intermedia*)	Grass	Per	Intermediate	0.05
Bottlebrush squirreltail (*Elymus elymoides*)	Grass	Per	Cool	1.25
New Mexico needlegrass (*Achthanerum perplexum*)	Grass	Per	Cool	1.75
Streambank wheatgrass (*Elymus lanceolatus* v. *riparium*)	Grass	Per	Cool	1.50
Apache plume (*Fallugia paradoxa*)	Shrub	Per	NA	0.10
Rubber rabbitbush (*Ericameria nauseosa*)	Shrub	Per	NA	0.05
Winterfat (*Krascheninnikovia lanata)*	Shrub	Per	NA	0.60
Yellow sweet clover (*Melilotus officinalis*)	Forb	Ann	NA	0.14
Globe mallow (*Sphaeralcea* sp.)	Forb	Per	NA	0.10
Blue flax (*Linum lewisii*)	Forb	Per	NA	0.15
Total PLS (lb/ac)				7.45

Notes:

Per = perennial; ann = annual
Rate is in pounds of pure live seed (PLS) per acre (lb/ac); substitutions may change seeding rates
NA = not applicable
Seed mix and rates are subject to change based on future investigations

In areas where the work area crosses or includes an existing drainage feature, straw bales will be placed across the drainage feature to limit sedimentation during storm events. Wattles and silt fences will not extend across drainage features. Erosion mats will be installed following excavation on slopes equal or greater than 3:1 and in areas where concentrated flow is likely to occur, as directed by the Engineer. The mats will be rolled out and secured using metal or wooden stakes as specified by the manufacturer. Straw wattles shall be installed along grade approximately every 50 feet vertically. Restoration BMPs are shown on Figure 2.

Construction Documentation

A Completion Report will be prepared and submitted to NMED following site work. The following information will be documented during field implementation and included in the Completion Report:

- Documentation of construction methods and sequencing,

- Final survey (depth and limits) of excavation
- Photo documentation
- Dust monitoring calibration and sample data
- Confirmation sample locations and results
- Final volume.

The Completion Report will be prepared and submitted for NMED review and approval after completion of field activities.

Worker Protection

All activities will be conducted in accordance with the Freeport-McMoRan Health and Safety Manual and the site-specific Health and Safety Plan (HASP). The site-specific work can follow safety guidelines outlined in the Hanover-Whitewater Creek Removal Action HASP for worker protection as well as for monitoring and minimization of fugitive dust. Specific air quality limits are provided in the existing HASP.

References

Arcadis. 2007. Administrative Order on Consent. Interim Removal Action Work Plan, Smelter/Tailing Soil Investigation Unit. November 2007.

Chino Mines Company. 1997. Administrative Order on Consent, Quality Assurance Plan, Chino Mine Investigation Area. Chino Mines Company, Hurley, New Mexico. (March. 1997).

VSP Development Team. 2019. Visual Sample Plan: A Tool for Design and Analysis of Environmental Sampling. Version 7.12a. Pacific Northwest National Laboratory. Richland, WA. http://vsp.pnnl.gov.

U.S. Environmental Protection Agency. 1989. Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media. Statistical Policy Branch (PM-223), Office of Policy, Planning and Evaluation. Washington, DC.

Table

Table 1: Confirmation Sampling Grid Coordinates

Figures

Figure 1: Proposed Investigation Area

Figure 2: Confirmation Sampling Grid

Figure 3: Topographic Map and BMP Placement

Table 1
Confirmation Sampling Grid Coordinates
B-Ranch Investigation Area Field Implementation Plan

Sample ID	Latitude	Longitude
1-BRC	32.7040972	-108.122229
2-BRC	32.7040976	-108.122079
3-BRC	32.7040979	-108.121928
4-BRC	32.7040983	-108.121778
5-BRC	32.7042245	-108.12223
6-BRC	32.7042248	-108.122079
7-BRC	32.7042252	-108.121929
8-BRC	32.7042255	-108.121778
9-BRC	32.7043514	-108.122381
10-BRC	32.7043518	-108.12223
11-BRC	32.7043521	-108.12208
12-BRC	32.7043525	-108.121929
13-BRC	32.7043528	-108.121779
14-BRC	32.7044787	-108.122381
15-BRC	32.704479	-108.122231
16-BRC	32.7044794	-108.12208
17-BRC	32.7044797	-108.12193
18-BRC	32.7044801	-108.121779
19-BRC	32.7044804	-108.121628
20-BRC	32.7046056	-108.122532
21-BRC	32.704606	-108.122382
22-BRC	32.7046063	-108.122231
23-BRC	32.7046067	-108.122081
24-BRC	32.704607	-108.12193
25-BRC	32.7046074	-108.121779
26-BRC	32.7046077	-108.121629
27-BRC	32.7046081	-108.121478
28-BRC	32.7047329	-108.122533
29-BRC	32.7047333	-108.122382
30-BRC	32.7047336	-108.122231
31-BRC	32.7047339	-108.122081
32-BRC	32.7047343	-108.12193
33-BRC	32.7047346	-108.12178
34-BRC	32.704735	-108.121629
35-BRC	32.7047353	-108.121479
36-BRC	32.7047357	-108.121328
37-BRC	32.7048598	-108.122683
38-BRC	32.7048602	-108.122533
39-BRC	32.7048605	-108.122382
40-BRC	32.7048609	-108.122232
41-BRC	32.7048612	-108.122081
42-BRC	32.7048616	-108.121931
43-BRC	32.7048619	-108.12178
44-BRC	32.7048623	-108.12163
45-BRC	32.7048626	-108.121479
46-BRC	32.704863	-108.121329
47-BRC	32.7049843	-108.123888
48-BRC	32.7049871	-108.122684
49-BRC	32.7049875	-108.122533
50-BRC	32.7049878	-108.122383
51-BRC	32.7049882	-108.122232
52-BRC	32.7049885	-108.122082
53-BRC	32.7049888	-108.121931
54-BRC	32.7049892	-108.121781
55-BRC	32.7049895	-108.12163
56-BRC	32.7049899	-108.12148
57-BRC	32.7049902	-108.121329
58-BRC	32.7049906	-108.121179
59-BRC	32.7051116	-108.123889
60-BRC	32.705112	-108.123738
61-BRC	32.7051137	-108.122985
62-BRC	32.705114	-108.122835
63-BRC	32.7051144	-108.122684
64-BRC	32.7051158	-108.122082
65-BRC	32.7051161	-108.121932
66-BRC	32.7051165	-108.121781
67-BRC	32.7051168	-108.121631
68-BRC	32.7051172	-108.12148
69-BRC	32.7051175	-108.121329
70-BRC	32.7051179	-108.121179
71-BRC	32.7052389	-108.123889
72-BRC	32.7052392	-108.123738
73-BRC	32.7052396	-108.123588
74-BRC	32.7052403	-108.123287
75-BRC	32.7052406	-108.123136
76-BRC	32.705241	-108.122986
77-BRC	32.7052431	-108.122083
78-BRC	32.7052434	-108.121932
79-BRC	32.7052438	-108.121781
80-BRC	32.7052441	-108.121631
81-BRC	32.7052444	-108.12148
82-BRC	32.7052448	-108.12133
83-BRC	32.7052451	-108.121179
84-BRC	32.7053658	-108.12404
85-BRC	32.7053662	-108.123889
86-BRC	32.7053665	-108.123739
87-BRC	32.7053669	-108.123588
88-BRC	32.7053672	-108.123438
89-BRC	32.7053676	-108.123287
90-BRC	32.7053679	-108.123137
91-BRC	32.7053707	-108.121932
92-BRC	32.705371	-108.121782
93-BRC	32.7053714	-108.121631
94-BRC	32.7053717	-108.121481
95-BRC	32.7053721	-108.12133
96-BRC	32.7053724	-108.12118
97-BRC	32.7053728	-108.121029
98-BRC	32.7053803	-108.117717
99-BRC	32.7054931	-108.12404
100-BRC	32.7054934	-108.12389
101-BRC	32.7054938	-108.123739
102-BRC	32.7054941	-108.123589
103-BRC	32.7054945	-108.123438
104-BRC	32.7054948	-108.123288
105-BRC	32.705498	-108.121933
106-BRC	32.7054983	-108.121782
107-BRC	32.7054987	-108.121632
108-BRC	32.705499	-108.121481
109-BRC	32.7054993	-108.121331
110-BRC	32.7054997	-108.12118
111-BRC	32.7055	-108.12103
112-BRC	32.7055055	-108.118621
113-BRC	32.7055059	-108.11847
114-BRC	32.7055062	-108.11832
115-BRC	32.7055066	-108.118169
116-BRC	32.7055069	-108.118019
117-BRC	32.7055072	-108.117868
118-BRC	32.7056204	-108.124041
119-BRC	32.7056207	-108.12389
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122-BRC	32.7056218	-108.123439
123-BRC	32.7056221	-108.123288
124-BRC	32.7056249	-108.122084
125-BRC	32.7056252	-108.121933
126-BRC	32.7056256	-108.121783
127-BRC	32.7056259	-108.121632
128-BRC	32.7056263	-108.121482
129-BRC	32.7056266	-108.121331
130-BRC	32.705627	-108.121181
131-BRC	32.7056273	-108.12103
132-BRC	32.7056321	-108.118922
133-BRC	32.7056325	-108.118772
134-BRC	32.7056328	-108.118621
135-BRC	32.7056332	-108.118471
136-BRC	32.7056335	-108.11832
137-BRC	32.7056338	-108.11817
138-BRC	32.7056342	-108.118019

Projection: NAD 1983 State Plane New Mexico West

Table 1
Confirmation Sampling Grid Coordinates
B-Ranch Investigation Area Field Implementation Plan

Sample ID	Latitude	Longitude
139-BRC	32.7057473	-108.124192
140-BRC	32.7057476	-108.124041
141-BRC	32.705748	-108.123891
142-BRC	32.7057483	-108.12374
143-BRC	32.7057487	-108.12359
144-BRC	32.705749	-108.123439
145-BRC	32.7057494	-108.123289
146-BRC	32.7057522	-108.122084
147-BRC	32.7057525	-108.121934
148-BRC	32.7057529	-108.121783
149-BRC	32.7057532	-108.121633
150-BRC	32.7057536	-108.121482
151-BRC	32.7057539	-108.121331
152-BRC	32.7057542	-108.121181
153-BRC	32.7057546	-108.12103
154-BRC	32.7057549	-108.12088
155-BRC	32.7057553	-108.120729
156-BRC	32.7057556	-108.120579
157-BRC	32.705756	-108.120428
158-BRC	32.7057563	-108.120278
159-BRC	32.7057584	-108.119374
160-BRC	32.7057587	-108.119224
161-BRC	32.7057591	-108.119073
162-BRC	32.7057594	-108.118923
163-BRC	32.7057597	-108.118772
164-BRC	32.7057601	-108.118622
165-BRC	32.7057604	-108.118471
166-BRC	32.7058746	-108.124192
167-BRC	32.7058749	-108.124042
168-BRC	32.7058753	-108.123891
169-BRC	32.7058756	-108.123741
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180-BRC	32.7058819	-108.121031
181-BRC	32.7058822	-108.12088
182-BRC	32.7058826	-108.12073
183-BRC	32.7058829	-108.120579
184-BRC	32.7058832	-108.120429
185-BRC	32.7058836	-108.120278
186-BRC	32.7058839	-108.120128
187-BRC	32.7058843	-108.119977
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192-BRC	32.705886	-108.119224
193-BRC	32.7058863	-108.119074
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197-BRC	32.7060019	-108.124193
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199-BRC	32.7060026	-108.123892
200-BRC	32.7060029	-108.123741
201-BRC	32.7060032	-108.12359
202-BRC	32.7060036	-108.12344
203-BRC	32.7060039	-108.123289
204-BRC	32.7060043	-108.123139
205-BRC	32.7060046	-108.122988
206-BRC	32.7060071	-108.121934
207-BRC	32.7060074	-108.121784
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209-BRC	32.7060081	-108.121483
210-BRC	32.7060085	-108.121332
211-BRC	32.7060088	-108.121182
212-BRC	32.7060091	-108.121031
213-BRC	32.7060095	-108.120881
214-BRC	32.7060098	-108.12073
215-BRC	32.7060102	-108.12058
216-BRC	32.7060105	-108.120429
217-BRC	32.7060109	-108.120279
218-BRC	32.7060112	-108.120128
219-BRC	32.7060116	-108.119977
220-BRC	32.7060119	-108.119827
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225-BRC	32.7060136	-108.119074
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227-BRC	32.7060143	-108.118773
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229-BRC	32.7061295	-108.124042
230-BRC	32.7061298	-108.123892
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233-BRC	32.7061309	-108.12344
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253-BRC	32.7061402	-108.119376
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267-BRC	32.7062592	-108.122989
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272-BRC	32.7062623	-108.121634
273-BRC	32.7062627	-108.121484
274-BRC	32.706263	-108.121333
275-BRC	32.7062634	-108.121183
276-BRC	32.7062637	-108.121032

Projection: NAD 1983 State Plane New Mexico West

Table 1
Confirmation Sampling Grid Coordinates
B-Ranch Investigation Area Field Implementation Plan

Sample ID	Latitude	Longitude
277-BRC	32.7062665	-108.119828
278-BRC	32.7062668	-108.119677
279-BRC	32.7062671	-108.119527
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281-BRC	32.7062678	-108.119226
282-BRC	32.7062682	-108.119075
283-BRC	32.7062685	-108.118924
284-BRC	32.7063833	-108.124344
285-BRC	32.7063837	-108.124194
286-BRC	32.706384	-108.124043
287-BRC	32.7063844	-108.123893
288-BRC	32.7063847	-108.123742
289-BRC	32.7063851	-108.123592
290-BRC	32.7063854	-108.123441
291-BRC	32.7063858	-108.123291
292-BRC	32.7063861	-108.12314
293-BRC	32.7063865	-108.122989
294-BRC	32.7063868	-108.122839
295-BRC	32.7063872	-108.122688
296-BRC	32.7063875	-108.122538
297-BRC	32.7063879	-108.122387
298-BRC	32.7063889	-108.121936
299-BRC	32.7063892	-108.121785
300-BRC	32.7063896	-108.121635
301-BRC	32.7063899	-108.121484
302-BRC	32.7063903	-108.121334
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305-BRC	32.7063941	-108.119678
306-BRC	32.7063944	-108.119527
307-BRC	32.7063948	-108.119377
308-BRC	32.7063951	-108.119226
309-BRC	32.7063955	-108.119075
310-BRC	32.7063958	-108.118925
311-BRC	32.7065106	-108.124345
312-BRC	32.706511	-108.124194
313-BRC	32.7065113	-108.124044
314-BRC	32.7065117	-108.123893
315-BRC	32.706512	-108.123743
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319-BRC	32.7065134	-108.12314
320-BRC	32.7065138	-108.12299
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322-BRC	32.7065144	-108.122689
323-BRC	32.7065148	-108.122538
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325-BRC	32.7065155	-108.122237
326-BRC	32.7065162	-108.121936
327-BRC	32.7065165	-108.121786
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329-BRC	32.7065224	-108.119226
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331-BRC	32.7066379	-108.124345
332-BRC	32.7066382	-108.124195
333-BRC	32.7066386	-108.124044
334-BRC	32.7066389	-108.123894
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361-BRC	32.7071477	-108.124046
362-BRC	32.7071577	-108.11968
363-BRC	32.7071581	-108.119529
364-BRC	32.7071584	-108.119379
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366-BRC	32.7072854	-108.11953
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368-BRC	32.707412	-108.119831
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370-BRC	32.7074126	-108.11953
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372-BRC	32.7075392	-108.119832
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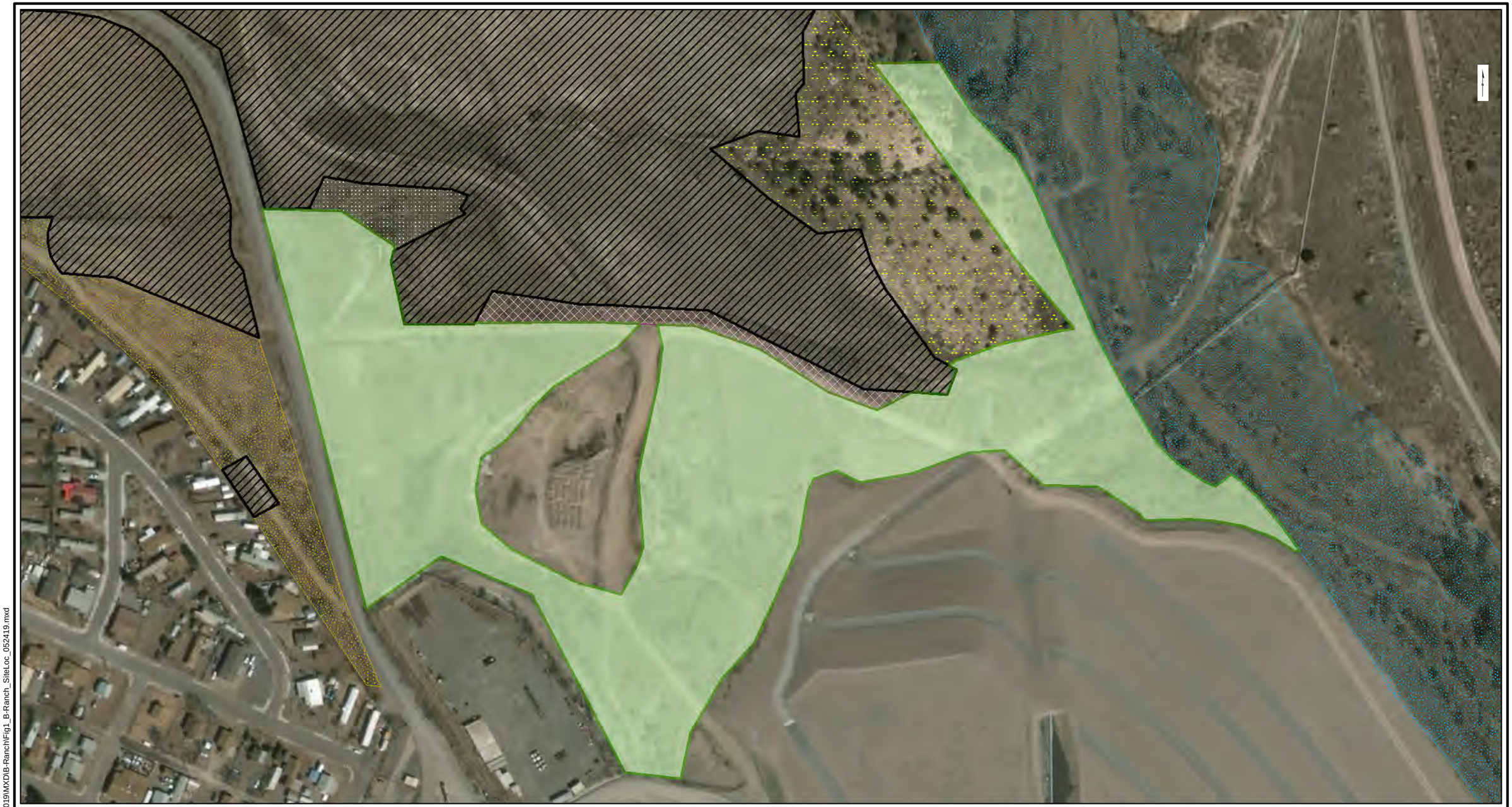
374-BRC	32.7075399	-108.119531
375-BRC	32.7076662	-108.119983
376-BRC	32.7076665	-108.119832
377-BRC	32.7076669	-108.119682
378-BRC	32.7077931	-108.120134
379-BRC	32.7077934	-108.119983
380-BRC	32.7077938	-108.119833
381-BRC	32.70792	-108.120285
382-BRC	32.7079204	-108.120134
383-BRC	32.7079207	-108.119984
384-BRC	32.708047	-108.120436
385-BRC	32.7080473	-108.120285
386-BRC	32.7080477	-108.120135

Projection: NAD 1983 State Plane New Mexico West



LEGEND

- PROPOSED INVESTIGATION AREA
- EXCAVATION LIMITS FROM GOLF COURSE IRA (2009)
- HANOVER-WHITEWATER CREEK
- AREA DESIGNATED AS ARCHAEOLOGICALLY SIGNIFICANT AND OUTSIDE FENCE LINE
- ADDITIONAL DELINEATION SAMPLES COLLECTED IN THIS AREA WITH LIMITED EXCAVATION
- LIMITED EXCAVATION DUE TO BEDROCK/CALICHE AT SURFACE OR AREA DETERMINED TO BE ARCHAEOLOGICALLY SIGNIFICANT
- AREA WHERE FENCE LINE WAS USED TO DEFINE BOUNDARY OF PROJECT AREA AND MINE OPERATIONS

GRAPHIC SCALE

0 300 600 Feet

Arcadis. 2009. Chino Mines Company Smelter/Tailings Soil Investigation Unit Interim Removal Action Completion Report. March 10, 2009

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS

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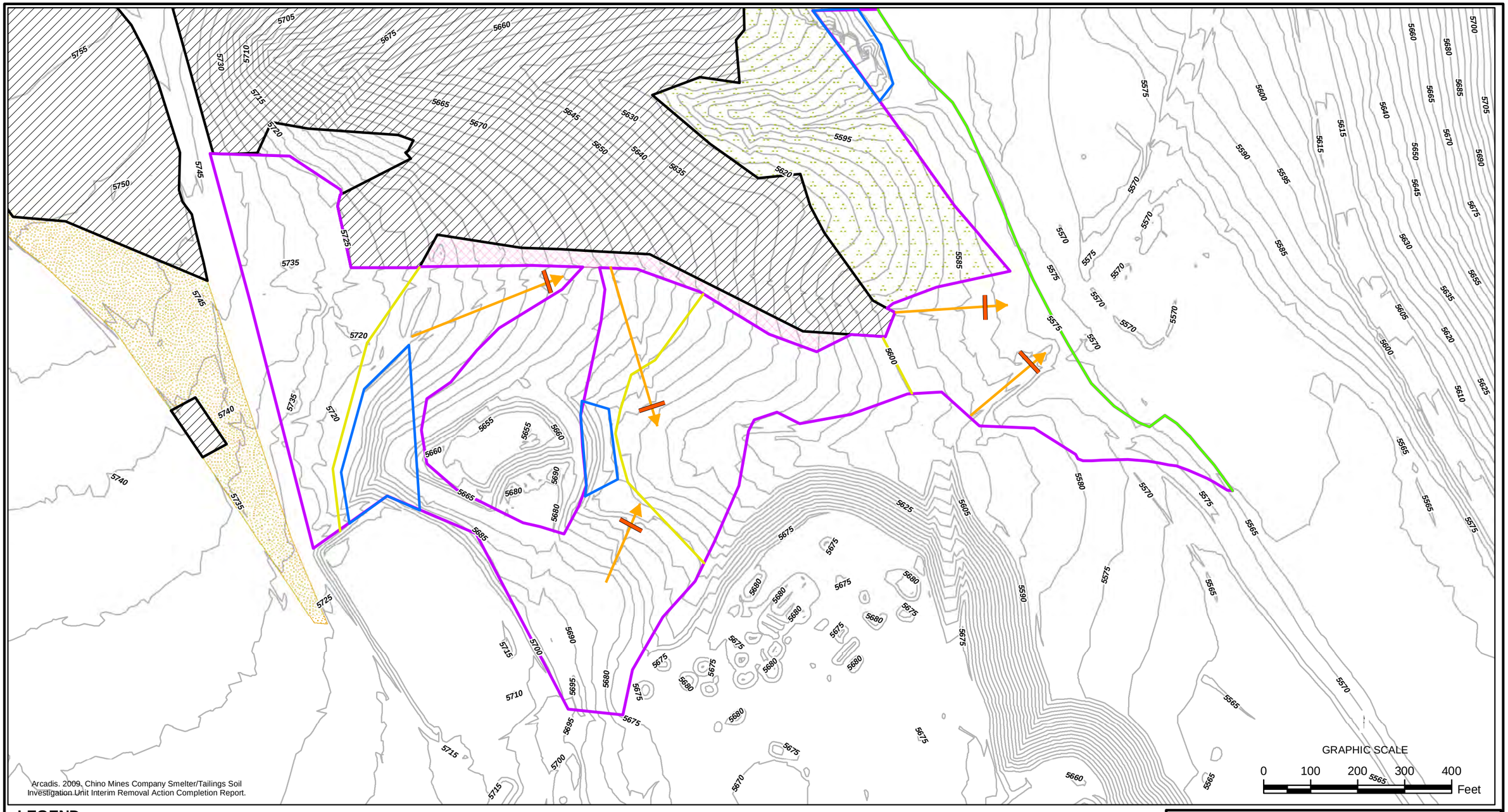
VAN ADIUM, N EW MEX ICO
SMELTER/TAILINGS SOIL INVESTIGATION UNIT

PROPOSED INVESTIGATION AREA

ARCADIS

FIGURE 1

CITY: Broomfield PIC: AT PM: MEB TM: TR: MEB
Project #B0063543.0023
Document Path: Z:\GISProjects_ENVChino\2019MXD\B-Ranch\Fig1_B-Ranch_SiteLoc_052419.mxd



LEGEND

- EXCAVATION BMP: SILT FENCE OR WATTLES ALONG DOWNGRADIENT PERIMETER
- RESTORATION BMP: EROSION MAT IN AREA THAT EXHIBITS >3:1 SLOPE, OR WHERE CONCENTRATED FLOW IS LIKELY TO OCCUR
- RESTORATION BMP: STRAW WATTLES PLACED EVERY 50' VERTICAL
- RESTORATION BMP: DRAINAGE, INSTALL STRAW BALES ACROSS BOTTOM OF DRAINAGE
- PROPOSED INVESTIGATION AREA
- EXCAVATION LIMITS FROM GOLF COURSE IRA (2009)
- HANOVER-WHITEWATER CREEK
- AREA DESIGNATED AS ARCHAEOLOGICALLY SIGNIFICANT AND OUTSIDE FENCE LINE
- ADDITIONAL DELINEATION SAMPLES COLLECTED IN THIS AREA WITH LIMITED EXCAVATION
- LIMITED EXCAVATION DUE TO BEDROCK/CALICHE AT SURFACE OR AREA DETERMINED TO BE ARCHAEOLOGICALLY SIGNIFICANT
- AREA WHERE FENCE LINE WAS USED TO DEFINE BOUNDARY OF PROJECT AREA AND MINE OPERATIONS

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VAN ADIUM, N EW MEX ICO
SMELTER/TAILINGS SOIL INVESTIGATION UNIT

TOPOGRAPHIC MAP AND BMP PLACEMENT

ARCADIS

FIGURE 2

CITY: Broomfield PIC: AT PM: MEB TM: TR: MEB
Project #B0063543.0023
Document Path: Z:\GISProjects_ENVChino\2019MXD\B-RanchFig1_B-Ranch_Topo_052219.mxd

LEGEND

- CONFIRMATION SAMPLES
- PROPOSED INVESTIGATION AREA
- EXCAVATION LIMITS FROM GOLF COURSE IRA (2009)
- HANOVER-WHITEWATER CREEK
- AREA DESIGNATED AS ARCHAEOLOGICALLY SIGNIFICANT AND OUTSIDE FENCE LINE
- ADDITIONAL DELINEATION SAMPLES COLLECTED IN THIS AREA WITH LIMITED EXCAVATION
- LIMITED EXCAVATION DUE TO BEDROCK/CALICHE AT SURFACE OR AREA DETERMINED TO BE ARCHAEOLOGICALLY SIGNIFICANT
- AREA WHERE FENCE LINE WAS USED TO DEFINE BOUNDARY OF PROJECT AREA AND MINE OPERATIONS

GRAPHIC SCALE

0 300 600 Feet

Arcadis. 2009. Chino Mines Company Smelter/Tailings Soil Investigation Unit Interim Removal Action Completion Report. March 10, 2009

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS

FR EEPOR T-MCMOR AN CHIN O MIN ES COMPAN Y
VAN ADIUM, N EW MEX ICO
SMELTER/TAILINGS SOIL INVESTIGATION UNIT

CONFIRMATION SAMPLING GRID

ARCADIS

FIGURE 3

CITY: Broomfield PIC: AT PM: MEB TM: TR: MEB
Project #B0063543.0023
Document Path: Z:\GISProjects_ENVVChino\2019MXD\B-Ranch\Fig1_B-Ranch_RemovalArea_pCu_050619.mxd

Appendix B

Biological Survey

BIOLOGICAL ASSESSMENT

B – RANCH SECTION

OF

WHITE WATER CREEK PROJECT

FREEPORT McMoRan COPPER AND GOLD

CHINO MINING OPERATIONS

Completed by

Gila Biological Consulting

Dennis Miller

Report written June 23, 2019

(Report format – USFWS Biological Assessment/Evaluation
under section 7 of the Endangered Species Act)

1.0 Background

The purpose of this Biological Assessment is to address the effects of grubbing activities ine the B Ranch area on ESA-listed species, listed as endangered or threatened under the Endangered Species Act (ESA). Freeport has taken a proactive stance and is also asking for this survey to protect any protected species and any breeding birds.

The project involves the removal of above ground vegetation in the area delineated on the enclosed map.

The project area in general is a wide open area at the top, sloping down to a lower riparian area with larger trees. Most of the upper area is grassland with a few scattered small trees and shrubs. The area was probably originally a savannah of grassland and pinon/juniper habitat that has been altered many times with mining activities.

The project has the potential to impact the following ESA-listed species that are known to occur in the general area:

Amphibians
- Chiricahua Leopard Frog (*Rana chiricahuensis*)

Reptiles
- Narrow Headed Garter Snake (*Thamnophis rufipunctatus)*

Birds
- Northern Aplomado Falcon (*Falco femoralis septentrionalis)*
- Bald eagle (*Haliaeetus leucocephalus)*
- Mexican spotted owl (*Strix occidentalis lucida*)*
- Willow Flycatcher (*Empidonax traillii*)*

Mammals
- Mexican Gray Wolf (*Canis lupus baileyi)*
- Black-footed ferret *(Mustela nigripes)*

*Species not found in impacted area historically and/or incorrect habitat type

This BA, prepared by Gila Biological Consulting, addresses the proposed action in compliance with the ESA and the U.S. ACE. This assures that, through consultation with GBC, actions in this proposed project do not jeopardize the continued existence of any threatened, endangered, or proposed species, or result in the destruction or adverse modification of habitat including critical habitat. Note: No critical habitat designation is present at the project site.

2.0 Description of the Action & Action Area

Details of this will be specified in the Pre-Construction Notification Form prepared by Freeport McMoRan. A general description is included here for the BA. The proposed action includes the removal of all above ground vegetation in the proposed area. Heavy equipment will remove all trees, bushes, and most grasses and herbaceous plants.

Action Area: All actions will be in the specified B Ranch project area shown in the enclosed map.

Direct Effects: All direct effects will be in the Action Area described above. This includes the complete removal of above ground vegetation.

Indirect Effects: None

Methodology for biological and wildlife inventory:

Three site visitations occurred on June 4, 12, and 20, 2019. These visitations included early morning observations (pre-daylight), observations during the middle of the day, and observations in the evening until dark. Most of these observations were accomplished using optic equipment (binoculars, spotting scopes) and systematically walking through the project area and indirect effect areas.

Mammal surveys were accomplished by using Sherman live traps set early in the morning and checked early in the morning the next day. All mammals were released. Other mammals were observed by direct sighting or by tracks at the project site.

3.0 Listed Species & Critical Habitat in the Action Area

The ESA listed species previously mentioned in Background section 1.0 of this document occur in this area. The list of the species that potentially could be present in the project area has been documented through the *U.S. Fish and Wildlife Service Environmental Conservation Online System* and through the *Information, Planning and Conservation System (IPaC*).

4.0 Environmental Baseline Conditions

The Action Area has minimal human-induced sources of impact on the listed species potentially present. Very little recreational impact is present due to this land being private and the public is not allowed access. Ranching activities occur nearby but not directly in the Action Area.

5.0 Effects of the Action

The proposed project has major direct effects on the species present in the area. Since no listed plants or animals were located the effects on listed species is non-existent. Protected bird species were pushed out of the area by the grubbing activities. No breeding or breeding behavior was observed and as a result birds were not affected.

6.0 Cumulative Effects

There will be no cumulative effects or impacts from the actions in this project as defined by NEPA (40 C.F.R. – 1508.7).

7.0 Conclusions

In general, no detrimental effects to any wildlife including any listed species should occur from this project's activities. Some native birds, none of them listed species, will be displaced temporarily by this project but there should be no mortalities. Once the disturbance starts, the few birds that were found in the direct impact area will be pushed by the activity into the surrounding habitat. Once the project is completed these birds may be able to reside in the impact area once again.

Specific conclusions that are biologically related are as follows:

- No ESA listed species delineated in section 1.0 (Background) of this document were found in the Action Area or in the indirect impacted areas. (Refer to appendix A Species List) Due to this absence there will be no effects on endangered or threatened species.
- Migratory Bird Breeding Areas – The action area and the indirect impacted areas do not have suitable habitat for bird breeding. It is a wide open area with no cover and no vegetation on the banks.
- Migratory Bird and Bald and Golden Eagles – The action area did have migratory birds located in it but these are all birds that would be only feeding in the area and will be scared away temporarily by the activity so no impact would be occurring. There were no Bald Eagles or Golden Eagles found anywhere near the project area. Bald Eagles are not present in the entire general area except in winter months and this project will be occurring in early summer.

APPENDIX A – Species List

The following species of wildlife were observed and located in the Action Area:

Birds

Ash Throated Flycatcher (*Myiarchus cinerascens*)
Bell's Vireo (*Vireo bellii*)
Black-Chinned Hummingbird (*Archilochus alexandri*)
Black-throated Sparrow (*Amphispiza bilineata*)
Blue Grosbeak (*Guiraca caerulea*)
Broad-Tailed Hummingbird (*Selasphorus platycercus*)
Canyon Towhee (*Pipilo fuscus*)
Gambel's Quail (*Callipepla gambelii*)
House Finch (*Carpodacus mexicanus*)
House Wren (*Troglodytes aedon*)
Magnificent Hummingbird (*Eugenes fulgens*)
Mourning Dove (*Zenaida macroura*)
Northern Mockingbird (*Mimus polyglottos*)
Red-tailed Hawk (*Buteo jamaicensis*)*
Spotted Towhee (*Pipilo maculatus*)
Western Kingbird (*Tyrannus vociferans*)
White-Winged Dove (*Zenaida asiatica*)

*Birds observed flying over project area but not observed on ground near area

Reptiles

New Mexico Whiptail Lizard (*Cnemidophorus neomexicanus*)
Western Fence Lizard (*Sceloporus occidentalis*)

Amphibians

None

Mammals

Rock Pocket Mouse (*Chaetodipus intermedius*)
White Throated Woodrat (Packrat) (*Neotoma albigula*)
Mexican Woodrat (Packrat) (*Neotoma mexicana*)
Brush Mouse (*Peromyscus boylii*)
White Footed Mouse (*Peromyscus leucopus*)
Mule Deer (*Odocoileus hemionus*)
Javelina (*Tayassu tajacu*)
Raccoon (*Procyon lotor)*

Invertebrates

Tarantula hawk (*Pepsis formosa)*
Black Swallowtail Butterfly (*Papilio polyxenes*)
Locust(grasshopper) (*Xanthippus montanus*)
Monarch Butterfly *(Danaus plexippus*)
Plains Cicada (*Megatibicen dealbatus)*

The following species of plants were observed and located in the Action Area:

Alligator Juniper (*Juniperus deppeana*)
Apache Plume (*Fallugia paradoxa*)
Banana Yucca (*Yucca bacata*)
Blue Gramma Grass (*Bouteloua gracilis*)
Broom Snakeweed (*Gutierrezia sarothrae*)
Dayflower *(Commelina dianthifolia)*
Feathergrass (*Nasella tenuissima*)
Goldenbrush (*Ericameria sp.)*
Honey Mesquite (*Prosopis glandulosa)*
Johnson's Grass (*Sorgum halepense)*
Live Oak (*Quercus virginiana*)
Locoweed (*Oxytropis lambertii)*
New Mexico Bird of Paradise (*Caesalpinia mexicana*)
New Mexico Olive (*Forestiera neomexicana*)
New Mexico Thistle (*Cirsium neomexicanum)*
Orange Mallow (*Sphaeralcea ambigua*)
Paperflower (*Psilostrophe cooperi)*
Primrose (*Oenothera primiveris*)
Purple Aster (*Machaeranthera tanacetifolia*)
Purple Nightshade (*Solanum elaegnifolium)*
Purple Prickly Pear Cactus (O*puntia martiniana)*
Ring Muhley Grass (*Muhlenbergia torreyi*)
Russian Thistle (*Echinops exaltatus*)
Salt Cedar (*Tamarix ramosissima*)
Siberian Elm (*Ulmus pumila)*
Side Oats Gramma Grass (*Bouteloua curtipendula*)
Soapweed (*Yucca elata*)
Tackstem (*Calycoseris wrightii*)
Thistle Poppy (*Argemone albiflora)*
White Sage *(Salvia apiana*)

Appendix C

Daily Reports

DAILY SUMMARY REPORT

DATE: June 14, 2019
S M T W T **F** S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Mostly clear
Wind: W 10 – 25 mph

Precipitation: None
Temperature: 54 - 90 °F

VISITORS ON SITE:
- None

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Motor Grader – Cat M160
- 2 Water Trucks – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Grubbed vegetation from center of site and hauled to C&D Landfill,
- Day 2 of soil removal: scraped 2”-12” from ~7-acre area on westernmost portion of site and above C&D landfill,
- Graded removal areas for improved access and drainage,
- Loaded and hauled soil to stockpile at MM #4.

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Numerous correspondences with Pam Pinson (FCX), Rebecca Lindeman, and Marianne Batchelder (Arcadis) regarding updated Collector map:
    - New map issued in morning with updated boundaries, sample locations, and IDs. New map functioning well on Golder’s tablet.
    - Pam noticed a small wedge of removal area was not included on map – located at extreme NW corner of site sandwiched between paved road and fence line at boundary of Golf Course area. Arcadis will add this area to Collector map Monday and add sample points that do not disrupt spacing and IDs already established. USA Env will ensure Blue Stake is updated to include new area before any activity occurs there.
    - York noticed that sample locations as they appear on Collector map relative to site features do not match GPS locations. For example, sample points that appear to be directly adjacent to the road are more than 50 feet east of it per GPS. Also, while standing east of the paved road onsite, the aerial photo on Collector makes it appear as though you are in the Golf Course area west of the road. Marianne suggested the oddity is probably due to Collector projection issues. She will add columns of sample points so the sampling grid reaches the west boundary of the site (even though it will appear on the aerial that these new columns are on the road or west of it.)
    - Marianne will ask Brian Webb (Arcadis GIS) to add the ability to insert comments on Collector for each sample point. This will enable Golder to keep track of which round of tests (R1, R2, R3, etc.) is next at a given sample point.
- Completed dozens of courtesy XRF tests on in situ soils to determine optimal removal depths and methods for visually estimating goal achievement. Ultimately determined that fine, light grayish-brown soils typically have elevated Cu; whereas white (caliche), dark brown (organic matter), and reddish soils typically have low Cu. Worked with foreman and operators to identify patterns and minimize blading of grayish-brown material to other work areas.
- Continued to encounter higher than anticipated copper concentrations (up to 2.4% Cu) in grayish-brown material - particularly along paved road and in drainage areas. Some of these areas continued to exhibit high copper concentrations after 1’ of soil was removed. Pam reminded Golder that capping is an option if removal depths would be greater than 1’. USA Env will consider capping areas along paved road where drop off is already precipitous. An elevated platform of clean soil that was apparently imported in the past is

DAILY SUMMARY REPORT

DATE: June 14, 2019
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available in the middle of the site above the C&D Landfill for use as capping material if needed. Effects on site grading must be evaluated before the material is moved.

- Golder and Runyan completed XRF sampling/sieving/testing on Round 1 (R1) samples in areas that were expected to have low Cu based on earlier in-situ courtesy tests: 20 out of 21 samples exhibited Cu concentrations below the 4500 ppm decision criteria.
- While working through various issues onsite and completing dozens of courtesy XRF tests, Golder was unable to keep up with the pace of USA Env's soil removal efforts; therefore, Golder and Runyan will work tomorrow (Saturday) so the crew will have firm guidance when work resumes Monday. Golder is using labeled green pin flags to denote sample locations with low copper and red pin flags where Cu concentrations are >4500 ppm. Arcadis included the ability to change the color of sample locations on the Collector map making it easy to keep track of the status of each location.
- Runyan collected 4 assay samples from removal material temporarily stockpiled at MM #4. Assay samples will be delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough dust suppression, traffic control (when needed), and safety oversight by USA all day.
- In preparation for weekend, crew placed orange safety fencing and barriers along west edge of site where there was a drop off adjacent to the paved road. Also, soil stockpiles were soaked thoroughly to produce a crust and reduce dust.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 17, 2019
S **M** T W T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Mostly clear
Wind: W 5 – 15 mph

Precipitation: None
Temperature: 56 - 91 °F

VISITORS ON SITE:
- Pam Pinson, David Mercer (NMED), Craig Lugowski (USA Env)

EQUIPMENT ON SITE:
- 2 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Motor Grader – Cat M160
- 1 Water Truck – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Smaller crew today because hauling is underway at 356 (HWCIU – Bayard), so 1 water truck and various personnel were working there;
- Grubbed vegetation and hauled to C&D Landfill;
- Day 3 of soil removal: scraped 2”-12” from ~7-acre area on westernmost portion of site and above C&D landfill;
- Loaded and hauled soil to stockpile at MM #4.

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Walked recently-flagged sample points with USA Env showing which areas require more scraping.
- Continued to encounter higher than anticipated copper concentrations (up to 2.4% Cu) in grayish-brown material - particularly in SW corner of site where a USA Env operator spent nearly the entire day on a dozer and grader trying to remove soil with highest Cu concentrations. Some of these areas continued to exhibit high copper concentrations after >1’ of soil was removed.
- Golder and Runyan completed XRF sampling/sieving/testing on Round 1 & 2 (R1 & R2) samples. To date 90 sample locations have had Cu below 4500 ppm and another 10 have been outside project boundaries, so **approximately 20-25% of known sample locations are complete**.
- Pam pointed out that one of the grub piles USA Env has stockpiled in the C&D Landfill has too much soil and too little vegetation to burn. USA will segregate vegetation and haul remaining soil to temporary stockpile at MM#4.
- Runyan collected 2 assay samples (6 total for B-Ranch) from removal material. Assay samples will be delivered to the Chino ENV building on regular intervals each week.
- Marianne and Brian (Arcadis) provided an updated Collector map that includes new sample locations for “wedge” at NW corner of site and along boundaries in case needed. Map loaded well on Golder’s tablet and was used for most of the day.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough dust suppression, traffic control (when needed), and safety oversight by USA all day.

PREPARED BY GOLDER ASSOCIATES
York Morgan
Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 18, 2019
S M **T** W T F S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Mostly clear
Wind: W 5 – 15 mph
Precipitation: None
Temperature: 51 - 89 °F

VISITORS ON SITE:
- Craig Lugowski (USA Env)

EQUIPMENT ON SITE:
- 2 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Motor Grader – Cat M160
- 1 Water Truck – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Small crew again today due to hauling at 356 (HWCIU – Bayard) that requires 1 water truck, 1 loader, and various personnel;
- Sorted grub material at C&D and removed woody and succulent debris from the pile that was mostly soil;
- Grubbed vegetation from NE corner of site near ranch buildings and placed in small piles for future removal;
- Day 4 of soil removal: scraped 2"-12" from western portions of site – focusing exclusively on locations where previous R1 tests had elevated Cu. No new areas were opened for excavation;
- Loaded and hauled soil to stockpile at MM #4.

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Worked closely all day with USA Env's Allan and Craig to guide soil scraping efforts so crew achieved passing Cu results at virtually every open location including the troublesome SW corner where deep excavations were sometimes required. By closing out all locations with elevated Cu, USA Env can continue moving east tomorrow without returning to previously-scraped areas – a strategy favored by all present.
- With soil removal complete in the SW corner, there is now the matter of security and safety. There was already a sharp drop off in that corner but it was concealed by mesquite and other veg so drivers would not be tempted to drive off road. Now – even with a strong re-grading effort by USA Env – there's a moderate drop off along the road's east shoulder. To build that area up would require large quantities (at least 4' deep) of fill. A fence along the roadside would be less expensive and the area will ultimately require fencing anyway. Note that the shoulders a little farther north where trucks frequently pull over are still in good shape because minimal scraping was required on them.
- Golder and Runyan completed numerous courtesy tests and 31 XRF sampling/sieving/testing on Round 2 - 4(R2 – R4) samples until all areas had been scraped such that test results were below 4500 ppm Cu. To date 111 sample locations have Cu below 4500 ppm and another 10 are outside project boundaries, so **approximately 27-30% of known sample locations are complete**.
- Golder and Runyan marked 12 locations for Pam in the 5-acre "donut hole" former operations area. Pam will confirm these locations are suitably placed next time she is onsite. Golder recommended that remediation of this area be saved for last to ensure ample budget is available.
- Runyan collected 2 assay samples (8 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough dust suppression, traffic control (when needed), and safety oversight by USA all day.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 19, 2019
S M T **W** T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Mostly clear, smoky a.m.
Wind: W 5 – 15 mph

Precipitation: None
Temperature: 51 - 90 °F

VISITORS ON SITE:
- Craig Lugowski (USA Env)

EQUIPMENT ON SITE:
- 2 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Motor Grader – Cat M160
- 1 Water Truck – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Small crew again due to hauling at 356 that requires 1 water truck, 1 loader, and various personnel – plus USA was 1 guy short today;
- Grubbed vegetation from SE corner of site in "dagger" area and placed in small piles for future removal;
- Day 5 of soil removal: scraped 2"- 4" from north-central portions of site north and northwest of C&D. Scraped area up to 12" deep W/NW of C&D where R1 tests had elevated Cu as did subsequent courtesy tests. This area has a yellowish soil in places that looks somewhat like tailings. USA Env was attempting to remove all of it in preparation for R2 tests tomorrow.
- USA Env focused efforts primarily on loading and hauling soil from various temp stockpiles where Cu is below target levels to stockpile at MM #4.

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Courtesy tests in a.m. with USA Env's Allan along north fence line (N of C&D) showed post-grubbing concentrations of Cu were moderate, so a 3" scrape was expected to achieve goals.
- USA Env's Craig and Allan noted that they intend to leave the wedge in extreme NW corner of site located between paved road and Golf Course for last due to traffic concerns and lack of manpower right now. I advised them that it is a high priority area for Pam because it is extremely visible and accessible to public; plus they will be tracking over clean areas to remove it. They said they will get it when they have a full crew again.
- Although additional scraping was completed by USA Env, Golder conducted no new XRF tests today. So, the totals did not change from yesterday: To date 111 sample locations have Cu below 4500 ppm and another 10 are outside project boundaries, so **approximately 27-30% of known sample locations are complete**.
- Runyan collected 2 assay samples (10 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough dust suppression and safety oversight by USA all day.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 20, 2019
S M T W **T** F S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Clear but Smoky
Wind: W 10 – 15 mph
Precipitation: None
Temperature: 56 - 89 °F

VISITORS ON SITE:
- Pam Pinson
- Chino Industrial Hygienist (1), Env Staff (1) with interns (2)
- David Mercer (NMED)

EQUIPMENT ON SITE:
- 1-3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 950
- 1 Water Truck – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Small crew again due to hauling at 356 that requires 1 water truck, 1 loader, and various personnel; plus crew is 1 man short. USA Env expects to finish work at 356 tomorrow or Monday, then faster pace will resume at B-Ranch.
- Excavated potholes in 5-acre landfill with Pam Pinson overseeing effort. Grubbed as needed and built paths/pads at pothole sites. Fenced off holes at end of day.
- Grubbed vegetation from area south of C&D Landfill and loaded trucks with woody/succulent material to C&D;
- Day 6 of soil removal: scraped 2"- 24" from area adjacently NW of C&D and along fence line north of C&D.
- Loaded and hauled soil (using only 1-2 haul trucks most of day) to stockpile at MM #4 from various temporary stockpiles NW of C&D.

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Identified another area with high-Cu soil located NW of C&D that was evidently a drainage/settling area for stormwater coming from the elevated-Cu areas along the paved road. R1 and R2 samples from 3 points had 1% - 2.6% Cu. Worked with USA Env to delineate these areas and "gouge" them out. Eventually achieved <4500 Cu. Large stockpile remains.
- Pam met with USA Env's Allan, Tony, and excavator operator and potholed numerous locations within the former landfill area. Chino Env staff will be onsite tomorrow to collect composite samples from potholes.
- Chino staff (with help from interns) completed full day of air monitoring on 2 operators and at 3 discreet locations onsite – using tripod-mounted pump. They were back-and-forth to site all day checking monitors and changing filters.
- Golder and Runyan - numerous courtesy tests and 35 XRF sampling/ testing on Round 1 - 4(R1 – R4) samples until all but 4 locations had been scraped to < 4500 ppm Cu. To date 135 sample locations have Cu <4500 ppm and another 12 are outside project boundaries, so **approximately 33-37% of known sample locations are complete**.
- USA Env is short-handed. Scraping and grubbing are well ahead of haulage. USA **hauled 39 loads today** because Allan drove a truck part of the day and the guys came down from 356 late in the day to help. Most of the day, only 1 truck was hauling – which left large gaps when the loader was doing very little. USA Env is working to provide a cumulative haulage total to Golder.
- York (Golder) will be away next T-Fr. Sam (Golder) is busy on a liner job at Chino, but will visit B-Ranch for a few hours each day to run XRF tests. In preparation, Ray (Runyan) has attended all meetings/discussions thus far, so he understands the plan. Today, he used the Collector tablet, labeled soil bags, led the effort, and essentially did everything Golder normally does except the XRF tests. Ray will

DAILY SUMMARY REPORT

DATE: June 20, 2019
S M T W **T** F S

continue to train all day Friday and Monday in this capacity. Thus, we anticipate solid coverage next week that will enable the crew to continue moving forward.

- Runyan collected 2 assay samples (10 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough dust suppression, traffic control (when needed), and safety oversight by USA all day.
- USA used T-posts and safety fencing along paved road (at drop off), on top of C&D berm, and around potholes that were excavated today.
- Crew shut down several times today waiting for water truck to return full.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 21, 2019
S M T W T **F** S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Clear
Wind: W 10 – 15 mph
Precipitation: None
Temperature: 54 - 88°F

VISITORS ON SITE:
- Chino ENV sampling crew

EQUIPMENT ON SITE:
- 1-2 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 950
- 1 Water Truck – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Small crew again due to hauling at 356 that requires 1 water truck, 1 loader, and various personnel; plus crew is 1 man short. USA Env expects to finish work at 356 next Tuesday, then faster pace will resume at B-Ranch.
- Excavated potholes in 5-acre landfill with Chino ENV staff collecting samples and overseeing effort. Grubbed as needed and built paths/pads at pothole sites. Built berms to prevent access to area via vehicle. Excavator busy most the day in this area.
- Day 7 of soil removal: Scraping effort focused entirely on strip between main haul road and fence line along northern boundary. Dozer scraped 2"- 18".
- Loaded and hauled soil (using only 1-2 haul trucks most of day) to stockpile at MM #4 from various temporary stockpiles NW of C&D. **Hauled 44 loads today, 39 loads yesterday, and 401 loads to date.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Identified another area with high-Cu soil - located in strip between haul road and north fence line near bottom of slope slightly above B-Ranch proper. Soils in the area were generally low in Cu, but an area approx. 150' x 50' had Cu concentrations as high as 8%. Dozer cut down to caliche, but elevated Cu persisted in pockets where caliche was absent or not competent. Rebecca (Arcadis) advised to attempt continued soil removal until Cu was lower or until no soil was available for sampling. USA continued scraping/ripping and eventually removed enough soil and caliche to achieve <4500 Cu in 2 of 3 sample points. Additional effort is expected to continue Monday.
- Unpredictable Cu concentrations encountered in soils. Some areas that had low Cu pre-scraping (via in situ courtesy tests) actually had higher Cu after scraping. In some places, concentrations increased as excavation continued down to caliche. In one area, post-scrape testing rendered a 155 ppm Cu test and 50' away on similar-looking soil, there was a 25,200 ppm test. The uncertainty causes numerous rounds of scraping/testing and requires frequent communication between testers and operators.
- Golder was very busy the entire day collecting/testing soil in conjunction with dozer effort and did NOT accompany soil sampling crew during lengthy work in 5-acre landfill. No XRF testing done in potholes.
- Isak (Chino), Allan (USA), Ray (Runyan), and York (Golder) met with very amenable property owner at 2 Santa Rita St. in Hurley to discuss workplan for residential yard cleanup. Good meeting. Also briefly toured vacant lot on D St. that might be remediated.
- Golder and Runyan - numerous courtesy tests and 45 XRF sampling/ testing on Round 1 – 5 (R1 – R5) samples until all but 3 locations had been scraped to < 4500 ppm Cu. To date, 159 sample locations have Cu <4500 ppm and another 12 are outside project boundaries, so **approximately 38-43% of known sample locations are complete**.
- York (Golder) will be away next T-Fr. Sam (Golder) will visit B-Ranch for a few hours each day to run XRF tests. Sam will transmit daily raw data to York, who will finalize it and send a Daily Report as usual. Ray

is increasingly prepared to cover oversight duties and he will call Arcadis (Rebecca or Marianne) or Golder (York) or Chino (Pam) if questions arise.

- Runyan collected 2 assay samples (14 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough dust suppression and safety oversight by USA all day.
- Crew shut down several times today waiting for water truck to return full.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 24, 2019
S **M** T W T F S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Clear
Wind: W 10 – 15 mph
Precipitation: None
Temperature: 49 - 91°F

VISITORS ON SITE:
- None

EQUIPMENT ON SITE:
- 2-3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 950
- 1 Water Truck – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Small crew again due to hauling at 356; but regained one truck driver who was out last week. USA Env expects to finish work at 356 tomorrow (Tuesday), then faster pace will resume at B-Ranch.
- Day 8 of soil removal: Scraping effort focused on strip between main haul road and northern fence line, and northern portion of B-Ranch proper. Dozer scraped 2"- 6" and excavator also scraped material from difficult-to-reach areas on boulder slope west of B-Ranch arena area.
- Loaded and hauled soil (using 2 haul trucks most of day, and 3 toward end) to stockpile at MM #4 from various temporary stockpiles NW of C&D. **Hauled 69 loads today; 470 loads to date.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Elevated Cu remaining at 2 points in area located in strip between haul road and north fence line near bottom of slope. Dozer cut deeper into caliche, but elevated Cu persisted in pockets where caliche was absent or not competent. USA Env will either rip deeper into caliche tomorrow or will remove surface soil with smaller equipment or hand tools.
- Drainage area located downgradient of elevated Cu area (described above) had unexpectedly low Cu. Soils appear to be imported Gila Conglomerate from previous reclamation efforts. USA removing minimal volume from these areas – all XRF results were very low. Excellent progress in this area today.
- USA Env transitioning into B-Ranch proper, working flat area and boulder slope west of the former arena with excavator. Golder walked the boulder area with USA Env and used a combination of courtesy shots and post-removal XRF tests to identify patterns in Cu concentrations. (Cu is apparently accumulated in organic material beneath trees and shrubs and also in places where a thin layer of soil covers boulders. Where soils are deeper or farther downslope, Cu concentrations are very low.) USA's excavator has made good progress so most of the sample points on the steepest portion of slope have already passed. USA will use hand tools to move difficult-to-reach soil into areas where excavator can grab it. Good plan agreed upon by Allan (USA), Ray (Runyan), and York (Golder). Area will go much faster than initially anticipated.
- Courtesy XRF tests in SE portion of site (south of pipeline) on in-situ surface soil were all <4500 ppm Cu. It appears that this area will go quickly.
- Golder and Runyan - numerous courtesy tests and 39 XRF tests on R1-R5 samples, with 27 of the tests yielding <4500 ppm results. To date, 186 sample locations have Cu <4500 ppm and another 14 are outside project boundaries, so **approximately 44-50% of known sample locations are complete**.
- Allan and York discussed need for stormwater BMPs (per Arcadis FIP) now that soil has been removed from slopes and particularly with monsoon rains predicted to begin this weekend. USA planning to spend entire day with full crew Friday installing erosion mats and wattles. Storms predicted for Friday-Sunday. USA will not leave for break starting July 3rd without thorough BMP placement.
- York left the jobsite at 15:00 and will be away next T-Fr. Ray collected another 10 samples after York left. He will coordinate with Sam (Golder) to determine a suitable time for Sam to visit B-Ranch for a few hours to run XRF tests tomorrow and each day this week.

DAILY SUMMARY REPORT

DATE: June 24, 2019

S **M** T W T F S

- Runyan collected 2 assay samples (16 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough dust suppression and safety oversight by USA all day.
- Crew never loads soil from temp stockpiles until thoroughly soaked by water truck.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 25, 2019
S M **T** W T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Clear
Wind: W 10 – 15 mph

Precipitation: None
Temperature: 54 - 90°F

VISITORS ON SITE:
- None

EQUIPMENT ON SITE:
- 2-3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 950
- 1-2 Water Truck – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full crew onsite in afternoon as USA Env finished work at 356. Additional haul truck sped up removal. 2nd water truck made big difference in dust control.
- Day 9 of soil removal: Scraping effort focused on northern portion of B-Ranch proper and also began on SE corner of site on south side of pipeline. Dozer scraped 2"- 6" and excavator also scraped material from difficult-to-reach areas on boulder slope west of B-Ranch arena area.
- Loaded and hauled soil (using 2 haul trucks most of day, and 3 in afternoon) to stockpile at MM #4 from various temporary stockpiles NW of C&D. **Today's haul count pending.** **Hauled 69 loads yesterday; 470 loads through yesterday.**
- USA began installing BMPs (wattles, matting, and hay bales) in various locations.

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Elevated Cu still at 2 points in area located in strip between haul road and north fence line near bottom of slope. Golder stuck to script…USA needs to either go deeper into caliche and rip out more material or go lighter and remove all visible soil with smaller equipment or hand tools.
- Golder and Runyan - 27 XRF tests on R1-R5 samples, with 18 of the tests yielding <4500 ppm results. To date, 204 sample locations have Cu <4500 ppm and another 14 are outside project boundaries, so **approximately 48-55% of known sample locations are complete**.
- USA planning to spend entire day with full crew Friday installing erosion mats, hay bales, and wattles. Storms predicted for Friday-Sunday. USA will not leave for break starting July 3rd without thorough BMP placement. Allan reported that USA is short of erosion matting because they did not account for extended area to north (which is entirely on a slope) when ordering supplies. More matting is on the way and expected to arrive by Monday.
- Ray (Runyan) kept up with sampling and Collector map updates since York is away the rest of the week. Sam visited the site for a few hours – just long enough to test the samples Ray collected. Sam subsequently downloaded data files and emailed to York.
- Runyan collected 2 assay samples (18 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough dust suppression and safety oversight by USA all day.
- Additional water truck in afternoon was a big help.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 26, 2019
S M T **W** T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy
Wind: W 10 – 15 mph

Precipitation: None
Temperature: 57 - 91°F

VISITORS ON SITE:
- Uncertain

EQUIPMENT ON SITE:
- 1 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 950
- 1-2 Water Trucks – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full crew onsite all day – focused primarily on installation of stormwater BMPs (matting, wattles, and hay bales) most of day.
- Day 10 of soil removal: Minimal scraping effort. Focus was on SE corner of site on south side of pipeline.
- Loaded and hauled soil (using 1 haul truck for only part of day) to stockpile at MM #4. **Today's haul count was 9 loads. Hauled 56 loads yesterday; 535 loads through yesterday.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Elevated Cu still at 2 points in area located in strip between haul road and north fence line near bottom of slope. Golder stuck to script…USA needs to either go deeper into caliche and rip out more material or go lighter and remove all visible soil with smaller equipment or hand tools.
- Golder and Runyan - 30 XRF tests on R1-R5 samples, with 25 of the tests yielding <4500 ppm results. To date, 229 sample locations have Cu <4500 ppm and another 14 are outside project boundaries, so **approximately 54-61% of known sample locations are complete**.
- USA planning to spend entire day with full crew Friday installing erosion mats, hay bales, and wattles. Storms predicted for Friday-Sunday. USA will not leave for break starting July 3rd without thorough BMP placement.
- Ray (Runyan) kept up with sampling and Collector map updates since York is away the rest of the week. Sam visited the site for a few hours – just long enough to test the samples Ray collected. Sam subsequently downloaded data files and emailed to York.
- Runyan collected 2 assay samples (20 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough dust suppression and safety oversight by USA all day.
- Focus on stormwater BMPs ahead of rain in forecast.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 27, 2019
S M T W **T** F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy
Wind: W 10 – 15 mph

Precipitation: None
Temperature: 63 - 91°F

VISITORS ON SITE:
- Uncertain

EQUIPMENT ON SITE:
- 1-2 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 950
- 1-2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Partial USA Env crew onsite most of day due to follow-up work at Saucedo property on WWCr. Crew worked only 10 hours vs. the 12 they've been working.
- Continued installation of stormwater BMPs (matting, wattles, and hay bales) until they ran out of staples and wattles.
- Day 11 of soil removal:
    - Moved to former operations area south of the C&D Landfill. Experimented with 3" scrape, which rendered moderate to very high (3.1%) Cu in R1 testing. Planning to remove up to 1' tomorrow.
    - Re-scraped several locations with high Cu and had minimal success in the following round of testing.
    - Also worked in SE corner, south of pipeline.
- Loaded and hauled soil (using 1-2 haul trucks) to stockpile at MM #4. **Today's haul count was 32 loads; 567 loads total for project.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- After another round of scraping, elevated Cu still at 2 points in area located in strip between haul road and north fence line near bottom of slope. This area is starting to form a depression that could pond. Will ask USA to grade clean material into area after Cu target is met.
- Runyan discussed relatively high Cu concentrations in R1 samples south of C&D and USA agreed that deeper excavation will be required in these areas around former foundations and misc. operations.
- Golder and Runyan: 21 XRF tests on R1-R6 samples, with only 9 of the tests yielding <4500 ppm results. To date, 238 sample locations have Cu <4500 ppm and another 14 are outside project boundaries, so **approximately 56-63% of known sample locations are complete**.
- Ray (Runyan) kept up with sampling and Collector map updates since York is away the rest of the week. Sam visited the site for a few hours – just long enough to test the samples Ray collected. Sam subsequently downloaded data files and emailed to York.
- Runyan collected 2 assay samples (22 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough dust suppression and safety oversight by USA all day.
- Focus on stormwater BMPs ahead of rain in forecast.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: June 27, 2019
S M T W T **F** S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy
Wind: W 10 – 15 mph
Precipitation: Rain late afternoon
Temperature: 67 - 94°F

VISITORS ON SITE:
- Uncertain

EQUIPMENT ON SITE:
- 1-2 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 950
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew onsite – apparently finished Saucedo property on WWCr. 10-hour day.
- Continued installation of stormwater BMPs (matting, wattles, and hay bales).
- Day 12 of soil removal:
    - Moved to former operations area south of the C&D Landfill. Excavated >12" deep in some areas and soils still have elevated Cu and color/texture indicative of operations-related material.
    - Re-scraped several locations in SE corner with high Cu on R1 & R2 and had good success in the R3 tests.
    - Also grubbed area in extreme NW corner of site – ROW between Golf Course fence and paved road. No excavation along roadside due to weekend coming up. Traffic control necessary in curve at times. All 6 sample points from this area had very high Cu and light grayish material similar in appearance to material that rendered high Cu along roadside farther south.
- Loaded and hauled soil (using 2-3 haul trucks) to stockpile at MM #4. **Today's haul count was 53 loads; 620 loads total for project.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Despite deeper excavation (>12") in area south of C&D, visibly-impacted materials abound in some areas. Allan and York met Saturday (6/29) and discussed. Allan is concerned deeper excavation in some areas might yield unsafe slope. Will meet to discuss onsite Monday.
- Golder and Runyan - 17 XRF tests on R1-R3 samples, with 9 of the tests yielding <4500 ppm results. To date, 247 sample locations have Cu <4500 ppm and another 14 are outside project boundaries, so **approximately 58-65% of known sample locations are complete**.
- Ray (Runyan) kept up with sampling and Collector map updates since York was away. Sam visited the site for a few hours – just long enough to test the samples Ray collected. Sam subsequently downloaded data files and emailed to York.
- Runyan collected 2 assay samples (24 total from B-Ranch) from removal material. These are delivered to the Chino ENV building on regular intervals each week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough dust suppression and safety oversight by USA all day.
- Traffic control in curve of paved road during grubbing.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 01, 2019
S **M** T W T F S

PROJECT NUMBER: 18102605 | **PROJECT TITLE: HWCIU B-Ranch**
CONTRACTOR: USA Environment, L.P. | **LOCATION: Chino Mine**

WEATHER: Cloud cover: Clear to 100% cloudy | **Precipitation: Rain mid-afternoon**
Wind: W 10 – 25 mph | **Temperature: 63 - 88°F**

VISITORS ON SITE:
- Pam Pinson and Isak Larsen (Chino); David Mercer (NMED)

EQUIPMENT ON SITE:
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew onsite. 11-hour workday.
- Focused entirely on installation of stormwater BMPs (matting, wattles, and hay bales), grading, safety fencing, and dust control.
- Day 13 of project: No soil removal today.
- **Today's haul count was 0 loads; 620 loads total for project.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Allan, Ray, and York walked the former ops area south of C&D Landfill. R2 XRF testing yielded better-than-expected results such that the remaining area to be re-scraped is relatively well-defined and accessible with no additional safety concerns (e.g. steep slopes or foundations.)
- Runyan confirmed that USA excavated and swept to bedrock/caliche such that no soil was obtainable for sampling at 3 locations where elevated Cu had been detected despite multiple removal attempts.
- Golder and Runyan - 18 XRF tests on R1-R3 samples, with 9 of the tests yielding <4500 ppm results. To date, 256 sample locations have Cu <4500 ppm, 3 were scraped to bedrock, and another 15 are outside project boundaries, so **approximately 61-69% of known sample locations are complete**.
- York returned after 4 days away. He and Ray spent much of the day reconciling XRF test results with map entries, field logs, and archive samples.
- Pam, Isak, Allan, Ray, and York did a thorough drive around the site. Findings:
  - USA needs to excavate one small triangle-shaped area above the C&D landfill and then build a berm over for safety and stormwater control purposes. Other boundaries that have been established are in keeping with project goals and Pam's expectations.
  - USA must import backfill material (Gila conglomerate) for placement along the paved road on the west side of the site where drop-offs could present safety hazards in the future.
- Heavy rain last Friday pm caused minor erosion in some recently excavated areas. USA re-graded some of the areas and will use post-storm observations to guide final grading efforts.
- USA not excavating sliver at NW corner of site along paved road until after they return from break.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough dust suppression and safety oversight by USA all day.
- Strong effort to finish BMP installation before long weekend.
- Afternoon rain and a Red Alert due to lightning caused delays as crews sought shelter.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 09, 2019
S M **T** W T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Mostly clear
Wind: W 5 – 10 mph

Precipitation: None
Temperature: 59 - 88°F

VISITORS ON SITE:
- Mike Steward (FCX)

EQUIPMENT ON SITE:
- 2-3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 950
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew (minus 1 member) onsite after week off. 12-hour workday.
- Day 15 of project. Crew completed soil removal in all outlying areas: wedge at NW corner between paved road and fence, small triangular area west/above C&D, and one oil-impacted area adjacent to operations south of C&D.
- Crew moved to 5-acre area and completed grubbing and R1 scrape of approx. 35% - all on east side of fence.
- **Today's haul count was 40 loads; 691 loads total for project + loads of grubbed woody material to the C&D Landfill.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Mike Steward completed summary review of site and activities with Golder, Runyan, and USA Env. Also visited 2 residential properties that are to be remediated.
- USA initially focused on achieving Cu <4500 ppm at outlying locations. Now, all known exceedances outside the 5-acre area have been addressed. The only removal areas that remain are in the 5-acre area and a small strip north of the pipeline.
- Golder and Runyan completed 39 XRF tests on R1-R3 samples + numerous courtesy tests in the 5-acrea area. 21 tests yielded <4500 ppm results. To date, 299 sample locations have Cu <4500 ppm out of 390 known points = **76.7% of known sample locations are complete**.
- Golder and Runyan XRF testing could not keep pace with USA's removal effort as crew used blade, dozer, loader, and excavator to complete R1 scraping of 5-acre area where only a thin layer of soil lies above bedrock/caliche.
- Golder and Runyan will start testing at 06:00 tomorrow so USA operators have R1 results to guide effort at 5-acre area. R1 samples today show some areas with very high Cu and bluish material.
- Per Mike Steward, USA will segregate soil piles with high grade Cu (≥1% estimated, minimal rocks & debris) at MM#4 stockpile so Shared Services can haul directly to the mill. Golder and Allan (USA) will monitor pile contents to extent practicable and direct crew whether to dump at high or low-grade area.
- Runyan collected 2 assay samples (#27 & 28) from the MM#4 Stockpile and delivered them to Chino ENV. Also, Runyan collected a composite sample from approx. 12 piles at MM#4 and delivered them to the mill per Pam's request.

DAILY SUMMARY REPORT

DATE: July 09, 2019

S M **T** W T F S

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough dust suppression and safety oversight by USA all day.
- Traffic control as needed along paved road.
- Safety fencing and barricades in good shape after week off.
- Mike Steward is meeting with Tom Head (Chino) to discuss options for fencing along paved road on west boundary for safety and security purposes. Current shoulder is unsafe in places.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 10, 2019
S M T **W** T F S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Mostly clear
Wind: W 5 – 10 mph
Precipitation: None
Temperature: 64 - 92°F

VISITORS ON SITE:
- Chino ENV air monitoring personnel.

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 960
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 12-hour workday.
- Day 16 of project. Crew focused entirely on 5-acre area. Soil removal effort was fast paced on east half of area, east of fence line. Nearly all remaining grubbing was completed west of the fence line using excavator.
- **Today's haul count was 75 loads; 766 loads total for project + loads of grubbed woody material to the C&D Landfill.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:

Golder and Runyan worked hard all day to keep up with USA crew. Completed 57 XRF tests on R1-R6 samples & dozens of courtesy tests; all in the 5-acrea area. 32 tests yielded <4500 ppm results. To date, 331 sample locations have Cu <4500 ppm out of 390 known points = **84.8% of known sample locations are complete**.

- USA achieved <4500 ppm Cu in all but 5 sample locations east of the fence line that bisects the 5-acre area. These 5 locations are situated either beneath temporary stockpiles that will be hauled away tomorrow or within former drainage areas where particularly high Cu concentrations persist despite excavation cutting well into caliche. It is expected that target levels will be achieved in these areas by noon tomorrow and the entire USA effort will be refocused west of the fence line.
- USA encountered a yellowish, fine-grained material that appeared to be tailings immediately east of the fence, in the lowest part of the valley. It appeared this material was placed historically to provide a better working platform by in-filling the steep-walled valley. Cu concentrations were uniformly ~7800 ppm, so USA (per Chino guidance) continued cutting until target Cu levels were met. Ultimately, a 7'-deep layer of said material was removed from the deepest area. It is anticipated this fill pattern will persist west of the fence line.
- Shared Services used 3 haul trucks (777s) and a water wagon to move material through the middle of USA's haul route most of the day. Some minor delays were encountered but both teams communicated well and no major issues occurred.
- Weekly conference call today. Notes:
    - USA will work with HEI to locate underground lines in the vicinity of the aboveground pipeline located in the SE portion of the site. Locates must be completed prior to soil removal in this area.
    - Metal debris removed from the 5-acre area (including fencing) should be hauled to the recycler scrap yard vs. the C&D.
    - USA should place stormwater BMPs as areas are opened vs. waiting for large areas to be available…particularly with monsoon season here. Devan reported good efforts so far. In the future, areas that require matting should be seeded before installation. In areas where matting is already in place, Freeport will coordinate with USA to determine feasibility of seeding through or beneath the matting.

DAILY SUMMARY REPORT

DATE: July 10, 2019
S M T **W** T F S

- Mike Steward is working with Tom Head (Chino) to determine optimal fencing plan along paved road on west edge of site in order to reduce hazards associated with drop off along shoulder and to enhance security.
- Chino clarified requirements for high-grade vs. low-grade material segregation at the MM#4 stockpile. Given the relatively high Cu concentrations exhibited over much of the 5-acre area, all loads will be considered high-grade as long as they have no minimal debris, vegetation, and rock. After this clarification, USA began segregating qualifying material at the MM#4 stockpile. Most soil hauled prior to 13:00 today will meet high-grade designation, but the team who is loading trucks must visually screen for disqualifying elements.

- Runyan collected 2 assay samples (#29 & 30) from the MM#4 Stockpile. These samples are delivered to Chino ENV on regular intervals.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough dust suppression and safety oversight by USA all day.
- Good coordination with Shared Services trucks overseen by Tony Six (USA).
- Tony ensured safety berms placed at top edge of 5-acre area where grubbing opened potentially hazardous pathways.
- All personnel (USA, Golder, & Runyan) actively avoiding new high walls where potential for caving exists. Excellent excavation hazard awareness employed.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 11, 2019
S M T W **T** F S

PROJECT NUMBER: 18102605 | **PROJECT TITLE: HWCIU B-Ranch**
CONTRACTOR: USA Environment, L.P. | **LOCATION: Chino Mine**

WEATHER: Cloud cover: Partly Cloudy | **Precipitation: None, afternoon T-storms to north**
Wind: W 10 – 25mph | **Temperature: 64 - 85°F**

VISITORS ON SITE:
- Pam Pinson. David Mercer (NMED). HEI – utility locators

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

Note: Cat 950 Loader was demobilized from site today

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 12-hour workday (minus 3 lightning-related shutdowns).
- Day 17 of project. Crew focused primarily on 5-acre area, east of fence line. Soil removal effort was hampered by a wedge of copper-impacted material situated in the valley east of the fence between the caliche slope to the north and a reclaimed slope to the south. USA used the dozer to chase the pocket of high Cu until it was nearly 4' deep. Then, an excavator was used to delineate the material and excavate it.
- Soil removal in the 5-acre area was also hampered by the tailings-like material located in the valley adjacent to the fence. Using a dozer and excavator, tailings-like material was found at depths of nearly 10' below ground surface and in a channel as wide as 20' in some places.
- Grubbing continued west of the fence line using the excavator when available.
- HEI hydro-excavated (under USA's supervision) near the pipeline.
- **Today's haul count was 67 loads; 833 loads total for project + loads of metal to the scrapyard.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder and Runyan completed 8 XRF tests on R1-R7 samples & dozens of courtesy tests; mostly in the 5-acrea area. 4 tests yielded <4500 ppm results. To date, 335 sample locations have Cu <4500 ppm out of 390 known points = **85.9% of known sample locations are complete**.
- USA achieved <4500 ppm Cu in all but 1 sample location east of the fence line that bisects the 5-acre area. This location is situated near the temporary stockpile that grew considerably today as USA chased pockets of high Cu and tailings-like material.
- USA did not begin soil removal west of the fence line do to delays associated with increased soil volumes to the east.
- Shared Services used 2 haul trucks (777s) and a water wagon to move material through the middle of USA's haul route for a portion of the day.
- Freeport and Golder communicated throughout the day regarding ever-increasing size of excavations relating to removal of unexpectedly large/deep quantities of high-Cu soil and tailings-like material.
- USA plans to continue removal of soils with very high Cu and tailings-like material tomorrow after the overlying temporary stockpile is hauled to MM#4. The cavity resulting from removal of these materials will lead to ponding and a potential safety hazard. Therefore – at Freeport's suggestion – USA intends to haul 8" filter material from their North Hurley Stockpile for use as a cover/fill.
- USA worked with HEI to locate underground line in the vicinity of the aboveground pipeline located in the SE portion of the site. Line was 4' deep or more. Golder completed courtesy XRF tests along pipeline that showed only minor Cu impact. Minimal scraping is expected in the area.
- USA expects a delivery of stormwater BMPs tomorrow. They will seed areas before installing new matting.

DAILY SUMMARY REPORT

DATE: July 11, 2019
S M T W **T** F S

- Chino confirmed that the mill will not be able to receive high-grade material from B-Ranch; however, high-grade vs. low-grade will continue to be segregated at the MM#4 Stockpile for now.
- Runyan collected 2 assay samples (#31 & 32) from the MM#4 Stockpile.
- USA shut down 3 separate times for 30 minutes each because personnel observed lightning in the distance to the north. Freeport had several Yellow Alerts at the mine but no Alerts at Tailings. Tony Six explained it is company policy that all vehicles, equipment, and personnel must stop work for 30 minutes after any lightning is observed. Golder asked for clarification on this policy. Tony intends to talk to USA corporate H&S personnel to determine if flexibility might be possible given Freeport's Lightning Detection System.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough safety oversight by USA all day.
- USA Lightning Stand Downs – 3 @ 30 minutes each.
- All personnel (USA, Golder, & Runyan) actively avoiding high walls where potential for caving exists.
- Cones used to delineate newly-created low areas.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 12, 2019
S M T W T **F** S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly Cloudy
Wind: W 5 – 10mph
Precipitation: None, afternoon T-storms to north
Temperature: 58 - 93°F

VISITORS ON SITE:
- None

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 12-hour workday.
- Day 18 of project. Crew focused almost entirely on chasing tailings-like material in valley of 5-acre area, east of fence line. Used loader, dozer, excavator, and all 3 haul trucks to remove yellowish material all day. Volume of material was much larger than anticipated - with depths of 10' in places.
- Removed 200' section of fencing and posts that were separating east and west halves of 5-acre area. Hauled to scrapyard.
- Graded tailings "high-wall" (that formed during excavation along fence line) to a 3:1 slope to eliminate safety hazard.
- Used grader to improve roads, berms, and stormwater control features.
- **Today's haul count was 83 loads; 916 loads total for project + loads of metal to the scrapyard.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder and Runyan closely monitored excavation to ensure all tailings were removed while minimizing removal of unimpacted materials. There was only 1 XRF test: the last remaining sample location on the east half of the 5-acre area. To date, 336 sample locations have Cu <4500 ppm out of 390 known points = **86.2% of known sample locations are complete**.
- USA did not begin soil removal west of the fence line due to delays associated with increased soil volumes to the east. Looking at west area post-grubbing, it appears the valley floor will have deep tailings-like material as will at least 2 access roads.
- Shared Services did not work today. USA is running out of space in the MM#4 stockpile and is hoping Shared Services will doze more space next Monday.
- Instead of importing 8" filter material to fill the large hole created while chasing tailings, USA dozed clean material from both sides of the valley into the void, which created a much safer slope. Note: stormwater will still pond in this area unless substantial fill is imported.
- Runyan collected 2 assay samples (#33 & 34) from the MM#4 Stockpile and delivered to Chino ENV.
- Tony Six (USA Safety Officer) worked with his corporate office to tailor a Lightning Policy that relies more on Chino's Lightning Detection System. The new compromise emphasizes safety first while also considering the proximity of lightning (vs. automatically shutting down for 30 minutes when it is observed regardless of distance.)

DAILY SUMMARY REPORT

DATE: July 12, 2019
S M T W T **F** S

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough safety oversight by USA all day.
- USA Lightning Policy clarification.
- High wall eliminated – no hazard remaining there.
- Clean material pushed into newly-created low areas and cones used to delineate.
- BMPs checked and repaired as needed.
- Water trucks actively sprayed stockpile and open areas to create a crust going into the weekend.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 15, 2019
S **M** T W T F S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly Cloudy
Wind: 5 – 10mph
Precipitation: None, afternoon T-storms in area
Temperature: 63 - 95°F

VISITORS ON SITE:
- Pam Pinson (Chino); David Mercer (NMED)

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 12-hour workday.
- Day 19 of project. USA finished hauling all stockpiled soil from east side of fence in 5-acre area. Then, crew focused almost entirely on grubbing and scraping in 5-acre area, west of fence line. Made excellent progress on slopes and former operational areas.
- Segregated metals/debris and hauled some to scrapyard/C&D.
- Used grader to maintain haul roads.
- **Today's haul count was 67 loads; 983 loads total for project + loads of metal to the scrapyard.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder and Runyan completed 40 XRF tests on R1-R2 samples & courtesy tests; all in the 5-acrea area east of the fence line. 22 tests yielded Cu <4500 ppm results and 1 sample location was determined to be outside project boundaries. To date, 358 sample locations have Cu <4500 ppm out of 389 known points = **92.0% of known sample locations are complete**.
- Golder and Runyan closely monitored loading/hauling east of fence line in 5-acre area to ensure all tailings were removed while minimizing removal of unimpacted materials.
- Slopes and areas around former operations in 5-acre area west of fence line have generally exhibited lower than anticipated Cu concentrations, so initial scraping attempts have yielded good results. However, the lowest portion of the area appears to have deep tailings and a large stockpile of soil is already present from today's scraping. Thus, the 92.0% statistic (above) does not reflect actual work remaining since significant vertical excavation and haulage remains.
- Shared Services ran one haul truck today (a 789), which helped create more space for USA in the MM#4 stockpile.
- Runyan collected 2 assay samples (#35 & 36) from the MM#4 Stockpile and delivered to Chino ENV.
- Runyan delivered 41 samples, 1 cooler, and 5 chains of custody to Chino ENV for initial round of 10% split samples going to SVL.
- Shipment of stormwater BMPs arrived today. USA to begin installing tomorrow.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight and dust control by USA all day.
- No Red or Yellow Alerts although storms were visible in distance. USA continued working per their amended Lightning Policy
- Clean material pushed into newly-created low areas and cones used to delineate.

PREPARED BY GOLDER ASSOCIATES
York Morgan
Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 16, 2019
S M **T** W T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy to cloudy
Wind: 5 – 20mph

Precipitation: Strong afternoon T-storm
Temperature: 64 - 92°F

VISITORS ON SITE:
- None

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 966
- 1-2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 10-hour workday – thunderstorm ended workday 2 hours earlier than planned.
- Day 20 of project. USA focused almost entirely scraping and hauling in 5-acre area, west of fence line.
- Segregated metals/debris.
- **Today's haul count was 56 loads; 1039 loads total for project**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder and Runyan completed 15 XRF tests on R1-R3 samples & numerous courtesy tests; all in the 5-acrea area west of the fence line. 12 tests yielded Cu <4500 ppm results and 1 sample location was found to be outside project boundaries. To date, 370 sample locations have Cu <4500 ppm out of 388 known points = **95.4% of known sample locations are complete**.
- A strong thunderstorm dumped heavy rain on the site in the late afternoon – causing the crew to stop work early.
- The lowest portion of the remaining area appears to have deep tailings that will require significant vertical excavation and associated haulage.
- Shared Services ran haul trucks today, which helped create more space for USA in the MM#4 stockpile.
- One water truck was down most of the day with a flat tire.
- Encountered 8" HDPE line on south end of 5-acre area. Waiting for Chino to evaluate. No damage. Line surrounded by bluish material with Cu >20%.
- Runyan collected 2 assay samples (#37 & 38) from the MM#4 Stockpile and delivered to Chino ENV.
- Shipment of stormwater BMPs is onsite. USA to begin installation tomorrow.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight and dust control by USA all day.
- Red Alert toward end of day. USA shut down per their amended Lightning Policy
- Must evaluate erosion and other effects of today's rain.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 17, 2019
S M T **W** T F S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy to cloudy
Wind: 5 – 20mph
Precipitation: Light rain afternoon
Lightning: Afternoon Red Alert
Temperature: 64 - 92°F

VISITORS ON SITE:
- None

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 10-hour workday – thunderstorm ended workday 2 hours earlier than planned.
- Day 21 of project. USA focused almost entirely on loading & hauling in 5-acre area, west of fence line.
- Segregated metals/debris and hauled to scrapyard/C&D.
- BMP inspection revealed minimal damage from yesterday's storm.
- **Today's haul count was 48 loads; 1087 loads total for project**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder and Runyan completed 6 XRF tests on R1-R2 samples; all in the 5-acrea area west of the fence line. 5 tests yielded Cu <4500 ppm results. To date, 377 sample locations have Cu <4500 ppm out of 388 known points = **97.2% of known sample locations are complete**.
- Heavy thunder and lightning near the site in the late afternoon caused the crew to stop work early.
- USA reported that no Alert was issued for Tailings/Hurley yesterday. Pam Pinson (Chino) conferred with Chino Security regarding Lightning Detection System and was told reports over radio would be for "Hurley, Hurley Ops, or Filter Plant", not for "Tailings." York Morgan (Golder) spoke with Security (Carlos) at the Main Gate who said the Lake One channel is not reliable for Alerts…USA should use Security channel for best updates or call North Gate when in doubt. Tony Six reported that there was only a Yellow Alert today at Hurley despite lightning being very nearby (7 miles or less.)
- Pam reported that Rocky Mountain Reclamation wants to start seeding next week. USA agreed to work with them in clearing areas for seeding.
- Pam will try to visit site tomorrow to evaluate grading of 5-acre area to determine if USA should plan to import Gila conglomerate for fill to maintain positive drainage in low areas.
- The lowest portion of the remaining area has deep tailings that will require significant vertical excavation and associated haulage.
- Encountered 8" HDPE line on south end of 5-acre area yesterday. Waiting for Chino (Laramie) to evaluate. No damage. Line surrounded by bluish material with Cu >20%.
- Runyan collected 2 assay samples (#39 & 40) from the MM#4 Stockpile and delivered to Chino ENV.
- Shipment of stormwater BMPs is onsite. USA to begin installation this week.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight and dust control by USA all day.
- Lightning nearby toward end of day. USA shut down per their amended Lightning Policy.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 18, 2019
S M T W **T** F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy to cloudy
Wind: 5 – 20mph

Precipitation: Heavy rain afternoon
Lightning: Afternoon Red Alert
Temperature: 64 - 95°F

VISITORS ON SITE:
- David Mercer (NMED); Tom Head & colleague (Chino)

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 10-hour workday – thunderstorm ended workday 2 hours earlier than planned.
- Day 22 of project. USA focused almost on loading & hauling in 5-acre area, west of fence line and along narrow strip north of pipeline in SE corner of site.
- BMP inspection revealed minimal damage from yesterday's storm.
- Using motor grader to clean mud and rock from haul roads.
- **Today's haul count was 49 loads; 1,136 loads total for project**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder and Runyan completed 5 XRF tests on R1samples; all in either the 5-acrea area west of the fence line or the narrow strip along the pipeline. 5 tests yielded Cu <4500 ppm results. To date, 381 sample locations have Cu <4500 ppm out of 388 known points = **98.2% of known sample locations are complete**.
- Heavy rain and lightning in the late afternoon caused the crew to stop work early.
- York Morgan (Golder) spoke with Security at the Main Gate and North Gate in attempt to understand SOPs for broadcasting Alerts from Lightning Detection System. Security said protocol is to announce "Filter Plant" and/or "Tailings" when an Alert occurs in our work area. Today, the announcements for Yellow Alert were timely, but the Red Alert announcement didn't occur until lightning was <5 miles from work area. USA shut down work on its own accord.
- Tom Head and one of his colleagues were onsite evaluating areas along paved road, Golf Course, and B Ranch where fence replacement will be needed. They decided to return when USA's work is complete late next week. York emphasized need for fencing along road where drop off is present.
- Tony Six (USA – Safety) will be out for 1 week starting this afternoon. Allan Weiss will manage Safety in Tony's absence.
- USA is planning to import Gila conglomerate for fill to maintain positive drainage in low areas.
- The lowest portion of the remaining area has deep tailings that will require significant vertical excavation and associated haulage. USA initiated this effort this afternoon.
- Encountered 8" HDPE line on south end of 5-acre area Tuesday. Laramie (Chino) visited site and determined it is probably an old nitrogen line and that there are at least 2 other lines in area. I instructed USA not to excavate within 5' of the line for safety reasons. They used clean fill from nearby to re-cover the pipeline and surrounding area.
- York toured site with David Mercer (NMED) who arrived just as storm was moving in, so he participated in the activities associated with evaluating radar, talking to Security, monitoring Alerts, and ultimately shutting down work.
- Runyan collected 2 assay samples (#40 & 41) from the MM#4 Stockpile.
- Shipment of stormwater BMPs is onsite. USA to begin installation this week.

DAILY SUMMARY REPORT

DATE: July 18, 2019
S M T W **T** F S

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough safety oversight and dust control by USA all day.
- Lightning nearby toward end of day. USA shut down per their amended Lightning Policy combined with Red Alert status and proximity of lightning on radar and in actuality.
- Fencing still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 19, 2019
S M T W T **F** S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy to cloudy
Wind: 10 – 25 mph
Precipitation: Rain afternoon
Lightning: Afternoon Red Alert
Temperature: 64 - 95°F

VISITORS ON SITE:
- None

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer – Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon
- 1 Motor Grader – CatM60

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 10-hour workday – thunderstorm ended workday 2 hours earlier than planned for 4th day in a row.
- Day 23 of project. USA focused on excavating & hauling tailings-like material from 5-acre area, west of fence line except when Lake One Haul Rd was closed.
- Installed straw wattles within 5-acre area.
- Imported 16 loads of Gila Conglomerate from Tailings area and graded to fill low area and promote positive drainage in 5-acre area.
- BMP inspection revealed minimal damage from yesterday's storm.
- Used motor grader to clean mud and rock from haul roads.
- **Today's haul count pending; 1,136 + today's loads total for project**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder completed 8 XRF tests on R1-R5 samples; all in the 5-acrea area west of the fence line. 4 tests yielded Cu <4500 ppm results. To date, 385 sample locations have Cu <4500 ppm out of 389 known points = **99.0% of known sample locations are complete**. Only 4 sample locations remain.
- Pam Pinson called at 08:15 to say Lake One Haul Road was closed per Grant County Sheriff as law enforcement was having a standoff with an armed resident of North Hurley. The road was not re-opened until after 13:00. USA used the downtime to install nearly all the wattles needed for the site. They also stockpiled tailings material and imported Gila for fill.
- The lowest portion of the remaining area has tailings 12'-15' deep in places. USA's excavator and dozer spent the entire day removing yellowish tailings material while Golder evaluated to be sure removal was thorough without going to deep into underlying material.
- Golder collected 2 assay samples (#43 & 44) from the excavation stockpile.
- Allan Weiss (USA) said he will wait to install erosion control matting next week after Rocky Mountain Reclamation seeds the slopes.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight and dust control by USA all day.
- Lightning nearby toward end of day. USA shut down per their amended Lightning Policy combined with Red Alert status and proximity of lightning on radar and in actuality.
- Fencing is still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 20, 2019
S M T W T F **S**

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Clear
Wind: 5-10 mph

Precipitation: None
Lightning: None
Temperature: 65 - 94°F

VISITORS ON SITE:
- None

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Front End Loader – Cat 966
- 1 Water Truck – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Partial USA Env crew. 7-hour workday – to make up for time lost to lightning shut-downs 4 days of previous week.
- Day 24 of project. USA used partial crew to continue excavating & hauling tailings from 5-acre area.
- BMP inspection revealed minimal damage from yesterday's storm.
- **Today's haul count 45 loads; yesterday's was 43 loads; 1,224 loads total for project**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder & Runyan completed 2 XRF tests on R1 samples. Both tests yielded Cu <4500 ppm results. To date, 387 sample locations have Cu <4500 ppm out of 389 known points = **99.5% of known sample locations are complete**. Only 2 sample locations remain.
- The remaining area has tailings 15'-18' deep in places. USA spent the entire day removing yellowish tailings material while Runyan evaluated to be sure removal was thorough without going too deep into underlying material.
- Concrete culvert in remaining area has thin layer of dark sludge inside. This culvert might require removal depending on extent of tailings material near it.
- Runyan collected 2 assay samples (#45 & 46) from the excavation stockpile.
- Allan Weiss (USA) said he will wait to install erosion control matting next week after Rocky Mountain Reclamation seeds the slopes.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight and dust control by USA all day.
- Fencing is still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 22, 2019
S **M** T W T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Clear becoming cloudy
Wind: 5-10 mph

Precipitation: None
Lightning: To north, Yellow Alert
Temperature: 62 - 90°F

VISITORS ON SITE:
- David Mercer

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Motor grader – CatM60
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon
- 1 Dozer - Cat D6

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 10-hour workday – anticipating late afternoon storms.
- Day 25 of project. USA used full crew to continue excavating & hauling tailings from 5-acre area.
- Motor grader improved haul road and removed mud.
- BMP inspection revealed no damage.
- **Today's haul count 58 loads; 1,282 loads total for project**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder completed 0 XRF tests because no new location was ready. To date, 387 sample locations have Cu <4500 ppm out of 389 known points = **99.5% of known sample locations are complete**. Only 2 sample locations remain.
- The remaining area has tailings 15'-18' deep in places and wider than previously thought. USA spent the entire day removing yellowish tailings. A layer of tailings was uncovered that appears to go deep into bank to west where it might undercut a thick concrete foundation. Pam Pinson will visit site in morning to evaluate with USA and Golder.
- Concrete culvert in remaining area has thin layer of dark sludge inside. This culvert required removal because it was surrounded by tailings. USA drummed the sludge and wrapped the culvert in plastic.
- Golder collected 2 assay samples (#47 & 48) from the excavation stockpile.
- Allan Weiss (USA) said he will wait to install erosion control matting next week after Rocky Mountain Reclamation seeds the slopes. Rocky Mountain is scheduled to begin seeding Thursday.
- Golder toured site with David Mercer (NMED), who voiced no concerns.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight and dust control by USA all day.
- Fencing is still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 23, 2019
S M **T** W T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Clear becoming cloudy
Wind: 5-10 mph

Precipitation: None
Lightning: To north, Yellow Alert
Temperature: 62 - 81°F

VISITORS ON SITE:
- Pam Pinson & Shane Medley (Chino ENV)

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer - Cat D6
  *Motor grader demobed from site today
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 10-hour workday – anticipating late afternoon storms.
- Day 26 of project. USA used full crew to finish excavating & hauling tailings from 5-acre area.
- Rough-graded low areas and **imported 30 loads of Gila Conglomerate** (clean fill) to promote positive drainage.
- BMP inspection revealed minor damage, new wattles to be installed in SE corner.
- **Today's haul count 37 loads; 1,319 loads total for project…no more soil going to MM#4 stockpile.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Golder & Runyan completed 1 XRF test and determined one remaining location was out of bounds. **100% of known sample locations are complete**.
- USA spent more > half the day removing the remaining accessible yellowish tailings. Pam Pinson visited and agreed that tailings material remaining on steep west slope of 5-acre area must remain in place to avoid undermining C&D Landfill. USA will use imported Gila fill to cap all visible tailings during final grading of area.
- Golder & Runyan visually confirmed thorough removal of tailings from all accessible removal area surfaces. Then, USA regraded west half of 5-acre area – eliminating steep slopes and pushing clean material into low area created by deep tailings removal.
- USA nearly achieved positive drainage in 5-acre area with imported Gila fill. They will continue importing Gila tomorrow, then final grade, and prep for seeding.
- USA hauled concrete debris to C&D Landfill.
- Shane (Chino ENV) observed concrete culverts with dark sludge inside and drum of PCS. Chino will determine disposal requirements. Runyan will pick up 2 more drums tomorrow for USA for PCS storage…drums that Pam ordered and paid for.
- Runyan collected 2 assay samples (#49 & 50) from the excavation stockpile and delivered to Chino ENV bldg. No additional assay samples are expected from B Ranch.
- USA will wait to install erosion control matting after Rocky Mountain Reclamation seeds the slopes. Rocky Mountain is scheduled to begin seeding Thursday. USA will coordinate with Rocky Mountain to temporarily remove wattles to facilitate seeding.
- USA de-mobed the motor grader today. They will begin prepping for de-mobe of other unnecessary equipment tomorrow.
- Shared Services continued hauling material from the MM#4 stockpile today. Chris and Shane estimate that they could be done hauling by the end of the week.
- USA began bloodwork for a portion of its employees today in preparation for residential remediation. They will send remaining field crew for bloodwork before week's end.
- NMED – Joe Fox and David

DAILY SUMMARY REPORT

DATE: July 23, 2019
S M **T** W T F S

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK

- Thorough safety oversight and dust control by USA all day.
- Disposal of PCS drum(s) and concrete culvert pending.
- Yellow Alert toward end of shift with big storm moving in.
- Fencing is still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 24, 2019
S M T **W** T F S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy to cloudy
Wind: 5-10 mph
Temperature: 62 - 85°F
Precipitation: None
Lightning: To north

VISITORS ON SITE:
- Pam Pinson with NMED GW Division

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer - Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 10-hour workday – anticipating late afternoon storms.
- Day 27 of project.
- Rough-graded low areas and **imported 9 loads of Gila Conglomerate** (clean fill) to promote positive drainage and cap tailings material remaining on steep west slope.
- Dozer broke down – awaiting repairs. So, USA ceased import of Gila and began broadcasting seed by hand over slopes with matting. Crew also seeded additional slopes and installed matting on top.
- **Today's haul count was 2 loads; 1,321 loads total for project to MM#4 Stockpile.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- **100% of known XRF sample locations are complete**.
- USA nearly achieved positive drainage in 5-acre area with imported Gila fill before their dozer broke down. They will continue importing Gila tomorrow, then final grade, and prep for seeding – assuming dozer is repaired.
- Rocky Mountain is scheduled to begin seeding tomorrow. USA will coordinate with them to temporarily remove wattles to facilitate seeding.
- Shared Services continued hauling material from the MM#4 stockpile today.
- USA continued bloodwork for a portion of its employees today in preparation for residential remediation. They will send remaining field crew for bloodwork before week's end.
- First tour scheduled with NMED fell through, but GW Division briefly visited site with Pam.
- Allan (USA) and York (Golder) did a thorough walk through of entire site and identified minor punchlist items that USA will address before demobe. Golder typed up and distributed the punchlist.
- Runyan picked up bag of seed from Chino ENV and assisted with broadcasting it and installation of BMPs.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight by USA all day.
- Disposal of PCS drum(s) and concrete culvert pending.
- No lightning alerts today.
- Fencing is still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES
York Morgan
Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 25, 2019
S M T W **T** F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy to cloudy
Wind: 5-10 mph
Temperature: 62 - 90°F

Precipitation: None
Lightning: None

VISITORS ON SITE:
- Rocky Mountain Reclamation

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer - Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 10-hour workday – anticipating late afternoon storms.
- Day 28 of project. USA focused on final punchlist items today.
- Crew final-graded low areas and **imported 26 loads of Gila Conglomerate** (clean fill) to promote positive drainage and cap tailings material remaining on steep west slope. Dozer was repaired in morning.
- Crew installed more erosion matting on top and removed wattles to make room for Rocky Mountain Reclamation (RMR).
- **No loads to MM#4 Stockpile today; 1,321 loads total for project.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- **100% of known XRF sample locations are complete**.
- USA achieved positive drainage in 5-acre area with imported Gila fill. Tailings appear to have a good cap over them. NOTE: substantial stormwater volumes could be channeled through the 5-acre area. An engineered drainage channel might ultimately be required.
- Rocky Mountain began disking and seeding work today and made tremendous progress (as usual) in a short time. USA coordinated with them to facilitate effort. Allan rode around the site with their foreman and pointed out various boundaries and hazards. Allan will continue to keep an eye on them and help when needed.
- Runyan returned 1 bag of seed to Chino ENV and assisted USA with BMP work. Runyan also worked in lab, pulling samples from archives for 10% split analysis at SVL.
- Golder (York) was onsite in the morning but left in the afternoon for an alternate project. He will be away tomorrow.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight by USA all day.
- Disposal of PCS drum(s) and concrete culvert pending.
- No lightning alerts today.
- Fencing is still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES
York Morgan
Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 26, 2019
S M T W T **F** S

PROJECT NUMBER: 18102605
PROJECT TITLE: HWCIU B-Ranch
CONTRACTOR: USA Environment, L.P.
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy to cloudy
Wind: 5-10 mph
Temperature: 62 - 90°F
Precipitation: Heavy rain in afternoon
Lightning: Red Alert after crew shut down

VISITORS ON SITE:
- Rocky Mountain Reclamation

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer - Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 9-hour workday – anticipating late afternoon storms and running out of work.
- Day 29 of project. USA focused on final punchlist items today.
- Crew final-graded low areas and **imported ? loads of Gila Conglomerate** (clean fill) to promote positive drainage
- Crew coordinated with Rocky Mountain Reclamation (RMR) to facilitate seeding/mulching effort.
- **No new loads to MM#4 Stockpile; 1,321 loads total for project.**

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- **100% of known XRF sample locations are complete**.
- USA achieved positive drainage in 5-acre area with imported Gila fill. NOTE: substantial stormwater volumes could be channeled through the 5-acre area. An engineered drainage channel might ultimately be required.
- USA finished bloodwork for entire crew in advance of residential soils startup.
- RMR continued disking, seeding, and mulching - making good progress. USA moved wattles and graded areas to help the seeding effort.
- USA was running out of work as they finish B Ranch and prep for residential properties.
- Runyan helped USA and worked in lab, pulling samples from archives for 10% split analysis at SVL.
- Golder (York) was working out of town and was not able to reach Allan for discussion.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight by USA all day.
- Disposal of PCS drums and concrete culvert pending.
- Lightning alerts came in late afternoon, after crew was already gone.
- Fencing is still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

DAILY SUMMARY REPORT

DATE: July 29, 2019
S **M** T W T F S

PROJECT NUMBER: 18102605
CONTRACTOR: USA Environment, L.P.

PROJECT TITLE: HWCIU B-Ranch
LOCATION: Chino Mine

WEATHER: Cloud cover: Partly cloudy to cloudy
Wind: 5-10 mph
Temperature: 63 - 88°F

Precipitation: None
Lightning: Yellow Alert to north

VISITORS ON SITE:
- David Mercer (NMED)

EQUIPMENT ON SITE:
- 3 Articulated Haul Trucks – Cat 730
- 1 Excavator – Cat 323S
- 1 Dozer - Cat D6
- 1 Front End Loader – Cat 966
- 2 Water Trucks – 2500-gallon

* Note: Only the loader and 1 water truck remain on rental.

SUMMARY OF CONSTRUCTION ACTIVITIES:
- Full USA Env crew. 8-hour workday – running out of work.
- Day 30 of project. USA focused on final punchlist items again today.
- No new loads to MM#4 Stockpile; 1,321 loads total for project.

SUMMARY OF ACTIVITIES/MEETINGS/DISCUSSIONS/ISSUES:
- Rocky Mountain Reclamation hit Ty Bae's water line last Friday while disking soil – the line that runs through B-Ranch. Chino ops crew was able to turn off valve located near guard shack. Repairs made.
- RMR did not seed/mulch imported Gila Conglomerate in 5-acre area due to a misunderstanding. USA will hand-broadcast seed as needed including on steep slope where Gila material is capping tailings material, then USA will install its remaining erosion mats on the slope. Also, USA will break up remaining straw bales and use straw to mulch along the channel in the bottom of the 5-acre area. Per Mike, they will use dozer tracks running perpendicular to the slope to help crimp straw and prevent seed runoff. Also, they will use BMPs only as prescribed in FIP.
- RMR seeded the MM#5.5 stockpile area and the Gunner(?) area on Saturday. They demobed Sunday.
- USA punchlist items completed today:
    - Berms restored as needed throughout site.
    - Ramp removed at SE corner of site.
    - BMPs repaired/replaced on lower perimeter and throughout.
    - Oily soils placed in drum and labeled.
    - Placed orange fencing along paved road. Removed orange barricades.
- USA imported 26 loads of Gila and final graded it last Friday.
- USA prepping for Hurley Yards.
- Golder ran 10 XRF tests at 2 Santa Rita Rd on smelter bricks. Pam determined that the bricks must be drummed for later removal. She ordered drums that Runyan will pick up tomorrow.
- Golder toured site with David Mercer (NMED) – no issues arose.

SUMMARY OF HEALTH, SAFETY, ENVIRONMENT AND RISK
- Thorough safety oversight by USA all day.
- Disposal of PCS drums and concrete culvert pending.
- Fencing is still needed along paved road for safety (drop off hazard) and security reasons.

PREPARED BY GOLDER ASSOCIATES

York Morgan

Senior Field Technician

Appendix D

Laboratory Data Packages

One Government Gulch - PO Box 929
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www.svl.net

Freeport McMoRan - Chino Mines	**Project Name: HWCIU - XRF 5% Calibration Check**
PO Box 10	Work Order: **X9G0331**
Bayard, NM 88023	Reported: 30-Jul-19 11:42

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received	Notes
B-197 R1	X9G0331-01	Soil	14-Jun-19 15:43	YM	16-Jul-2019	
B-312 R1	X9G0331-02	Soil	14-Jun-19 16:55	YM	16-Jul-2019	
B-314 R1	X9G0331-03	Soil	15-Jun-19 08:00	YM	16-Jul-2019	
B-117 R1	X9G0331-04	Soil	15-Jun-19 09:33	YM	16-Jul-2019	
B-398 R1	X9G0331-05	Soil	15-Jun-19 10:44	YM	16-Jul-2019	
B-333 R1	X9G0331-06	Soil	15-Jun-19 12:23	YM	16-Jul-2019	
B-412 R1	X9G0331-07	Soil	15-Jun-19 14:20	YM	16-Jul-2019	
B-353 R1	X9G0331-08	Soil	17-Jun-19 09:07	YM	16-Jul-2019	
B-377 R1	X9G0331-09	Soil	17-Jun-19 10:09	YM	16-Jul-2019	
B-359 R1	X9G0331-10	Soil	17-Jun-19 12:14	YM	16-Jul-2019	
B-203 R1	X9G0331-11	Soil	17-Jun-19 14:42	YM	16-Jul-2019	
B-098 R2	X9G0331-12	Soil	17-Jun-19 16:28	YM	16-Jul-2019	
B-99 R3	X9G0331-13	Soil	18-Jun-19 11:12	YM	16-Jul-2019	
B-142 R4	X9G0331-14	Soil	18-Jun-19 12:28	YM	16-Jul-2019	
B-375 R2	X9G0331-15	Soil	18-Jun-19 15:23	YM	16-Jul-2019	
B-231 R1	X9G0331-16	Soil	20-Jun-19 09:11	YM	16-Jul-2019	
B-265 R1	X9G0331-17	Soil	20-Jun-19 12:11	YM	16-Jul-2019	
B-298 R1	X9G0331-18	Soil	20-Jun-19 14:35	YM	16-Jul-2019	
B-324 R1	X9G0331-19	Soil	21-Jun-19 07:25	YM	16-Jul-2019	
B-248 R1	X9G0331-20	Soil	21-Jun-19 10:20	YM	16-Jul-2019	

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.
Sample preparation is defined by the client as per their Data Quality Objectives.
This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.
Analyses were performed in accordance with SVL standard operating procedures and calibrations were performed and met SVL internal QC criteria.
The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

Case Narrative: X9G0331

The state of origin only accredits for drinking water analyses.

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Freeport McMoRan - Chino Mines
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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-197 R1**
SVL Sample ID: **X9G0331-01 (Soil)**

Sampled: 14-Jun-19 15:43
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	588	mg/kg	1.00	0.52		X930152	AS	07/26/19 14:33	M3
EPA 6010D	**Iron**	9650	mg/kg	20.0	6.6		X930152	AS	07/26/19 14:33	M3

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Dianne Gardner
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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-312 R1**
SVL Sample ID: **X9G0331-02 (Soil)**

Sampled: 14-Jun-19 16:55
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	3730	mg/kg	1.00	0.52		X930152	AS	07/26/19 14:42	
EPA 6010D	**Iron**	22800	mg/kg	20.0	6.6		X930152	AS	07/26/19 14:42	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-314 R1**
SVL Sample ID: **X9G0331-03 (Soil)**

Sampled: 15-Jun-19 08:00
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	2200	mg/kg	1.00	0.52		X930152	AS	07/26/19 14:45	
EPA 6010D	**Iron**	18900	mg/kg	20.0	6.6		X930152	AS	07/26/19 14:45	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-117 R1**
SVL Sample ID: **X9G0331-04 (Soil)**

Sampled: 15-Jun-19 09:33
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	325	mg/kg	1.00	0.52		X930152	AS	07/26/19 14:48	
EPA 6010D	**Iron**	19000	mg/kg	20.0	6.6		X930152	AS	07/26/19 14:48	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-398 R1**
SVL Sample ID: **X9G0331-05 (Soil)**

Sampled: 15-Jun-19 10:44
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	13100	mg/kg	10.0	5.20	10	X930152	DJS	07/26/19 17:57	D2
EPA 6010D	**Iron**	22000	mg/kg	200	66.0	10	X930152	DJS	07/26/19 17:57	D1

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-333 R1**
SVL Sample ID: **X9G0331-06 (Soil)**

Sampled: 15-Jun-19 12:23
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	1440	mg/kg	1.00	0.52		X930152	AS	07/26/19 14:54	
EPA 6010D	**Iron**	14100	mg/kg	20.0	6.6		X930152	AS	07/26/19 14:54	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-412 R1**
SVL Sample ID: **X9G0331-07 (Soil)**

Sampled: 15-Jun-19 14:20
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	4780	mg/kg	10.0	5.20	10	X930152	AS	07/26/19 16:06	D2
EPA 6010D	**Iron**	25600	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:03	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-353 R1**
SVL Sample ID: **X9G0331-08 (Soil)**

Sampled: 17-Jun-19 09:07
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	2690	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:06	
EPA 6010D	**Iron**	19400	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:06	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-377 R1**
SVL Sample ID: **X9G0331-09 (Soil)**

Sampled: 17-Jun-19 10:09
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	5650	mg/kg	10.0	5.20	10	X930152	AS	07/26/19 16:09	D2
EPA 6010D	**Iron**	25100	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:09	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-359 R1**
SVL Sample ID: **X9G0331-10 (Soil)**

Sampled: 17-Jun-19 12:14
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	166	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:12	
EPA 6010D	**Iron**	10300	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:12	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-203 R1**
SVL Sample ID: **X9G0331-11 (Soil)**

Sampled: 17-Jun-19 14:42
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	452	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:15	
EPA 6010D	**Iron**	15500	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:15	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-098 R2**
SVL Sample ID: **X9G0331-12 (Soil)**

Sampled: 17-Jun-19 16:28
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	6120	mg/kg	10.0	5.20	10	X930152	AS	07/26/19 16:12	D2
EPA 6010D	**Iron**	23200	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:18	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-99 R3**
SVL Sample ID: **X9G0331-13 (Soil)**

Sampled: 18-Jun-19 11:12
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	2280	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:21	
EPA 6010D	**Iron**	18400	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:21	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-142 R4**
SVL Sample ID: **X9G0331-14 (Soil)**

Sampled: 18-Jun-19 12:28
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	2060	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:24	
EPA 6010D	**Iron**	20400	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:24	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-375 R2**
SVL Sample ID: **X9G0331-15 (Soil)**

Sampled: 18-Jun-19 15:23
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	2780	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:27	
EPA 6010D	**Iron**	21900	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:27	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-231 R1**
SVL Sample ID: **X9G0331-16 (Soil)**

Sampled: 20-Jun-19 09:11
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	8320	mg/kg	10.0	5.20	10	X930152	AS	07/26/19 16:21	D2
EPA 6010D	**Iron**	20900	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:30	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-265 R1**
SVL Sample ID: **X9G0331-17 (Soil)**

Sampled: 20-Jun-19 12:11
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	1630	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:39	
EPA 6010D	**Iron**	18000	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:39	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-298 R1**
SVL Sample ID: **X9G0331-18 (Soil)**

Sampled: 20-Jun-19 14:35
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	497	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:42	
EPA 6010D	**Iron**	11400	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:42	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-324 R1**
SVL Sample ID: **X9G0331-19 (Soil)**

Sampled: 21-Jun-19 07:25
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	3880	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:45	
EPA 6010D	**Iron**	18400	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:45	

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Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Client Sample ID: **B-248 R1**
SVL Sample ID: **X9G0331-20 (Soil)**

Sampled: 21-Jun-19 10:20
Received: 16-Jul-19
Sampled By: YM

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	**Copper**	3810	mg/kg	1.00	0.52		X930152	AS	07/26/19 15:49	
EPA 6010D	**Iron**	17400	mg/kg	20.0	6.6		X930152	AS	07/26/19 15:49	

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Bayard, NM 88023

Project Name: HWCIU - XRF 5% Calibration Check
Work Order: **X9G0331**
Reported: 30-Jul-19 11:42

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods								
EPA 6010D	Copper	mg/kg	<1.00	0.52	1.00	X930152	26-Jul-19	
EPA 6010D	Iron	mg/kg	<20.0	6.6	20.0	X930152	26-Jul-19	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods									
EPA 6010D	Copper	mg/kg	100	100	100	80 - 120	X930152	26-Jul-19	
EPA 6010D	Iron	mg/kg	990	1000	99.0	80 - 120	X930152	26-Jul-19	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Recovery	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010D	Copper	mg/kg	704	588	100	116	75 - 125	X930152	26-Jul-19	
EPA 6010D	Iron	mg/kg	12500	9650	1000	0.30R>S	75 - 125	X930152	26-Jul-19	M3

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	% Rec.	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods											
EPA 6010D	Copper	mg/kg	722	704	100	0.30R>S	2.6	20	X930152	26-Jul-19	M3
EPA 6010D	Iron	mg/kg	14900	12500	1000	0.30R>S	17.3	20	X930152	26-Jul-19	M3

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Freeport McMoRan - Chino Mines	**Project Name: HWCIU - XRF 5% Calibration Check**	
PO Box 10	Work Order:	**X9G0331**
Bayard, NM 88023	Reported:	30-Jul-19 11:42

Notes and Definitions

D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of target analyte.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
0.30R>S	% recovery not applicable; spike level is less than 30% of the sample concentration
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

Appendix E

Photograph Log

APPENDIX E - PHOTOGRAPH LOG

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 1

Description:
Facing Northwest

Location:
Photograph Location 2

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 2

Description:
Facing Southeast

Location:
Photograph Location 3

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 3

Description:
Facing Southwest

Location:
Photograph Location 4

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 4

Description:
Facing South

Location:
Photograph Location 5

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 5

Description:
Facing South

Location:
Photograph Location 6

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 6

Description:
Facing Southeast

Location:
Photograph Location 7

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 7

Description:
Facing West

Location:
Photograph Location 8

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 8

Description:
Facing West

Location:
Photograph Location 8

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 9

Description:
Facing West

Location:
Photograph Location 8

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 10

Description:
Facing Southeast

Location:
Photograph Location 9

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 11

Description:
Facing Southeast

Location:
Photograph Location 9

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 12

Description:
Facing East

Location:
Photograph Location 10

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 13

Description:
Facing East

Location:
Photograph Location 10

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 14

Description:
Facing East

Location:
Photograph Location 10

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 15

Description:
Facing East

Location:
Photograph Location 10

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 16

Description:
Facing West

Location:
Photograph Location 11

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 17

Description:
Facing West

Location:
Photograph Location 11

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 18

Description:
Facing West

Location:
Photograph Location 11

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 19

Description:
Facing West

Location:
Photograph Location 11

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 20

Description:
Facing East

Location:
Photograph Location 12

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 21

Description:
Facing East

Location:
Photograph Location 12

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 22

Description:
Facing East

Location:
Photograph Location 12

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 23

Description:
Facing East

Location:
Photograph Location 13

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 24

Description:
Facing East

Location:
Photograph Location 13

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 25

Description:
Facing East

Location:
Photograph Location 13

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 26

Description:
Facing East

Location:
Photograph Location 13

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 27

Description:
Facing East

Location:
Photograph Location 14

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 28

Description:
Facing East

Location:
Photograph Location 14

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 29

Description:
Facing East

Location:
Photograph Location 14

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 30

Description:
Facing Northwest

Location:
Photograph Location 15

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 31

Description:
Facing Northwest

Location:
Photograph Location 15

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 32

Description:
Facing Northwest

Location:
Photograph Location 15

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 33

Description:
Facing Southeast

Location:
Photograph Location 16

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 34

Description:
Facing Southeast

Location:
Photograph Location 16

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 35

Description:
Facing Southeast

Location:
Photograph Location 16

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 36

Description:
Facing Southwest

Location:
Photograph Location 17

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 37

Description:
Facing Southwest

Location:
Photograph Location 17

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 38

Description:
Facing Southwest

Location:
Photograph Location 17

Photograph taken by:
Golder Associates

Construction Phase:
Pre-Construction

Photograph: 39

Description:
Facing Northwest

Location:
Photograph Location 20

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Photograph: 40

Description:
Facing Northeast

Location:
Photograph Location 21

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Photograph: 41

Description:
Facing Southwest

Location:
Photograph Location 21

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Photograph: 42

Description:
Facing Southwest

Location:
Photograph Location 23

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 43

Description:
Facing Southwest

Location:
Photograph Location 23

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 44

Description:
BMP placement

Location:
Photograph Location 24

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 45

Description:
BMP placement

Location:
Photograph Location 24

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 46

Description:
BMP placement

Location:
Photograph Location 25

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 47

Description:
BMP placement

Location:
Photograph Location 26

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 48

Description:
Facing South

Location:
Photograph Location 28

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 49

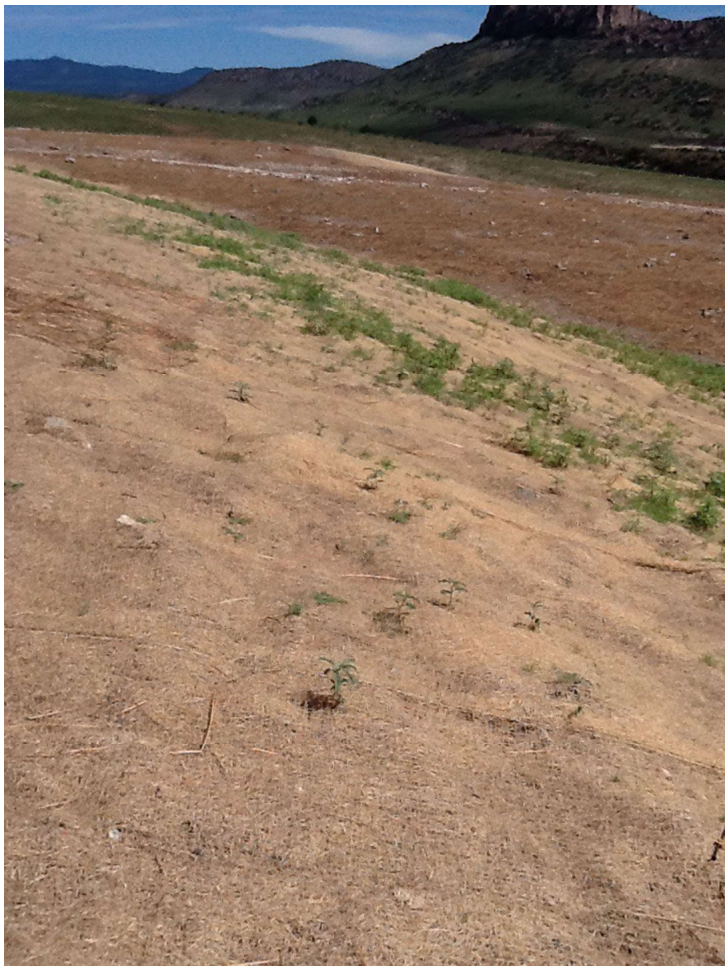
Description:
Facing South

Location:
Photograph Location 28

Photograph taken by:
Golder Associates

Construction Phase:
Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico



Photograph: 50

Description:
Facing South

Location:
Photograph Location 28

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 51

Description:
Facing Northeast

Location:
Photograph Location 29

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 52

Description:
Facing Northeast

Location:
Photograph Location 29

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 53

Description:
Facing Northeast

Location:
Photograph Location 29

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 54

Description:
Facing Northeast

Location:
Photograph Location 29

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 55

Description:
BMP placement

Location:
Photograph Location 30

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 56

Description:
BMP placement

Location:
Photograph Location 30

Photograph taken by:
Golder Associates

Construction Phase:
Post--Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 57

Description:
BMP placement

Location:
Photograph Location 31

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 58

Description:
BMP placement

Location:
Photograph Location 31

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 59

Description:
Facing East

Location:
Photograph Location 32

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 60

Description:
Facing East

Location:
Photograph Location 32

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 61

Description:
Facing West

Location:
Photograph Location 33

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 62

Description:
Facing West

Location:
Photograph Location 33

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 63

Description:
Facing West

Location:
Photograph Location 33

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 64

Description:
Facing East

Location:
Photograph Location 34

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 65

Description:
Facing East

Location:
Photograph Location 34

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 66

Description:
Facing East

Location:
Photograph Location 34

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 67

Description:
Facing West

Location:
Photograph Location 35

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 68

Description:
Facing West

Location:
Photograph Location 35

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 69

Description:
Facing West

Location:
Photograph Location 35

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 70

Description:
Facing Northwest

Location:
Photograph Location 36

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 71

Description:
Facing Northwest

Location:
Photograph Location 36

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Freeport-McMoRan Chino Mines Company
B-Ranch Investigation Area
Vanadium, New Mexico

Photograph: 72

Description:
Facing Northwest

Location:
Photograph Location 36

Photograph taken by:
Golder Associates

Construction Phase:
Post-Construction

Appendix F

Air Quality Reports

FREEPORT-McMoRan

CONTRACTOR RECLAMATION—HURLEY B Ranch

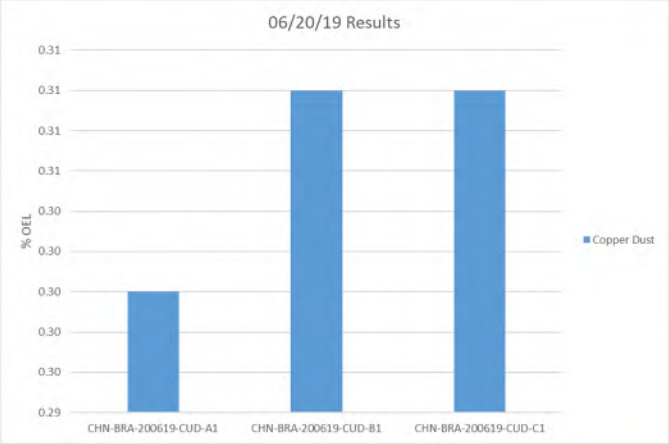
SUMMARY

On June 20th, 2019, three personal respirable crystalline silica samples were collected from three USA Environment, L.P. reclamation contractors performing routine work reclaiming surface Copper at Hurley B Ranch. In addition, three stationary samples of respirable Copper were collected from three strategic locations to assess possible exposures to the residents of Hurley. These specific areas were selected due to high traffic and windy locations. (Refer to Appendix B). USA contractors are not currently required to wear respiratory PPE. The personal and area samples were sent to Maxxam Labs to be analyzed using the NIOSH 7500 method. This is the first of two sampling periods to assess potential exposures to employees and the public.

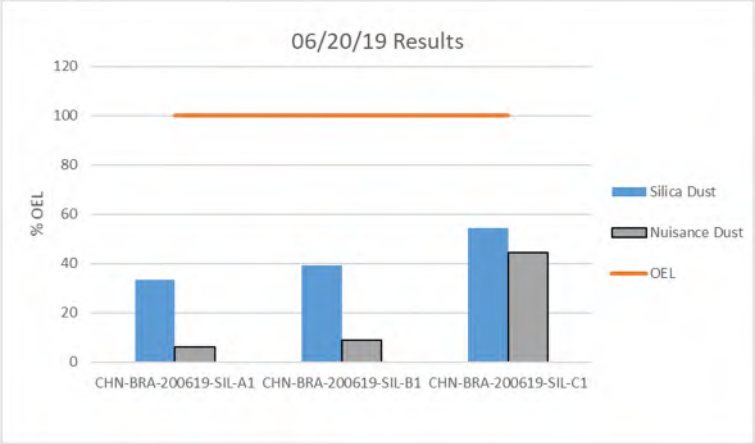
RESULTS

The results show the USA contractors were below the Freeport-McMoRan OEL[1] for respirable crystalline silica, nuisance dust, and copper dust. (Graph 1, 2) One data point in Graph 2 is over 50% OEL, however the concentration in Appendix A shows the exposure was less than 12 ug/m^3, which would be under the limit of detection. Copper dust was negligent and will not be sampled in further testing.

Graph 1



Graph 2



RECOMMENDATIONS

- Remain in operator cab as much as possible
- Perform routine checks on cab seals on both trucks and equipment
- Routinely clean/replace cabin air filters
- Utilize water truck in area as needed
- Half-faced respirators with P100 filters may be worn at operator's discretion under the assumption that the operator has been fit tested

Report Prepared by:

Logan Ingalls BS PH
Health & Safety Intern
Office: 575-912-5100
Email: lingalls@fmi.com

For questions, please contact NMO Health and Safety.

[1] Occupational Exposure Limit

Appendix A: Cority Results

Sample Number	Agent	Type	Limit Type	Volume	><	Conc.	Units	%OEL	Location Comments
CHN-BRA-200619-CUD-A1	COPPER-DUST AND MIST	Area	12 HR TWA	494.265	<	0.002	MG/M3	0.3	Top Stationary Tripod
CHN-BRA-200619-CUD-B1	COPPER-DUST AND MIST	Area	12 HR TWA	466.83	<	0.0021	MG/M3	0.31	Bottom Stationary Tripod
CHN-BRA-200619-CUD-C1	COPPER-DUST AND MIST	Area	12 HR TWA	476.805	<	0.0021	MG/M3	0.31	Stationary middle tripod
CHN-BRA-200619-SIL-A1	CRISTOBALITE (R)	Personal	12 HR TWA	600.24	<	8.3	UG/M3	33.33	Dry. Water truck cycling through area.
CHN-BRA-200619-SIL-B1	CRISTOBALITE (R)	Personal	12 HR TWA	596.475	<	8.4	UG/M3	39.39	Operator. Dry. Cycling water truck.
CHN-BRA-200619-SIL-C1	CRISTOBALITE (R)	Personal	12 HR TWA	601.425	<	8.3	UG/M3	42.42	Supervisor. Directing work. Dry. Cycling water truck.
CHN-BRA-200619-SIL-A1	NUISANCE DUST (R)	Personal	12 HR TWA	600.24	<	0.083	MG/M3	6	Dry. Water truck cycling through area.
CHN-BRA-200619-SIL-B1	NUISANCE DUST (R)	Personal	12 HR TWA	596.475		0.13	MG/M3	9	Operator. Dry. Cycling water truck.
CHN-BRA-200619-SIL-C1	NUISANCE DUST (R)	Personal	12 HR TWA	601.425		0.83	MG/M3	44.5	Supervisor. Directing work. Dry. Cycling water truck.
CHN-BRA-200619-SIL-A1	SILICA, CRYSTALLINE QUARTZ (R)	Personal	12 HR TWA	600.24	<	8.3	UG/M3	33.33	Dry. Water truck cycling through area.
CHN-BRA-200619-SIL-B1	SILICA, CRYSTALLINE QUARTZ (R)	Personal	12 HR TWA	596.475	<	8.4	UG/M3	39.39	Operator. Dry. Cycling water truck.
CHN-BRA-200619-SIL-C1	SILICA, CRYSTALLINE QUARTZ (R)	Personal	12 HR TWA	601.425	<	12	UG/M3	**54.55**	Supervisor. Directing work. Dry. Cycling water truck.

Appendix B: Stationary Sample Map

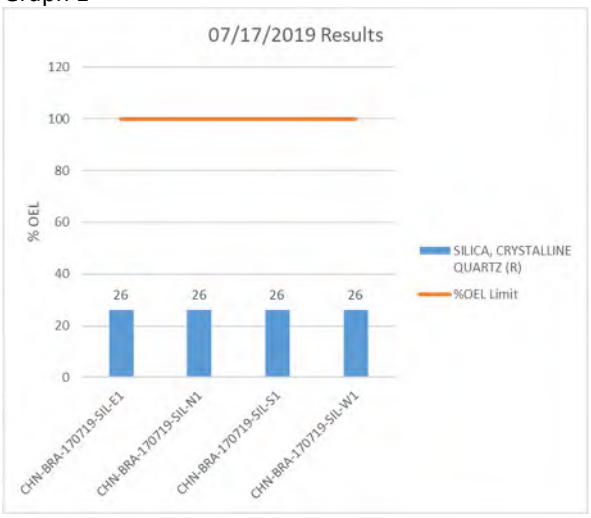
SUMMARY

On July 17th, 2019, four area samples of respirable crystalline silica were collected from four strategic locations (Map 1) of Hurley B Ranch reclamation site. Contractors were performing routine work reclaiming surface Copper and area samples were collected for an 8-hour period to determine if there were any perimeter exposures. Respiratory protective equipment is not required among the contractors currently. The collected samples were sent to Maxxam Labs to be analyzed using the NIOSH 7500 method. This is the second of two surveys sampled.

RESULTS

The results show the contractors were under the Freeport-McMoRan OELs[1] for respirable crystalline silica and nuisance dust (ND). (See Graph 1) No action required at this time for silica dust or ND. ND was negligent and will not be included in the graph. (For results, see Appendix A for data on ND)

Graph 1



Map 1

RECOMMENDATIONS

- Continue use of water truck in area
- Routinely replace cabin air filters with P100 filters
- Remain in operator cab as often as possible
- Perform routine checks on cab seals on both trucks and equipment

Report Prepared by:

Logan Ingalls BS PH
Health & Safety Intern
Office: 575-912-5100
Email: logan.ingalls3@gmail.com

For questions, please contact NMO Health and Safety.

[1] Occupational Exposure Limit

Appendix A: Cority Results

Sample Number	Agent	Sample Type	Limit Type	Volume	><	Concentration	Units	%OEL	Location Comments
CHN-BRA-170719-SIL-E1	CRISTOBALITE (R)	Area	8 HR TWA	566.58	<	8.8	UG/M3	26	Sample was located on the East side of the perimeter. It was close to the road.
CHN-BRA-170719-SIL-E1	NUISANCE DUST (R)	Area	8 HR TWA	566.58	<	0.088	UG/M3	0	Sample was located on the East side of the perimeter. It was close to the road.
CHN-BRA-170719-SIL-E1	SILICA, CRYSTALLINE QUARTZ (R)	Area	8 HR TWA	566.58	<	8.8	UG/M3	26	Sample was located on the East side of the perimeter. It was close to the road.
CHN-BRA-170719-SIL-E1	TRIDYMITE (R)	Area	8 HR TWA	566.58	<	18	UG/M3	104	Sample was located on the East side of the perimeter. It was close to the road.
CHN-BRA-170719-SIL-N1	CRISTOBALITE (R)	Area	8 HR TWA	570	<	8.8	UG/M3	26	Routine water truck sin the area. Secured to a rock to prevent tipping. Windy, hot, busy road.
CHN-BRA-170719-SIL-N1	NUISANCE DUST (R)	Area	8 HR TWA	570	<	0.088	UG/M3	0	Routine water truck sin the area. Secured to a rock to prevent tipping. Windy, hot, busy road.
CHN-BRA-170719-SIL-N1	SILICA, CRYSTALLINE QUARTZ (R)	Area	8 HR TWA	570	<	8.8	UG/M3	26	Routine water truck sin the area. Secured to a rock to prevent tipping. Windy, hot, busy road.
CHN-BRA-170719-SIL-N1	TRIDYMITE (R)	Area	8 HR TWA	570	<	18	UG/M3	108	Routine water truck sin the area. Secured to a rock to prevent tipping. Windy, hot, busy road.
CHN-BRA-170719-SIL-S1	CRISTOBALITE (R)	Area	8 HR TWA	573.645	<	8.7	UG/M3	26	Water truck in the area for dust control. By the fence on the south side.
CHN-BRA-170719-SIL-S1	NUISANCE DUST (R)	Area	8 HR TWA	573.645	<	0.087	UG/M3	0	Water truck in the area for dust control. By the fence on the south side.
CHN-BRA-170719-SIL-S1	SILICA, CRYSTALLINE QUARTZ (R)	Area	8 HR TWA	573.645	<	8.7	UG/M3	26	Water truck in the area for dust control. By the fence on the south side.
CHN-BRA-170719-SIL-S1	TRIDYMITE (R)	Area	8 HR TWA	573.645	<	17	UG/M3	84	Water truck in the area for dust control. By the fence on the south side.
CHN-BRA-170719-SIL-W1	CRISTOBALITE (R)	Area	8 HR TWA	558.33	<	9	UG/M3	26	Water truck in the area, secured to a rock to prevent tipping. High traffic area, rained the night before.
CHN-BRA-170719-SIL-W1	NUISANCE DUST (R)	Area	8 HR TWA	558.33	<	0.09	UG/M3	0	Water truck in the area, secured to a rock to prevent tipping. High traffic area, rained the night before.
CHN-BRA-170719-SIL-W1	SILICA, CRYSTALLINE QUARTZ (R)	Area	8 HR TWA	558.33	<	9	UG/M3	26	Water truck in the area, secured to a rock to prevent tipping. High traffic area, rained the night before.
CHN-BRA-170719-SIL-W1	TRIDYMITE (R)	Area	8 HR TWA	558.33	<	18	UG/M3	104	Water truck in the area, secured to a rock to prevent tipping. High traffic area, rained the night before.

Appendix G

Water Truck Source Water Quality Report

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

December 31, 2018

Stephanie Stringer

NMED Drinking Water SF
525 Camino de Los Marquez Suite 4
Santa Fe, NM 87505
TEL: (505) 476-8600
FAX

RE: NM3522409 OrderNo.: 1812232
Freeport McMoran Chino Mines

Dear Stephanie Stringer:

Hall Environmental Analysis Laboratory received 6 sample(s) on 12/5/2018 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

John Caldwell

Supervisor

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order: **1812232**
Date Reported: **12/31/2018**

CLIENT:	NMED Drinking Water SF	**Client Sample ID:**	HAL157656
Facility:	NM3522409 Freeport McMoran Chino M	**Collection Date:**	12/4/2018 11:31:00 AM
Lab ID:	1812232-001	**Received Date:**	12/5/2018 8:45:00 AM
Location:	036	**Compliance Safe:**	YES
Matrix:	Aqueous		

Analyses		Result	RL	Qual	Units	MCL	DF	
EPA METHOD 300.0: ANIONS								Analyst: **MRA**
SDWIS								Date Analyzed
1025	Fluoride	2.1	0.10		mg/L	4.0	1	12/13/2018 9:58:20 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order: **1812232**
Date Reported: **12/31/2018**

CLIENT:	NMED Drinking Water SF	**Client Sample ID:**	HAL157592
Facility:	NM3522409 Freeport McMoran Chino M	**Collection Date:**	12/4/2018 11:34:00 AM
Lab ID:	1812232-002	**Received Date:**	12/5/2018 8:45:00 AM
Location:	036	**Compliance Safe:**	YES
Matrix:	Aqueous		

Analyses		**Result**	**RL**	**Qual**	**Units**	**MCL**	**DF**	
EPA METHOD 300.0: ANIONS								Analyst: **MRA**
SDWIS								Date Analyzed
1038	Nitrate+Nitrite as N	0.62	0.50		mg/L	10	2.5	12/18/2018 11:18:06 A

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order: **1812232**
Date Reported: **12/31/2018**

CLIENT:	NMED Drinking Water SF	**Client Sample ID:**	HAL157591
Facility:	NM3522409 Freeport McMoran Chino M	**Collection Date:**	12/4/2018 11:32:00 AM
Lab ID:	1812232-003	**Received Date:**	12/5/2018 8:45:00 AM
Location:	036	**Compliance Safe:**	YES
Matrix:	Aqueous		

Analyses		**Result**	**RL**	**Qual**	**Units**	**MCL**	**DF**	
EPA METHOD 200.7: METALS								Analyst: **ELS**
SDWIS								Date Analyzed
1010	Barium	0.018	0.0020		mg/L	2.0	1	12/11/2018 10:36:15 P
1020	Chromium	ND	0.0060		mg/L	0.10	1	12/11/2018 10:36:15 P
1036	Nickel	ND	0.010		mg/L	0.10	1	12/11/2018 10:36:15 P
1052	Sodium	44	1.0		mg/L		1	12/11/2018 10:36:15 P
1095	Zinc	ND	0.010		mg/L	5.0	1	12/13/2018 7:59:47 PM
EPA 200.8: METALS								Analyst: **DBK**
SDWIS								Date Analyzed
1074	Antimony	ND	0.0010		mg/L	0.0060	1	12/11/2018 2:05:50 PM
1005	Arsenic	0.0044	0.0010		mg/L	0.010	1	12/11/2018 2:05:50 PM
1075	Beryllium	ND	0.0010		mg/L		1	12/11/2018 6:20:06 PM
1015	Cadmium	ND	0.00050		mg/L	0.0050	1	12/11/2018 2:05:50 PM
1045	Selenium	ND	0.0010		mg/L	0.050	1	12/11/2018 2:05:50 PM
1085	Thallium	ND	0.00050		mg/L	0.0020	1	12/11/2018 2:05:50 PM
EPA METHOD 245.1: MERCURY								Analyst: **pmf**
SDWIS								Date Analyzed
1035	Mercury	ND	0.00020		mg/L	0.0020	1	12/21/2018 12:01:03 P

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT:	NMED Drinking Water SF	**Client Sample ID:**	HAL148319
Facility:	NM3522409 Freeport McMoran Chino M	**Collection Date:**	12/4/2018 11:33:00 AM
Lab ID:	1812232-004	**Received Date:**	12/5/2018 8:45:00 AM
Location:	036	**Compliance Safe:**	YES
Matrix:	Aqueous		

Analyses		Result	RL	Qual	Units	MCL	DF	
EPA METHOD 504.1: EDB/DBCP								Analyst: **JME**
SDWIS								Date Analyzed
2931	1,2-Dibromo-3-chloropropane	ND	0.019		µg/L	0.20	1	12/11/2018 11:35:20 A
2946	1,2-Dibromoethane	ND	0.0094		µg/L	0.050	1	12/11/2018 11:35:20 A
525.2 SYNTHETIC ORGANICS								Analyst: **SUB**
SDWIS								Date Analyzed
2035	Di(2-Ethylhexyl)adipate	ND	0.200		ug/L	400	1	12/19/2018 6:30:00 AM
2042	Hexachlorocyclopentadiene	ND	0.100		ug/L	50.0	1	12/19/2018 6:30:00 AM
2050	Atrazine	ND	0.100		ug/L	3.00	1	12/19/2018 6:30:00 AM
2051	Alachlor	ND	0.200		ug/L	2.00	1	12/19/2018 6:30:00 AM
2274	Hexachlorobenzene	ND	0.100		ug/L	1.00	1	12/19/2018 6:30:00 AM
2039	Di(2-ethylhexyl)phthalate	ND	0.600		ug/L	6.00	1	12/19/2018 6:30:00 AM
2306	Benzo(a)pyrene	ND	0.0200		ug/L	0.200	1	12/19/2018 6:30:00 AM
2037	Simazine	ND	0.0700		ug/L	4.00	1	12/19/2018 6:30:00 AM
EPA 531.2: CARBAMATES								Analyst: **SUB**
SDWIS								Date Analyzed
2046	Carbofuran	ND	0.90		ug/L	40	1	12/13/2018 2:59:00 AM
2036	Oxamyl	ND	2.0		ug/L	200	1	12/13/2018 2:59:00 AM
EPA 549.2: DIQUAT								Analyst: **SUB**
SDWIS								Date Analyzed
2032	Diquat	ND	0.40		ug/L	20	1	12/11/2018 1:50:00 PM
EPA 548.1: ENDOTHALL								Analyst: **SUB**
SDWIS								Date Analyzed
2033	Endothall	ND	9.0		ug/L	100	1	12/12/2018 5:34:00 PM
EPA 547: GLYPHOSATE								Analyst: **SUB**
SDWIS								Date Analyzed
2034	Glyphosate	ND	5.0		ug/L	700	1	12/11/2018 4:05:00 AM
EPA 515.3 HERBICIDES								Analyst: **SUB**
SDWIS								Date Analyzed
2105	2,4-D	ND	0.10		ug/L	70	1	12/21/2018 10:00:00 A
2110	2,4,5-TP (Silvex)	ND	0.20		ug/L	50	1	12/21/2018 10:00:00 A
2031	Dalapon	ND	1.0		ug/L	200	1	12/21/2018 10:00:00 A
2041	Dinoseb	ND	0.20		ug/L	7.0	1	12/21/2018 10:00:00 A
2326	Pentachlorophenol	ND	0.040		ug/L	1.0	1	12/21/2018 10:00:00 A

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT:	NMED Drinking Water SF	**Client Sample ID:**	HAL148319
Facility:	NM3522409 Freeport McMoran Chino M	**Collection Date:**	12/4/2018 11:33:00 AM
Lab ID:	1812232-004	**Received Date:**	12/5/2018 8:45:00 AM
Location:	036	**Compliance Safe:**	YES
Matrix:	Aqueous		

Analyses		Result	RL	Qual	Units	MCL	DF	
EPA 515.3 HERBICIDES								Analyst: **SUB**
SDWIS								Date Analyzed
2040	Picloram	ND	0.10		ug/L	500	1	12/21/2018 10:00:00 A
EPA 505: CHLORINATED PESTICIDES & PCBS								Analyst: **SUB**
SDWIS								Date Analyzed
2005	Endrin	ND	0.010		ug/L	2.0	1	12/13/2018 4:40:00 AM
2010	gamma-BHC	ND	0.020		ug/L	0.20	1	12/13/2018 4:40:00 AM
2015	Methoxychlor	ND	0.10		ug/L	40	1	12/13/2018 4:40:00 AM
2020	Toxaphene	ND	1.0		ug/L	3.0	1	12/13/2018 4:40:00 AM
2065	Heptachlor	ND	0.040		ug/L	0.40	1	12/13/2018 4:40:00 AM
2067	Heptachlor epoxide	ND	0.020		ug/L	0.20	1	12/13/2018 4:40:00 AM
2383	Polychlorinated Biphenyls	ND	0.10		ug/L	0.50	1	12/13/2018 4:40:00 AM
2959	Chlordane	ND	0.10		ug/L	2.0	1	12/13/2018 4:40:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT:	NMED Drinking Water SF	**Client Sample ID:**	HAL157655
Facility:	NM3522409 Freeport McMoran Chino M	**Collection Date:**	12/4/2018 11:30:00 AM
Lab ID:	1812232-005	**Received Date:**	12/5/2018 8:45:00 AM
Location:	036	**Compliance Safe:**	YES
Matrix:	Aqueous		

Analyses		**Result**	**RL**	**Qual**	**Units**	**MCL**	**DF**	
EPA 335.4: CYANIDE								Analyst: **SUB**
SDWIS								Date Analyzed
1024	Cyanide	ND	0.010		mg/L	0.20	1	12/13/2018 2:40:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order: **1812232**
Date Reported: **12/31/2018**

CLIENT:	NMED Drinking Water SF	**Client Sample ID:**	HAL157593
Facility:	NM3522409 Freeport McMoran Chino M	**Collection Date:**	12/4/2018 11:35:00 AM
Lab ID:	1812232-006	**Received Date:**	12/5/2018 8:45:00 AM
Location:	036	**Compliance Safe:**	YES
Matrix:	Aqueous		

Analyses		Result	RL	Qual	Units	MCL	DF	
PURGEABLE ORGANICS BY EPA 524								Analyst: **DJF**
SDWIS								Date Analyzed
2955	Total Xylenes	ND	0.50		µg/L	10000	1	12/10/2018 3:50:21 PM
2990	Benzene	ND	0.50		µg/L	5.0	1	12/10/2018 3:50:21 PM
2982	Carbon tetrachloride	ND	0.50		µg/L	5.0	1	12/10/2018 3:50:21 PM
2989	Chlorobenzene	ND	0.50		µg/L	100	1	12/10/2018 3:50:21 PM
2380	cis-1,2-Dichloroethene	ND	0.50		µg/L	70	1	12/10/2018 3:50:21 PM
2968	1,2-Dichlorobenzene	ND	0.50		µg/L	600	1	12/10/2018 3:50:21 PM
2969	1,4-Dichlorobenzene	ND	0.50		µg/L	75	1	12/10/2018 3:50:21 PM
2980	1,2-Dichloroethane	ND	0.50		µg/L	5.0	1	12/10/2018 3:50:21 PM
2977	1,1-Dichloroethene	ND	0.50		µg/L	7.0	1	12/10/2018 3:50:21 PM
2983	1,2-Dichloropropane	ND	0.50		µg/L	5.0	1	12/10/2018 3:50:21 PM
2992	Ethylbenzene	ND	0.50		µg/L	700	1	12/10/2018 3:50:21 PM
2964	Methylene chloride	ND	0.50		µg/L	5.0	1	12/10/2018 3:50:21 PM
2996	Styrene	ND	0.50		µg/L	100	1	12/10/2018 3:50:21 PM
2987	Tetrachloroethene	ND	0.50		µg/L	5.0	1	12/10/2018 3:50:21 PM
2991	Toluene	ND	0.50		µg/L	1000	1	12/10/2018 3:50:21 PM
2979	trans-1,2-Dichloroethene	ND	0.50		µg/L	100	1	12/10/2018 3:50:21 PM
2378	1,2,4-Trichlorobenzene	ND	0.50		µg/L	70	1	12/10/2018 3:50:21 PM
2981	1,1,1-Trichloroethane	ND	0.50		µg/L	200	1	12/10/2018 3:50:21 PM
2985	1,1,2-Trichloroethane	ND	0.50		µg/L	5.0	1	12/10/2018 3:50:21 PM
2984	Trichloroethene	ND	0.50		µg/L	5.0	1	12/10/2018 3:50:21 PM
2976	Vinyl chloride	ND	0.50		µg/L	2.0	1	12/10/2018 3:50:21 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: NMED Drinking Water SF | Work Order Number: 1812232 | Rcptno: 1

Received By: Erin Melendrez | 12/6/2018 8:40:00 AM

Completed By: Victoria Ashley | 12/6/2018 2:40:48 PM | Victoria Ashley

Reviewed By: VZ 12/6/18

Labeled by VVZ 12/6/18

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not present ☐
2. How was the sample delivered? Client

Log In

3. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
5. Sample(s) in proper container(s)? Yes ☑ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
8. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
9. VOA vials have zero headspace? Yes ☑ No ☐ No VOA Vials ☐
10. Were any sample containers received broken? Yes ☐ No ☑
11. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes ☑ No ☐ # of preserved bottles checked for pH: 3 (1) (2 or >12 unless noted)
12. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐ Adjusted? NA
13. Is it clear what analyses were requested? Yes ☑ No ☐
14. Were all holding times able to be met? (If no, notify customer for authorization.) Yes ☑ No ☐ Checked by: VZ 12/6/18

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑ VZ 12/6/18

Person Notified: [illegible] Date: 12/6/18

By Whom: [illegible] Via: ☑ eMail ☑ Phone ☐ Fax ☐ In Person

Regarding: [illegible]

Client Instructions: [illegible]

16. Additional remarks:

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	0.1	Good	Not Present			

Request ID Here

HAL157650

HALL ENVIRONMENTAL ANALYSIS

1 Form / Sample

ALBUQUERQUE NM 87109

ANALYTICAL REQUEST
Accession # Here

One Form Per Sample: 1812251-001

LAB USE ONLY / DATE <<< TIME STAMP	SAMPLE TEMPERATURE (deg C): 0.9+0.2(CF)=1.1 / Field preservation confirmed
	Sample Priority (1, 1 or 2 call lab): 3 / ☐ Preserved to pH<2 at Lab / Date/initial
SUBMITTER CODE (3-digit): 070	LAB REMARKS:

○ 55000 (RWB-SDWA - fee-for-service) ○ 55420 (DWB non-reg. contaminants) ○ 62000 (Individual client fee-for-service) ○ OTHER

NMED AREA OFFICE: LAS CRUCES AREA	SAMPLER NAME: ERIC GARCIA	SAMPLE CONTACT: 575-643-5858
WATER SYSTEM ID: NM3522409	WATER SYSTEM NAME: FREEPORT MCMORAN CHINO MINES	
FACILITY/LOCATION: ENTRY POINT#1 (2C BOOSTER)	FACILITY ID: 22409036	SAMPLING POINT ID: SP224090361

FIELD DATA AND REMARKS: ☒ Non-chlorinated ☐ Chlorinated | Residual (mg/l): | pH: | Conductivity (uS/cm): | Temperature (deg. C):

Field remarks:

SAMPLING DOCUMENTATION: ☐ NMED monitoring ☒ Compliance ☐ Confirmation ☐ Composite ☐ Raw-with facility ☒ Grab sample ☐ Non-compliance ☐ Other — Describe:

SAMPLE TYPE: ☐ Non-filtered Water ☐ Filtered water ☐ Raw water ☒ Untreated water ☐ Other — Describe:

PRESERVATION: ☐ None ☒ Stored Shipped at < 4 C ☐ HCl added to pH < 2 ☐ HNO3 added to pH < 2 ☐ H2SO4 added to pH < 2 ☐ Lab to acidify ☐ NaOH added to pH > 12 ☐ Other ☐ CSHIO (Aquat) added ☐ Added at Lab ☐ Na2S2O3 — Describe:

Analysis Requested:	FLUORIDE
Additional Analytical Requests:	

CHAIN OF CUSTODY

MUST BE FILLED OUT FOR ALL COMPLIANCE SAMPLES

Sample was Collected By:	Print Name	Signature	Sampler / Operator ID #	Date of Collection MM/DD/YY	Time of Collection HHMM (24 HR)
	ERIC GARCIA	[signature]	8131	12-4-18	1137

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Placed in Care of:	Print Name of Carrier	Tracking Number / Bill of Lading	Date MM/DD/YY	Time HHMM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HHMM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

TO BE FILLED OUT BY LABORATORY PERSONNEL ONLY

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HHMM (24 HR)
E4	Erin Melendrez	[signature]	12/05/18	0845

Tamper-Proof Seal - ☒ Not Present ☐ Present & Intact ☐ Present & Damaged

Comments:

Comments:

Request ID Here

HALL ENVIRONMENTAL ANALYSIS

4901 Hawkins NE Suite D
ALBUQUERQUE, NM 87109
505-345-3975

ANALYTICAL REQUEST
Accession # Here

HALL17502 | Entry info

One Form Per Sample | 1812283 [illegible]

LAB USE >>> ONLY | STAMP

SAMPLE TEMPERATURE (deg C) [illegible] | Field preservation confirmed

Sample Priority (# 1 or 2 call lab) 3 | ☐ Preserved to pH < 2 at Lab | Date/Initial

SUBMITTER CODE (3 digit) 070 | LAB REMARKS:

○ 55000 (DWB-SDWA - fee-for-service) | ○ 55020 (DWB-non reg. contaminants) | ○ 54000 (individual client fee-for-service) | ○ OTHER

NMED AREA OFFICE: LAS CRUCES AREA | SAMPLER NAME: ERIC GARCIA | SAMPLE CONTACT: 575-543-5058

WATER SYSTEM ID: NM3528409 | WATER SYSTEM NAME: FREEPORT MCMORAN CHINO MINES

FACILITY/LOCATION: ENTRY POINT#1 (7C BOOSTER) | FACILITY ID: 22409036 | SAMPLING POINT ID: SP224090361

FIELD DATA AND REMARKS: ☒ Non-chlorinated ☐ Chlorinated | Residual (mg/l) | pH | Conductivity (uS/cm) | Temperature (deg. C)

Field remarks:

SAMPLING DOCUMENTATION: ☐ NMED monitoring ☒ Compliance ☐ Confirmation ☐ Composite | Describe:
☐ Split with facility ☒ Grab sample ☐ Non-compliance ☐ Other

SAMPLE TYPE: ☐ Non-filtered Water ☐ Filtered water | Describe:
☐ Raw water ☒ Finished water ☐ Other, solid/sediment

PRESERVATION: ☐ None ☒ Stored Shipped at < 4 C ☐ HCl added to pH <= 2 ☐ HNO3 added to pH <=2 ☒ H2SO4 added to pH <= 2
☐ Lab to acidify ☐ NaOH added to pH >= 12 ☐ Other | Describe:
☐ CH3COOH acid added ☐ Acidified at Lab ☐ Na2S2O3

Analysis Requested: NITRATE-NITRITE

Additional Analytical Requests:

CHAIN OF CUSTODY

MUST BE FILLED OUT FOR ALL COMPLIANCE SAMPLES

Sample was Collected By:	Print Name	Signature	Sampler / Operator ID #	Date of Collection MM/DD/YY	Time of Collection HHMM (24 HR)
	ERIC GARCIA	[signature]	8131	12-4-18	11 34

Tamper-Proof Seal: ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Shipped in Care of:	Print Name of Carrier	Tracking Number / Bill of Lading	Date MM/DD/YY	Time HHMM (24 HR)

Tamper-Proof Seal: ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HHMM (24 HR)

Tamper-Proof Seal: ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

TO BE FILLED OUT BY LABORATORY PERSONNEL ONLY

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HHMM (24 HR)
	Erin Melendrez	[signature]	12/05/18	0845

Tamper-Proof Seal: ☒ Not Present ☐ Present & Intact ☐ Present & Damaged

Comments: Updated-received COC w/updated date & time [illegible]

Comments: [illegible]

Received on Mon

HALL ENVIRONMENTAL ANALYSIS

4901 Hawkins NE Suite D
ALBUQUERQUE, NM 87109
505-345-3975

ANALYTICAL REQUEST
Accession # Here

HAL157591 — 1 Form Per Sample

One Form Per Sample: 12/03/18

LAB USE ONLY	DATE and TIME STAMP	SAMPLE TEMPERATURE (deg C) 0.5+0.2(CF)=1.1	Field preservation confirmed
		Sample Priority (1 or 2 call Ho): 3	☐ Preserved to pH < 2 at Lab — Date/Initial

SUBMITTER CODE (3-digit): 076 — LAB REMARKS:

☐ 5660 (DW3-SDWA - fee-for-service) ☐ 5520 (DW8 pre-reg. contaminants) ☐ 5400 (individual client fee-for-service) ☐ OTHER

NMED AREA OFFICE: LAS CRUCES AREA	SAMPLER NAME: ERIC GARCIA	SAMPLE CONTACT: 575-543-5858
WATER SYSTEM ID: NM3522409	WATER SYSTEM NAME: FREEPORT MCMORAN CHINO MINES	
FACILITY LOCATION: ENTRY POINT#1 (2C BOOSTER)	FACILITY ID: 22A000036	SAMPLING POINT ID: SP22A000361

FIELD DATA (MUST BE COMPLETED) ☑ Non-chlorinated ☐ Chlorinated — Residual mg/l: — pH: — Conductivity (µS/cm): — Temperature (deg C):

Field remarks:

SAMPLING DOCUMENTATION: ☐ NMED monitoring ☑ Compliance ☐ Contamination ☐ Composite ☐ Split with facility ☑ Grab sample ☐ Non-compliance ☐ Other — Describe:

SAMPLE TYPE: ☐ Non-chlorinated drinking water ☐ Chlorinated water ☐ Raw water ☑ Finished water ☐ Other aqueous/solid — Describe:

PRESERVATION: ☐ None ☑ Stored Shipped at < 4 C ☐ HCl added to pH <= 2 ☑ HNO3 added to pH <= 2 ☐ H2SO4 added to pH <= 2 ☐ Ice to sample ☐ NaOH added to pH >= 12 ☐ Other ☐ DI/H2O2 acid added ☐ Acidified at Lab ☐ Na2S2O3 — Describe:

Analysis Requested: HM - Sb As Ba Be Cd Cr Hg Ni Se Tl - (40 CFR 141.62b)

Additional Analytical Requests:

CHAIN OF CUSTODY

MUST BE FILLED OUT FOR ALL COMPLIANCE SAMPLES

Sample was Collected By:	Print Name	Signature	Sampler / Operator ID #	Date of Collection MM/DD/YY	Time of Collection HH:MM (24 HR)
	ERIC GARCIA	E-G	8151	12-2-18	11:42

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Placed in Care of:	Print Name of Carrier	Tracking Number / Bill of Lading	Date MM/DD/YY	Time HH:MM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HH:MM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

TO BE FILLED OUT BY LABORATORY PERSONNEL ONLY

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HH:MM (24 HR)
EG	G. Hellendrea		12/05/18	08:15

Tamper-Proof Seal - ☑ Not Present ☐ Present & Intact ☐ Present & Damaged

Comments:

Comments:

Request ID Here

HALL ENVIRONMENTAL ANALYSIS

ANALYTICAL REQUEST
Accession # Here

HALLMARK

Form / Sample

ALBUQUERQUE, NM 87109
505-345-3975

One Form Per Sample: 1812252-004

LAB USE ONLY	DATE TIME STAMP	SAMPLE TEMPERATURE (deg C): AS 10-27-CF-1.1 / Field preservation confirmed
		Sample Priority (# 1 or 2 call lab): 3 / ☐ Preserved to pH < 2 at Lab / Date/Initial:

SUBMITTER CODE (3-digit): 070 | LAB REMARKS:

○ 55000 (DWB-SDWA - fee-contaminants) ○ 55420 (DWB-non-reg. contaminants) ○ 64000 (Individual client fee-for-service) ○ OTHER

NMED AREA OFFICE: LAS CRUCES AREA	SAMPLER NAME: ERIC GARCIA	SAMPLE CONTACT: 575-543-5856
WATER SYSTEM ID: NM3522409	WATER SYSTEM NAME: FREEPORT MCMORAN CHINO MINES	
FACILITY/LOCATION: ENTRY POINT#1 (7C BOOSTER)	FACILITY ID: 22409036	SAMPLING POINT ID: EP22409036 1

FIELD DATA AND REMARKS: ☐ Non-chlorinated ☐ Chlorinated | Residual (mg/l): | pH: | Conductivity (uS/cm): | Temperature (deg. C):

Field remarks:

SAMPLING DOCUMENTATION: ☐ NMED monitoring ☒ Compliance ☐ Confirmation ☐ Composite ☐ Split with facility ☒ Grab sample ☐ Non-compliance ☐ Other | Describe:

SAMPLE TYPE: ☐ Raw filtered water ☐ Filtered water ☐ Raw water ☒ Finished water ☐ Other air/liquid/solid | Describe:

PRESERVATION: ☐ None ☒ Stored Shipped at < 4 C ☐ HCl added to pH <= 2 ☐ HNO3 added to pH <= 2 ☐ H2SO4 added to pH <= 2 ☐ Lab to acidify ☐ NaOH added to pH >= 10 ☒ Other ☐ C6H8O6 acid added ☐ Acidified at Lab ☒ Na2S2O3 | Describe: PRESERVED AND ACIDIFIED ACCORDING TO PROVIDED LAB

Analysis Requested	SOCs. (40 CFR 141.61c)
Additional Analytical Requests	

CHAIN OF CUSTODY

MUST BE FILLED OUT FOR ALL COMPLIANCE SAMPLES

Sample was Collected By:	Print Name	Signature	Sampler / Operator ID #	Date of Collection MM/DD/YY	Time of Collection HHMM (24 HR)
	ERIC GARCIA	EG [signature]	8131	12 5 18	11 33

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Placed in Care of:	Print Name of Carrier	Tracking Number / Bill of Lading	Date MM/DD/YY	Time HHMM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HHMM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

TO BE FILLED OUT BY LABORATORY PERSONNEL ONLY

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HHMM (24 HR)
EG	Erin Melendrez	[signature]	12/05/18	0845

Tamper-Proof Seal - ☒ Not Present ☐ Present & Intact ☐ Present & Damaged

Comments:

Comments:

Request ID Here

HALL ENVIRONMENTAL ANALYSIS

ANALYTICAL REQUEST
Accession # Here

HALL57655

4901 Hawkins NE Suite D
ALBUQUERQUE NM 87109
505-345-3975

Use Form for Sample

Use Form Per Sample 1812390005

LAB USE >>> ONLY

<<< TIME STAMP

SAMPLE TEMPERATURE (deg C) 0.9+0.2(CF)=1.1 Field preservation confirmed

Sample Priority (1 or 2 call lab) 3 ☐ Preserved to pH < 2 at Lab Date/Initial

SUBMITTER CODE (3-digit) 070 LAB REMARKS

☐ 55000 (DWR-SDWA - fee for service) ☐ 55420 (DWR-non-reg. contaminants) ☐ 55001 (non-federal client; fee for service) ☐ OTHER

NMED AREA OFFICE: LAS CRUCES AREA | SAMPLER NAME: ERIC GARCIA | SAMPLE CONTACT: 575-543-5858

WATER SYSTEM ID: NM3522409 | WATER SYSTEM NAME: FREEPORT MCMORAN CHINO MINES

FACILITY/LOCATION: ENTRY POINT 1 (2C BOOSTER) | FACILITY ID: 22409036 | SAMPLING POINT ID: SP224090361

FIELD DATA AND REMARKS: ☐ Non-chlorinated ☐ Chlorinated | Residual (mg/L) | pH | Conductivity (µS/cm) | Temperature (deg C)

Field remarks:

SAMPLING DOCUMENTATION: ☐ NMED monitoring ☒ Compliance ☐ Confirmation ☐ Composite ☐ Split with facility ☒ Grab sample ☐ Verification ☐ Other — Describe:

SAMPLE TYPE: ☐ Non-filtered Water ☐ Filtered water ☐ Raw water ☐ Finished Water ☐ Other Ambient/Soil — Describe:

PRESERVATION: ☐ None ☒ Stored Shipped at < 4 C ☐ HCl added to pH <= 2 ☐ HNO3 added to pH <= 2 ☐ H2SO4 added to pH <= 2 ☐ Ice to acidify ☒ NaOH added to pH >= 12 ☐ Other ☒ Cool to 4 deg celsius ☐ Received on Ice ☐ Volatiles — Describe:

Analysis Requested: CYANIDE

Additional Analytes Requested:

CHAIN OF CUSTODY

MUST BE FILLED OUT FOR ALL COMPLIANCE SAMPLES

Sample was Collected By:	Print Name	Signature	Sampler / Operator ID #	Date of Collection MM/DD/YY	Time of Collection HH:MM (24 HR)
	ERIC GARCIA		8131	11/9/18	11:30

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Placed in Use of:	Print Name of Carrier	Tracking Number / Bill of Lading	Date MM/DD/YY	Time HH:MM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HH:MM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

TO BE FILLED OUT BY LABORATORY PERSONNEL ONLY

Relinquished by:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HH:MM (24 HR)
VG	Erin Hellentrez		12/05/18	0845

Tamper-Proof Seal - ☒ Not Present ☐ Present & Intact ☐ Present & Damaged

Comments:

Comments:

Request ID Here

HAL157593

Form: Sample

HALL ENVIRONMENTAL ANALYSIS

4901 Hawkins NE Suite D
ALBUQUERQUE, NM 87109
505-345-3975

ANALYTICAL REQUEST
Accession # Here

One Form Per Sample: 1812338-006

LAB USE ONLY — TIME STAMP	SAMPLE TEMPERATURE (deg C): 0.9+0.2CF=1.1 — Field preservation confirmed
	Sample Priority (if 1 or 2 call lab): 3 — ☐ Preserved to pH < 2 at Lab — Requested
SUBMITTER CODE (if any): 070	LAB REMARKS:
○ 55000 (DWB-SDWA - fee-for-service)	○ 55AW (DWB non-reg. contaminants) — ○ 64000 (individual client - fee-for-service) — ○ OTHER
NMED AREA OFFICE: LAS CRUCES AREA	SAMPLER NAME: ERIC GARCIA — SAMPLE CONTACT: 575-543-5656
WATER SYSTEM ID: NM3522409	WATER SYSTEM NAME: FREEPORT MCMORAN CHINO MINES
FACILITY/LOCATION: ENTRY POINT#1 (3L BOOSTER)	FACILITY ID: 22409036 — SAMPLING POINT ID: SP224090361
FIELD DATA AND REMARKS	☒ Non-chlorinated ☐ Chlorinated — Residual (mg/L) — pH — Conductivity (uS/cm) — Temperature (deg C) — Field remarks:
SAMPLING DOCUMENTATION	☐ NMED monitoring ☒ Compliance ☐ Confirmation ☐ Composite ☐ Split with facility ☒ Grab sample ☐ Non-compliance ☐ Other — Describe:
SAMPLE TYPE	☐ Non-filtered Water ☐ Filtered water ☐ Raw water ☒ Finished water ☐ Other - animal/liquid/solid — Describe:
PRESERVATION	☐ None ☒ Stored Shipped at < 4 C ☒ HCl added to pH <= 2 ☐ HNO3 added to pH <= 2 ☐ H2SO4 added to pH <= 2 ☐ Lab to acidify ☐ NaOH added to pH >= 12 ☐ Other ☒ Chlorine removed ☐ Adjusted at Lab ☐ Not known — Describe:
Analysis Requested	VOCs (40 CFR 141.61a)
Additional Analytical Requests	

CHAIN OF CUSTODY

MUST BE FILLED OUT FOR ALL COMPLIANCE SAMPLES

Sample was Collected By:	Print Name	Signature	Sampler / Operator ID #	Date of Collection MM/DD/YY	Time of Collection HHMM (24 HR)
	ERIC GARCIA	[signature]	8131	12-4-18	1135

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Placed in Care of:	Print Name of Carrier	Tracking Number / Bill of Lading	Date MM/DD/YY	Time HHMM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

Relinquished By:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HHMM (24 HR)

Tamper-Proof Seal - ☐ Not Present ☐ Present & Intact ☐ Present & Damaged

TO BE FILLED OUT BY LABORATORY PERSONNEL ONLY

Relinquished By:	Print Name of Receiver	Signature of Receiver	Date MM/DD/YY	Time HHMM (24 HR)
FEX	Erin Melendrez	[signature]	12/05/18	0845

Tamper-Proof Seal - ☒ Not Present ☐ Present & Intact ☐ Present & Damaged

Comments:

Comments:

Appendix H

Quality Assurance Report

REPORT

Quality Assurance Report
B-Ranch Interim Remedial Action
Smelter Tailing Soil Investigation Unit

Submitted to:

Freeport McMoRan Chino Mines Company
99 Santa Rita Mine Road
Vanadium, NM 88023

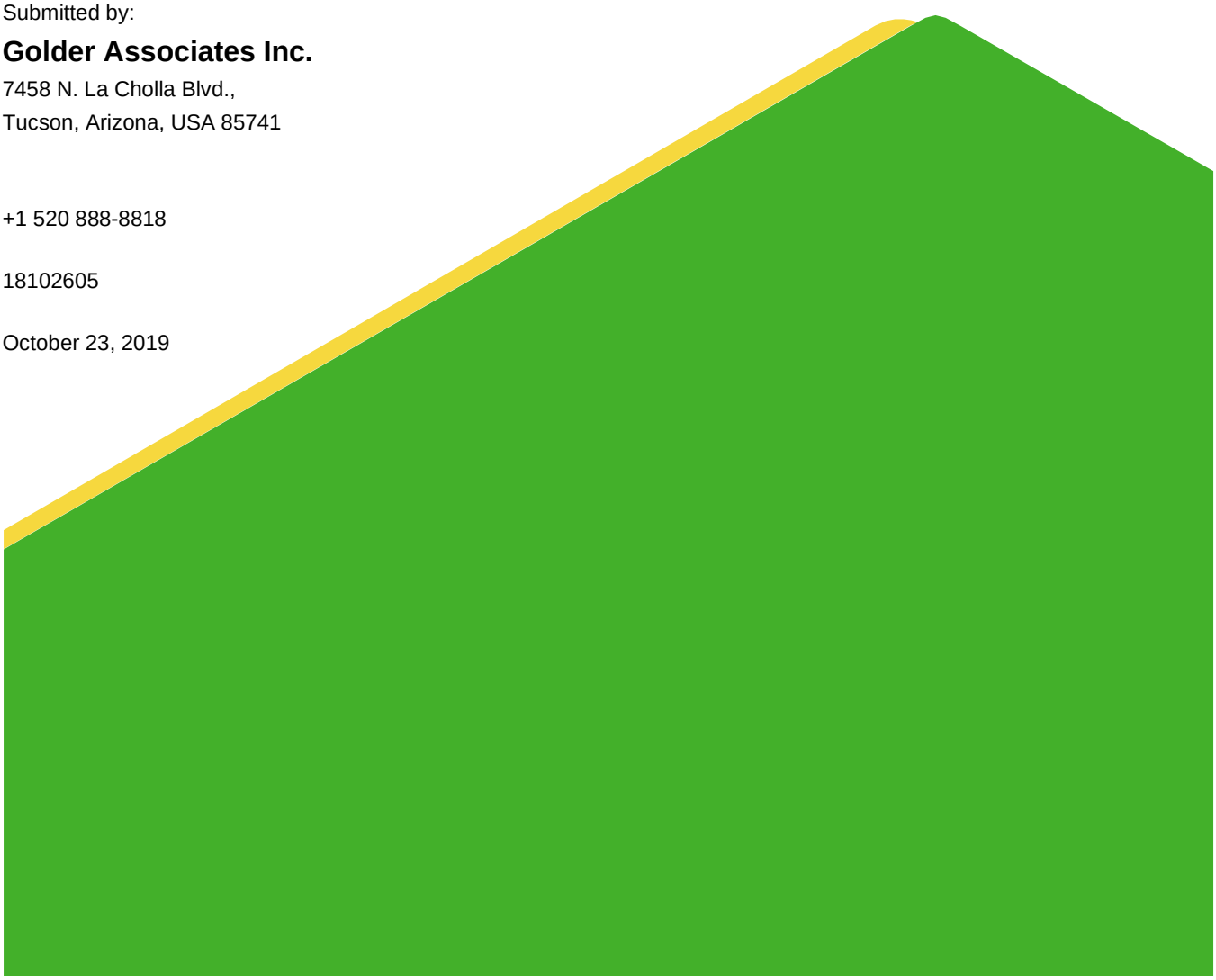
Submitted by:

Golder Associates Inc.
7458 N. La Cholla Blvd.,
Tucson, Arizona, USA 85741

+1 520 888-8818

18102605

October 23, 2019



Distribution List

Chino - 1 Word File and 1 pdf

Table of Contents

TABLES

APPENDICES

1.0 INTRODUCTION

On behalf of Freeport McMoRan Chino Mines Company (Chino), Golder Associates Inc. (Golder) and Crawford Environmental LLC (CEL) have prepared this Quality Assurance Report (QAR) in support of an interim remedial action (IRA) at the B-Ranch area as an extension to a previously completed IRA for the Golf Course (Golder 2008). The scope of the IRA was presented in a Field Implementation Plan (FIP) (Appendix A) and then adjusted in the field by Chino. The work was conducted as part of the Smelter Tailing Soil Investigation Unit (STSIU) under the Administrative Order on Consent (AOC) between Chino and the New Mexico Environment Department (NMED). The STSIU was established to address possible impacts due to mining operations, historical releases, and natural sources. The B-Ranch area under the FIP was previously part of the Chino Operational Area and was not included in prior remedial actions. The B-Ranch area has since ceased to be a part of the Chino Operational Area and therefore has integrated into the STSIU.

For the purposes of the administrative record for the B-Ranch IRA, Chino requested that this QAR be prepared to document quality assurance activities as actually conducted.

1.1 Site Description

The portion of B-Ranch within the scope of this IRA is located north of the Town of Hurley, west of Whitewater Creek, and east of Highway 180 in Grant County, New Mexico. Drawings were presented in the FIP (Appendix A). Mining impacts to soil were caused by smelter emissions, windblown tailing, and other fugitive emissions from the smelter complex.

1.2 Project Objective and Scope

The objective of the IRA was to remove areas where soil copper concentrations were greater than 5,000 milligrams per kilogram (mg/kg), which is the NMED pre-feasibility study decision criteria (DC) considered to be protective of residential human health (Appendix A).

This report documents field and laboratory quality assurance measures for removed soil. It does not address imported materials for backfilling removal areas or assay samples for disposal of removed materials. Golder's role in the project was to collect soil samples during removal for x-ray fluorescence (XRF) analysis and to collect final samples for laboratory analysis. Golder also coordinated between Chino and the removal contractor regarding daily activities.

The soil removal activities took place from June 12 to July 23, 2019.

1.3 Project Organization

Key personnel and their contact information are provided in Table 1 and described in more detail below.

Table 1: Project Personnel

Role	Name/ Email Address	Company/ Address	Phone
NMED Project Manager	David Mercer David.Mercer1@state.nm.us	NMED 3082 32nd Street By-Pass Rd, Suite D Silver City, NM 88061	575-388-1934 office
Owner/ Project Manager	Pam Pinson ppinson@fmi.com Michael Steward msteward@fmi.com	Chino Mines Company 99 Santa Rita Mine Rd. Vanadium, NM 88023	575-912-5213 office 575-313-7571 mobile 520-498-6565 office 520-437-3005 mobile
Chino Health and Safety Officer	Jim Cook jcook1@fmi.com	Chino Mines Company 99 Santa Rita Mine Rd. Vanadium, NM 88023	575-912-5328 office 575-956-5188 mobile
Design Engineer/ Engineer of Record	Rebecca Lindeman, P.E. Daniel Bonner, P.E. daniel.bonner@arcadis.com	Arcadis U.S., Inc. Broomfield CO	408-834-0368 office
Project Manager	Matthew Barkley Matthew.Barkley@ arcadis.com	Arcadis U.S., Inc. Broomfield, CO	720-386-1148 office 805-450-4435 mobile
Removal Contractor Project Manager	Craig Lugowski clugowski@usaenviro.com	USA Environment, L.P.	303-242-8050 office 303-717-6543 mobile
Golder Project Manager	Kent Johnejack, PE kjohnejack@golder.com	Golder Associates Inc. 4730 North Oracle Rd, Ste 210, Tucson, Arizona, USA 85705	520-888-8818 office 520-404-8162 mobile
Golder XRF Technician / Field Engineer	York Morgan ymorgan@golder.com	Golder Associates Inc. 301 W College Ave # 8, Silver City, NM 88061	575-388-0118 office 575-590-0199 mobile
Golder Radiation Safety Officer	Sam Keller skeller@golder.com	Golder Associates Inc. 301 W College Ave # 8, Silver City, NM 88061	575-388-0118 office 575-574-8963 mobile
XRF Quality Assurance/Quality Control (QA/QC) Manager	Diane Crawford DianeC@ crawfordenvironmental.net	Crawford Environmental, LLC 12909 SW 248th St. Vashon, WA 98070	206-713-5878 mobile
Analytical Laboratory	Dianne Gardner Project Manager	SVL Analytical Inc. One Government Gulch Kellogg, ID 3837	208-784-1258 office
Chino Shipping Coordinators	Nick Lemme nlemme@fmi.com Trish Potter tpotter@fmi.com	Chino Mines Company 99 Santa Rita Mine Rd. Vanadium, NM 88023	

NMED Project Manager

The NMED project manager, David Mercer, was responsible for oversight of the regulatory aspects of the IRA, including compliance with the DC, and site visits to the field.

Chino Owner/ Project Manager

The Chino project manager, Pam Pinson, was responsible for overall project management, including contracting and permits, access to the project sites, and review of weekly data reports.

Chino Health and Safety Manager

The Chino Health and Safety manager, Jim Cook, was responsible for oversight of the health and safety aspects of the IRA activities. These include compliance with Mine Safety and Health Administration rules and regulations.

Arcadis Design Engineer

The design engineer, Rebecca Lindeman, was responsible for the design and preparation of the drawings. Daniel Bonner replaced Ms. Lindeman partway through the project.

Arcadis Project Manager

The Arcadis project manager, Matthew Barkley, was responsible for generally ensuring all work was in compliance with the FIP (Appendix A).

USA Environmental Project Manager

The project manager, Craig Lugowski, for the removal contractor, USA Environment, LP, was responsible for performing construction in accordance with the contract drawings and specifications, including removal of soil/sediment, hauling excavated materials, and backfilling removal areas as appropriate. The removal contractor worked with the field engineer to determine the extent of excavation and removal based on visual observations and XRF results.

Golder Project Manager

The Golder project manager, Kent Johnejack, was responsible for oversight of Golder's role in the IRA, including sampling, analysis, data management, and reporting.

Golder XRF Technician / Field Engineer

The Golder XRF technician/field engineer, York Morgan, was responsible for management and maintenance of the XRF analyzer field laboratory, collection of soil samples, and XRF analysis. The XRF technician/field engineer also coordinated between Chino and the removal contractor, as well as assisting with shipping of samples to the analytical laboratory, tracking samples and laboratory reports, maintaining the project database, and preparing daily reports.

Golder Radiation Safety Officer

Golder's radiation safety officer, Sam Keller, was responsible for determining, maintaining, and posting the appropriate permits for XRF use, storage, and shipping in the State of New Mexico.

Crawford Environmental XRF QA/QC Manager

Golder subcontracted Quality Assurance/Quality Control (QA/QC) to CEL. Diane Crawford, the CEL QA/QC Manager, was responsible for developing the QA/QC specifications for the project, XRF selection and calibration, and XRF data review.

Contracting Laboratory

SVL Analytical Inc. (SVL) was subcontracted by Chino as the analytical laboratory for soil and sediment confirmation analyses.

Chino Shipping Coordinators

Chino Environmental personnel, Nick Lemme and Trish Potter, assisted with shipping of samples to SVL by ensuring all coolers contained signed chains of custody and were properly labeled, secured, and sealed prior to shipping via United Parcel Service (UPS).

2.0 CONSTITUENT OF POTENTIAL CONCERN

The single constituent of potential concern (COPC), copper, was selected by Arcadis and approved by Chino. The DC for copper was 5,000 mg/kg, as indicated in FIP (Appendix A). However, a buffer of 500 mg/kg was subtracted, resulting in a value of 4,500 mg/kg actually implemented in the field. Iron was also analyzed for information only but had no DC and was not a COPC.

3.0 SAMPLING AND FIELD PROCEDURES

3.1 Sample Types

Confirmation sampling occurred in multiple post-removal rounds to confirm that the DC was achieved. If the DC was achieved, the areas were ready for restoration; if not, further excavation was performed. The first round of confirmation sampling was identified as Round 1 sampling. Subsequent sampling rounds were identified as Rounds 2, 3, 4, etc. After soil was excavated, the excavated areas were sampled at grid locations identified in the Collector App. If further excavation was required, confirmation sampling was conducted to monitor progress towards achieving the DC. When additional excavation was required, samples during Rounds 2 and higher were collected in approximately the same location as the Round 1 sample. Excavation stopped when the analytical results indicated that the DC was achieved or until refusal, for example, when bedrock was encountered.

3.2 Sample Collection Procedures

Soil samples were collected in general accordance with applicable Standard Operating Procedures provided in the Interim Remedial Action Work Plan (Arcadis 2007) and the Quality Assurance Plan (Chino et. al., 1997). Samples for all rounds were collected as follows:

- Samples were collected at grid nodes from a depth of 0 (surface) to 1 inch below the surface using a clean new plastic trowel. Samples were scooped so as to sample the complete interval.
- Material was placed into a clean No. 10 (2 millimeter) sieve that was used to retain coarse particles, which were subsequently discarded.
- The fraction that passed the No. 10 sieve (i.e., the sample) was homogenized by vigorously shaking with a lid covering the bottom pan.
- Samples were placed in a thin, unused, clear plastic zippered bag and labelled with the appropriate information.
- Samples remained in control of the field personnel or were stored in a secured area until they were analyzed with the XRF.

In addition, split samples were collected for laboratory analysis at SVL at a rate of at least 5 percent (i.e., 1 per 20 samples) using the same collection procedures.

As each sample was collected, the XRF technician recorded the following in tables that were updated regularly:

- The sample's location (i.e., grid node)
- Reading number
- Sample type and moisture condition
- Units and results
- Collection date and time
- Collector's initials

Appendix B-1 provides a table of all raw XRF data for samples, blanks, standards, and QC samples. Appendix B-2 provides a listing of all data by grid node to verify completeness of sampling throughout the project boundaries. Appendix B-2 includes all sample rounds for each grid node and indicates why certain grid nodes were not sampled. Entries also indicated when a sample was a split sample and the parent sample that it duplicated.

3.3 Sample Identification

Samples from all rounds were identified and labelled, for example, as "B-XXX-RY" or "BX-XXX-RY" where:

- "B" indicates B-Ranch
- "BX" indicates a grid node added later in the project to accommodate field conditions
- "XXX" indicates the grid node number
- "Y" indicates the round number

Sample labels also included the collection date/time and sampler's initials.

3.4 Sample Containerization, Volume, and Handling

Soil samples were collected in unused, clean, thin-walled plastic zippered bags that were sealed and labelled prior to testing. Sample volumes were typically about 25 percent of a small bag – approximately 5 ounces (140 grams.) Subsequent to XRF testing, these sample bags were additionally placed inside unused, clean, thick walled plastic zippered bags to maintain sample integrity and archived in plastic storage bins inside the locked laboratory provided on mine property by Chino. There were no preservation requirements for soil samples.

Subsequent to collection, split samples were placed in transport sample chests (coolers) that were custody sealed and stored inside Golder's locked laboratory at Chino or the locked Silver City office while awaiting shipping. On shipping days, the XRF technicians transported the sample chests under formal chain of custody to the Chino Environmental building where Chino shipping coordinators weighed, banded, and custody sealed all coolers before placing them inside cardboard boxes. Samples were shipped via UPS standard service from Chino to SVL in Kellogg, Idaho.

3.5 Chain-of-Custody

Split samples were controlled using chain of custody forms (chains) supplied by SVL. The XRF technician completed chains electronically prior to transporting to Chino Environmental for shipping. Chains included sample IDs, sample collection date/times, sampler's initials, matrix type, number of containers, analysis instructions and methodology, reporting recipients, contact information, and required turnaround times. A separate page of the chain was produced for each cooler in each shipment. When the XRF technician delivered samples to Chino for shipping, the Chino staff wrote time, date, and signature at the bottom of each chain indicating relinquishment of custody to Chino. Prior to shipping, the Chino shipping coordinator and the UPS driver signed the bottom of the chains with dates and times indicating transfer of custody from Chino to UPS. Upon receipt at the lab, SVL signed the bottom of the chains and included copies with final analytical reports.

3.6 Sampling Equipment Decontamination

Disposable sampling equipment was used to avoid the need for decontamination and rinsate blanks. Clean and unused disposable equipment was kept in clean plastic bags or containers when not in use.

The No. 10 soil sieves were the only equipment requiring decontamination. At least four full sets of sieves were maintained onsite to enable thorough drying and decontamination between samples. Sieves were decontaminated as follows:

- After dry sediment was sieved, the sieves were brushed with a clean plastic-bristled brush until visibly free of fine-grained sediment.
- After moist or wet sediment was sieved, the sieves were sprayed with Alconox solution, air dried, and then brushed with a plastic-bristled brush until visibly free of fine-grained sediment.

4.0 ANALYTICAL PROCEDURES ASSOCIATED WITH XRF ANALYSES

The project samples were analyzed in the field laboratory with the XRF for the COPC, and random samples were split and sent to SVL for analyses of the COPC. The XRF calibration and quality control checks conducted throughout the course of the project are described in this section along with the laboratory methods and limits.

4.1 XRF Setup and Operating Procedures

XRF analyses were conducted in accordance with Environmental Protection Agency (EPA) Method 6200 (2007) and manufacturer instructions. The XRF unit was an Olympus Vanta series M handheld XRF. The XRF technicians conferred with Olympus technical experts to optimize features and software for this project. The device was preset to report the COPCs using 90-second tests.

Prior to testing, sieved samples in thin plastic bags were placed on a flat, stable surface, and the material in the bag was mounded so that it was at least 1.5 centimeters in depth at the measurement window, as recommended by the XRF manufacturer. The measurement window was placed so that it rested on the sample and did not move during the analyzer operation. Best practices for XRF operation were conducted, as recommended by the manufacturer and EPA Method 6200 (EPA 2007), including:

- Ensuring that the measurement window is clean and intact
- Keeping the measurement window properly positioned over or onto the sample for the duration of the test
- Ensuring that the sample completely covers the measurement window

4.2 XRF Calibration and Quality Control

The XRF was used in general accordance with EPA Method 6200 (EPA 2007), including instrument calibration; analysis of blank samples, standard reference materials, and precision runs, as described in detail in Appendix C. In addition, a minimum of 5 percent of project samples were split and sent under chain of custody to SVL for laboratory confirmation analysis.

The reference materials used for this project included the following:

- A blank sample provided by the XRF manufacturer (silicon dioxide).
- A National Institute of Standards and Technology (NIST) standard reference material (SRM) with certified concentrations of metals provided by the manufacturer. For this project, a NIST 2711A SRM was supplied.

The evaluation of the quality control (QC) checks for the XRF, as described in Appendix C, included the following:

- Blank Samples – Blanks were analyzed daily and every 20 samples. The blank sample results should be less than the lowest observed project sample concentration.
- NIST 2711A Samples – The NIST samples were analyzed daily and every 20 samples. The NIST XRF results should be within +/- 20 percent difference (20%D) of the certified results for the SRM.
- Precision Runs – The precision runs were a series of seven (or more) consecutive XRF measurements taken from one randomly selected project sample. Precision runs were conducted daily and every 20 samples. The results of the precision runs should ideally be <20 percent relative standard deviation of the full run, but <30 percent is also acceptable.

4.3 Laboratory Analysis

Split samples were shipped under chain of custody to SVL for analysis of the copper and iron. Table 2 presents the constituents cross referenced to the standard reference methods and precision and accuracy requirements that were established as contractual requirements between Chino and SVL. SVL was responsible for implementing the analytical and sample preparation methods selected.

Table 2: Soil Analytical Parameters

Chemical and Matrix Information			Method Reference and Reporting Limits			Method Quality Control	
Parameter	CAS Number	Matrix	ICP	Method Detection Limits (mg/kg)	Maximum Holding Times	Precision (RPD)	Accuracy (% Recovery)
Copper	7440-50-8	Soil	6010B or C	0.16	180 days	<20%	75-125%
Iron	7439-89-6	Soil	6010B or C	6.6	180 days	<20%	75-125%

CAS = Chemical Abstracts Service
ICP = Inductively coupled plasma
mg/kg = milligrams per kilogram
RPD = relative percent difference

4.3.1 Minimum Requirements for Analytical Laboratory Data Packages

The analytical laboratory provided Level II analytical reports with a normal turnaround (approximately 15 business days), unless otherwise noted. The data packages were reviewed and approved by the analytical laboratory's QA/QC staff prior to submittal for verification. Chino contracted with the laboratory, and the laboratory sent data packages to Chino and Golder.

4.3.2 Laboratory Quality Control Samples

The internal QA/QC checks performed by the analytical laboratory met the following minimum requirements:

- Matrix spike and matrix spike duplicate samples. Matrix spike and matrix spike duplicate samples require the addition of a known quantity of a representative analyte of interest to the sample as a measure of recovery percentage. The spike shall be made in a field sample replicate. Spike compound selection, quantities, and concentrations shall be described in the laboratory' analytical procedures as appropriate to the analytical method. One sample shall be spiked per analytical batch, or once every 20 samples, whichever is greater.
- Method blanks. Method blanks are prepared during the preparation of samples in the laboratory to determine the proficiency of the laboratory at eliminating reagent contaminants, and preparation vessel carryover contaminants. The method blank shall be prepared using the same procedure used for preparation of the samples, at the same time, and involving the same reagents. The method blank must be tested after the QC reference sample and before any samples are analyzed and shall be run with every analytical batch or 20 samples, whichever is more frequent.

5.0 DATA VERIFICATION

Data verification was conducted on the XRF results and split results from the laboratory, in accordance with EPA Method 6200 (EPA 2007). The laboratory results were verified in accordance with the methods listed in Table 2.

5.1 XRF Data Verification

The QC checks on the XRF data are presented in Appendix C and the overall summary of the XRF data verification is summarized below. The parameters for precision, accuracy, representativeness, completeness, and comparability (PARCC) were used to assess overall XRF data quality, as follows:

- Precision – Precision is a measure of the agreement between replicate measurements. The evaluation of the precision runs indicated that the XRF data exhibits acceptable precision.
- Accuracy – Accuracy is the degree of agreement between a measurement and an accepted or true reference value. The evaluation of blank and SRM samples with certified (“true”) results compared to project samples indicated that the XRF data are of acceptable accuracy.
- Representativeness – Representativeness is the evaluation of how well the data characterize the media of concern. This is determined by the selection of and adherence to the appropriate sampling plan, protocols, procedures, and analytical methods. The collection and analysis of project samples was conducted in accordance with the FIP (Appendix A) and subsequent field changes made by Chino, Arcadis, and the field engineer.
- Comparability – Comparability is evaluated by review of the sample collection and analytical procedures for comparability with other possibly related data sets. The comparability of the XRF data in this project was assessed by the continued use of XRF sampling and analytical techniques, procedures, and QA/QC

protocols, as well as the use of field technicians that conducted similar work in and for other Chino AOC Investigation Units.

- Completeness – Completeness refers to the rate of successful sampling. The XRF completed analysis of 100% of the sample locations within the project area that were directed by Chino and Arcadis for confirmation XRF analysis. In addition, all frequency requirements for the precision and accuracy QC were fulfilled.

It can be concluded that the XRF data are acceptable for the nature of the removal decisions being made with the data.

5.2 Laboratory Confirmation of Split Samples

The results of the split sample laboratory results and their corresponding XRF measurements were compared using linear regression, to evaluate how well the XRF results can predict the laboratory results, as described in Appendix C.

The trendline for copper shows that the calculated r^2 value for the XRF and SVL samples is 0.98, which indicates acceptable correlation. All but six results occur within the True Negative or True Positive quadrants, indicating that the XRF result resulted in the same decisions as that SVL results. The six exceptions all occurred in the Type II Error (False Negative) quadrant, which means that the XRF result incorrectly indicated that the DC was exceeded when the SVL result indicated that the DC was not exceeded. The decisions made from these errors would be to remediate when remediation was potentially not needed.

5.3 Laboratory Data Verification

Data verification, rather than full data validation, was performed by CEL on the laboratory data packages for the 5 percent split samples to evaluate analytical data to ensure that the laboratory has met contractual requirements and PARCC parameters, as summarized in Appendix C. Data verification reports were developed for each laboratory data package. Data verification included evaluation of the following:

- Laboratory blanks
- Field blanks
- Equipment blanks
- Duplicates
- Matrix spikes/matrix spike duplicates
- Laboratory control samples
- Calibration data
- Any re-qualification of analytical results required as a result of the validation exercise

The objectives for analytical data quality were defined in terms of the quantitation limits achievable using the referenced analytical methods, and in terms of the resulting PARCC goals for analytical data. Quantitation limits were provided for each analytical parameter in Table 2 and were cross-referenced to an applicable standard EPA reference method. The quality objectives were as follows:

- **Precision:** Analytical precision was reported on laboratory duplicates, blank spike/blank spike duplicates, and matrix spike/matrix spike duplicates as required by the governing reference methods cited in Table 2. Specific precision criteria for the governing methods as required by data validation guidelines were presented in Table 2.
- **Accuracy:** Accuracy was reported from certified standard recovery, blank spike recovery, and matrix spike recoveries as required by the governing reference methods cited in Table 2.
- **Representativeness:** Goals for sample representativeness were addressed qualitatively by the sampling locations and frequencies.
- **Completeness:** Completeness was defined as the percentage of valid analytical determinations with respect to the total number of requested determinations in each laboratory data package.
- **Comparability:** Approved analytical procedures required the consistent use of the reporting techniques and units specified by the EPA reference methods cited in Table 2.

The CEL data verification reports, included in Appendix C, indicate that the laboratory data were acceptable for their intended use.

6.0 DATA MANAGEMENT

Sample location, XRF, and analytical laboratory data were managed as described in the following sections.

6.1 Sample Location Data Management

To document sample locations, the XRF technicians used a field tablet uploaded with a digital map that was prepared by the design engineer using ArcGIS by Environmental Systems Research Institute (ESRI). The design engineer (or their designee) updated the field map regularly to show evolving removal area boundaries and similar features. Using the ESRI ArcGIS Collector App loaded on the field tablet, the field engineer added sample locations directly to the map in real time as samples were collected. The field engineer uploaded new sample locations daily wirelessly to the master map that was shared by numerous project personnel. The field engineer employed a Bad Elf GNSS Surveyor that functioned as a global positioning system (GPS) antenna enabling accuracy typically within approximately 1 meter when entering sample locations on the field map.

As earthwork in the B-Ranch area came to an end, the field engineer used the field tablet and most recent version of the digital map to verify mapped locations and IDs matched those recorded in field tables. Reconciliation of anomalies was achieved by walking point-by-point in the project area. Later, the field engineer worked with Arcadis database personnel to clarify any remaining anomalies. Final GPS points for each sample location are on the database maintained by Arcadis.

6.2 XRF Data Management

Raw XRF data were transferred from the XRF instrument to a computer and a secure, web-based storage location after each day of use (Appendix B-1). These data were consolidated into cumulative spreadsheet (Appendix B-2). This final compilation was emailed to Chino and Arcadis and later uploaded to the Golder secure storage site for long-term storage. Upon project completion, Golder downloaded every raw data point recorded on the XRF device and saved the cumulative file on its secure storage site for documentation purposes. In addition, Golder worked closely with Arcadis database personnel to rectify any anomalies related to XRF data.

6.3 Laboratory Data Management

The analytical laboratory data packages for the confirmatory analyses were provided to Golder and Chino via email as PDF files and then uploaded to the Golder secure storage site for long-term storage.

7.0 REFERENCES

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APPENDIX A

B-Ranch Investigation Area Field Implementation Plan (Arcadis Work Product)

SEE APPENDIX A IN MAIN REPORT

APPENDIX B

XRF Data
(Golder Work Product)

APPENDIX B-1

Raw XRF Data
(Golder Work Product)

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
2	6/12/2019	8:18:38	Blank				Blank	Blank	PPM	0	4	0	172	0	16	4	1	28	3	0	164	0	18	0	4
3	6/12/2019	8:21:13	Nist2711a				Nist2711a	Nist2711a	PPM	92	3	48	4	0	23	148	2	24191	74	561	9	1409	6	409	3
6	6/12/2019	13:54:09	Blank				Blank	Blank	PPM	0	4	0	170	0	16	4	1	16	3	0	161	2	1	2	1
7	6/12/2019	13:58:34	Blank				Blank	Blank	PPM	0	4	0	169	0	16	4	1	24	3	0	161	0	18	0	4
8	6/12/2019	14:02:48	Nist2711a				Nist2711a	Nist2711a	PPM	89	3	39	3	27	6	149	2	24256	69	587	9	1418	6	406	3
51	6/14/2019	12:49:24	Blank				Blank	Blank	PPM	0	5	0	208	0	21	8	1	49	4	0	260	0	23	0	5
52	6/14/2019	12:53:00	Nist2711a				Nist2711a	Nist2711a	PPM	89	4	44	4	0	29	150	3	23529	96	572	11	1368	7	400	4
53	6/14/2019	13:06:41	B-228 R1	B	228	R1	Sample	B-228-R1	PPM	8	1	0	179	69	7	2318	11	29520	81	524	9	57	1	191	3
54	6/14/2019	13:20:11	B-259 R1	B	259	R1	Sample	B-259-R1	PPM	7	1	0	176	52	7	798	6	27326	74	380	8	23	1	112	2
55	6/14/2019	13:31:44	B-229 R1	B	229	R1	Sample	B-229-R1	PPM	7	1	0	175	60	7	1821	9	30779	84	503	9	38	1	146	2
56	6/14/2019	13:37:45	B-260 R1	B	260	R1	Sample	B-260-R1	PPM	5	1	0	177	43	7	1169	7	19572	56	332	8	23	1	86	2
57	6/14/2019	13:45:11	B-258 R1	B	258	R1	Sample	B-258-R1	PPM	4	1	0	204	48	7	136	3	15830	50	219	8	10	1	57	1
58	6/14/2019	14:32:49	B-227 R1	B	227	R1	Sample	B-227-R1	PPM	6	1	0	176	44	7	142	3	30398	83	376	8	23	1	104	2
59	6/14/2019	14:39:06	B-226 R1	B	226	R1	Sample	B-226-R1	PPM	8	1	0	168	62	7	3140	12	27510	74	522	9	56	1	194	2
60	6/14/2019	15:24:58	B-257 R1	B	257	R1	Sample	B-257-R1	PPM	7	1	0	163	58	6	838	6	30547	80	469	8	26	1	126	2
61	6/14/2019	15:32:12	B-196 R1	B	196	R1	Sample	B-196-R1	PPM	4	1	0	194	39	7	164	3	17772	54	436	9	12	1	68	1
62	6/14/2019	15:39:17	B-197 R1	B	197	R1	Sample	B-197-R1	PPM	4	1	0	196	49	7	702	5	15145	48	251	8	13	1	70	2
63	6/14/2019	15:45:11	B-198 R1	B	198	R1	Sample	B-198-R1	PPM	7	1	0	173	46	7	1516	8	26710	72	473	9	33	1	144	2
64	6/14/2019	15:52:06	B-199 R1	B	199	R1	Sample	B-199-R1	PPM	4	1	0	177	57	7	1798	9	27357	76	438	9	37	1	152	2
65	6/14/2019	16:02:37	B-288 R1	B	288	R1	Sample	B-288-R1	PPM	5	1	0	177	51	7	1089	7	27576	75	387	8	17	1	85	2
66	6/14/2019	16:09:02	B-287 R1	B	287	R1	Sample	B-287-R1	PPM	6	1	0	178	52	7	1113	7	26484	72	399	8	20	1	84	2
67	6/14/2019	16:15:12	B-286 R1	B	286	R1	Sample	B-286-R1	PPM	3	1	0	199	28	7	530	5	11125	39	179	7	12	1	54	1
68	6/14/2019	16:22:32	B-285 R1	B	285	R1	Sample	B-285-R1	PPM	6	1	0	189	53	7	1127	7	23036	68	370	9	22	1	98	2
69	6/14/2019	16:30:43	B-309 R1	B	309	R1	Sample	B-309-R1	PPM	6	1	0	164	53	6	1936	9	27387	72	483	8	50	1	148	2
70	6/14/2019	16:36:44	B-310 R1	B	310	R1	Sample	B-310-R1	PPM	10	1	0	183	61	8	4098	16	29712	83	448	9	43	1	213	3
71	6/14/2019	16:42:56	B-311 R1	B	311	R1	Sample	B-311-R1	PPM	8	1	0	170	64	7	6517	22	35468	99	523	9	75	1	247	3
72	6/14/2019	16:50:55	B-312 R1	B	312	R1	Sample	B-312-R1	PPM	8	1	0	165	52	6	4280	17	27375	87	452	8	62	1	196	3
73	6/14/2019	16:56:28	B-313 R1	B	313	R1	Sample	B-313-R1	PPM	4	1	0	181	50	7	1929	9	21843	64	392	8	45	1	132	2
1	6/15/2019	6:39:57	Blank				Blank	Blank	PPM	0	4	0	198	0	19	6	1	37	3	0	229	0	21	0	5
2	6/15/2019	6:42:01	Nist2711a				Nist2711a	Nist2711a	PPM	89	4	38	4	28	8	153	3	24041	76	586	11	1420	6	408	4
3	6/15/2019	7:05:09	B-166 R1	B	166	R1	Sample	B-166-R1	PPM	7	1	0	189	43	7	1221	7	22650	66	339	8	21	1	107	2
4	6/15/2019	7:10:49	B-167 R1	B	167	R1	Sample	B-167-R1	PPM	6	1	0	178	46	7	1317	7	25626	72	443	9	29	1	130	2
5	6/15/2019	7:17:26	B-168 R1	B	168	R1	Sample	B-168-R1	PPM	5	1	0	183	57	7	934	6	23142	66	427	9	23	1	111	2
6	6/15/2019	7:23:53	B-169 R1	B	169	R1	Sample	B-169-R1	PPM	7	1	0	171	62	7	4615	18	30021	97	467	9	53	1	215	3
7	6/15/2019	7:29:40	B-200 R1	B	200	R1	Sample	B-200-R1	PPM	7	1	0	159	53	6	16792	45	25649	71	370	8	85	1	240	4
8	6/15/2019	7:34:28	B-230 R1	B	230	R1	Sample	B-230-R1	PPM	6	1	0	178	63	7	1205	7	21558	60	361	8	28	1	89	2
9	6/15/2019	7:40:24	B-261 R1	B	261	R1	Sample	B-261-R1	PPM	9	1	0	172	69	7	5705	19	32282	87	543	9	72	1	175	3
10	6/15/2019	7:46:17	B-289 R1	B	289	R1	Sample	B-289-R1	PPM	6	1	0	190	29	7	973	7	28649	82	448	9	18	1	87	2
11	6/15/2019	7:55:02	B-314 R1	B	314	R1	Sample	B-314-R1	PPM	7	1	0	174	58	7	2535	11	27916	75	446	9	47	1	157	2
12	6/15/2019	8:05:19	B-316 R1	B	316	R1	Sample	B-316-R1	PPM	7	1	0	163	52	6	2760	11	30076	78	509	8	73	1	169	2
13	6/15/2019	8:13:21	B-291 R1	B	291	R1	Sample	B-291-R1	PPM	5	1	0	172	42	7	703	5	28794	78	376	8	27	1	90	2
14	6/15/2019	8:20:01	B-290 R1	B	290	R1	Sample	B-290-R1	PPM	7	1	0	167	51	7	2672	12	35704	97	497	9	41	1	141	2
15	6/15/2019	8:25:29	B-290 R1	B	290	R1	Precision	B-290-R1	PPM	7	1	0	164	49	7	2395	10	34133	90	499	9	40	1	143	2
16	6/15/2019	8:26:42	B-290 R1	B	290	R1	Precision	B-290-R1	PPM	7	1	0	164	39	6	2408	11	34112	90	507	9	40	1	144	2
17	6/15/2019	8:28:03	B-290 R1	B	290	R1	Precision	B-290-R1	PPM	7	1	0	164	39	6	2404	11	34135	90	507	9	39	1	141	2
18	6/15/2019	8:29:23	B-290 R1	B	290	R1	Precision	B-290-R1	PPM	7	1	0	164	48	7	2413	11	34193	90	509	9	38	1	140	2
19	6/15/2019	8:30:41	B-290 R1	B	290	R1	Precision	B-290-R1	PPM	6	1	0	164	44	7	2399	10	34061	89	494	9	40	1	139	2
20	6/15/2019	8:33:18	B-290 R1	B	290	R1	Precision	B-290-R1	PPM	9	1	0	164	52	7	2394	10	34121	90	499	9	38	1	139	2
21	6/15/2019	8:34:43	B-290 R1	B	290	R1	Precision	B-290-R1	PPM	7	1	0	164	54	7	2404	11	34260	106	505	9	40	1	138	2
22	6/15/2019	8:36:32	Blank				Blank	Blank	PPM	0	4	0	199	0	19	0	8	57	4	0	234	0	21	0	5
23	6/15/2019	8:38:40	Nist2711a				Nist2711a	Nist2711a	PPM	96	4	42	4	0	26	163	3	24543	92	593	10	1433	7	417	4
24	6/15/2019	8:47:00	B-139 R1	B	139	R1	Sample	B-139-R1	PPM	7	1	0	200	46	8	2146	11	26998	82	433	10	32	1	203	3
25	6/15/2019	8:53:22	B-140 R1	B	140	R1	Sample	B-140-R1	PPM	7	1	0	179	65	7	4080	15	29172	82	546	10	45	1	334	3
26	6/15/2019	8:59:02	B-141 R1	B	141	R1	Sample	B-141-R1	PPM	6	1	0	176	47	7	1918	9	26591	72	453	9	35	1	147	2
27	6/15/2019	9:04:47	B-142 R1	B	142	R1	Sample	B-142-R1	PPM	6	1	0	168	145	8	5374	18	30456	82	741	10	179	2	723	5
28	6/15/2019	9:12:04	B-119 R1	B	119	R1	Out	B-119-R1	PPM	10	1	0	177	82	7	5164	18	27153	76	624	10	194	2	413	4
29	6/15/2019	9:21:22	B-118 R1	B	118	R1	Sample	B-118-R1	PPM	11	1	0	179	52	7	10442	32	30035	87	590	10	112	2	473	4
30	6/15/2019	9:27:32	B-117 R1	B	117	R1	Sample	B-117-R1	PPM	9	1	0	190	40	7	529	5	32935	99	632	11	116	2	209	3
31	6/15/2019	9:34:07	B-116 R1	B	116	R1	Sample	B-116-R1	PPM	6	1	0	163	62	6	4857	16	29394	78	551	9	43	1	300	3
33	6/15/2019	9:47:41	B-098 R1	B	98	R1	Sample	B-098-R1	PPM	7	1	0	176	50	7	6775	22	26567	76	419	8	67	1	287	3
34	6/15/2019	9:52:18	B-099 R1	B	99	R1	Sample	B-099-R1	PPM	13	2	0	163	68	7	9597	28	30652	82	605	9	225	2	595	4
35	6/15/2019	9:58:00	B-080 R1	B	80	R1	Sample	B-080-R1	PPM	11	1	0	167	51	6	10511	30	24445	68	464	8	107	2	425	4
36	6/15/2019	10:05:49	B-079 R1	B	79	R1	Sample	B-079-R1	PPM	6	1	0	164	58	6	5537	18	24320	66	477	8	67	1	316	3
37	6/15/2019	10:11:13	B-065 R1	B	65	R1	Sample	B-065-R1	PPM	5	1	0	181	51	7	3795	14	23987	68	626	10	29	1	324	3
38	6/15/2019	10:16:59	B-052 R1	B	52	R1	Sample	B-052-R1	PPM	5	1	0	209	31	8	1144	8	19326	63	397	10	23	1	117	2
39	6/15/2019	10:33:57	B-397 R1	B	397	R1	Sample	B-397-R1	PPM	6	1	0	187	45	7	4741	18	32315	93	430	9	36	1	191	3
40	6/15/2019	10:39:11	B-398 R1	B	398	R1	Sample	B-398-R1	PPM	7	1	0	173	75	7	14620	40	26348	75	438	9	99	2	532	5
41	6/15/2019	10:45:38	B-399 R1	B	399	R1	Sample	B-399-R1	PPM	9	1	0	168	52	6	1152	7	30772	84	490	9	30	1	150	2
42	6/15/2019	10:51:34	B-400 R1	B	400	R1	Sample	B-400-R1	PPM	10	1	0	174	40	7	5540	19	32113	91	579	10	66	1	305	3
43	6/15/2019	11:04:45	B-401 R1	B	401	R1	Sample	B-401-R1	PPM	19	2	0	158	76	7	20894	74	48219	167	449	9	144	2	638	6
44	6/15/2019	11:12:29	B-402 R1	B	402	R1	Sample	B-402-R1	PPM	4	1	0	174	50	7	832	6	23791	66	312	8	19	1	106	2
45	6/15/2019	11:18:21	B-403 R1	B	403	R1	Sample	B-403-R1	PPM	8	1	0	166	56	6	1135	7	33404	89	565	9	30	1	157	2
46	6/15/2019	11:25:55	B-404 R1	B	404	R1	Sample	B-404-R1	PPM	7	1	0	166	49	6	284	3	37851	100	459	8	26	1	119	2
47	6/15/2019	11:30:40	Blank				Blank	Blank	PPM	0	7	0	336	0	32	10	2	34	6	0	230	0	35	0	9

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
48	6/15/2019	11:31:53	Nist2711a				Nist2711a	Nist2711a	PPM	88	7	35	7	0	48	168	5	24341	128	552	18	1410	11	411	6
49	6/15/2019	11:35:20	B097 PRun	B	97	PR	Precision	B-097	PPM	8	2	0	278	58	11	5938	33	32909	148	473	14	59	2	297	5
50	6/15/2019	11:36:55	B097 PRun	B	97		Precision	B-097	PPM	10	1	0	279	41	11	5967	33	32850	147	452	14	55	2	299	5
51	6/15/2019	11:37:39	B097 PRun	B	97		Precision	B-097	PPM	11	1	0	278	38	11	5919	33	32619	146	468	14	54	2	295	5
52	6/15/2019	11:39:19	B097 PRun	B	97		Precision	B-097	PPM	9	1	0	276	54	11	5931	33	32161	144	443	14	57	2	283	5
53	6/15/2019	11:40:03	B097 PRun	B	97		Precision	B-097	PPM	6	1	0	276	44	11	5876	32	31806	142	476	14	59	2	286	5
54	6/15/2019	11:40:49	B097 PRun	B	97		Precision	B-097	PPM	9	1	0	277	41	11	5847	32	31687	142	470	14	58	2	280	5
55	6/15/2019	11:41:51	B097 PRun	B	97		Precision	B-097	PPM	6	1	0	277	34	11	5864	32	31905	143	475	14	60	2	285	5
56	6/15/2019	11:59:01	B-329 R1	B	329	R1	Sample extra	B-329-R1	PPM	7	1	0	282	56	11	137	4	29947	136	492	14	23	2	98	3
57	6/15/2019	12:00:07	B-329 R1	B	329	R1	Sample	B-329-R1	PPM	8	1	0	164	51	6	141	2	29939	79	501	8	25	1	95	2
58	6/15/2019	12:06:34	B-331 R1	B	331	R1	Sample	B-331-R1	PPM	4	1	0	175	36	7	2185	10	26056	73	386	8	116	2	341	3
59	6/15/2019	12:12:45	B-332 R1	B	332	R1	Sample	B-332-R1	PPM	6	1	0	236	0	31	1268	9	21089	76	366	10	37	1	129	3
60	6/15/2019	12:18:17	B-333 R1	B	333	R1	Sample	B-333-R1	PPM	6	1	0	179	44	7	2052	10	25938	71	382	8	41	1	151	2
61	6/15/2019	12:23:33	B-334 R1	B	334	R1	Sample extra	B-334-R1	PPM	5	1	0	190	52	7	565	5	20631	60	358	9	21	1	70	2
62	6/15/2019	12:33:06	B-334 R1	B	334	R1	Sample	B-334-R1	PPM	9	1	0	156	73	7	865	6	39017	99	524	9	28	1	112	2
63	6/15/2019	12:40:56	B-335 R1	B	335	R1	Sample	B-335-R1	PPM	4	1	0	180	32	7	702	5	21633	63	372	8	32	1	90	2
64	6/15/2019	12:50:44	B-340 R1	B	340	R1	Sample	B-340-R1	PPM	8	1	0	164	57	6	2822	11	29308	79	556	9	57	1	148	2
65	6/15/2019	12:55:51	B-352 R1	B	352	R1	Sample	B-352-R1	PPM	6	1	0	168	65	7	2886	12	28643	78	479	8	56	1	147	2
66	6/15/2019	13:01:23	B-363 R1	B	363	R1	Sample	B-363-R1	PPM	7	1	0	185	39	7	1214	8	29344	86	465	9	31	1	135	2
67	6/15/2019	13:07:26	B-362 R1	B	362	R1	Sample	B-362-R1	PPM	5	1	0	184	37	7	463	4	22120	64	378	8	19	1	93	2
68	6/15/2019	13:12:40	B-351 R1	B	351	R1	Sample	B-351-R1	PPM	9	1	0	169	46	6	4636	19	33024	108	634	10	70	1	168	3
69	6/15/2019	13:16:45	B-351 R1	B	351	R1	Precision	B-351-R1	PPM	9	2	0	288	57	11	4387	27	31107	147	562	16	68	2	162	4
70	6/15/2019	13:17:31	B-351 R1	B	351	R1	Precision	B-351-R1	PPM	10	2	0	289	42	11	4428	28	31215	147	617	16	68	2	161	4
71	6/15/2019	13:18:14	B-351 R1	B	351	R1	Precision	B-351-R1	PPM	7	2	0	286	58	11	4415	27	31213	147	609	16	67	2	154	4
72	6/15/2019	13:19:20	B-351 R1	B	351	R1	Precision	B-351-R1	PPM	7	2	0	287	34	11	4380	27	31046	146	588	16	69	2	164	4
73	6/15/2019	13:20:02	B-351 R1	B	351	R1	Precision	B-351-R1	PPM	12	2	0	290	58	11	4430	29	31305	156	621	16	69	2	155	4
74	6/15/2019	13:20:44	B-351 R1	B	351	R1	Precision	B-351-R1	PPM	10	2	0	288	37	11	4386	27	31299	147	581	16	66	2	157	4
75	6/15/2019	13:21:27	B-351 R1	B	351	R1	Precision	B-351-R1	PPM	7	2	0	288	66	11	4385	27	31218	147	608	16	70	2	159	4
76	6/15/2019	13:24:56	Blank				Blank	Blank	PPM	0	7	0	332	0	33	0	13	22	5	0	226	0	34	0	8
77	6/15/2019	13:25:59	Nist2711a				Nist2711a	Nist2711a	PPM	82	7	38	7	0	46	140	5	24275	126	584	18	1420	11	408	6
78	6/15/2019	14:07:04	B-413 R1	B	413	R1	Sample	B-413-R1	PPM	37	3	0	255	85	12	24324	127	47856	246	802	18	140	4	633	10
79	6/15/2019	14:08:22	B-414 R1	B	414	R1	Sample	B-414-R1	PPM	31	2	0	148	69	6	24102	69	47402	134	812	10	138	2	610	6
80	6/15/2019	14:14:56	B-412 R1	B	412	R1	Sample	B-412-R1	PPM	8	1	0	167	48	6	5148	21	32408	109	520	9	76	1	176	3
81	6/15/2019	14:18:55	B-411 R1	B	411	R1	Sample	B-411-R1	PPM	8	1	0	166	53	6	1128	7	33123	105	538	9	39	1	123	2
82	6/15/2019	14:24:57	B-410 R1	B	410	R1	Sample	B-410-R1	PPM	11	1	0	180	73	7	10695	33	31682	93	349	8	67	1	355	4
83	6/15/2019	14:30:12	B-409 R1	B	409	R1	Sample	B-409-R1	PPM	8	1	0	193	90	8	2212	11	26255	78	507	10	34	1	143	2
84	6/15/2019	14:34:36	B-407 R1	B	407	R1	Sample	B-407-R1	PPM	18	1	0	167	57	7	7541	24	35439	96	510	9	63	1	288	3
1	6/17/2019	7:30:19	Blank				Blank	Blank	PPM	0	4	0	193	0	19	6	1	30	3	0	223	0	21	0	5
2	6/17/2019	7:32:27	Nist2711a				Nist2711a	Nist2711a	PPM	91	4	48	4	23	7	157	3	24676	95	606	11	1444	7	415	4
3	6/17/2019	7:42:43	B-343 R1	B	343	R1	Sample	B-343-R1	PPM	6	1	0	196	52	8	349	4	20201	61	304	8	23	1	113	2
4	6/17/2019	7:50:55	B-355 R1	B	355	R1	Sample	B-355-R1	PPM	7	1	0	196	53	8	803	6	20974	64	346	9	38	1	131	2
5	6/17/2019	7:57:39	B-354 R1	B	354	R1	Sample	B-354-R1	PPM	5	1	0	180	50	7	2163	10	23728	69	422	9	73	1	166	2
6	6/17/2019	8:39:27	B-405 R1	B	405	R1	Sample	B-405-R1	PPM	6	1	0	200	77	8	3391	14	22224	66	270	8	24	1	155	3
7	6/17/2019	8:49:27	B-406 R1	B	406	R1	Sample	B-406-R1	PPM	12	1	0	200	152	9	2433	11	22980	68	267	8	26	1	163	3
8	6/17/2019	9:02:16	B-353 R1	B	353	R1	Sample	B-353-R1	PPM	7	1	0	166	63	7	3523	13	29705	79	516	9	83	1	197	3
9	6/17/2019	9:08:19	B-341 R1	B	341	R1	Sample	B-341-R1	PPM	9	2	0	168	60	7	3189	12	29549	79	1196	12	246	2	202	3
10	6/17/2019	9:13:21	B-330 R1	B	330	R1	Sample	B-330-R1	PPM	13	1	0	177	48	7	9534	38	32598	123	453	9	98	2	702	6
11	6/17/2019	9:21:24	B-364 R1	B	364	R1	Sample	B-364-R1	PPM	7	1	0	170	42	6	1575	8	28772	78	503	9	47	1	178	2
12	6/17/2019	9:26:28	B-373 R1	B	373	R1	Sample	B-373-R1	PPM	7	1	0	165	42	6	401	4	30698	82	422	8	22	1	110	2
13	6/17/2019	9:32:24	B-365 R1	B	365	R1	Sample	B-365-R1	PPM	6	1	0	193	43	8	1751	9	26179	78	531	10	176	2	277	3
14	6/17/2019	9:37:56	B-374 R1	B	374	R1	Sample	B-374-R1	PPM	7	1	0	160	55	6	5063	17	33907	90	480	8	73	1	234	3
15	6/17/2019	9:41:47	B-374 R2	B	374	R2	Sample	B-374-R2	PPM	7	1	0	163	32	5	356	4	28179	79	316	7	22	1	105	2
16	6/17/2019	9:49:00	B-375 R1	B	375	R1	Sample	B-375-R1	PPM	0	21	0	166	40	6	4749	17	30131	84	513	9	474	3	442	4
17	6/17/2019	9:55:36	B-376 R1	B	376	R1	Sample	B-376-R1	PPM	7	2	0	178	30	7	4560	17	26321	76	516	9	274	2	411	4
18	6/17/2019	10:03:48	B-377 R1	B	377	R1	Sample	B-377-R1	PPM	0	20	0	177	51	7	7133	24	30308	88	526	9	390	3	642	5
19	6/17/2019	10:08:47	B-378 R1	B	378	R1	Sample	B-378-R1	PPM	8	1	0	175	52	7	5526	20	33212	93	506	9	188	2	412	4
20	6/17/2019	10:42:07	B-379 R1	B	379	R1	Sample	B-379-R1	PPM	7	1	0	180	36	7	1784	9	26974	77	448	9	65	1	164	2
21	6/17/2019	10:44:13	B-379 R1	B	379	R1	Precision	B-379-R1	PPM	0	17	0	311	57	12	1751	15	26781	132	433	15	66	2	165	4
22	6/17/2019	10:44:57	B-379 R1	B	379	R1	Precision	B-379-R1	PPM	5	2	0	312	47	12	1766	16	26856	132	433	15	68	2	165	4
23	6/17/2019	10:45:41	B-379 R1	B	379	R1	Precision	B-379-R1	PPM	6	2	0	311	55	12	1787	16	26764	132	468	15	65	2	160	4
24	6/17/2019	10:46:26	B-379 R1	B	379	R1	Precision	B-379-R1	PPM	0	17	0	311	43	12	1788	16	26714	132	433	15	67	2	165	4
25	6/17/2019	10:47:09	B-379 R1	B	379	R1	Precision	B-379-R1	PPM	5	2	0	308	38	12	1751	15	26592	131	423	15	67	2	161	4
26	6/17/2019	10:48:18	B-379 R1	B	379	R1	Precision	B-379-R1	PPM	6	2	0	312	47	12	1737	15	26573	131	407	15	65	2	158	4
27	6/17/2019	10:56:06	B-369 R1	B	369	R1	Sample extra	B-369-R1	PPM	0	19	0	289	58	12	776	10	33848	152	577	16	119	3	266	5
28	6/17/2019	10:57:10	B-369 R1	B	369	R1	Sample	B-369-R1	PPM	4	1	0	166	67	7	782	6	33709	89	577	9	118	2	258	3
29	6/17/2019	11:03:44	B-368 R1	B	368	R1	Sample	B-368-R1	PPM	0	10	0	191	57	7	947	6	21834	66	377	9	70	1	133	2
30	6/17/2019	11:09:38	B-367 R1	B	367	R1	Sample	B-367-R1	PPM	6	1	0	207	36	8	1270	8	21564	68	431	10	67	1	151	2
31	6/17/2019	11:15:00	B-366 R1	B	366	R1	Sample	B-366-R1	PPM	6	1	0	183	36	7	1795	9	24681	71	439	9	63	1	166	2
32	6/17/2019	11:22:24	Blank				Blank	Blank	PPM	0	4	0	193	0	18	6	1	32	3	0	227	0	21	0	5
33	6/17/2019	11:24:20	Nist2711a				Nist2711a	Nist2711a	PPM	96	4	45	4	0	26	155	3	24561	87	610	10	1422	7	411	4
34	6/17/2019	11:49:29	B-356 R1	B	356	R1	Sample	B-356-R1	PPM	5	1	0	187	60	7	1322	8	23391	67	478	9	42	1	131	2
35	6/17/2019	11:54:37	B-357 R1	B	357	R1	Sample	B-357-R1	PPM	7	1	0	184	57	7	1215	7	23053	66	397	9	67	1	161	2
36	6/17/2019	12:00:49	B-358 R1	B	358	R1	Sample	B-358-R1	PPM	5	1	0	191	46	7	875	6	21445	62	402	9	45	1	120	2
37	6/17/2019	12:07:17	B-359 R1	B	359	R1	Sample	B-359-R1	PPM	3	1	0	192	28	7	165	3	16512	53	265	8	19	1	61	1

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
38	6/17/2019	12:16:11	B-347 R1	B	347	R1	Sample	B-347-R1	PPM	5	1	0	189	37	7	1394	8	24492	72	404	9	66	1	159	2
39	6/17/2019	12:21:20	B-348 R1	B	348	R1	Sample	B-348-R1	PPM	8	2	0	353	0	51	2194	19	31341	167	543	17	87	3	184	5
40	6/17/2019	12:27:02	B-337 R1	B	337	R1	Sample	B-337-R1	PPM	7	1	0	164	55	7	785	6	33718	103	569	9	78	1	136	2
41	6/17/2019	12:35:32	B-336 R1	B	336	R1	Sample	B-336-R1	PPM	5	1	0	169	42	6	417	4	30552	83	431	8	31	1	95	2
42	6/17/2019	12:40:57	B-346 R1	B	346	R1	Sample	B-346-R1	PPM	6	1	0	188	57	7	1789	9	23325	67	435	9	40	1	115	2
43	6/17/2019	12:45:23	B-345 R1	B	345	R1	Sample	B-345-R1	PPM	5	1	0	183	41	7	1017	6	22184	63	384	8	34	1	127	2
44	6/17/2019	12:51:56	B-344 R1	B	344	R1	Sample	B-344-R1	PPM	5	1	0	197	62	8	1017	7	22545	67	381	9	52	1	159	2
45	6/17/2019	13:45:52	Blank				Blank	Blank	PPM	0	4	0	196	0	18	5	1	27	3	0	233	0	21	0	5
46	6/17/2019	13:50:41	Nist2711a				Nist2711a	Nist2711a	PPM	79	4	38	4	0	26	147	3	24009	71	559	10	1416	6	409	3
47	6/17/2019	13:55:01	B-375 R1PR	B	375	R1	Precision	B-375-R1	PPM	0	33	0	273	45	10	5154	30	31172	143	509	14	455	5	437	6
48	6/17/2019	13:56:29	B-375 R1PR	B	375	R1	Precision	B-375-R1	PPM	0	33	0	273	74	11	5205	30	31016	142	521	14	451	5	441	6
49	6/17/2019	13:58:42	B-375 R1PR	B	375	R1	Precision	B-375-R1	PPM	0	33	0	271	70	11	5121	29	30716	140	498	14	452	5	446	6
50	6/17/2019	14:02:58	B-375 R1PR	B	375	R1	Precision	B-375-R1	PPM	0	33	0	270	76	11	5086	30	30696	146	502	14	442	5	439	6
51	6/17/2019	14:05:13	B-375 R1PR	B	375	R1	Precision	B-375-R1	PPM	10	3	0	272	37	10	5126	29	30923	141	502	14	440	5	446	6
52	6/17/2019	14:06:02	B-375 R1PR	B	375	R1	Precision	B-375-R1	PPM	0	33	0	272	69	11	5108	30	30960	148	502	14	440	5	450	6
53	6/17/2019	14:07:04	B-375 R1PR	B	375	R1	Precision	B-375-R1	PPM	0	33	0	271	62	10	5118	29	30719	140	534	14	441	5	446	6
54	6/17/2019	14:14:54	B-370 R1	B	370	R1	Sample	B-370-R1	PPM	6	1	0	195	27	7	495	5	21176	65	331	8	38	1	91	2
55	6/17/2019	14:25:29	B-342 R1	B	342	R1	Sample	B-342-R1	PPM	8	1	0	168	38	7	4048	15	29259	78	480	9	71	1	218	3
56	6/17/2019	14:36:25	B-203 R1	B	203	R1	Sample	B-203-R1	PPM	5	1	0	175	30	7	389	4	26973	75	360	8	19	1	75	2
57	6/17/2019	14:43:08	B-234 R1	B	234	R1	Sample	B-234-R1	PPM	5	1	0	183	38	7	746	6	23179	68	440	9	20	1	72	2
58	6/17/2019	14:52:13	B-266 R1	B	266	R1	Sample	B-266-R1	PPM	10	1	0	176	31	7	3845	15	33597	98	505	9	53	1	194	3
59	6/17/2019	14:57:36	B-267 R1	B	267	R1	Sample	B-267-R1	PPM	4	1	0	163	40	6	106	2	29502	77	353	7	19	1	71	1
60	6/17/2019	15:07:57	B-296 R1	B	296	R1	Sample	B-296-R1	PPM	3	1	0	184	38	7	997	6	18274	55	386	8	24	1	57	1
61	6/17/2019	15:15:45	B-297 R1	B	297	R1	Sample	B-297-R1	PPM	5	1	0	194	63	8	1368	8	19996	61	313	8	19	1	75	2
62	6/17/2019	15:28:32	Blank				Blank	Blank	PPM	0	4	0	201	0	19	6	1	32	3	0	243	0	22	0	5
63	6/17/2019	15:30:26	Nist2711a				Nist2711a	Nist2711a	PPM	89	4	43	4	29	7	161	3	23948	81	564	10	1414	6	405	3
64	6/17/2019	15:37:08	B-398 R2	B	398	R2	Sample	B-398-R2	PPM	10	1	0	168	82	7	12509	36	30784	87	398	8	96	2	485	4
65	6/17/2019	15:43:46	B-397 R2	B	397	R2	Sample extra	B-397-R2	PPM	5	1	0	171	59	7	617	5	32475	89	635	10	22	1	116	2
66	6/17/2019	15:47:35	B-397 R2	B	397	R2	Sample	B-397-R2	PPM	6	1	0	202	29	8	1539	9	23948	74	539	10	30	1	147	2
67	6/17/2019	16:05:49	B-401 R2	B	401	R2	Sample	B-401-R2	PPM	11	2	0	160	67	7	24569	83	38209	130	390	8	162	2	909	7
68	6/17/2019	16:16:58	B-097 R2	B	97	R2	Sample	B-097-R2	PPM	7	1	0	171	45	7	5672	19	26540	72	454	9	58	1	279	3
69	6/17/2019	16:22:34	B-098 R2	B	98	R2	Sample	B-098-R2	PPM	9	1	0	168	55	6	7368	26	27649	89	600	9	71	1	341	4
70	6/17/2019	16:30:54	B-099 R2	B	99	R2	Sample	B-099-R2	PPM	10	2	0	183	47	7	6794	24	30447	90	674	11	206	2	495	4
71	6/17/2019	16:36:04	B-080 R2	B	80	R2	Sample	B-080-R2	PPM	7	1	0	170	56	7	9990	29	26672	74	461	9	129	2	435	4
72	6/17/2019	16:41:04	B-079 R2	B	79	R2	Sample	B-079-R2	PPM	10	1	0	177	57	7	11598	42	28144	100	629	10	125	2	566	5
73	6/17/2019	16:52:24	B-407 R2	B	407	R2	Sample	B-407-R2	PPM	7	1	0	158	64	6	635	5	33564	104	471	8	27	1	131	2
74	6/17/2019	16:58:09	B-408 R1	B	408	R1	Sample	B-408-R1	PPM	19	1	0	171	52	7	4334	16	31293	87	471	9	195	2	238	3
1	6/18/2019	10:02:28	Blank				Blank	Blank	PPM	0	4	0	195	0	19	13	1	85	4	0	237	0	21	0	5
2	6/18/2019	10:05:44	Blank				Blank	Blank	PPM	0	4	0	200	0	19	5	1	0	12	0	231	0	21	0	5
3	6/18/2019	10:07:10	Nist2711a				Nist2711a	Nist2711a	PPM	91	4	41	4	0	26	154	3	24306	91	593	10	1426	7	408	4
11	6/18/2019	10:41:06	B-398 R3	B	398	R3	Sample	B-398-R3	PPM	6	1	0	186	50	6	2557	12	19200	62	335	7	32	1	143	2
12	6/18/2019	10:47:40	B-079 R3	B	79	R3	Sample	B-079-R3	PPM	4	1	0	162	69	7	6021	20	34328	91	898	11	43	1	386	4
15	6/18/2019	10:54:30	B-079 R4	B	79	R4	Sample	B-079-R4	PPM	4	1	0	162	53	6	3646	13	29299	76	759	10	64	1	304	3
16	6/18/2019	11:00:53	B-080 R3	B	80	R3	Sample	B-080-R3	PPM	12	2	0	181	62	7	3896	15	28496	81	695	11	218	2	443	4
17	6/18/2019	11:06:28	B-099 R3	B	99	R3	Sample	B-099-R3	PPM	5	1	0	169	58	7	2750	12	22858	72	709	10	230	2	929	5
18	6/18/2019	11:11:41	B-098 R3	B	98	R3	Sample	B-098-R3	PPM	7	1	0	167	31	7	2680	12	34095	105	571	9	44	1	208	3
19	6/18/2019	11:17:28	B-097 R3	B	97	R3	Sample	B-097-R3	PPM	6	1	0	186	42	7	3092	13	25176	75	411	9	42	1	202	3
20	6/18/2019	11:24:12	B-401 R3	B	401	R3	Sample	B-401-R3	PPM	8	1	0	167	50	6	4138	16	28879	91	465	8	38	1	203	3
21	6/18/2019	11:32:29	B-400 R2	B	400	R2	Sample	B-400-R2	PPM	5	1	0	160	25	6	269	3	26650	79	304	7	20	1	127	2
22	6/18/2019	11:39:38	B-116 R2	B	116	R2	Sample	B-116-R2	PPM	6	1	0	163	63	6	4869	18	30928	92	523	9	45	1	280	3
23	6/18/2019	11:44:51	B-116 R3	B	116	R3	Sample	B-116-R3	PPM	33	1	14	4	71	6	19853	63	31754	102	328	7	158	2	577	5
24	6/18/2019	11:50:29	B-116 R4	B	116	R4	Sample	B-116-R4	PPM	3	1	0	194	29	7	392	4	9736	35	212	7	9	1	63	1
25	6/18/2019	12:02:35	B-142 R2	B	142	R2	Sample	B-142-R2	PPM	3	1	0	157	75	6	6765	23	28993	88	763	10	45	1	449	4
26	6/18/2019	12:18:09	B-142 R3	B	142	R3	Sample	B-142-R3	PPM	0	8	0	158	70	6	7185	25	32616	103	830	10	48	1	482	4
27	6/18/2019	12:23:40	B-142 R4	B	142	R4	Sample	B-142-R4	PPM	12	3	0	168	61	7	2582	12	25297	84	577	10	1250	6	1070	6
28	6/18/2019	12:33:49	B-118 R2	B	118	R2	Sample	B-118-R2	PPM	7	1	0	178	40	7	5080	20	26183	90	711	11	46	1	541	4
29	6/18/2019	12:39:03	B-097 R3	B	97	R3	Precision	B-097-R3	PPM	7	1	0	168	53	7	3449	14	27980	85	432	8	43	1	206	3
30	6/18/2019	12:41:05	B-097 R3	B	97	R3	Precision	B-097-R3	PPM	7	1	0	168	54	6	3423	14	27825	84	420	8	43	1	205	3
31	6/18/2019	12:45:09	B-097 R3	B	97	R3	Precision	B-097-R3	PPM	6	1	0	168	57	7	3445	14	27949	85	425	8	44	1	205	3
32	6/18/2019	12:49:02	B-097 R3	B	97	R3	Precision	B-097-R3	PPM	6	1	0	167	50	6	3425	14	27785	85	414	8	45	1	203	3
33	6/18/2019	12:50:18	B-097 R3	B	97	R3	Precision	B-097-R3	PPM	7	1	0	168	56	7	3427	14	27872	85	411	8	43	1	203	3
34	6/18/2019	12:54:14	B-097 R3	B	97	R3	Precision	B-097-R3	PPM	7	1	0	167	60	7	3448	14	27749	84	411	8	42	1	203	3
35	6/18/2019	12:56:03	B-097 R3	B	97	R3	Precision	B-097-R3	PPM	6	1	0	167	54	6	3430	14	27713	84	417	8	44	1	205	3
36	6/18/2019	12:59:01	Blank				Blank	Blank	PPM	0	4	0	199	0	19	7	1	34	3	0	238	0	21	0	5
37	6/18/2019	13:00:49	Nist2711a				Nist2711a	Nist2711a	PPM	85	4	46	4	26	8	153	3	24246	90	571	10	1417	7	408	4
47	6/18/2019	14:09:13	B-118 R3	B	118	R3	Sample	B-118-R3	PPM	6	1	0	181	52	7	4679	17	23748	69	480	9	62	1	289	3
48	6/18/2019	14:12:25	B-118 R4	B	118	R4	Sample	B-118-R4	PPM	10	1	0	174	74	7	4140	16	31094	95	625	10	82	1	247	3
49	6/18/2019	14:25:16	B-311 R2	B	311	R2	Sample	B-311-R2	PPM	9	1	0	161	50	6	1823	9	35205	107	594	9	53	1	144	2
50	6/18/2019	14:31:21	B-330 R2	B	330	R2	Sample	B-330-R2	PPM	6	1	0	171	49	7	2623	12	30706	97	502	9	44	1	272	3
51	6/18/2019	14:41:24	B-412 R2	B	412	R2	Sample	B-412-R2	PPM	11	1	0	164	47	6	1001	6	34730	106	555	9	41	1	136	2
52	6/18/2019	14:47:32	B-351 R2	B	351	R2	Sample	B-351-R2	PPM	8	1	0	162	53	6	316	3	30662	94	546	9	28	1	114	2
53	6/18/2019	14:54:40	B-413 R2	B	413	R2	Sample	B-413-R2	PPM	8	1	0	164	54	6	247	3	33764	108	484	8	28	1	130	2
54	6/18/2019	15:05:42	B-410 R2	B	410	R2	Sample	B-410-R2	PPM	7	1	0	189	46	7	818	6	20923	61	449	9	104	2	152	2
55	6/18/2019	15:17:53	B-375 R2	B	375	R2	Sample	B-375-R2	PPM	11	2	0	160	39	6	3166	13	32549	101	575	9	307	2	460	4

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
56	6/18/2019	15:23:10	B-376 R2	B	376	R2	Sample	B-376-R2	PPM	0	22	0	166	40	7	1523	8	26464	85	504	9	542	3	1248	6
57	6/18/2019	15:29:17	B-377 R2	B	377	R2	Sample	B-377-R2	PPM	6	2	0	184	39	7	5157	22	28741	103	474	9	219	2	383	4
58	6/18/2019	15:34:59	B-378 R2	B	378	R2	Sample	B-378-R2	PPM	0	11	0	178	151	8	842	6	26292	84	388	8	112	2	122	2
59	6/18/2019	15:42:57	B-377 R3	B	377	R3	Sample	B-377-R3	PPM	8	1	0	171	31	6	1528	8	28488	78	420	8	39	1	114	2
1	6/20/2019	7:52:09	Blank				Blank	Blank	PPM	0	7	0	337	0	33	0	14	0	21	0	220	0	36	0	9
2	6/20/2019	8:03:52	Nist2711a				Nist2711a	Nist2711a	PPM	87	7	42	7	0	44	141	5	24160	124	584	18	1429	11	403	6
3	6/20/2019	8:18:24	B-261 R2	B	261	R2	Sample	B-261-R2	PPM	3	1	0	308	47	11	2171	17	18448	99	502	15	22	2	164	4
4	6/20/2019	8:28:50	B-200 R2	B	200	R2	Sample	B-200-R2	PPM	5	1	0	304	63	12	4369	28	24014	123	478	15	26	2	192	5
5	6/20/2019	8:40:57	B-169 R2	B	169	R2	Sample	B-169-R2	PPM	5	1	0	279	0	39	1949	16	28157	130	651	16	21	2	221	4
6	6/20/2019	8:50:20	B-170 R1	B	170	R1	Sample	B-170-R1	PPM	7	2	0	318	38	12	7550	51	29693	180	769	19	45	2	490	8
7	6/20/2019	8:59:12	B-201 R1	B	201	R1	Sample	B-201-R1	PPM	7	2	0	276	77	12	26163	121	30987	152	453	15	93	3	348	8
8	6/20/2019	9:06:03	B-231 R1	B	231	R1	Sample	B-231-R1	PPM	7	2	0	289	101	12	9155	49	31176	155	503	15	85	3	266	6
9	6/20/2019	9:11:57	B-262 R1	B	262	R1	Sample	B-262-R1	PPM	6	1	0	283	35	11	2083	17	34068	168	460	14	30	2	140	4
10	6/20/2019	9:18:21	B-263 R1	B	263	R1	Sample	B-263-R1	PPM	0	14	0	385	47	14	1636	16	12991	85	277	15	21	2	93	4
11	6/20/2019	11:17:43	B-231 R2	B	231	R2	Sample	B-231-R2	PPM	8	2	0	298	46	12	5341	33	29757	151	750	18	65	2	223	5
12	6/20/2019	11:23:24	B-201 R2	B	201	R2	Sample	B-201-R2	PPM	8	2	0	265	54	11	25046	114	32738	155	518	15	115	3	364	8
13	6/20/2019	11:30:05	B-170 R2	B	170	R2	Sample	B-170-R2	PPM	0	12	0	276	70	11	7479	41	33383	161	1381	23	33	2	679	8
14	6/20/2019	11:38:08	B-202 R1	B	202	R1	Sample	B-202-R1	PPM	7	2	0	267	94	11	11911	59	35874	167	789	17	67	2	520	7
15	6/20/2019	11:43:52	B-232 R1	B	232	R1	Sample	B-232-R1	PPM	0	12	0	315	53	12	422	7	25752	130	417	15	21	2	81	3
16	6/20/2019	11:55:01	B-264 R1	B	264	R1	Sample	B-264-R1	PPM	5	1	0	297	57	12	1921	16	24390	120	326	13	27	2	119	3
17	6/20/2019	11:59:58	B-292 R1	B	292	R1	Sample	B-292-R1	PPM	7	1	0	315	63	13	1936	17	32425	157	432	16	38	2	135	4
18	6/20/2019	12:06:35	B-265 R1	B	265	R1	Sample	B-265-R1	PPM	8	2	0	297	41	11	2223	18	31182	153	564	16	60	2	178	4
19	6/20/2019	12:13:06	B-293 R1	B	293	R1	Sample	B-293-R1	PPM	8	1	0	295	52	11	1427	14	30925	154	483	15	33	2	163	4
20	6/20/2019	12:23:27	B-317 R1	B	317	R1	Sample	B-317-R1	PPM	5	1	0	301	55	12	1232	12	29341	144	427	15	58	2	148	4
21	6/20/2019	12:59:54	Blank				Blank	Blank	PPM	0	8	0	358	0	34	0	15	43	6	0	250	0	38	0	9
22	6/20/2019	13:01:06	Nist2711a				Nist2711a	Nist2711a	PPM	84	7	40	7	0	46	154	5	24482	135	579	18	1444	11	419	6
23	6/20/2019	13:03:04	B-232 R2	B	232	R2	Sample extra	B-232-R2	PPM	9	1	0	279	59	11	5300	31	28337	134	501	14	59	2	220	5
24	6/20/2019	13:04:54	B-232 R2	B	232	R2	Sample extra	B-232-R2	PPM	8	1	0	279	55	11	5320	31	28284	134	501	14	61	2	224	5
25	6/20/2019	13:05:40	B-231 R2	B	231	R2	Precision	B-231-R2	PPM	9	1	0	281	45	11	5312	31	28378	134	488	14	60	2	224	5
26	6/20/2019	13:08:27	B-231 R2	B	231	R2	Precision	B-231-R2	PPM	9	1	0	279	81	11	5307	30	28402	134	497	14	60	2	231	5
27	6/20/2019	13:10:36	B-231 R2	B	231	R2	Precision	B-231-R2	PPM	6	1	0	280	75	11	5318	31	28425	135	496	14	64	2	228	5
28	6/20/2019	13:12:42	B-231 R2	B	231	R2	Precision	B-231-R2	PPM	5	1	0	281	74	11	5374	31	28398	135	489	14	63	2	227	5
29	6/20/2019	13:38:34	B-318 R1	B	318	R1	Sample	B-318-R1	PPM	8	1	0	164	48	6	3183	12	30439	81	504	9	115	2	298	3
30	6/20/2019	13:45:33	BX-134 R1	BX	134	R1	Sample	BX-134-R1	PPM	7	1	0	161	51	6	1267	7	33937	105	425	8	29	1	127	2
31	6/20/2019	13:55:26	B-319 R1	B	319	R1	Sample	B-319-R1	PPM	8	1	0	169	41	6	4727	16	28226	76	432	8	67	1	196	3
32	6/20/2019	13:59:52	B-319 R2	B	319	R2	Sample	B-319-R2	PPM	6	1	0	165	46	7	2013	9	29644	80	474	9	42	1	122	2
33	6/20/2019	14:05:52	B-294 R1	B	294	R1	Sample	B-294-R1	PPM	7	1	0	170	59	7	1377	8	31655	100	477	9	30	1	118	2
34	6/20/2019	14:11:40	B-295 R1	B	295	R1	Sample	B-295-R1	PPM	6	1	0	167	66	7	2827	12	38029	100	534	9	54	1	136	2
35	6/20/2019	14:18:32	B-268 R1	B	268	R1	Sample	B-268-R1	PPM	3	1	0	198	42	8	214	3	21124	66	402	9	14	1	64	2
36	6/20/2019	14:31:42	B-298 R1	B	298	R1	Sample	B-298-R1	PPM	4	1	0	186	49	7	615	5	23558	67	1049	13	20	1	53	1
37	6/20/2019	14:59:29	B-320 R1	B	320	R1	Sample	B-320-R1	PPM	6	1	0	168	59	6	3367	13	24845	71	362	8	43	1	136	2
38	6/20/2019	15:10:08	B-321 R1	B	321	R1	Sample	B-321-R1	PPM	6	1	0	158	90	6	5703	18	28929	76	428	8	63	1	196	3
39	6/20/2019	15:18:49	B-322 R1	B	322	R1	Sample	B-322-R1	PPM	5	1	0	182	65	7	3752	16	25804	84	384	9	42	1	131	2
40	6/20/2019	15:32:15	B-323 R1	B	323	R1	Sample	B-323-R1	PPM	4	1	0	174	147	8	7643	24	29826	81	451	9	74	1	218	3
41	6/20/2019	15:45:14	B-231 R3	B	231	R3	Sample	B-231-R3	PPM	5	1	0	162	49	6	156	3	27389	84	386	8	19	1	87	2
42	6/20/2019	15:55:13	B-201 R3	B	201	R3	Sample	B-201-R3	PPM	5	1	0	165	40	6	272	3	32214	87	433	8	19	1	105	2
46	6/20/2019	16:14:49	B-170 R3	B	170	R3	Sample	B-170-R3	PPM	0	10	0	259	64	10	10595	53	32130	152	670	15	24	2	334	6
47	6/20/2019	16:16:31	B-170 R4	B	170	R4	Sample	B-170-R4	PPM	4	1	0	287	33	10	220	5	26189	136	367	13	20	2	80	3
48	6/20/2019	16:25:09	Blank				Blank	Blank	PPM	0	8	0	351	0	32	7	2	0	22	0	246	0	37	0	8
49	6/20/2019	16:26:20	Nist2711a				Nist2711a	Nist2711a	PPM	104	6	40	7	0	45	151	5	24211	124	598	18	1399	10	400	6
50	6/20/2019	16:29:49	Precision				Precision	Precision	PPM	8	2	0	265	43	10	24160	116	28591	144	445	14	111	3	364	8
51	6/20/2019	16:30:42	Precision				Precision	Precision	PPM	7	2	0	266	55	10	24241	125	28818	154	443	14	114	3	356	8
52	6/20/2019	16:31:28	Precision				Precision	Precision	PPM	9	2	0	266	61	10	24280	117	28689	145	428	14	118	3	354	8
53	6/20/2019	16:32:12	Precision				Precision	Precision	PPM	7	2	0	267	66	11	24303	117	28692	145	465	14	114	3	364	8
54	6/20/2019	16:33:06	Precision				Precision	Precision	PPM	7	2	0	265	56	10	24228	124	28591	153	464	14	110	3	362	8
55	6/20/2019	16:33:56	Precision				Precision	Precision	PPM	7	2	0	267	66	10	24267	117	28701	145	456	14	116	3	356	8
56	6/20/2019	16:34:55	Precision				Precision	Precision	PPM	0	18	0	265	56	10	24094	123	28747	153	450	14	120	3	366	8
57	6/20/2019	16:35:53	Precision				Precision	Precision	PPM	10	2	0	265	75	11	24143	124	28758	153	451	14	112	3	346	8
1	6/21/2019	7:04:06	Blank				Blank	Blank	PPM	0	7	0	333	0	31	7	2	0	20	0	218	0	35	0	8
2	6/21/2019	7:06:44	Nist2711a				Nist2711a	Nist2711a	PPM	90	6	35	7	0	44	145	5	24047	131	598	17	1407	11	401	6
3	6/21/2019	7:14:26	B-321 R2	B	321	R2	Sample	B-321-R2	PPM	7	1	0	171	95	7	7538	24	31473	88	479	9	81	1	182	3
4	6/21/2019	7:19:42	B-324 R1	B	324	R1	Sample	B-324-R1	PPM	6	1	0	188	42	8	3648	15	29195	85	434	9	45	1	131	2
5	6/21/2019	7:25:15	B-325 R1	B	325	R1	Sample	B-325-R1	PPM	5	1	0	180	73	7	4068	15	28120	80	420	9	44	1	138	2
6	6/21/2019	7:34:00	B-326 R1	B	326	R1	Sample	B-326-R1	PPM	6	1	0	171	82	7	6442	21	30850	86	419	8	59	1	177	3
7	6/21/2019	7:39:39	B-327 R1	B	327	R1	Sample	B-327-R1	PPM	6	1	0	179	45	7	5195	18	26904	78	401	8	40	1	121	2
8	6/21/2019	9:33:50	B-302 R1	B	302	R1	Sample	B-302-R1	PPM	5	1	0	197	22	7	1314	8	24786	75	361	9	33	1	101	2
9	6/21/2019	9:40:35	B-303 R1	B	303	R1	Sample	B-303-R1	PPM	6	1	0	176	62	7	5491	19	30191	84	441	9	49	1	156	3
10	6/21/2019	9:46:19	B-304 R1	B	304	R1	Sample	B-304-R1	PPM	5	1	0	186	44	7	224	3	26964	80	389	9	12	1	69	2
11	6/21/2019	9:54:52	B-276 R1	B	276	R1	Sample	B-276-R1	PPM	7	1	0	172	51	7	6606	23	34619	99	503	9	65	1	170	3
12	6/21/2019	10:00:22	B-277 R1	B	277	R1	Sample	B-277-R1	PPM	8	1	0	175	58	7	4880	18	28413	81	500	9	43	1	145	3
13	6/21/2019	10:08:32	B-249 R1	B	249	R1	Sample	B-249-R1	PPM	4	1	0	180	47	7	1114	7	25726	74	525	9	18	1	82	2
14	6/21/2019	10:16:39	B-248 R1	B	248	R1	Sample	B-248-R1	PPM	4	1	0	170	53	6	4364	15	24344	68	389	8	19	1	110	2
15	6/21/2019	10:25:13	B-247 R1	B	247	R1	Sample	B-247-R1	PPM	5	1	0	168	50	6	4552	16	25978	71	555	9	44	1	147	2
16	6/21/2019	10:31:30	B-246 R1	B	246	R1	Sample	B-246-R1	PPM	7	1	0	146	77	7	25200	72	52617	147	341	8	49	1	235	5

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
17	6/21/2019	10:36:20	B-245 R1	B	245	R1	Sample	B-245-R1	PPM	3	1	0	176	0	22	155	3	15010	46	355	8	19	1	57	1
18	6/21/2019	10:41:15	B-244 R1	B	244	R1	Sample	B-244-R1	PPM	6	1	0	171	62	7	2966	12	29390	82	512	9	42	1	117	2
19	6/21/2019	10:47:45	B-243 R1	B	243	R1	Sample	B-243-R1	PPM	3	1	0	177	46	7	1247	7	23186	65	593	9	24	1	82	2
20	6/21/2019	10:57:11	B-275 R1	B	275	R1	Sample	B-275-R1	PPM	9	1	0	157	90	7	7866	23	33534	87	509	8	53	1	198	3
21	6/21/2019	11:03:57	B-274 R1	B	274	R1	Sample	B-274-R1	PPM	6	1	0	167	65	7	4221	15	28895	77	407	8	21	1	94	2
22	6/21/2019	11:12:21	Blank				Blank	Blank	PPM	0	7	0	334	0	32	0	13	0	20	0	220	0	35	0	8
23	6/21/2019	11:13:27	Nist2711a				Nist2711a	Nist2711a	PPM	90	6	51	7	0	45	154	5	24046	131	574	18	1423	11	405	6
24	6/21/2019	11:15:27	Precision				Precision	Precision	PPM	4	1	0	281	53	10	3599	23	26242	124	333	12	25	2	84	3
25	6/21/2019	11:16:24	Precision				Precision	Precision	PPM	4	1	0	280	39	10	3620	24	26406	133	317	12	22	2	91	3
26	6/21/2019	11:18:38	Precision				Precision	Precision	PPM	3	1	0	282	53	11	3658	24	26626	134	357	13	22	2	88	3
27	6/21/2019	11:19:25	Precision				Precision	Precision	PPM	6	1	0	282	41	10	3665	23	26588	126	343	13	20	2	94	3
28	6/21/2019	11:20:37	Precision				Precision	Precision	PPM	5	1	0	280	53	10	3651	24	26450	133	333	12	22	2	85	3
29	6/21/2019	11:21:38	Precision				Precision	Precision	PPM	6	1	0	281	60	11	3639	24	26569	134	347	13	20	2	89	3
30	6/21/2019	11:22:29	Precision				Precision	Precision	PPM	4	1	0	280	33	10	3680	24	26473	134	348	13	22	2	84	3
31	6/21/2019	11:25:00	Precision				Precision	Precision	PPM	4	1	0	281	46	11	3698	24	26593	134	342	13	23	2	89	3
32	6/21/2019	11:47:48	B-217 R1	B	217	R1	Sample extra	B-217-R1	PPM	0	11	0	285	0	39	9545	50	16835	89	252	10	21	2	114	4
33	6/21/2019	11:48:46	B-217 R1	B	217	R1	Sample	B-217-R1	PPM	2	1	0	164	28	6	10160	29	19603	56	311	7	22	1	130	3
34	6/21/2019	11:52:34	B-186 R1	B	186	R1	Sample extra 1	B-186-R1	PPM	2	1	0	167	40	6	121	2	14706	43	337	7	17	1	49	1
35	6/21/2019	11:57:38	B-187 R1	B	187	R1	Sample	B-187-R1	PPM	5	1	0	175	74	8	1661	9	34869	96	547	10	21	1	102	2
36	6/21/2019	12:03:24	B-218 R1	B	218	R1	Sample	B-218-R1	PPM	3	1	0	174	45	6	1550	8	19453	56	424	8	22	1	81	2
37	6/21/2019	12:10:10	B-215 R1	B	215	R1	Sample	B-215-R1	PPM	5	1	0	164	43	6	4249	15	26119	71	400	8	31	1	114	2
38	6/21/2019	12:18:06	B-247 R2	B	247	R2	Sample	B-247-R2	PPM	5	1	0	167	60	6	5393	18	26710	73	484	8	47	1	146	2
39	6/21/2019	12:23:06	B-247 R3	B	247	R3	Sample	B-247-R3	PPM	6	1	0	165	49	6	5009	17	25787	70	582	9	40	1	135	2
40	6/21/2019	12:27:38	Blank				Blank	Blank	PPM	0	4	0	205	0	19	8	1	10	3	21	5	0	22	0	5
41	6/21/2019	12:30:31	Nist2711a				Nist2711a	Nist2711a	PPM	90	4	41	4	0	26	147	3	20666	69	495	9	1349	6	389	3
42	6/21/2019	12:32:42	Precision				Precision	Precision	PPM	0	11	0	302	61	11	1131	12	22146	113	422	14	16	1	75	3
43	6/21/2019	12:34:05	Precision				Precision	Precision	PPM	4	1	0	299	43	11	1158	12	22173	121	398	14	14	1	74	3
44	6/21/2019	12:34:48	Precision				Precision	Precision	PPM	3	1	0	302	61	11	1166	12	22309	123	413	14	16	1	75	3
45	6/21/2019	12:37:34	Precision				Precision	Precision	PPM	0	11	0	301	57	11	1175	12	22182	113	408	14	17	1	73	3
46	6/21/2019	12:38:15	Precision				Precision	Precision	PPM	0	11	0	303	77	11	1141	12	22438	123	412	14	16	1	82	3
47	6/21/2019	12:38:57	Precision				Precision	Precision	PPM	0	11	0	299	50	11	1137	12	22222	122	427	14	17	1	77	3
48	6/21/2019	12:40:06	Precision				Precision	Precision	PPM	4	1	0	303	41	11	1176	12	22259	122	413	14	16	1	80	3
49	6/21/2019	12:52:26	B-246 R2	B	246	R2	Sample	B-246-R2	PPM	6	2	0	262	59	11	22141	107	40351	194	471	14	73	3	306	8
50	6/21/2019	12:57:01	B-277 R2	B	277	R2	Sample	B-277-R2	PPM	5	1	0	297	61	11	2565	19	27798	134	427	14	34	2	126	4
51	6/21/2019	13:01:00	B-276 R2	B	276	R2	Sample	B-276-R2	PPM	9	1	0	156	71	6	7872	24	30864	82	453	8	61	1	214	3
52	6/21/2019	13:05:50	B-275 R2	B	275	R2	Sample	B-275-R2	PPM	8	1	0	166	61	7	4122	15	34807	95	438	8	30	1	132	2
53	6/21/2019	13:13:22	B-303 R2	B	303	R2	Sample	B-303-R2	PPM	9	1	0	181	70	7	6704	23	30234	87	454	9	51	1	170	3
60	6/21/2019	13:55:36	B-246 R3	B	246	R3	Sample	B-246-R3	PPM	8	2	0	283	41	11	9352	48	31363	147	462	14	55	2	161	5
61	6/21/2019	14:02:01	B-247 R4	B	247	R4	Sample	B-247-R4	PPM	5	1	0	315	0	43	7857	43	20525	107	537	16	26	2	117	5
62	6/21/2019	14:19:16	B-217 R2	B	217	R2	Sample	B-217-R2	PPM	5	2	0	245	58	10	31580	144	37048	175	472	14	43	2	333	8
63	6/21/2019	15:11:00	B-321 R3	B	321	R3	Sample	B-321-R3	PPM	6	1	0	288	60	11	3760	24	30511	138	429	14	46	2	140	4
64	6/21/2019	15:17:56	B-323 R2	B	323	R2	Sample extra	B-323-R2	PPM	4	1	0	319	55	13	339	7	24146	121	284	13	15	1	64	3
65	6/21/2019	15:19:08	B-323 R2	B	323	R2	Sample	B-323-R2	PPM	5	1	0	182	51	7	341	4	23984	69	320	8	13	1	58	1
66	6/21/2019	15:28:15	B-299 R1	B	299	R1	Sample	B-299-R1	PPM	6	1	0	211	42	8	1089	8	22885	73	376	10	17	1	77	2
67	6/21/2019	15:38:33	B-300 R1	B	300	R1	Sample	B-300-R1	PPM	3	1	0	185	46	7	1023	7	26008	74	423	9	25	1	84	2
68	6/21/2019	15:45:30	B-301 R1	B	301	R1	Sample	B-301-R1	PPM	3	1	0	189	43	7	1035	7	22945	68	423	9	22	1	105	2
69	6/21/2019	15:50:55	B-272 R1	B	272	R1	Sample	B-272-R1	PPM	4	1	0	197	54	8	1075	7	22675	80	401	9	19	1	99	2
70	6/21/2019	15:56:43	B-273 R1	B	273	R1	Sample	B-273-R1	PPM	5	1	0	189	60	8	1282	8	26012	76	470	10	24	1	105	2
71	6/21/2019	16:09:48	B-242 R1	B	242	R1	Sample	B-242-R1	PPM	3	1	0	182	43	7	1449	8	25142	71	496	9	24	1	87	2
72	6/21/2019	16:17:20	B-213 R1	B	213	R1	Sample	B-213-R1	PPM	4	1	0	176	42	7	2140	10	25365	73	527	9	29	1	106	2
73	6/21/2019	16:25:09	B-246 R4	B	246	R4	Sample	B-246-R4	PPM	6	1	0	168	29	6	348	4	27443	76	417	8	21	1	87	2
74	6/21/2019	16:30:07	B-247 R5	B	247	R5	Sample	B-247-R5	PPM	4	1	0	167	32	6	131	2	24605	68	457	8	21	1	70	1
75	6/21/2019	16:37:16	B-217 R3	B	217	R3	Sample	B-217-R3	PPM	3	1	0	159	38	6	6648	20	21291	57	469	8	24	1	133	2
1	6/24/2019	7:32:40	Blank				Blank	Blank	PPM	0	4	0	195	0	18	0	8	0	11	0	219	0	21	0	5
2	6/24/2019	7:34:34	Nist2711				Nist2711a	Nist2711a	PPM	87	4	46	4	0	26	149	3	24373	72	588	10	1429	6	413	3
3	6/24/2019	7:36:56	B-326 R2	B	326	R2	Sample	B-326-R2	PPM	6	1	0	171	58	7	4999	17	27083	75	424	8	52	1	155	3
4	6/24/2019	7:40:40	B-327 R2	B	327	R2	Sample	B-327-R2	PPM	6	1	0	184	36	7	2273	11	26117	77	523	9	44	1	105	2
5	6/24/2019	8:02:36	B-217 R4	B	217	R4	Sample	B-217-R4	PPM	2	1	0	172	28	6	9353	27	17250	51	534	9	26	1	201	3
6	6/24/2019	8:24:29	B-395 R1	B	395	R1	Sample	B-395-R1	PPM	3	1	0	165	27	6	5289	17	18110	51	667	9	70	1	190	3
7	6/24/2019	8:36:29	B-396 R1	B	396	R1	Sample	B-396-R1	PPM	3	1	0	174	19	6	793	5	19245	55	991	12	43	1	171	2
10	6/24/2019	8:45:32	B-395 R2	B	395	R2	Sample	B-395-R2	PPM	4	1	0	167	35	6	2812	11	16709	48	688	10	45	1	137	2
11	6/24/2019	8:54:47	B-393 R1	B	393	R1	Sample	B-393-R1	PPM	5	1	0	173	28	6	4591	16	16019	49	724	10	54	1	151	2
12	6/24/2019	8:58:12	B-393 R2	B	393	R2	Sample	B-393-R2	PPM	4	1	0	182	0	22	1252	7	15532	49	693	10	36	1	105	2
13	6/24/2019	9:07:10	B-394 R1	B	394	R1	Sample	B-394-R1	PPM	3	1	0	189	46	7	659	5	18370	64	380	9	21	1	90	2
14	6/24/2019	9:16:34	BX-103 R1	BX	103	R1	Sample extra	BX-103-R1	PPM	4	1	0	176	42	7	1221	7	24426	68	554	9	34	1	140	2
15	6/24/2019	9:24:48	B-389 R1	B	389	R1	Sample	B-389-R1	PPM	9	1	0	166	42	6	9168	31	21569	71	582	9	89	1	260	3
16	6/24/2019	9:32:32	B-390 R1	B	390	R1	Sample	B-390-R1	PPM	5	1	14	3	0	19	6611	22	13526	46	902	10	60	1	293	3
19	6/24/2019	9:40:14	B-391 R1	B	391	R1	Sample	B-391-R1	PPM	0	7	0	169	45	6	1371	8	22365	73	496	9	35	1	138	2
20	6/24/2019	9:50:48	B-388 R1	B	388	R1	Sample	B-388-R1	PPM	3	1	0	195	43	7	258	3	15071	56	287	8	15	1	58	1
21	6/24/2019	9:57:01	B-385 R1	B	385	R1	Sample	B-385-R1	PPM	3	1	0	182	39	7	394	4	18104	61	528	9	19	1	68	1
22	6/24/2019	10:02:45	B-384 R1	B	384	R1	Sample	B-384-R1	PPM	6	1	0	161	37	6	7312	25	20814	67	609	9	80	1	227	3
23	6/24/2019	10:09:37	B-382 R1	B	382	R1	Sample	B-382-R1	PPM	7	1	0	169	39	6	4731	18	22809	75	669	10	66	1	196	3
24	6/24/2019	10:26:15	BX-98 R1	BX	98	R1	Sample	BX-098-R1	PPM	5	1	0	191	36	7	1974	11	26372	96	640	11	44	1	189	3
25	6/24/2019	10:33:46	B-279 R1	B	279	R1	Sample	B-279-R1	PPM	5	1	0	166	47	6	2213	10	24694	67	507	8	32	1	108	2

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
26	6/24/2019	10:40:44	B-280 R1	B	280	R1	Sample	B-280-R1	PPM	5	1	0	168	41	6	2604	11	25697	71	421	8	24	1	107	2
27	6/24/2019	10:46:27	B-251 R1	B	251	R1	Sample	B-251-R1	PPM	2	1	0	173	67	6	2349	11	20107	66	415	8	18	1	63	2
28	6/24/2019	10:54:08	B-250 R1	B	250	R1	Sample	B-250-R1	PPM	2	1	0	179	54	7	2887	12	20279	60	352	8	19	1	78	2
29	6/24/2019	11:04:32	B-219 R1	B	219	R1	Sample	B-219-R1	PPM	3	1	0	165	33	6	659	5	22590	69	391	8	19	1	77	1
30	6/24/2019	11:13:42	B-220 R1	B	220	R1	Sample	B-220-R1	PPM	3	1	0	178	37	6	327	4	19417	57	371	8	18	1	62	1
31	6/24/2019	11:19:09	B-189 R1	B	189	R1	Sample	B-189-R1	PPM	3	1	0	177	57	7	691	5	23081	65	403	8	20	1	71	2
32	6/24/2019	11:24:54	B-188 R1	B	188	R1	Sample	B-188-R1	PPM	3	1	0	180	0	24	608	5	20343	60	643	10	22	1	103	2
33	6/24/2019	11:32:51	B-278 R1	B	278	R1	Sample	B-278-R1	PPM	5	1	0	166	44	6	1326	7	29221	78	464	8	25	1	103	2
34	6/24/2019	11:50:04	B-217 R1	B	186	R1	Sample	B-186-R1	PPM	6	1	0	173	38	6	2708	11	18925	55	630	9	52	1	115	2
35	6/24/2019	11:53:30	Blank				Blank	Blank	PPM	0	8	0	357	0	34	7	2	17	6	0	247	0	39	0	8
36	6/24/2019	11:54:55	Nist2711a				Nist2711a	Nist2711a	PPM	85	7	49	7	0	47	163	5	24503	126	585	18	1440	11	415	6
37	6/24/2019	11:56:00	Precision				Precision	Precision	PPM	5	1	0	274	0	36	4737	26	16251	81	554	14	65	2	171	4
38	6/24/2019	11:56:45	Precision				Precision	Precision	PPM	0	15	0	270	34	9	4679	27	16071	84	589	14	67	2	168	4
39	6/24/2019	11:57:31	Precision				Precision	Precision	PPM	0	15	0	273	36	9	4718	27	16212	85	602	15	66	2	170	4
40	6/24/2019	12:02:23	Precision				Precision	Precision	PPM	0	15	0	270	46	9	4657	27	16031	84	604	14	64	2	167	4
41	6/24/2019	12:03:05	Precision				Precision	Precision	PPM	0	15	0	273	30	9	4718	27	16170	85	611	15	67	2	158	4
42	6/24/2019	12:04:40	Precision				Precision	Precision	PPM	5	1	0	273	28	9	4737	27	16138	85	590	14	64	2	166	4
43	6/24/2019	12:05:43	Precision				Precision	Precision	PPM	5	1	0	271	39	9	4675	26	16042	80	591	14	64	2	169	4
44	6/24/2019	12:39:10	B-281 R1	B	281	R1	Sample	B-281-R1	PPM	3	1	0	164	43	6	1441	7	23789	64	351	7	19	1	91	2
45	6/24/2019	12:43:50	B-252 R1	B	252	R1	Sample	B-252-R1	PPM	5	1	0	165	57	6	10902	31	30258	82	429	8	36	1	194	3
46	6/24/2019	12:47:55	B-221 R1	B	221	R1	Sample	B-221-R1	PPM	5	1	0	184	48	7	3350	14	26744	80	571	10	28	1	119	2
47	6/24/2019	12:55:23	B-282 R1	B	282	R1	Sample	B-282-R1	PPM	5	1	0	174	36	6	3468	13	22629	65	634	9	24	1	97	2
60	6/24/2019	13:22:25	B-308 R1	B	308	R1	Sample	B-308-R1	PPM	5	1	0	299	59	12	4666	28	29258	136	513	16	32	2	159	4
63	6/24/2019	13:30:34	B-380 R1	B	380	R1	Sample	B-380-R1	PPM	5	1	0	169	45	6	3342	12	19523	56	733	10	54	1	135	2
64	6/24/2019	13:39:11	B-283 R1	B	283	R1	Sample	B-283-R1	PPM	6	1	0	166	50	6	2818	11	29039	78	583	9	35	1	118	2
65	6/24/2019	13:43:44	B-254 R1	B	254	R1	Sample	B-254-R1	PPM	4	1	0	172	52	7	3554	13	23735	66	468	9	30	1	130	2
66	6/24/2019	13:56:16	B-326 R3	B	326	R3	Sample	B-326-R3	PPM	7	1	0	168	70	7	4564	16	30220	82	430	8	45	1	143	2
67	6/24/2019	13:59:10	B-326 R4	B	326	R4	Sample	B-326-R4	PPM	5	1	0	166	53	6	1488	8	25910	70	373	8	23	1	87	2
68	6/24/2019	14:04:45	B-303 R3	B	303	R3	Sample	B-303-R3	PPM	4	1	0	175	53	7	378	4	24504	68	344	8	12	1	64	1
69	6/24/2019	14:32:30	Blank				Blank	Blank	PPM	0	4	0	204	0	19	6	1	32	3	0	248	0	22	0	5
70	6/24/2019	14:34:35	Nist2711a				Nist2711a	Nist2711a	PPM	86	6	49	7	0	45	156	5	23957	129	564	17	1404	11	401	6
71	6/24/2019	14:35:49	Precision				Precision	Precision	PPM	4	1	0	308	38	11	295	6	22352	115	295	13	12	1	57	2
72	6/24/2019	14:36:31	Precision				Precision	Precision	PPM	3	1	0	303	42	11	296	6	22096	113	278	13	13	1	59	2
73	6/24/2019	14:37:26	Precision				Precision	Precision	PPM	5	1	0	302	0	41	292	6	22004	113	320	13	11	1	59	2
74	6/24/2019	14:38:09	Precision				Precision	Precision	PPM	5	1	0	306	63	12	298	6	22190	114	267	13	13	1	59	2
75	6/24/2019	14:39:46	Precision				Precision	Precision	PPM	5	1	0	306	49	12	302	6	22195	114	280	13	10	1	58	2
76	6/24/2019	14:40:31	Precision				Precision	Precision	PPM	4	1	0	304	0	41	299	6	22164	121	264	12	11	1	61	2
77	6/24/2019	14:41:12	Precision				Precision	Precision	PPM	0	10	0	302	0	40	289	6	22222	121	260	12	12	1	60	2
78	6/24/2019	14:42:03	Precision				Precision	Precision	PPM	0	11	0	308	57	12	310	6	22268	114	294	13	14	1	57	2
79	6/24/2019	14:42:49	Precision				Precision	Precision	PPM	4	1	0	302	36	11	300	6	22145	120	284	13	10	1	59	2
80	6/24/2019	14:43:38	Precision				Precision	Precision	PPM	3	1	0	304	0	41	300	6	22179	113	281	13	11	1	52	2
1	6/25/2019	10:48:19	Blank				Blank	Blank	PPM	0	7	0	345	0	33	0	14	18	5	0	228	0	35	0	8
2	6/25/2019	10:50:17	NIST 2711A				Nist2711a	Nist2711a	PPM	82	7	41	7	0	46	156	5	24167	126	563	18	1435	11	401	6
3	6/25/2019	10:54:10	BX-123-R1	BX	123	R1	Out	BX-123-R1	PPM	8	2	0	289	40	11	7785	39	24259	112	543	15	77	2	203	5
4	6/25/2019	10:58:53	B-305-R1	B	305	R1	Sample	B-305-R1	PPM	4	1	0	280	60	10	2868	19	21611	100	509	14	42	2	119	3
5	6/25/2019	11:01:40	B-191-R1	B	191	R1	Sample	B-191-R1	PPM	0	12	0	301	50	11	2087	16	23430	113	478	15	27	2	112	3
6	6/25/2019	11:03:42	B-190-R1	B	190	R1	Sample	B-190-R1	PPM	3	1	0	303	42	11	2528	19	26923	128	571	16	28	2	136	4
7	6/25/2019	11:05:58	B-223-R1	B	223	R1	Sample	B-223-R1	PPM	6	1	0	296	619	19	4037	27	34022	161	643	18	36	2	176	5
8	6/25/2019	11:09:28	B-253-R1	B	253	R1	Sample	B-253-R1	PPM	4	1	0	297	48	11	2682	19	23644	111	459	15	29	2	114	3
9	6/25/2019	11:11:57	BX-121-R1	BX	121	R1	Sample	BX-121-R1	PPM	6	1	0	299	45	11	4245	26	20938	102	705	17	58	2	152	4
10	6/25/2019	11:14:16	B-227-R1	B	222	R1	Sample	B-222-R1	PPM	0	11	0	283	56	10	6313	32	18126	87	481	14	28	2	163	4
11	6/25/2019	11:16:24	B-361-R1	B	361	R1	Sample	B-361-R1	PPM	0	14	0	286	41	10	2356	17	22093	105	820	17	54	2	161	4
12	6/25/2019	11:18:12	B-360-R1	B	360	R1	Sample	B-360-R1	PPM	0	15	0	287	48	10	3777	23	19912	95	687	16	64	2	126	4
13	6/25/2019	11:20:14	B-372-R1	B	372	R1	Sample	B-372-R1	PPM	5	1	0	278	64	10	3959	23	23343	106	504	14	63	2	142	4
14	6/25/2019	11:22:04	B-371-R1	B	371	R1	Sample	B-371-R1	PPM	9	1	0	307	0	42	3480	23	20577	103	775	18	58	2	143	4
15	6/25/2019	11:23:43	BX-116-R1	BX	116	R1	Sample	BX-116-R1	PPM	0	14	0	301	0	37	3529	22	15037	79	512	15	47	2	105	3
16	6/25/2019	11:25:35	B-253-R1	B	253	R1	Sample	B-284-R1	PPM	4	1	0	296	53	11	2120	16	23451	112	431	14	21	2	95	3
17	6/25/2019	11:27:13	B-384-R2	B	384	R2	Sample	B-384-R2	PPM	5	2	0	286	0	38	5206	29	20527	100	807	17	73	2	164	4
18	6/25/2019	11:29:54	B-381-R1	B	381	R1	Sample	B-381-R1	PPM	5	1	0	295	0	37	2419	17	16921	85	574	15	39	2	111	3
19	6/25/2019	11:31:32	B-389-R2	B	389	R2	Sample	B-389-R2	PPM	10	2	0	282	41	10	7959	41	20915	102	692	16	109	3	273	5
20	6/25/2019	11:33:26	B-390-R2	B	390	R2	Sample	B-390-R2	PPM	4	1	0	277	0	35	186	4	16683	81	641	15	26	1	129	3
21	6/25/2019	11:35:28	B-338-R1	B	338	R1	Sample	B-338-R1	PPM	6	1	0	286	0	38	3646	22	19601	94	590	15	46	2	128	4
22	6/25/2019	11:37:12	B-339-R1	B	339	R1	Sample	B-339-R1	PPM	5	1	0	288	0	39	3109	20	22671	105	625	16	54	2	177	4
23	6/25/2019	11:39:08	B-383-R1	B	383	R1	Sample	B-383-R1	PPM	7	1	0	293	42	11	4647	27	19339	95	637	16	50	2	138	4
24	6/25/2019	11:40:56	B-328-R1	B	328	R1	Sample	B-328-R1	PPM	5	1	0	302	34	11	3516	23	24513	119	511	15	50	2	219	5
25	6/25/2019	11:42:26	B-350-R1	B	350	R1	Sample	B-350-R1	PPM	6	1	0	285	46	10	4603	27	21445	102	410	13	62	2	147	4
26	6/25/2019	11:44:18	BX-120-R1	BX	120	R1	Sample	BX-120-R1	PPM	5	1	0	293	43	11	2616	18	19256	93	581	16	42	2	119	3
27	6/25/2019	11:46:17	B-349-R1	B	349	R1	Sample	B-349-R1	PPM	9	1	0	287	38	10	4961	28	20199	97	652	16	61	2	164	4
28	6/25/2019	11:48:55	B-216-R1	B	216	R1	Sample	B-216-R1	PPM	4	1	0	291	35	11	8525	43	24319	117	476	15	28	2	155	5
29	6/25/2019	11:50:47	BX-122-R1	BX	122	R1	Sample	BX-122-R1	PPM	4	1	0	285	31	10	2478	17	18669	88	516	14	37	2	120	3
30	6/25/2019	11:52:39	B-217-R5	B	217	R5	Sample	B-217-R5	PPM	4	1	0	291	0	39	8263	42	18791	94	305	12	23	2	148	5
31	6/25/2019	11:53:49	B-217-R5	B	217	R5	Precision	B-217-R5	PPM	0	11	0	291	0	39	8334	42	18861	94	292	12	24	2	139	5
32	6/25/2019	11:55:32	B-217-R5	B	217	R5	Precision	B-217-R5	PPM	4	1	0	289	0	39	8213	42	18755	94	285	12	22	2	154	5
33	6/25/2019	11:57:19	B-217-R5	B	217	R5	Precision	B-217-R5	PPM	3	1	0	291	0	38	8328	42	18843	94	271	12	23	2	148	5

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
34	6/25/2019	11:58:47	B-217-R5	B	217	R5	Precision	B-217-R5	PPM	0	12	0	292	0	38	8353	42	18864	94	294	12	25	2	140	5
35	6/25/2019	11:59:50	B-217-R5	B	217	R5	Precision	B-217-R5	PPM	0	12	0	289	0	38	8234	42	18796	94	285	12	24	2	148	5
36	6/25/2019	12:03:12	B-217-R5	B	217	R5	Precision	B-217-R5	PPM	0	12	0	290	0	38	8275	44	18855	100	299	12	25	2	153	5
1	6/26/2019	11:39:27	Blank				Blank	Blank	PPM	0	8	0	340	0	33	0	14	22	5	0	222	0	37	0	9
2	6/26/2019	11:42:08	Nist2711A				Nist2711a	Nist2711a	PPM	89	7	46	7	0	46	164	5	24238	126	580	18	1425	11	413	6
3	6/26/2019	11:47:46	B-349-R2	B	349	R2	Sample	B-349-R2	PPM	5	1	0	298	59	11	800	9	17444	87	547	15	30	2	76	3
4	6/26/2019	11:49:38	B-350-R2	B	350	R2	Sample	B-350-R2	PPM	6	1	0	282	34	10	2589	18	23123	106	572	15	51	2	144	4
5	6/26/2019	11:51:49	B-133-R1	B	133	R1	Sample	B-133-R1	PPM	6	1	0	292	58	12	1976	16	34019	155	517	16	30	2	108	3
6	6/26/2019	11:55:06	B-306-R1	B	306	R1	Sample	B-306-R1	PPM	4	1	0	283	66	11	3534	22	22802	106	553	15	41	2	140	4
7	6/26/2019	11:56:42	BX-77-R1	BX	77	R1	Sample	BX-077-R1	PPM	6	1	0	282	38	10	522	7	27180	131	447	14	16	1	78	3
8	6/26/2019	11:58:38	B-110-R1	B	110	R1	Sample	B-110-R1	PPM	9	2	0	277	112	13	6380	37	47242	215	603	17	51	2	228	6
9	6/26/2019	12:01:15	B-158-R1	B	158	R1	Sample	B-158-R1	PPM	3	1	0	285	0	37	356	6	19016	90	355	13	18	1	63	2
10	6/26/2019	12:03:15	B-132-R1	B	132	R1	Sample	B-132-R1	PPM	5	2	0	280	81	11	7826	41	31249	142	533	15	65	2	219	5
11	6/26/2019	12:05:21	BX-70-R1	BX	70	R1	Sample	BX-070-R1	PPM	0	13	0	313	42	12	1986	17	28469	137	621	17	31	2	146	4
12	6/26/2019	12:08:19	B-255-R1	B	255	R1	Sample	B-255-R1	PPM	8	2	0	280	0	42	2774	20	39223	172	1026	20	65	2	365	6
13	6/26/2019	12:10:17	B-162-R1	B	162	R1	Sample	B-162-R1	PPM	7	1	0	299	97	13	3371	23	31374	154	631	17	47	2	179	4
14	6/26/2019	12:11:56	B-138-R1	B	138	R1	Sample	B-138-R1	PPM	8	2	0	286	35	11	1003	11	38930	177	1563	24	190	4	1162	10
15	6/26/2019	12:13:39	B-163-R1	B	163	R1	Sample	B-163-R1	PPM	4	1	0	287	51	11	2299	17	30480	134	558	15	38	2	137	4
16	6/26/2019	12:15:59	B-214-R1	B	214	R1	Sample	B-214-R1	PPM	4	1	0	305	47	11	825	10	22540	111	476	15	22	2	86	3
17	6/26/2019	12:18:24	B-384-R3	B	384	R3	Sample	B-384-R3	PPM	7	1	0	273	0	36	2889	18	20417	93	713	16	53	2	147	4
18	6/26/2019	12:21:58	B-134-R1	B	134	R1	Sample	B-134-R1	PPM	9	1	0	284	80	12	4762	28	33270	150	587	16	50	2	176	4
19	6/26/2019	12:24:04	BX-87-R1	BX	87	R1	Sample	BX-087-R1	PPM	7	2	0	288	0	44	1230	13	38696	189	1439	24	168	3	966	9
20	6/26/2019	12:25:41	B-157-R1	B	157	R1	Sample	B-157-R1	PPM	4	1	0	318	0	42	398	7	20819	104	515	16	17	1	74	3
21	6/26/2019	12:28:45	B-194-R1	B	194	R1	Sample	B-194-R1	PPM	0	17	0	316	61	12	4251	28	29525	144	659	18	72	2	266	5
22	6/26/2019	12:30:18	B-185-R1	B	185	R1	Sample	B-185-R1	PPM	0	11	0	311	38	11	1073	11	20206	103	418	14	20	2	79	3
23	6/26/2019	12:32:07	BX-111-R1	BX	111	R1	Sample	BX-111-R1	PPM	5	1	0	297	39	11	4651	27	15477	80	787	18	53	2	131	4
24	6/26/2019	12:33:48	B-352-R1	B	352	R1	Sample	B-252-R2	PPM	0	11	0	298	45	11	3304	22	22401	108	426	14	24	2	110	4
25	6/26/2019	12:35:00	B-164-R1	B	164	R1	Sample	B-164-R1	PPM	7	1	0	297	83	12	3435	22	29376	133	558	16	44	2	153	4
26	6/26/2019	12:37:47	B-383-R2	B	383	R2	Sample	B-383-R2	PPM	5	1	0	296	36	11	785	9	20886	98	637	16	30	2	88	3
27	6/26/2019	12:39:48	B-135-R1	B	135	R1	Sample	B-135-R1	PPM	7	2	0	288	71	12	4080	26	34072	162	672	17	57	2	233	5
28	6/26/2019	12:41:26	B-137-R1	B	137	R1	Sample	B-137-R1	PPM	5	2	0	290	37	11	791	10	37577	169	735	18	60	2	339	5
29	6/26/2019	12:43:04	B-115-R1	B	115	R1	Sample	B-115-R1	PPM	0	21	0	283	0	43	777	10	37613	178	1452	24	156	3	963	9
30	6/26/2019	12:44:37	B-195-R1	B	195	R1	Sample	B-195-R1	PPM	6	2	0	295	42	11	4740	29	28060	132	860	19	61	2	249	5
31	6/26/2019	12:46:06	B-136-R1	B	136	R1	Sample	B-136-R1	PPM	7	1	0	272	50	11	860	10	44212	196	701	17	36	2	175	4
32	6/26/2019	12:47:37	B-222-R1	B	222	R1	Sample	B-222-R2	PPM	5	1	0	292	0	37	1463	13	18326	89	616	16	31	2	109	3
33	6/26/2019	12:48:39	B-222-R1	B	222	R1	Precision	B-222-R1	PPM	3	1	0	292	0	37	1452	13	18306	89	595	16	29	2	114	3
34	6/26/2019	12:49:34	B-222-R1	B	222	R1	Precision	B-222-R1	PPM	3	1	0	292	61	11	1471	13	18395	89	574	15	30	2	107	3
35	6/26/2019	12:50:28	B-222-R1	B	222	R1	Precision	B-222-R1	PPM	4	1	0	292	0	38	1453	13	18464	90	591	16	32	2	110	3
36	6/26/2019	12:51:25	B-222-R1	B	222	R1	Precision	B-222-R1	PPM	4	1	0	292	0	38	1473	13	18506	90	577	15	31	2	107	3
37	6/26/2019	12:52:21	B-222-R1	B	222	R1	Precision	B-222-R1	PPM	0	12	0	291	0	37	1439	12	18386	89	563	15	29	2	110	3
38	6/26/2019	12:53:16	B-222-R1	B	222	R1	Precision	B-222-R1	PPM	4	1	0	292	38	11	1449	13	18369	89	581	15	30	2	106	3
1	6/27/2019	12:47:05	Blank				Blank	Blank	PPM	0	7	0	339	0	31	0	14	32	6	0	228	0	36	0	8
2	6/27/2019	12:49:09	Nist2711A				Nist2711a	Nist2711a	PPM	89	7	55	7	0	47	161	5	24041	138	597	18	1408	11	404	6
3	6/27/2019	12:51:10	BX-111-R2	BX	111	R2	Sample	BX-111-R2	PPM	0	15	0	298	56	11	3965	24	19407	96	602	16	58	2	119	4
4	6/27/2019	12:53:02	B-195-R2	B	195	R2	Sample	B-195-R2	PPM	6	1	0	286	45	11	3244	22	29077	134	666	16	42	2	153	4
5	6/27/2019	12:55:10	B-110-R2	B	110	R2	Sample	B-110-R2	PPM	4	1	0	292	51	11	408	7	30242	140	485	15	20	2	82	3
6	6/27/2019	12:56:57	B-134-R2	B	134	R2	Sample	B-134-R2	PPM	7	1	0	289	72	12	5288	31	35074	160	550	16	53	2	162	5
7	6/27/2019	12:58:54	B-132-R2	B	132	R2	Sample	B-132-R2	PPM	6	2	0	281	261	14	7824	41	31500	144	513	15	69	2	223	5
8	6/27/2019	13:00:26	B-216-R2	B	216	R2	Sample	B-216-R2	PPM	5	1	0	288	35	10	7156	37	21081	102	364	13	24	2	111	4
9	6/27/2019	13:02:40	B-217-R6	B	217	R6	Sample	B-217-R6	PPM	4	1	0	304	33	10	8265	43	17226	90	282	12	22	2	132	5
10	6/27/2019	13:04:49	B-382-R1	B	382	R1	Sample	B-382-R2	PPM	6	1	0	298	35	11	2826	19	20889	101	747	18	51	2	140	4
11	6/27/2019	13:06:00	B-382-R1	B	382	R1	Precision	B-382-R1	PPM	8	1	0	299	41	11	2811	19	20833	100	739	17	47	2	136	4
12	6/27/2019	13:06:57	B-382-R1	B	382	R1	Precision	B-382-R1	PPM	6	1	0	299	40	11	2821	19	20881	100	728	17	50	2	133	4
13	6/27/2019	13:07:55	B-382-R1	B	382	R1	Precision	B-382-R1	PPM	0	14	0	296	39	11	2788	19	20849	100	721	17	52	2	138	4
14	6/27/2019	13:08:47	B-382-R1	B	382	R1	Precision	B-382-R1	PPM	6	1	0	300	36	11	2862	20	21115	108	708	17	49	2	138	4
15	6/27/2019	13:09:45	B-382-R1	B	382	R1	Precision	B-382-R1	PPM	5	1	0	299	0	40	2864	20	20986	101	733	17	51	2	141	4
16	6/27/2019	13:11:06	B-382-R1	B	382	R1	Precision	B-382-R1	PPM	4	1	0	288	40	11	2406	17	20834	96	652	16	45	2	137	4
17	6/27/2019	13:49:09	B-9-R1	B	9	R1	Sample	B-009-R1	PPM	13	2	0	270	41	11	16958	80	37267	173	373	14	87	3	332	7
18	6/27/2019	13:51:38	B-26-R1	B	26	R1	Sample	B-026-R1	PPM	5	1	0	297	33	11	241	6	32762	151	438	14	20	2	99	3
19	6/27/2019	13:53:21	B-8-R1	B	8	R1	Sample	B-008-R1	PPM	27	2	0	297	67	12	16506	79	22577	116	252	12	121	3	484	8
20	6/27/2019	13:55:40	B-25-R1	B	25	R1	Sample	B-025-R1	PPM	3	1	0	360	0	41	267	6	8681	60	169	12	6	1	33	2
21	6/27/2019	13:56:57	B-18-R1	B	18	R1	Sample	B-018-R1	PPM	6	1	0	291	50	11	3036	21	29726	137	347	13	43	2	143	4
22	6/27/2019	13:58:19	B-4-R1	B	4	R1	Sample	B-004-R1	PPM	0	22	0	289	68	12	14445	67	30769	142	409	15	154	3	473	8
23	6/27/2019	14:00:19	B-12-R1	B	12	R1	Sample	B-012-R1	PPM	5	1	0	303	43	11	1564	13	17679	88	243	12	16	1	112	3
24	6/27/2019	14:01:46	B-7-R1	B	7	R1	Sample	B-007-R1	PPM	10	2	0	309	70	13	11253	58	29697	145	369	15	106	3	364	7
25	6/27/2019	14:03:20	B-1-R1	B	1	R1	Sample	B-001-R1	PPM	6	2	0	301	83	12	6746	37	26635	127	389	14	60	2	256	5
26	6/27/2019	14:05:31	B-5-R1	B	5	R1	Sample	B-005-R1	PPM	16	2	0	247	69	11	31567	147	43567	206	258	12	97	3	434	9
27	6/27/2019	14:07:16	B-2-R1	B	2	R1	Sample	B-002-R1	PPM	6	2	0	274	57	11	18211	88	34997	169	336	13	75	3	297	7
28	6/27/2019	14:08:49	B-19-R1	B	19	R1	Sample	B-019-R1	PPM	11	2	0	281	49	11	8212	43	31494	144	496	15	85	2	250	5
29	6/27/2019	14:10:31	B-13-R1	B	13	R1	Sample	B-013-R1	PPM	0	15	0	297	44	12	2400	18	27442	130	791	18	60	2	133	4
1	6/28/2019	12:41:16	Blank				Blank	Blank	PPM	0	7	0	343	0	33	8	2	34	6	0	227	0	37	0	8
2	6/28/2019	12:42:58	Nist2711A				Nist2711a	Nist2711a	PPM	98	7	45	7	0	45	165	5	24219	139	599	18	1415	11	407	6
3	6/28/2019	12:47:11	B-188-R1	BX	188	R1	Sample	BX-188-R1	PPM	20	2	0	278	60	11	14367	71	36515	172	467	15	126	3	600	8
4	6/28/2019	12:49:08	B-169-R1	B	169	R1	Sample extra	B-169-R1	PPM	9	2	0	279	53	11	11648	58	36120	168	502	15	110	3	467	7

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
4	6/28/2019	12:49:08	BX-169-R1	BX	169	R1	Sample	BX-169-R1	PPM	9	2	0	279	53	11	11648	58	36120	168	502	15	110	3	467	7
5	6/28/2019	12:51:22	BX-167-R1	B	414	R1	Sample	B-414-R2	PPM	10	2	0	275	59	11	10694	54	33285	154	477	14	90	3	441	7
5	6/28/2019	12:51:22	BX-167-R1	B	167	R1	Out	BX-167-R1	PPM	10	2	0	275	59	11	10694	54	33285	154	477	14	90	3	441	7
6	6/28/2019	12:53:13	BX-175-R1	BX	175	R1	Sample	BX-175-R1	PPM	15	2	0	286	49	12	12789	64	37535	175	539	16	99	3	491	8
7	6/28/2019	12:57:43	BX-171-R1	BX	171	R1	Sample	BX-171-R1	PPM	10	2	0	282	34	11	8081	44	36672	172	621	16	93	3	371	6
8	6/28/2019	12:59:20	BX-172-R1	BX	172	R1	Sample	BX-172-R1	PPM	21	2	0	277	78	12	14447	71	38192	179	415	14	93	3	434	8
9	6/28/2019	13:01:10	B-33-R1	B	33	R1	Sample	B-033-R1	PPM	3	1	0	313	0	39	190	5	16198	85	299	13	14	1	48	2
10	6/28/2019	13:04:19	BX-195-R1	BX	195	R1	Sample	BX-195-R1	PPM	8	2	0	281	57	11	8957	47	33715	157	536	15	93	3	452	7
11	6/28/2019	13:06:26	B-32-R1	B	32	R1	Sample	B-032-R1	PPM	6	1	0	307	0	40	1145	12	21530	106	397	14	23	2	79	3
12	6/28/2019	13:07:56	B-134-R3	B	134	R3	Sample	B-134-R3	PPM	5	1	0	283	68	11	3717	23	30045	136	508	15	40	2	141	4
13	6/28/2019	13:09:40	B-132-R3	B	132	R3	Sample	B-132-R3	PPM	5	1	0	294	78	12	2961	20	27472	128	572	16	41	2	128	4
14	6/28/2019	13:12:02	B-34-R1	B	34	R1	Sample	B-034-R1	PPM	5	1	0	295	0	41	2115	17	26171	124	452	14	30	2	125	4
15	6/28/2019	13:13:23	B-24-R1	B	24	R1	Sample	B-024-R1	PPM	0	12	0	319	0	40	1544	14	19632	100	301	13	23	2	82	3
16	6/28/2019	13:14:31	B-43-R1	B	43	R1	Sample	B-043-R1	PPM	6	1	0	297	66	11	3649	23	22288	108	351	13	34	2	158	4
17	6/28/2019	13:16:02	B-42-R1	B	42	R1	Sample	B-042-R1	PPM	7	1	0	293	38	11	4203	26	25701	123	411	14	40	2	161	4
18	6/28/2019	13:17:54	B-19-R2	B	19	R2	Sample	B-019-R2	PPM	9	1	0	292	84	12	4388	26	25154	118	384	14	39	2	161	4
19	6/28/2019	13:20:05	BX-38-R1	B	38	R1	Out	BX-038-R1	PPM	8	1	0	301	97	12	7644	39	21901	107	333	13	52	2	241	5
20	6/28/2019	13:22:14	BX-38-R1	B	38	R1	Precision	BX-038-R1	PPM	7	1	0	301	97	12	7659	39	21772	106	357	14	52	2	231	5
21	6/28/2019	13:23:14	BX-38-R1	B	38	R1	Precision	BX-038-R1	PPM	9	1	0	301	105	12	7614	39	21716	106	312	13	51	2	228	5
22	6/28/2019	13:24:10	BX-38-R1	B	38	R1	Precision	BX-038-R1	PPM	12	1	0	300	88	12	7632	39	21674	106	313	13	50	2	232	5
23	6/28/2019	13:25:07	BX-38-R1	B	38	R1	Precision	BX-038-R1	PPM	8	1	0	300	113	12	7625	39	21772	106	330	13	50	2	223	5
24	6/28/2019	13:26:10	BX-38-R1	B	38	R1	Precision	BX-038-R1	PPM	8	1	0	301	102	12	7655	39	21781	106	317	13	49	2	232	5
25	6/28/2019	13:27:06	BX-38-R1	B	38	R1	Precision	BX-038-R1	PPM	6	1	0	299	101	12	7535	39	21549	105	335	13	51	2	233	5
1	7/1/2019	7:48:50	Blank				Blank	Blank	PPM	0	7	0	332	0	32	14	2	66	6	0	219	0	35	0	8
2	7/1/2019	7:50:08	Nist2711a				Nist2711a	Nist2711a	PPM	86	6	40	7	0	45	160	5	23490	128	582	17	1388	11	403	6
3	7/1/2019	7:51:59	B-020 R1	B	20	R1	Sample	B-020-R1	PPM	11	2	0	285	47	11	7162	39	34229	160	497	15	66	2	228	5
4	7/1/2019	7:56:16	B-014 R1	B	14	R1	Sample	B-014-R1	PPM	6	1	0	297	34	11	3047	21	23203	113	409	14	32	2	112	4
5	7/1/2019	8:06:36	B-009 R2	B	9	R2	Sample	B-009-R2	PPM	9	1	0	292	0	43	5249	31	28839	135	389	14	43	2	173	5
6	7/1/2019	8:11:45	B-005 R2	B	5	R2	Sample	B-005-R2	PPM	7	1	0	281	43	11	4922	29	29145	134	333	13	30	2	139	4
7	7/1/2019	8:15:56	B-002 R2	B	2	R2	Sample	B-002-R2	PPM	6	1	0	291	0	41	333	6	28110	129	411	14	21	2	79	3
8	7/1/2019	8:25:59	B-003 R1	B	3	R1	Sample	B-003-R1	PPM	6	1	0	297	54	11	1571	14	25469	119	764	18	21	2	85	3
9	7/1/2019	8:31:45	B-006 R1	B	6	R1	Sample	B-006-R1	PPM	7	1	0	296	0	42	2111	17	29007	140	363	13	28	2	129	4
10	7/1/2019	8:36:21	B-010 R1	B	10	R1	Sample	B-010-R1	PPM	15	2	0	302	46	12	8148	43	27891	134	389	14	66	2	226	5
11	7/1/2019	8:40:33	B-015 R1	B	15	R1	Sample	B-015-R1	PPM	4	1	0	304	38	12	2182	17	27328	132	430	15	25	2	95	3
12	7/1/2019	8:51:51	B-007 R2	B	7	R2	Sample	B-007-R2	PPM	4	1	0	316	0	44	204	5	23114	117	320	14	14	1	75	3
13	7/1/2019	8:56:20	B-008 R2	B	8	R2	Sample	B-008-R2	PPM	16	2	0	308	80	13	15429	73	30963	149	342	15	101	3	433	8
14	7/1/2019	9:00:10	B-004 R2	B	4	R2	Sample	B-004-R2	PPM	6	1	0	324	38	12	1301	13	21333	109	351	14	29	2	112	3
15	7/1/2019	9:04:25	B-001 R2	B	1	R2	Sample	B-001-R2	PPM	5	1	0	301	43	11	5647	32	25350	122	231	12	57	2	199	5
16	7/1/2019	9:29:26	B-044 R1	B	44	R1	Sample	B-044-R1	PPM	0	14	0	307	81	12	2556	18	21321	104	491	15	41	2	126	4
17	7/1/2019	10:43:02	Precision				Precision	Precision	PPM	12	2	0	319	44	12	13615	72	24983	135	307	14	89	3	384	8
18	7/1/2019	10:46:44	Precision				Precision	Precision	PPM	12	2	0	318	38	12	13601	71	24953	134	321	14	89	3	379	7
19	7/1/2019	10:48:04	Precision				Precision	Precision	PPM	11	2	0	315	54	12	13504	75	24709	140	319	14	86	3	375	7
20	7/1/2019	10:48:47	Precision				Precision	Precision	PPM	11	2	0	315	62	12	13473	71	24802	133	310	14	91	3	377	7
21	7/1/2019	10:49:28	Precision				Precision	Precision	PPM	10	2	0	316	61	12	13529	71	24868	133	317	14	87	3	370	7
22	7/1/2019	10:51:23	Precision				Precision	Precision	PPM	12	2	0	315	67	13	13472	75	24834	140	285	14	90	3	376	7
23	7/1/2019	10:53:01	Precision				Precision	Precision	PPM	10	2	0	313	60	12	13454	75	24965	141	336	14	92	3	378	7
24	7/1/2019	10:53:49	Precision				Precision	Precision	PPM	11	2	0	316	38	12	13472	71	24894	133	285	14	88	3	382	7
25	7/1/2019	10:54:50	Precision				Precision	Precision	PPM	12	2	0	312	48	12	13414	70	24786	132	302	14	88	3	387	7
26	7/1/2019	10:55:33	Precision				Precision	Precision	PPM	10	2	0	315	76	13	13473	70	24714	132	308	14	88	3	378	7
27	7/1/2019	10:56:36	Precision				Precision	Precision	PPM	11	2	0	315	83	13	13469	75	24828	140	313	14	91	3	388	8
28	7/1/2019	10:58:13	Blank				Blank	Blank	PPM	0	8	0	351	0	33	0	15	23	6	0	247	0	37	0	9
29	7/1/2019	10:59:33	Nist2711a				Nist2711a	Nist2711a	PPM	104	7	39	7	0	46	156	5	24239	125	582	18	1416	11	412	6
30	7/1/2019	12:10:20	B-233 R1	B	233	R1	Sample	B-233-R1	PPM	0	13	0	280	75	11	5119	30	32961	147	754	17	45	2	342	6
31	7/1/2019	12:12:37	B-233 R2	B	233	R2	Sample	B-233-R2	PPM	5	1	0	293	86	13	4716	27	37088	154	758	19	40	2	298	6
32	7/1/2019	12:17:34	B-202 R2	B	202	R2	Sample	B-202-R2	PPM	0	13	0	283	66	11	6068	34	31518	143	989	19	42	2	433	6
33	7/1/2019	16:11:01	B-276 R3	B	276	R3	Sample	B-276-R3	PPM	5	1	0	279	59	11	3277	21	28323	130	394	13	37	2	128	4
1	7/2/2019	8:05:40	Blank				Blank	Blank	PPM	0	7	0	338	0	33	0	13	0	20	0	222	0	35	0	8
2	7/2/2019	8:08:32	Nist2711a				Nist2711a	Nist2711a	PPM	93	6	44	7	0	43	146	5	23877	129	588	17	1390	11	403	6
3	7/2/2019	8:25:27	B-202 R3	B	202	R3	Sample	B-202-R3	PPM	4	1	0	160	64	6	6220	20	31782	85	1038	11	36	1	513	4
4	7/2/2019	8:33:58	B-233 R3	B	233	R3	Sample	B-233-R3	PPM	4	1	0	158	76	6	6080	19	31255	82	759	10	34	1	356	3
5	7/2/2019	8:56:47	B-008 R3	B	8	R3	Sample	B-008-R3	PPM	11	2	0	174	44	7	1912	9	27896	80	481	9	257	2	410	3
6	7/2/2019	9:04:07	B-001 R3	B	1	R3	Sample	B-001-R3	PPM	12	1	0	179	128	8	11758	37	35486	104	431	9	65	1	272	4
10	7/2/2019	9:44:18	B-005 R3	B	5	R3	Sample	B-005-R3	PPM	3	1	0	305	56	12	508	7	20066	99	400	14	13	1	58	2
11	7/2/2019	9:58:38	B-009 R3	B	9	R3	Sample	B-009-R3	PPM	38	3	0	269	66	11	22265	108	41350	200	423	14	128	3	496	9
12	7/2/2019	10:04:48	B-010 R2	B	10	R2	Sample	B-010-R2	PPM	13	1	0	175	64	7	8888	28	35053	100	561	10	74	1	232	3
14	7/2/2019	10:12:14	B-020 R2	B	20	R2	Sample	B-020-R2	PPM	5	1	0	270	0	38	316	6	28730	129	452	13	20	1	91	3
15	7/2/2019	10:33:40	B-202 R4	B	202	R4	Sample	B-202-R4	PPM	5	1	0	294	38	11	521	8	31347	148	370	14	22	2	110	3
16	7/2/2019	10:38:41	B-233 R4	B	233	R4	Sample	B-233-R4	PPM	5	1	0	292	39	11	980	11	28235	130	402	14	24	2	97	3
17	7/2/2019	10:49:52	B-009 R4	B	9	R4	Sample	B-009-R4	PPM	4	1	0	184	28	7	237	3	18321	55	384	8	10	1	62	1
18	7/2/2019	10:54:10	B-010 R3	B	10	R3	Sample	B-010-R3	PPM	5	1	0	196	51	7	3886	15	20132	64	420	9	43	1	128	2
19	7/2/2019	11:40:21	Blank				Blank	Blank	PPM	1	0	0	199	0	19	0	8	0	12	0	233	0	21	0	5
20	7/2/2019	11:42:09	Nist2711a				Nist2711a	Nist2711a	PPM	82	4	44	4	0	27	152	3	24008	74	560	10	1421	6	401	4
21	7/2/2019	11:43:54	Precision				Precision	Precision	PPM	36	2	0	275	41	10	19685	114	34393	198	371	13	115	3	407	8
22	7/2/2019	11:44:39	Precision				Precision	Precision	PPM	32	2	0	277	50	11	19804	114	34494	199	361	13	117	3	394	8

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
23	7/2/2019	11:45:31	Precision				Precision	Precision	PPM	35	2	0	277	43	11	19899	115	34625	200	359	13	116	3	402	8
24	7/2/2019	11:48:45	Precision				Precision	Precision	PPM	38	2	0	274	68	11	19604	113	34647	199	364	13	109	3	382	8
25	7/2/2019	11:50:26	Precision				Precision	Precision	PPM	33	2	0	272	52	10	19333	111	34317	196	380	13	115	3	397	8
26	7/2/2019	11:53:57	Precision				Precision	Precision	PPM	34	2	0	275	80	11	19526	112	34530	197	392	14	115	3	397	8
27	7/2/2019	12:01:17	Precision				Precision	Precision	PPM	36	2	0	274	56	11	19396	111	34834	198	346	13	106	3	404	8
28	7/2/2019	12:02:02	Precision				Precision	Precision	PPM	37	2	0	274	75	11	19439	111	34856	199	338	13	107	3	411	8
29	7/2/2019	12:02:50	Precision				Precision	Precision	PPM	35	2	0	273	74	11	19195	109	34496	196	357	13	110	3	401	8
30	7/2/2019	12:03:31	Precision				Precision	Precision	PPM	34	2	0	272	65	11	19148	109	34401	195	372	13	109	3	397	8
31	7/2/2019	12:04:14	Precision				Precision	Precision	PPM	37	2	0	274	67	11	19092	101	34213	179	350	13	107	3	406	8
32	7/2/2019	12:11:00	B-001 R4	B	1	R4	Sample	B-001-R4	PPM	0	11	0	324	47	12	907	10	14942	83	312	14	14	1	74	3
33	7/2/2019	12:57:04	B-308 R2	B	308	R2	Sample	B-308-R2	PPM	4	1	0	305	38	12	1998	16	22715	113	374	14	21	2	98	3
34	7/2/2019	13:17:19	B-386 R1	B	386	R1	Sample	B-386-R1	PPM	5	1	0	180	0	23	2019	9	17331	53	489	9	43	1	115	2
35	7/2/2019	13:28:00	B-387 R1	B	387	R1	Sample	B-387-R1	PPM	2	1	0	190	23	7	694	5	18638	57	410	9	28	1	75	2
36	7/2/2019	14:25:58	B-094 R1	B	94	R1	Sample	B-094-R1	PPM	2	0	0	162	43	6	48	2	23506	63	483	8	10	1	55	1
37	7/2/2019	14:30:54	B-093 R1	B	93	R1	Sample	B-093-R1	PPM	3	1	0	164	46	6	53	2	31547	98	539	9	8	1	64	1
38	7/2/2019	14:35:42	B-092 R1	B	92	R1	Sample	B-092-R1	PPM	2	1	0	173	31	6	35	2	27842	78	491	9	9	1	63	1
39	7/2/2019	14:40:32	BX-079 R1	BX	79	R1	Sample	BX-079-R1	PPM	2	1	0	170	28	6	44	2	29157	79	477	8	10	1	62	1
1	7/4/2019	9:10:37	Blank				Blank	Blank	PPM	0	4	0	197	0	19	0	8	0	12	0	226	0	21	0	5
2	7/4/2019	9:12:05	Nist2711a				Nist2711a	Nist2711a	PPM	100	4	36	4	24	7	149	3	24181	72	597	10	1422	6	421	4
3	7/4/2019	9:14:37	B-161 R1	B	161	R1	Sample	B-161-R1	PPM	4	1	0	169	149	7	2238	10	27236	74	554	9	33	1	117	2
4	7/4/2019	9:16:37	B-161 R1	B	161	R1	Precision	B-161-R1	PPM	6	1	0	292	159	13	2241	17	27113	127	564	16	31	2	112	3
5	7/4/2019	9:18:02	B-161 R1	B	161	R1	Precision	B-161-R1	PPM	5	1	0	292	154	13	2246	17	27139	126	520	15	31	2	113	3
6	7/4/2019	9:19:06	B-161 R1	B	161	R1	Precision	B-161-R1	PPM	6	1	0	290	161	13	2230	17	27001	126	556	16	33	2	116	3
7	7/4/2019	9:19:49	B-161 R1	B	161	R1	Precision	B-161-R1	PPM	7	1	0	291	155	13	2203	17	26948	134	560	16	31	2	120	3
8	7/4/2019	9:20:34	B-161 R1	B	161	R1	Precision	B-161-R1	PPM	5	1	0	292	158	13	2242	17	27087	126	553	16	30	2	117	3
9	7/4/2019	9:21:21	B-161 R1	B	161	R1	Precision	B-161-R1	PPM	5	1	0	289	165	13	2230	17	27018	125	514	15	31	2	118	3
10	7/4/2019	11:12:20	B-415 R1	B	415	R1	Sample	B-415-R1	PPM	5	1	0	315	62	13	2122	17	27834	131	424	15	31	2	104	4
26	7/4/2019	14:35:06	Blank				Blank	Blank	PPM	0	7	0	335	0	33	0	14	0	21	0	228	0	36	0	8
27	7/4/2019	14:41:58	Nist2711a				Nist2711a	Nist2711a	PPM	79	6	50	7	0	44	148	5	24118	123	572	17	1433	11	413	6
1	7/8/2019	10:13:03	Blank				Blank	Blank	PPM	0	7	0	343	0	34	7	2	0	22	0	228	0	37	0	9
2	7/8/2019	10:17:01	Nist2711a				Nist2711a	Nist2711a	PPM	91	6	32	7	0	43	161	5	24066	132	566	17	1406	11	410	6
22	7/8/2019	11:44:43	Blank				Blank	Blank	PPM	0	8	0	344	0	35	0	14	0	19	0	236	0	38	0	9
23	7/8/2019	11:45:53	Nist2711a				Nist2711a	Nist2711a	PPM	91	6	44	7	0	46	152	5	24220	131	564	17	1409	11	407	6
24	7/8/2019	11:48:38	Precision				Precision	Precision	PPM	11	2	0	329	57	13	4991	32	19412	107	357	15	65	2	183	5
25	7/8/2019	11:49:56	Precision				Precision	Precision	PPM	7	2	0	328	0	43	5042	32	19291	107	360	15	66	2	176	5
26	7/8/2019	11:50:45	Precision				Precision	Precision	PPM	7	2	0	330	0	44	5067	33	19326	113	367	15	66	2	178	5
27	7/8/2019	11:51:34	Precision				Precision	Precision	PPM	8	2	0	329	0	43	5053	32	19329	107	368	15	67	2	184	5
28	7/8/2019	11:52:45	Precision				Precision	Precision	PPM	8	2	0	331	0	44	5064	32	19353	107	347	14	67	2	178	5
29	7/8/2019	11:53:38	Precision				Precision	Precision	PPM	8	2	0	327	0	44	5068	32	19323	106	341	14	67	2	172	5
30	7/8/2019	11:54:59	Precision				Precision	Precision	PPM	6	2	0	330	0	44	5103	32	19301	107	333	14	68	2	178	5
31	7/8/2019	11:56:03	Precision				Precision	Precision	PPM	0	18	0	330	0	42	5072	32	19282	106	380	15	71	2	173	5
45	7/8/2019	12:51:25	Blank				Blank	Blank	PPM	0	8	0	359	0	35	0	15	18	6	0	256	0	39	0	9
46	7/8/2019	12:53:06	Nist2711a				Nist2711a	Nist2711a	PPM	86	6	45	7	0	46	150	5	24201	131	582	18	1410	11	411	6
47	7/8/2019	12:55:16	Precision				Precision	Precision	PPM	0	15	0	340	0	44	2326	19	15104	89	296	14	38	2	85	3
48	7/8/2019	12:56:00	Precision				Precision	Precision	PPM	6	1	0	340	42	13	2337	19	14934	88	278	14	35	2	90	3
49	7/8/2019	12:57:06	Precision				Precision	Precision	PPM	4	1	0	340	0	42	2349	19	14963	88	294	14	38	2	97	4
50	7/8/2019	12:58:46	Precision				Precision	Precision	PPM	4	1	0	340	39	12	2346	19	15055	88	300	14	37	2	94	3
51	7/8/2019	12:59:57	Precision				Precision	Precision	PPM	5	1	0	337	52	13	2304	19	14872	91	289	14	38	2	96	4
52	7/8/2019	13:00:54	Precision				Precision	Precision	PPM	4	1	0	336	0	42	2319	19	14772	86	278	14	40	2	86	3
53	7/8/2019	13:01:47	Precision				Precision	Precision	PPM	6	1	0	340	0	44	2311	19	14970	88	270	14	37	2	94	3
1	7/9/2019	8:14:20	Blank				Blank	Blank	PPM	0	7	0	332	0	32	0	14	0	21	0	217	0	34	0	8
2	7/9/2019	8:16:40	Nist2711a				Nist2711a	Nist2711a	PPM	89	6	39	7	0	45	148	5	23772	131	562	17	1410	11	405	6
3	7/9/2019	8:29:03	BX-195 R2	BX	195	R2	Sample	BX-195-R2	PPM	12	3	0	324	72	14	22360	126	44428	247	512	18	163	4	866	13
4	7/9/2019	8:41:52	B-53 R1	B	53	R1	Sample	B-053-R1	PPM	0	22	0	279	69	11	7215	37	29534	133	687	17	202	3	531	7
5	7/9/2019	9:16:56	B-53 R2	B	53	R2	Sample	B-053-R2	PPM	5	1	0	292	37	11	703	9	27198	126	425	14	21	2	130	3
6	7/9/2019	10:29:44	BX-188 R2	BX	188	R2	Sample	BX-188-R2	PPM	15	2	0	297	57	12	8635	47	36515	173	439	15	62	2	374	7
7	7/9/2019	10:36:41	BX-175 R2	BX	175	R2	Sample	BX-175-R2	PPM	13	2	0	289	43	12	7776	48	52692	261	522	16	85	3	270	6
8	7/9/2019	10:42:01	BX-172 R2	BX	172	R2	Sample	BX-172-R2	PPM	10	1	0	289	48	11	2216	17	30669	141	447	14	37	2	145	4
9	7/9/2019	10:45:42	BX-171 R2	BX	171	R2	Sample	BX-171-R2	PPM	10	1	0	278	42	10	3010	21	30794	142	505	14	47	2	188	4
10	7/9/2019	10:49:31	BX-169 R2	BX	169	R2	Sample	BX-169-R2	PPM	8	1	0	292	34	11	244	6	31105	147	423	14	29	2	121	3
11	7/9/2019	11:04:38	B-414 R3	B	414	R3	Sample	B-414-R3	PPM	9	1	0	274	0	40	148	4	32232	147	450	14	27	2	105	3
21	7/9/2019	11:51:45	BX-195 R3	BX	195	R3	Sample	BX-195-R3	PPM	8	1	0	283	35	11	938	11	33506	154	428	14	29	2	131	3
22	7/9/2019	11:55:19	BX-188 R3	BX	188	R3	Sample	BX-188-R3	PPM	6	1	0	326	0	45	1282	13	27613	138	404	16	30	2	130	4
23	7/9/2019	13:04:13	BX-175 R3	BX	175	R3	Sample	BX-175-R3	PPM	4	1	0	333	55	12	230	5	16575	88	318	14	18	1	72	3
24	7/9/2019	13:45:59	BX-38 R2	B	38	R2	Sample	BX-038-R2	PPM	4	1	0	312	50	12	451	7	20484	102	360	14	25	2	78	3
25	7/9/2019	14:03:28	B-271 R1	B	271	R1	Sample	B-271-R1	PPM	5	1	0	317	51	12	2751	20	21871	110	307	14	19	2	130	4
26	7/9/2019	14:05:20	Blank				Blank	Blank	PPM	0	7	0	333	0	32	0	13	0	20	0	219	0	35	0	8
27	7/9/2019	14:06:33	Nist2711a				Nist2711a	Nist2711a	PPM	95	6	44	7	0	44	150	5	23958	129	593	18	1397	11	397	6
28	7/9/2019	14:07:57	Precision				Precision	Precision	PPM	4	1	0	317	56	12	2406	19	19944	106	286	13	19	2	118	4
29	7/9/2019	14:08:38	Precision				Precision	Precision	PPM	6	1	0	318	42	12	2397	19	20187	107	292	13	18	2	118	4
30	7/9/2019	14:09:21	Precision				Precision	Precision	PPM	5	1	0	317	0	42	2394	19	20132	107	278	13	19	2	117	4
31	7/9/2019	14:10:15	Precision				Precision	Precision	PPM	6	1	0	315	0	42	2396	19	20137	113	280	13	18	2	113	4
32	7/9/2019	14:10:58	Precision				Precision	Precision	PPM	3	1	0	314	0	41	2373	19	19967	106	300	13	20	2	114	4
33	7/9/2019	14:12:42	Precision				Precision	Precision	PPM	0	12	0	317	50	12	2396	19	19993	106	287	13	22	2	117	4

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
34	7/9/2019	14:13:28	Precision				Precision	Precision	PPM	0	12	0	317	43	12	2404	19	20058	107	280	13	21	2	113	4
35	7/9/2019	14:19:43	B-239 R1	B	239	R1	Sample	B-239-R1	PPM	7	1	0	310	49	12	2962	21	29890	142	351	14	17	2	148	4
36	7/9/2019	14:24:00	B-208 R1	B	208	R1	Sample	B-208-R1	PPM	0	11	0	338	0	44	1036	12	20770	106	350	15	15	2	75	3
37	7/9/2019	14:27:32	B-177 R1	B	177	R1	Sample	B-177-R1	PPM	0	13	0	386	73	15	1514	16	17635	105	305	16	16	2	76	3
38	7/9/2019	14:31:44	B-148 R1	B	148	R1	Sample	B-148-R1	PPM	6	2	0	315	51	13	8846	47	31917	152	480	17	54	2	223	6
39	7/9/2019	14:36:05	B-126 R1	B	126	R1	Sample	B-126-R1	PPM	8	2	0	310	138	14	7263	41	30981	152	450	16	62	2	199	5
40	7/9/2019	14:38:59	B-149 R1	B	149	R1	Sample	B-149-R1	PPM	7	1	0	314	92	13	6238	36	27188	133	393	15	47	2	207	5
41	7/9/2019	14:42:16	B-178 R1	B	178	R1	Sample	B-178-R1	PPM	0	11	0	347	40	13	1382	14	16477	90	305	14	15	2	75	3
42	7/9/2019	14:46:02	B-209 R1	B	209	R1	Sample	B-209-R1	PPM	0	11	0	355	57	14	1293	14	16204	92	268	14	9	1	67	3
43	7/9/2019	14:49:45	B-240 R1	B	240	R1	Sample	B-240-R1	PPM	4	1	0	325	51	13	275	6	24143	122	367	15	11	1	65	3
44	7/9/2019	14:53:57	B-241 R1	B	241	R1	Sample	B-241-R1	PPM	0	11	0	282	41	11	21250	95	25334	123	437	14	24	2	340	7
45	7/9/2019	14:57:47	Blank				Blank	Blank	PPM	0	7	0	332	0	31	0	14	0	21	0	224	0	34	0	8
46	7/9/2019	14:58:44	Nist2711a				Nist2711a	Nist2711a	PPM	90	6	44	7	0	43	153	5	23711	123	574	17	1380	10	396	6
47	7/9/2019	15:06:00	B-211 R1	B	211	R1	Sample	B-211-R1	PPM	0	17	0	292	90	12	8802	46	32135	149	456	15	85	3	234	6
48	7/9/2019	15:09:35	B-210 R1	B	210	R1	Sample	B-210-R1	PPM	4	1	0	333	76	14	13220	68	26319	137	444	17	23	2	231	7
49	7/9/2019	15:14:04	B-212 R1	B	212	R1	Sample	B-212-R1	PPM	5	1	0	283	55	11	4172	26	34949	158	499	15	27	2	108	4
50	7/9/2019	15:20:31	B-180 R1	B	180	R1	Sample	B-180-R1	PPM	0	13	0	291	86	12	11398	57	31774	150	453	15	37	2	242	6
51	7/9/2019	15:24:49	B-179 R1	B	179	R1	Sample	B-179-R1	PPM	5	1	0	321	77	13	8218	43	26171	127	518	17	25	2	200	5
52	7/9/2019	15:30:14	B-181 R1	B	181	R1	Sample	B-181-R1	PPM	5	1	0	279	69	12	11598	57	36787	169	399	14	39	2	186	6
53	7/9/2019	15:33:20	B-182 R1	B	182	R1	Sample	B-182-R1	PPM	7	2	0	290	88	13	7606	42	37277	171	511	16	59	2	189	5
54	7/9/2019	15:36:46	B-183 R1	B	183	R1	Sample	B-183-R1	PPM	7	1	0	268	101	11	6995	37	34027	153	499	14	42	2	170	5
55	7/9/2019	15:40:50	B-184 R1	B	184	R1	Sample	B-184-R1	PPM	6	2	0	304	114	13	13709	75	41449	210	595	18	57	3	234	7
56	7/9/2019	15:46:12	B-156 R1	B	156	R1	Sample	B-156-R1	PPM	0	11	0	304	46	11	1362	13	18789	95	362	13	19	1	70	3
57	7/9/2019	15:51:51	B-155 R1	B	155	R1	Sample	B-155-R1	PPM	0	12	0	309	49	12	995	11	22315	112	549	16	21	2	96	3
58	7/9/2019	15:56:30	B-154 R1	B	154	R1	Sample	B-154-R1	PPM	0	11	0	301	43	12	1910	16	25719	124	761	18	24	2	95	3
59	7/9/2019	16:08:59	B-153 R1	B	153	R1	Sample	B-153-R1	PPM	8	1	0	303	58	12	2614	20	31484	153	725	18	28	2	128	4
60	7/9/2019	16:12:51	BX-65 R1	BX	65	R1	Sample	BX-065-R1	PPM	14	2	0	234	128	13	29454	152	67325	337	486	16	85	3	504	10
61	7/9/2019	16:17:25	B-130 R1	B	130	R1	Sample	B-130-R1	PPM	23	2	0	266	126	12	10996	57	44067	204	470	14	107	3	247	6
1	7/10/2019	6:09:48	Blank				Blank	Blank	PPM	0	7	0	337	0	31	0	14	0	20	0	223	0	36	0	9
2	7/10/2019	6:11:14	Nist2711a				Nist2711a	Nist2711a	PPM	84	7	50	7	0	46	159	5	24274	125	583	18	1440	11	427	6
3	7/10/2019	6:24:42	B-127 R1	B	127	R1	Sample	B-127-R1	PPM	7	1	0	295	68	12	8051	42	30943	143	439	15	44	2	200	5
4	7/10/2019	6:30:33	B-106 R1	B	106	R1	Sample	B-106-R1	PPM	0	13	0	312	44	12	7891	45	31226	158	1748	27	32	2	735	9
5	7/10/2019	6:35:27	B-148 R2	B	148	R2	Sample	B-148-R2	PPM	4	1	0	342	79	14	2527	21	24934	132	464	17	30	2	113	4
6	7/10/2019	6:40:52	B-125 R1	B	125	R1	Sample	B-125-R1	PPM	5	1	0	303	58	12	3396	23	26923	132	800	19	32	2	409	6
7	7/10/2019	6:47:14	B-076 R1	B	76	R1	Sample	B-076-R1	PPM	6	1	0	331	0	44	6373	37	22891	118	375	15	28	2	181	5
8	7/10/2019	6:57:11	B-076 R1	B	76	R1	Sample	B-077-R1	PPM	7	1	0	315	71	13	3757	26	30877	149	451	16	27	2	141	4
9	7/10/2019	7:02:46	B-064 R1	B	64	R1	Sample	B-064-R1	PPM	0	13	0	329	0	46	2111	18	25914	132	539	17	31	2	116	4
10	7/10/2019	7:06:42	B-051 R1	B	51	R1	Sample	B-051-R1	PPM	4	1	0	301	50	12	1179	12	28661	132	543	16	22	2	112	3
11	7/10/2019	7:10:45	B-050 R1	B	50	R1	Sample	B-050-R1	PPM	9	2	0	281	87	12	12525	60	32583	150	422	14	86	3	519	8
12	7/10/2019	7:14:36	B-063 R1	B	63	R1	Sample	B-063-R1	PPM	6	1	0	320	0	44	2559	20	25113	125	385	15	31	2	178	4
13	7/10/2019	7:21:52	B-091 R1	B	91	R1	Sample	B-091-R1	PPM	0	13	0	317	60	13	1851	16	25272	124	537	17	27	2	108	3
14	7/10/2019	7:25:47	B-090 R1	B	90	R1	Sample	B-090-R1	PPM	14	2	0	282	120	13	12642	63	36328	170	708	18	96	3	472	8
15	7/10/2019	7:35:36	B-108 R1	B	108	R1	Sample	B-108-R1	PPM	8	1	0	308	67	12	5247	31	30188	143	785	19	35	2	205	5
16	7/10/2019	7:40:54	B-128 R1	B	128	R1	Sample	B-128-R1	PPM	6	1	0	283	73	12	9462	48	31701	146	466	15	51	2	285	6
17	7/10/2019	7:48:01	B-151 R1	B	151	R1	Sample	B-151-R1	PPM	5	1	0	310	117	13	6849	41	32826	167	443	16	42	2	209	6
18	7/10/2019	7:51:28	B-150 R1	B	150	R1	Sample	B-150-R1	PPM	7	2	0	295	129	13	8852	46	32869	153	453	15	84	3	234	6
19	7/10/2019	7:53:56	Blank				Blank	Blank	PPM	0	7	0	333	0	33	0	14	0	20	0	217	0	35	0	8
20	7/10/2019	7:54:56	Nist2711a				Nist2711a	Nist2711a	PPM	84	6	49	7	0	45	149	5	24229	131	596	18	1414	11	404	6
21	7/10/2019	7:55:56	Precision				Precision	Precision	PPM	6	2	0	283	45	10	6066	36	23518	126	335	13	65	2	195	5
22	7/10/2019	7:56:44	Precision				Precision	Precision	PPM	6	2	0	282	61	11	6010	36	23581	126	315	12	66	2	205	5
23	7/10/2019	7:57:26	Precision				Precision	Precision	PPM	7	2	0	282	39	10	6047	34	23392	116	299	12	66	2	203	5
24	7/10/2019	7:58:13	Precision				Precision	Precision	PPM	6	2	0	283	53	11	6024	34	23544	117	310	12	66	2	203	5
25	7/10/2019	7:58:56	Precision				Precision	Precision	PPM	7	2	0	283	45	10	6051	34	23426	117	317	12	67	2	192	5
26	7/10/2019	7:59:37	Precision				Precision	Precision	PPM	0	16	0	283	45	10	6065	36	23565	126	322	12	68	2	196	5
27	7/10/2019	8:00:19	Precision				Precision	Precision	PPM	0	16	0	282	70	11	6040	36	23560	126	321	12	68	2	198	5
28	7/10/2019	8:03:13	B152-R1	B	152	R1	Sample	B-152-R1	PPM	5	1	0	303	52	12	2473	19	31815	152	443	15	24	2	112	4
29	7/10/2019	8:08:14	B149-R2	B	149	R2	Sample	B-149-R2	PPM	6	2	0	316	206	15	5993	35	26563	131	416	16	80	3	230	5
30	7/10/2019	8:15:23	B106-R2	B	106	R2	Sample	B-106-R2	PPM	5	1	0	289	66	12	7832	45	31986	164	1638	25	25	2	711	9
31	7/10/2019	8:24:37	B182-R2	B	182	R2	Sample	B-182-R2	PPM	4	1	0	282	37	10	2026	16	26234	121	568	15	26	2	106	3
32	7/10/2019	8:30:51	B183-R2	B	183	R2	Sample	B-183-R2	PPM	4	1	0	289	70	11	2655	19	28468	133	781	18	35	2	103	3
33	7/10/2019	8:38:17	B184-R2	B	184	R2	Sample	B-184-R2	PPM	4	1	0	282	49	10	6424	35	26848	126	484	14	34	2	137	4
70	7/10/2019	9:23:02	B180-R2	B	180	R2	Sample	B-180-R2	PPM	6	1	0	297	68	12	2056	17	26896	129	278	13	14	1	102	3
71	7/10/2019	9:27:21	B179-R2	B	179	R2	Sample	B-179-R2	PPM	4	1	0	301	42	12	2641	19	26930	128	351	14	18	2	97	3
72	7/10/2019	9:35:15	B211-R2	B	211	R2	Sample	B-211-R2	PPM	4	1	0	320	44	13	316	7	28204	139	438	16	14	2	66	3
73	7/10/2019	9:46:13	B106-R3	B	106	R3	Sample	B-106-R3	PPM	0	11	0	274	71	11	7720	40	29499	136	1485	23	26	2	626	7
74	7/10/2019	9:52:14	B-149 R3	B	149	R3	Sample	B-149-R3	PPM	7	2	0	283	166	14	11740	60	42799	198	406	15	111	3	351	7
75	7/10/2019	10:02:52	B-150 R2	B	150	R2	Sample	B-150-R2	PPM	7	1	0	307	60	12	1999	17	28621	138	508	16	33	2	160	4
76	7/10/2019	10:07:13	B-151 R2	B	151	R2	Sample	B-151-R2	PPM	4	1	0	341	93	14	1579	14	14608	82	327	14	17	1	75	3
77	7/10/2019	10:11:40	B-128 R2	B	128	R2	Sample	B-128-R2	PPM	6	1	0	282	35	11	7480	40	30254	142	754	17	48	2	333	6
78	7/10/2019	10:29:23	BX-065 R2	BX	65	R2	Sample	BX-065-R2	PPM	5	1	0	273	83	11	2681	18	28134	126	469	14	26	2	114	3
79	7/10/2019	10:41:06	Blank				Blank	Blank	PPM	0	7	0	330	0	32	12	2	69	6	0	230	0	35	0	8
80	7/10/2019	10:42:59	Nist2711a				Nist2711a	Nist2711a	PPM	89	6	62	7	0	44	159	5	23846	125	595	17	1408	10	402	6
81	7/10/2019	10:57:32	B-130 R2	B	130	R2	Sample	B-130-R2	PPM	16	3	0	243	128	12	27771	139	51211	252	616	16	189	4	659	10
82	7/10/2019	11:02:05	BX-066 R1	BX	66	R1	Sample	BX-066-R1	PPM	0	12	0	309	0	41	1631	14	20940	103	363	14	27	2	89	3

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
83	7/10/2019	11:13:32	B-090 R2	B	90	R2	Sample	B-090-R2	PPM	4	1	0	312	0	43	999	11	27205	133	421	15	18	2	86	3
84	7/10/2019	11:18:16	B-076 R2	B	76	R2	Sample	B-076-R2	PPM	4	1	0	392	0	53	578	10	19742	119	424	19	13	2	63	3
85	7/10/2019	11:24:33	B-050 R2	B	50	R2	Sample	B-050-R2	PPM	5	1	0	311	50	12	3648	24	22980	115	326	14	32	2	142	4
88	7/10/2019	11:37:25	B-109 R1	B	109	R1	Sample	B-109-R1	PPM	4	1	0	306	47	11	2181	17	20618	105	523	15	18	1	119	3
89	7/10/2019	11:40:54	B-128 R3	B	128	R3	Sample	B-128-R3	PPM	0	11	0	342	0	42	134	5	16943	92	215	13	10	1	50	2
90	7/10/2019	11:46:48	B-149 R4	B	149	R4	Sample	B-149-R4	PPM	0	11	0	357	0	44	97	4	12093	81	284	14	7	1	37	2
91	7/10/2019	12:43:12	B-106 R4	B	106	R4	Sample	B-106-R4	PPM	0	11	0	336	40	13	542	8	18442	98	385	15	14	1	86	3
92	7/10/2019	12:55:13	B-126 R2	B	126	R2	Sample	B-126-R2	PPM	0	10	0	339	69	13	70	4	15236	86	299	14	8	1	44	2
93	7/10/2019	13:00:57	B-129 R1	B	129	R1	Sample	B-129-R1	PPM	4	1	0	280	55	11	16050	78	30275	147	501	15	33	2	522	8
94	7/10/2019	13:06:27	BX-063 R1	BX	63	R1	Sample	BX-063-R1	PPM	3	1	0	318	0	43	1398	14	23045	117	584	17	22	2	108	3
95	7/10/2019	13:12:33	B-108 R2	B	108	R2	Sample	B-108-R2	PPM	8	1	0	277	111	12	6140	35	38950	176	493	15	37	2	240	5
96	7/10/2019	13:27:47	B-078 R1	B	78	R1	Sample	B-078-R1	PPM	4	1	0	304	36	11	436	7	22118	107	594	16	18	2	69	3
97	7/10/2019	13:35:01	B-089 R1	B	89	R1	Sample	B-089-R1	PPM	3	1	0	334	86	14	666	10	24277	125	596	18	14	2	73	3
98	7/10/2019	13:50:41	B-241 R2	B	241	R2	Sample	B-241-R2	PPM	3	1	0	332	49	13	1430	14	18374	97	322	14	9	1	76	3
99	7/10/2019	13:58:51	Blank				Blank	Blank	PPM	0	7	0	347	0	33	0	14	0	21	0	238	0	36	0	8
100	7/10/2019	14:00:06	Nist2711a				Nist2711a	Nist2711a	PPM	88	6	51	7	0	44	163	5	24023	129	560	17	1411	11	418	6
101	7/10/2019	14:01:25	Precision				Precision	Precision	PPM	0	10	0	308	0	38	233	5	13427	84	203	12	10	1	65	2
102	7/10/2019	14:02:08	Precision				Precision	Precision	PPM	0	10	0	309	0	37	232	5	13512	84	206	12	12	1	68	2
103	7/10/2019	14:03:09	Precision				Precision	Precision	PPM	0	10	0	310	0	37	226	5	13428	78	205	12	12	1	65	2
104	7/10/2019	14:05:44	Precision				Precision	Precision	PPM	0	10	0	311	0	37	231	5	13353	78	213	12	12	1	72	3
105	7/10/2019	14:06:38	Precision				Precision	Precision	PPM	3	1	0	308	0	37	228	5	13427	84	195	11	9	1	67	2
106	7/10/2019	14:08:21	Precision				Precision	Precision	PPM	0	10	0	308	0	39	228	5	13451	84	174	11	11	1	67	2
107	7/10/2019	14:09:06	Precision				Precision	Precision	PPM	0	10	0	307	0	38	223	5	13313	83	196	11	11	1	67	2
108	7/10/2019	16:40:51	B-184 R3	B	184	R3	Sample	B-184-R3	PPM	5	1	0	313	35	11	1702	15	18778	97	514	16	25	2	80	3
109	7/10/2019	16:47:53	B-130 R3	B	130	R3	Sample	B-130-R3	PPM	0	13	0	299	0	45	7116	40	28762	140	330	13	34	2	110	4
110	7/10/2019	16:50:09	B-130 R4	B	130	R4	Sample	B-130-R4	PPM	4	1	0	287	205	13	4569	27	27699	128	421	14	32	2	103	4
111	7/10/2019	16:57:44	B-129 R2	B	129	R2	Sample	B-129-R2	PPM	0	11	0	269	48	11	25821	122	27143	137	562	15	22	2	611	9
112	7/10/2019	17:04:43	B-127 R2	B	127	R2	Sample	B-127-R2	PPM	13	2	0	281	224	14	14202	71	37444	179	395	14	89	3	290	7
113	7/10/2019	17:17:41	B-129 R3	B	129	R3	Sample	B-129-R3	PPM	0	11	0	364	44	13	98	4	6509	50	197	13	8	1	25	2
114	7/10/2019	17:28:34	B-130 R5	B	130	R5	Sample	B-130-R5	PPM	0	12	0	291	36	11	4648	28	25809	124	486	15	32	2	106	4
115	7/10/2019	17:31:51	B-130 R6	B	130	R6	Sample	B-130-R6	PPM	5	1	0	300	0	43	7052	39	22802	116	410	14	26	2	110	4
116	7/10/2019	17:40:21	B-127 R3	B	127	R3	Sample	B-127-R3	PPM	3	1	0	376	0	44	447	8	11357	74	322	15	11	2	42	2
117	7/10/2019	17:45:58	B-108 R2	B	108	R2	Sample	B-108-R3	PPM	0	15	0	288	76	12	7122	38	29192	135	527	15	62	2	245	5
1	7/11/2019	7:48:16	Blank				Blank	Blank	PPM	0	8	0	354	0	34	0	14	0	22	0	243	0	37	0	9
2	7/11/2019	7:50:53	Nist2711a				Nist2711a	Nist2711a	PPM	83	6	31	7	0	44	143	5	22232	114	547	17	1282	10	376	6
3	7/11/2019	7:54:08	Precision				Precision	Precision	PPM	4	1	0	284	75	11	3237	22	28799	134	588	15	31	2	113	4
4	7/11/2019	7:57:24	Precision				Precision	Precision	PPM	5	1	0	284	58	11	3255	22	28857	134	550	15	30	2	107	4
5	7/11/2019	7:59:34	Precision				Precision	Precision	PPM	4	1	0	283	76	11	3259	22	28865	134	583	15	28	2	108	4
6	7/11/2019	8:00:26	Precision				Precision	Precision	PPM	5	1	0	283	62	11	3199	21	28690	133	569	15	26	2	114	4
7	7/11/2019	8:03:07	Precision				Precision	Precision	PPM	6	1	0	284	69	11	3271	22	28991	135	572	15	29	2	105	4
8	7/11/2019	8:05:16	Precision				Precision	Precision	PPM	7	1	0	287	71	11	3286	22	28895	135	573	15	30	2	104	4
9	7/11/2019	8:07:11	Precision				Precision	Precision	PPM	5	1	0	283	84	11	3202	21	28723	133	552	15	28	2	109	4
10	7/11/2019	8:10:13	Precision				Precision	Precision	PPM	6	1	0	285	39	11	3212	22	28733	134	579	15	28	2	106	4
11	7/11/2019	8:18:49	B-130 R7	B	130	R7	Sample	B-130-R7	PPM	5	1	0	302	0	42	3539	24	23726	119	570	16	21	2	103	4
12	7/11/2019	8:51:19	B-181 R2	B	181	R2	Sample	B-181-R2	PPM	10	2	0	308	59	13	5846	36	35338	174	524	17	56	2	143	5
13	7/11/2019	8:57:01	B-210 R2	B	210	R2	Sample	B-210-R2	PPM	3	1	0	325	43	12	4007	25	16759	90	288	13	9	1	113	4
19	7/11/2019	10:12:43	B-181 R3	B	181	R3	Sample	B-181-R3	PPM	6	1	0	279	57	11	319	6	27803	124	413	13	11	1	70	2
20	7/11/2019	10:23:39	B-241 R3	B	241	R3	Sample extra	B-241-R3	PPM	3	1	0	346	65	13	54	3	15154	84	342	15	6	1	34	2
21	7/11/2019	13:01:32	B-108 R4	B	108	R4	Sample	B-108-R4	PPM	6	1	0	315	0	44	5042	30	26669	129	352	14	54	2	192	5
22	7/11/2019	13:03:25	B-107 R1	B	107	R1	Sample	B-107-R1	PPM	0	10	0	297	52	11	174	5	27810	129	424	14	14	1	64	2
27	7/11/2019	13:37:29	B-108 R5	B	108	R5	Sample	B-108-R5	PPM	6	1	0	302	71	12	6281	36	27918	138	549	16	49	2	263	6
28	7/11/2019	13:42:23	Blank				Blank	Blank	PPM	0	7	0	330	0	32	6	2	0	20	0	230	0	37	0	8
29	7/11/2019	13:43:47	Nist2711a				Nist2711a	Nist2711a	PPM	90	6	49	7	0	45	153	5	23874	129	572	17	1393	11	400	6
30	7/11/2019	14:31:14	B-108 R6	B	108	R6	Sample	B-108-R6	PPM	5	1	0	316	40	12	5283	31	22332	110	329	14	55	2	208	5
1	7/12/2019	7:26:12	Blank				Blank	Blank	PPM	0	7	0	335	0	34	0	14	0	21	0	218	0	36	0	9
2	7/12/2019	7:27:18	Nist2711a				Nist2711a	Nist2711a	PPM	85	7	39	7	0	45	145	5	24254	137	575	18	1427	11	412	6
3	7/12/2019	7:30:34	B-108 R7	B	108	R7	Sample	B-108-R7	PPM	4	1	0	269	38	11	2483	19	39344	178	980	19	27	2	197	4
4	7/12/2019	7:32:04	B-108 R7	B	108	R7	Precision	B-108-R7	PPM	0	12	0	271	61	12	2466	19	39632	180	1044	20	30	2	198	4
5	7/12/2019	7:33:48	B-108 R7	B	108	R7	Precision	B-108-R7	PPM	4	1	0	269	47	11	2475	19	39404	179	999	20	26	2	199	4
6	7/12/2019	7:35:50	B-108 R7	B	108	R7	Precision	B-108-R7	PPM	5	1	0	271	63	12	2497	19	39362	179	1029	20	27	2	193	4
7	7/12/2019	7:37:44	B-108 R7	B	108	R7	Precision	B-108-R7	PPM	5	1	0	269	57	11	2488	19	39308	178	999	20	26	2	192	4
8	7/12/2019	8:08:51	B-108 R7	B	108	R7	Precision	B-108-R7	PPM	4	1	0	270	39	11	2494	19	39488	179	1006	20	27	2	194	4
9	7/12/2019	8:09:39	B-108 R7	B	108	R7	Precision	B-108-R7	PPM	0	11	0	270	53	11	2497	19	39632	179	1023	20	27	2	196	4
1	7/15/2019	10:16:38	Blank				Blank	Blank	PPM	0	7	0	332	0	32	0	14	0	18	0	216	0	36	0	8
2	7/15/2019	10:17:53	Nist2711a				Nist2711a	Nist2711a	PPM	76	6	36	7	0	46	149	5	24025	133	593	18	1416	11	413	6
3	7/15/2019	10:26:53	B-270 R1	B	270	R1	Sample	B-270-R1	PPM	6	2	0	291	54	9	9853	56	26263	141	367	12	64	2	606	8
4	7/15/2019	10:37:40	B-269 R1	B	269	R1	Sample	B-269-R1	PPM	6	1	0	308	51	12	4918	30	28400	136	385	15	46	2	164	5
5	7/15/2019	10:41:08	B-416 R1	B	416	R1	Sample	B-416-R1	PPM	9	2	0	291	73	12	6477	36	28729	135	396	14	57	2	180	5
6	7/15/2019	10:44:49	B-417 R1	B	417	R1	Sample	B-417-R1	PPM	4	1	0	318	58	13	2230	18	22444	112	452	16	25	2	95	3
7	7/15/2019	10:48:37	B-237 R1	B	237	R1	Sample	B-237-R1	PPM	5	1	0	344	54	14	2263	19	25183	129	387	16	27	2	162	4
8	7/15/2019	10:52:23	B-238 R1	B	238	R1	Sample	B-238-R1	PPM	6	1	0	306	82	13	2392	19	29550	139	452	16	34	2	121	4
9	7/15/2019	10:56:24	B-207 R1	B	207	R1	Sample	B-207-R1	PPM	0	12	0	394	47	15	444	8	13406	88	234	15	10	2	40	3
10	7/15/2019	11:00:41	B-206 R1	B	206	R1	Sample	B-206-R1	PPM	12	2	0	302	247	16	15901	76	38078	177	437	17	100	3	265	7
11	7/15/2019	11:05:38	B-418 R1	B	418	R1	Sample	B-418-R1	PPM	0	12	0	346	262	17	3075	22	18303	99	451	17	18	2	100	4

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
12	7/15/2019	11:10:03	B-176 R1	B	176	R1	Sample	B-176-R1	PPM	0	11	0	330	0	42	604	9	19051	101	318	14	12	1	62	3
13	7/15/2019	11:14:03	B-147 R1	B	147	R1	Sample	B-147-R1	PPM	4	1	0	334	279	17	2874	21	19109	99	300	15	20	2	111	4
14	7/15/2019	11:19:24	B-175 R1	B	175	R1	Sample	B-175-R1	PPM	9	2	0	318	168	16	12687	67	37508	187	397	17	70	3	292	7
15	7/15/2019	11:22:42	B-174 R1	B	174	R1	Sample	B-174-R1	PPM	9	2	0	338	341	18	5649	34	23812	120	352	16	48	2	125	5
16	7/15/2019	11:27:29	Blank				Blank	Blank	PPM	0	8	0	353	0	34	12	2	26	6	0	249	0	39	0	9
17	7/15/2019	11:28:34	Nist2711a				Nist2711a	Nist2711a	PPM	92	7	34	7	0	46	156	5	24160	127	569	18	1434	11	409	6
18	7/15/2019	11:30:20	Precision				Precision	Precision	PPM	0	12	0	325	40	12	1742	16	17076	97	340	14	21	2	95	3
19	7/15/2019	11:31:06	Precision				Precision	Precision	PPM	0	12	0	321	45	12	1728	16	16917	96	334	14	19	2	92	3
20	7/15/2019	11:32:34	Precision				Precision	Precision	PPM	0	12	0	321	42	12	1705	16	17029	103	356	14	22	2	89	3
21	7/15/2019	11:33:35	Precision				Precision	Precision	PPM	0	12	0	324	37	12	1728	16	17213	97	359	14	23	2	92	3
22	7/15/2019	11:34:16	Precision				Precision	Precision	PPM	0	12	0	325	0	43	1738	16	17187	104	353	14	22	2	97	3
23	7/15/2019	11:34:59	Precision				Precision	Precision	PPM	0	12	0	324	0	43	1734	16	17113	103	374	15	22	2	90	3
24	7/15/2019	11:35:41	Precision				Precision	Precision	PPM	0	12	0	323	47	12	1759	16	17250	104	364	14	24	2	87	3
25	7/15/2019	11:36:24	Precision				Precision	Precision	PPM	0	12	0	323	0	43	1740	16	17171	104	379	15	24	2	91	3
26	7/15/2019	11:50:29	B-031 R1	B	31	R1	Sample	B-031-R1	PPM	5	1	0	308	65	12	3842	24	25177	119	325	14	30	2	120	4
27	7/15/2019	11:55:46	B-023 R1	B	23	R1	Out	B-023-R1	PPM	10	2	0	283	61	12	6675	38	37453	175	475	15	48	2	216	5
28	7/15/2019	12:01:25	B-040 R1	B	40	R1	Sample	B-040-R1	PPM	9	1	0	324	57	13	6620	38	27162	136	484	17	38	2	178	5
29	7/15/2019	12:08:32	B-049 R1	B	49	R1	Sample	B-049-R1	PPM	0	16	0	348	0	49	4376	29	21760	116	418	17	50	2	119	4
30	7/15/2019	12:17:14	B-062 R1	B	62	R1	Sample	B-062-R1	PPM	5	1	0	329	44	13	4824	30	22189	116	352	15	43	2	139	4
31	7/15/2019	12:22:43	Blank				Blank	Blank	PPM	0	7	0	334	0	32	0	14	0	21	0	229	0	34	0	8
32	7/15/2019	12:24:20	Nist2711a				Nist2711a	Nist2711a	PPM	103	6	57	7	0	43	153	5	23968	129	596	18	1401	11	399	6
33	7/15/2019	12:26:43	Precision				Precision	Precision	PPM	0	13	0	305	0	41	4671	31	19578	113	296	13	34	2	149	4
34	7/15/2019	12:27:34	Precision				Precision	Precision	PPM	5	1	0	306	0	41	4800	32	19835	114	303	13	34	2	140	4
35	7/15/2019	12:29:11	Precision				Precision	Precision	PPM	4	1	0	305	34	11	4771	30	19901	107	293	13	36	2	142	4
36	7/15/2019	12:31:59	Precision				Precision	Precision	PPM	7	1	0	302	0	41	4946	32	19757	111	299	13	32	2	140	4
37	7/15/2019	12:34:22	Precision				Precision	Precision	PPM	4	1	0	304	0	41	4967	32	19640	111	309	13	37	2	136	4
38	7/15/2019	12:35:19	Precision				Precision	Precision	PPM	5	1	0	303	42	11	4988	32	19745	111	292	13	36	2	140	4
39	7/15/2019	12:37:05	Precision				Precision	Precision	PPM	6	1	0	303	44	11	4923	30	19476	103	309	13	33	2	144	4
40	7/15/2019	14:50:30	B-086 R1	B	86	R1	Sample	B-086-R1	PPM	3	1	0	297	95	12	4348	28	24563	126	749	18	22	2	297	5
41	7/15/2019	14:54:56	B-104 R1	B	104	R1	Out	B-104-R1	PPM	6	1	0	295	50	12	6218	35	32315	151	523	16	37	2	258	5
42	7/15/2019	15:00:56	B-145 R1	B	145	R1	Sample	B-145-R1	PPM	6	1	0	372	174	17	6487	41	19729	116	271	15	24	2	120	5
43	7/15/2019	15:04:49	B-146 R1	B	146	R1	Sample	B-146-R1	PPM	3	1	0	348	0	44	602	9	17827	100	343	15	13	2	53	3
44	7/15/2019	15:10:08	B-123 R1	B	123	R1	Sample	B-123-R1	PPM	15	2	0	321	297	18	11356	60	36339	177	398	17	121	3	344	7
45	7/15/2019	15:16:50	B-206 R2	B	206	R2	Sample	B-206-R2	PPM	3	1	0	327	220	16	3850	25	17913	94	306	14	22	2	87	4
46	7/15/2019	15:25:53	B-075 R1	B	75	R1	Sample	B-075-R1	PPM	7	1	0	333	50	13	2578	20	20363	106	334	15	29	2	95	4
53	7/15/2019	16:02:37	B-035 R1	B	35	R1	Sample	B-035-R1	PPM	8	1	0	284	53	11	1880	15	27433	127	414	14	31	2	121	3
54	7/15/2019	16:06:11	B-045 R1	B	45	R1	Sample	B-045-R1	PPM	12	2	0	328	62	13	10829	59	24919	134	349	15	81	3	317	7
55	7/15/2019	16:10:49	B-046 R1	B	46	R1	Sample	B-046-R1	PPM	9	1	0	294	103	13	5688	32	27710	128	432	15	52	2	211	5
56	7/15/2019	16:13:58	B-036 R1	B	36	R1	Sample	B-036-R1	PPM	9	1	0	288	64	11	4940	29	28384	130	403	14	45	2	311	5
57	7/15/2019	16:19:21	B-059 R1	B	59	R1	Sample	B-059-R1	PPM	10	2	0	310	64	12	6693	41	29645	158	437	15	64	2	281	6
58	7/15/2019	16:23:57	Blank				Blank	Blank	PPM	0	7	0	331	0	31	8	2	22	5	0	226	0	35	0	8
59	7/15/2019	16:24:55	Nist2711a				Nist2711a	Nist2711a	PPM	90	7	27	7	0	45	160	5	24031	124	576	18	1401	11	404	6
60	7/15/2019	16:33:49	B-416 R2	B	416	R2	Sample	B-416-R2	PPM	4	1	0	316	0	42	99	4	23211	116	319	14	14	1	58	2
61	7/15/2019	16:39:40	B-269 R2	B	269	R2	Sample	B-269-R2	PPM	5	1	0	299	49	12	913	10	24128	115	342	13	20	1	78	3
62	7/15/2019	16:45:19	B-174 R2	B	174	R2	Sample	B-174-R2	PPM	0	11	0	396	0	46	179	5	6362	52	178	13	8	1	30	2
63	7/15/2019	16:49:11	B-145 R2	B	145	R2	Sample	B-145-R2	PPM	0	14	0	334	183	15	6248	36	18459	100	300	15	32	2	99	4
64	7/15/2019	16:55:46	B-175 R2	B	175	R2	Sample	B-175-R2	PPM	5	1	0	316	158	14	9240	48	27814	135	351	15	43	2	167	5
65	7/15/2019	17:05:17	B-036 R2	B	36	R2	Sample	B-036-R2	PPM	5	1	0	301	38	11	694	9	23657	114	378	14	17	1	81	3
66	7/15/2019	17:09:10	B-037 R1	B	37	R1	Sample	B-037-R1	PPM	6	1	0	315	0	44	1777	16	26800	132	426	15	23	2	90	3
67	7/15/2019	17:12:59	B-047 R1	B	47	R1	Sample	B-047-R1	PPM	7	1	0	298	42	11	1526	14	29413	142	377	14	25	2	103	3
68	7/15/2019	17:16:16	B-046 R2	B	46	R2	Sample	B-046-R2	PPM	8	1	0	290	48	11	1549	14	30349	138	489	15	33	2	112	3
69	7/15/2019	17:20:42	B-045 R2	B	45	R2	Sample	B-045-R2	PPM	9	1	0	305	71	12	2498	19	25124	120	522	16	41	2	178	4
70	7/15/2019	17:23:44	Blank				Blank	Blank	PPM	0	8	0	343	0	33	10	2	28	6	0	233	0	37	0	8
71	7/15/2019	17:25:08	Nist2711a				Nist2711a	Nist2711a	PPM	89	6	51	7	0	44	147	5	23572	125	567	17	1378	10	405	6
1	7/16/2019	6:47:42	Blank				Blank	Blank	PPM	0	8	0	356	0	34	8	2	0	22	0	242	0	39	0	9
2	7/16/2019	6:49:18	Nist2711a				Nist2711a	Nist2711a	PPM	86	7	35	7	0	47	171	5	24228	128	577	18	1417	11	412	6
3	7/16/2019	6:51:06	Precision				Precision	Precision	PPM	0	13	0	289	0	39	2041	17	19097	110	304	12	40	2	127	3
4	7/16/2019	6:51:58	Precision				Precision	Precision	PPM	5	1	0	290	0	39	2043	17	19343	112	295	12	37	2	133	4
5	7/16/2019	6:53:19	Precision				Precision	Precision	PPM	5	1	0	291	0	40	2079	17	19426	112	271	12	39	2	127	3
6	7/16/2019	6:55:57	Precision				Precision	Precision	PPM	5	1	0	289	0	38	2056	17	19370	111	314	12	41	2	130	3
7	7/16/2019	6:56:44	Precision				Precision	Precision	PPM	6	1	0	288	35	10	2029	16	19129	99	287	12	38	2	133	3
8	7/16/2019	6:57:43	Precision				Precision	Precision	PPM	6	1	0	290	33	10	2057	17	19324	110	308	12	39	2	135	4
9	7/16/2019	6:58:37	Precision				Precision	Precision	PPM	0	13	0	288	0	39	2051	16	19272	99	300	12	40	2	131	3
10	7/16/2019	7:01:08	Precision				Precision	Precision	PPM	7	1	0	290	0	39	2061	16	19344	100	302	12	37	2	123	3
11	7/16/2019	7:07:46	B-270 R2	B	270	R2	Sample	B-270-R2	PPM	6	1	0	335	52	14	1447	15	27115	141	363	15	23	2	140	4
19	7/16/2019	7:54:30	B-175 R3	B	175	R3	Sample	B-175-R3	PPM	0	12	0	329	45	13	3624	24	20322	104	336	14	19	2	83	4
20	7/16/2019	8:01:04	B-123 R2	B	123	R2	Sample	B-123-R2	PPM	5	1	0	327	71	13	4216	27	25075	125	322	14	43	2	137	4
21	7/16/2019	8:10:51	B-027 R1	B	27	R1	Sample	B-027-R1	PPM	3	1	0	327	0	42	476	8	17688	94	346	14	13	1	58	2
22	7/16/2019	8:17:10	B-028 R1	B	28	R1	Sample	B-028-R1	PPM	7	1	0	302	82	12	5953	35	22334	118	575	16	48	2	178	5
23	7/16/2019	8:20:54	B-021 R1	B	21	R1	Sample	B-021-R1	PPM	0	10	0	314	0	38	60	3	16867	87	349	14	15	1	49	2
24	7/16/2019	9:04:20	B-028 R2	B	28	R2	Sample	B-028-R2	PPM	0	11	0	319	0	44	62	3	22660	115	422	15	16	2	50	2
25	7/16/2019	9:10:47	B-038 R1		38	R1	Sample	B-038-R1	PPM	6	1	0	306	39	11	1593	15	30578	150	318	13	27	2	110	3
26	7/16/2019	9:17:08	B-062 R2	B	62	R2	Sample	B-062-R2	PPM	4	1	0	303	122	13	1162	12	22707	110	328	14	26	2	85	3
27	7/16/2019	9:21:35	B-074 R1	B	74	R1	Sample	B-074-R1	PPM	7	1	0	339	0	48	5552	35	26531	138	511	17	38	2	187	5

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
28	7/16/2019	10:26:46	B-145 R3	B	145	R3	Sample	B-145-R3	PPM	0	16	0	438	0	56	2386	23	17670	119	309	18	25	2	70	4
29	7/16/2019	10:32:02	B-104 R2	B	104	R2	Out	B-104-R2	PPM	0	12	0	301	59	12	6485	37	29753	143	1350	24	29	2	540	7
30	7/16/2019	10:36:48	B-074 R2	B	74	R2	Sample	B-074-R2	PPM	5	1	0	332	69	13	4409	30	26728	139	531	17	29	2	214	5
31	7/16/2019	10:44:36	Blank				Blank	Blank	PPM	0	8	0	354	0	33	0	15	21	6	0	248	0	38	0	8
32	7/16/2019	10:46:34	Nist2711a				Nist2711a	Nist2711a	PPM	81	6	36	7	0	45	152	5	24012	130	598	18	1411	11	408	6
33	7/16/2019	10:48:10	Precision				Precision	Precision	PPM	0	13	0	295	37	12	3738	25	34141	157	820	19	38	2	205	5
34	7/16/2019	10:48:51	Precision				Precision	Precision	PPM	5	1	0	295	76	13	3731	25	34318	157	764	19	36	2	210	5
35	7/16/2019	10:49:34	Precision				Precision	Precision	PPM	5	1	0	296	68	12	3733	25	34274	157	821	19	36	2	213	5
36	7/16/2019	10:50:57	Precision				Precision	Precision	PPM	5	1	0	294	49	12	3708	24	33902	155	780	19	34	2	207	5
37	7/16/2019	10:51:58	Precision				Precision	Precision	PPM	0	13	0	294	61	12	3720	25	33870	155	770	19	35	2	213	5
38	7/16/2019	10:52:41	Precision				Precision	Precision	PPM	0	13	0	297	56	12	3731	25	33840	156	781	19	38	2	208	5
39	7/16/2019	10:53:46	Precision				Precision	Precision	PPM	0	13	0	296	58	12	3674	24	33648	155	764	19	37	2	204	5
45	7/16/2019	11:57:17	B-016 R1	B	16	R1	Sample	B-016-R1	PPM	6	1	0	294	41	11	186	5	34795	168	361	13	19	2	106	3
46	7/16/2019	12:03:59	B-022 R1	B	22	R1	Sample	B-022-R1	PPM	8	1	0	293	56	11	701	9	31858	150	467	15	22	2	97	3
1	7/17/2019	6:20:35	Blank				Blank	Blank	PPM	0	7	0	334	0	32	0	14	16	5	0	220	0	35	0	8
2	7/17/2019	6:22:00	Nist2711a				Nist2711a	Nist2711a	PPM	78	6	33	7	43	13	148	5	23819	121	555	17	1415	10	400	6
3	7/17/2019	6:25:37	B-124 R1	B	124	R1	Sample	B-124-R1	PPM	8	2	0	319	111	14	7579	42	26491	132	417	16	53	2	211	6
4	7/17/2019	6:32:32	B-059 R2	B	59	R2	Sample	B-059-R2	PPM	6	1	0	284	37	10	2135	16	24591	116	458	14	30	2	113	3
5	7/17/2019	6:41:06	B-048 R1	B	48	R1	Sample	B-048-R1	PPM	0	13	0	321	36	12	2240	18	19662	101	299	13	28	2	94	3
6	7/17/2019	6:45:47	B-039 R1	B	39	R1	Sample	B-039-R1	PPM	3	1	0	336	37	12	179	5	11124	68	145	11	9	1	43	2
7	7/17/2019	6:51:34	B-040 R2	B	40	R2	Sample	B-040-R2	PPM	4	1	0	320	40	12	131	4	24302	122	371	15	11	1	61	2
8	7/17/2019	6:56:38	B-029 R1	B	29	R1	Sample	B-029-R1	PPM	4	1	0	311	0	41	1738	15	22071	110	517	16	26	2	92	3
1	7/18/2019	6:27:05	Blank				Blank	Blank	PPM	0	7	0	336	0	32	7	2	33	6	0	219	0	36	0	8
2	7/18/2019	6:29:12	Nist2711a				Nist2711a	Nist2711a	PPM	77	6	51	7	0	45	157	5	23794	121	551	17	1402	10	402	6
3	7/18/2019	6:37:06	B-060 R1	B	60	R1	Sample	B-060-R1	PPM	0	13	0	416	0	50	279	7	15731	101	395	18	14	2	48	3
4	7/18/2019	6:53:35	B-073 R1	B	73	R1	Sample	B-073-R1	PPM	4	1	0	334	59	13	2830	22	26808	136	495	17	33	2	157	4
5	7/18/2019	7:17:41	Precision				Precision	Precision	PPM	4	1	0	303	0	38	1864	16	14778	83	268	12	23	2	102	3
6	7/18/2019	7:19:37	Precision				Precision	Precision	PPM	0	12	0	300	0	38	1859	16	14613	89	296	13	24	2	104	3
7	7/18/2019	7:20:26	Precision				Precision	Precision	PPM	3	1	0	302	0	39	1840	16	14666	89	271	12	24	2	111	3
8	7/18/2019	7:21:09	Precision				Precision	Precision	PPM	4	1	0	302	0	37	1867	16	14608	82	266	12	25	2	104	3
9	7/18/2019	7:21:54	Precision				Precision	Precision	PPM	0	12	0	302	0	38	1819	15	14667	82	266	12	25	2	109	3
10	7/18/2019	7:22:42	Precision				Precision	Precision	PPM	0	12	0	301	0	38	1839	16	14676	89	289	13	28	2	106	3
11	7/18/2019	7:23:37	Precision				Precision	Precision	PPM	3	1	0	299	0	37	1826	15	14523	81	262	12	25	2	100	3
12	7/18/2019	11:11:56	B-256 R1	B	256	R1	Sample	B-256-R1	PPM	0	13	0	283	0	39	2473	18	26156	121	482	14	41	2	166	4
13	7/18/2019	12:08:48	B-159 R1	B	159	R1	Sample	B-159-R1	PPM	7	1	0	296	75	11	3545	23	20876	103	459	14	47	2	136	4
14	7/18/2019	12:43:08	BX-071 R1	BX	71	R1	Sample	BX-071-R1	PPM	8	1	0	292	69	11	3389	22	20579	101	308	12	23	2	69	3
1	7/19/2019	6:05:30	Blank				Blank	Blank	PPM	0	7	0	331	0	31	0	14	0	20	0	216	0	34	0	8
2	7/19/2019	6:06:43	Nist2711a				Nist2711a	Nist2711a	PPM	84	6	42	7	0	45	150	5	20698	116	484	15	1354	11	390	6
3	7/19/2019	6:07:21	Nist2711a				Nist2711a	Nist2711a	PPM	96	7	54	7	0	46	174	5	24327	124	589	18	1419	11	411	6
4	7/19/2019	6:09:11	B-030 R1	B	30	R1	Sample	B-030-R1	PPM	0	11	0	337	0	42	138	5	17150	94	344	15	10	1	49	2
5	7/19/2019	6:22:48	B-088 R1	B	88	R1	Sample	B-088-R1	PPM	4	1	0	294	0	41	134	4	26787	127	449	14	13	1	67	2
6	7/19/2019	6:30:48	B-124 R2	B	124	R2	Sample	B-124-R2	PPM	9	1	0	333	68	14	5090	33	25708	135	396	16	36	2	208	5
7	7/19/2019	6:43:35	B-061 R1	B	61	R1	Sample	B-061-R1	PPM	6	1	0	307	58	12	4729	29	25703	125	396	15	41	2	165	5
8	7/19/2019	6:52:55	Precision				Precision	Precision	PPM	0	14	0	311	38	11	4513	31	22946	131	373	14	40	2	158	4
9	7/19/2019	6:57:13	Precision				Precision	Precision	PPM	5	1	0	311	50	12	4506	31	23021	131	370	14	40	2	148	4
10	7/19/2019	6:57:54	Precision				Precision	Precision	PPM	6	1	0	306	50	12	4467	29	22703	118	354	14	40	2	154	4
11	7/19/2019	6:58:38	Precision				Precision	Precision	PPM	5	1	0	310	42	11	4526	29	22903	120	372	14	41	2	158	4
12	7/19/2019	6:59:23	Precision				Precision	Precision	PPM	6	1	0	308	68	12	4526	29	22768	119	371	14	40	2	157	4
13	7/19/2019	7:00:51	Precision				Precision	Precision	PPM	5	1	0	306	58	12	4461	28	22685	118	372	14	39	2	155	4
14	7/19/2019	7:01:58	Precision				Precision	Precision	PPM	7	1	0	309	44	11	4459	29	22729	119	344	14	37	2	155	4
15	7/19/2019	7:02:40	Precision				Precision	Precision	PPM	7	1	0	307	0	42	4526	29	22841	119	376	14	36	2	156	4
16	7/19/2019	7:26:10	B-124 R3	B	124	R3	Sample	B-124-R3	PPM	5	2	0	365	101	15	5356	36	25947	146	343	16	45	2	172	5
17	7/19/2019	7:52:43	B-124 R4	B	124	R4	Sample	B-124-R4	PPM	8	1	0	304	378	17	8089	43	25827	126	317	14	53	2	194	5
18	7/19/2019	14:02:21	B-061 R2	B	61	R2	Sample	B-061-R2	PPM	0	11	0	346	52	13	889	11	13272	77	296	14	12	1	67	3
19	7/19/2019	14:15:06	B-124 R5	B	124	R5	Sample	B-124-R5	PPM	4	1	0	324	49	12	755	10	19218	99	389	15	15	1	69	3
20	7/19/2019	14:18:09	Precision				Precision	Precision	PPM	3	1	0	324	63	13	763	10	19001	98	363	15	16	1	64	3
21	7/19/2019	14:19:07	Precision				Precision	Precision	PPM	0	11	0	326	39	12	742	9	19290	99	371	15	16	1	69	3
22	7/19/2019	14:20:52	Precision				Precision	Precision	PPM	0	11	0	324	45	12	757	10	19110	98	359	14	14	1	64	3
23	7/19/2019	14:22:50	Precision				Precision	Precision	PPM	4	1	0	327	47	13	763	10	19221	99	371	15	14	1	67	3
24	7/19/2019	14:24:06	Precision				Precision	Precision	PPM	0	11	0	325	49	12	749	10	19213	99	378	15	16	1	65	3
25	7/19/2019	14:26:10	Precision				Precision	Precision	PPM	3	1	0	323	52	13	759	10	19041	98	346	14	16	1	64	3
26	7/19/2019	14:27:23	Precision				Precision	Precision	PPM	0	11	0	326	66	13	762	10	19145	99	341	14	17	1	64	3
27	7/19/2019	14:30:05	Blank				Blank	Blank	PPM	0	7	0	333	0	33	0	14	19	5	0	221	0	35	0	8
28	7/19/2019	14:31:24	Nist2711a				Nist2711a	Nist2711a	PPM	74	6	47	7	0	44	156	5	23648	118	579	17	1394	10	405	6
1	7/20/2019	12:03:27	Blank				Blank	Blank	PPM	0	8	0	355	0	34	8	2	28	6	0	241	0	36	0	9
2	7/20/2019	12:04:31	Nist2711a				Nist2711a	Nist2711a	PPM	92	6	50	7	0	44	161	5	24363	133	613	18	1428	11	411	6
3	7/20/2019	12:10:58	B-087 R1	B	87	R1	Sample	B-087-R1	PPM	4	1	0	326	0	44	81	4	21643	112	343	14	11	1	53	2
4	7/20/2019	12:37:45	B-315 R1	B	315	R1	Sample	B-315-R1	PPM	7	1	0	297	0	45	827	10	35249	170	435	15	45	2	131	4
5	7/20/2019	12:43:16	Precision				Precision	Precision	PPM	6	1	0	291	57	10	2912	21	17565	100	290	12	22	2	87	3
6	7/20/2019	12:44:01	Precision				Precision	Precision	PPM	0	12	0	290	60	10	2944	21	17621	101	283	12	27	2	93	3
7	7/20/2019	12:44:45	Precision				Precision	Precision	PPM	3	1	0	289	66	11	2898	21	17578	100	300	12	25	2	90	3
8	7/20/2019	12:45:43	Precision				Precision	Precision	PPM	3	1	0	288	58	10	2894	21	17474	99	293	12	25	2	88	3
9	7/20/2019	12:46:27	Precision				Precision	Precision	PPM	4	1	0	287	60	10	2903	21	17420	99	280	12	23	2	89	3
10	7/20/2019	12:47:15	Precision				Precision	Precision	PPM	0	12	0	287	65	10	2889	21	17416	99	299	12	25	2	82	3

Table B1 XRF Data

Reading #	Date	Time	Old Sample ID	Prefix	Grid #	Suffix	Sample Type	Sample ID	Units	As Conc.	As Error1s	Cd Conc.	Cd Error1s	Cr Conc.	Cr Error1s	Cu Conc.	Cu Error1s	Fe Conc.	Fe Error1s	Mn Conc.	Mn Error1s	Pb Conc.	Pb Error1s	Zn Conc.	Zn Error1s
11	7/20/2019	12:48:06	Precision				Precision	Precision	PPM	3	1	0	286	53	10	2874	21	17387	99	282	12	24	2	86	3
12	7/20/2019	12:49:09	Precision				Precision	Precision	PPM	5	1	0	287	51	10	2909	21	17399	98	265	11	22	2	91	3
13	7/20/2019	12:49:55	Precision				Precision	Precision	PPM	4	1	0	286	60	10	2912	20	17290	90	281	11	22	2	79	3
14	7/20/2019	12:50:38	Precision				Precision	Precision	PPM	6	1	0	287	78	11	2912	21	17406	98	294	12	20	1	88	3
15	7/20/2019	12:51:29	Precision				Precision	Precision	PPM	3	1	0	287	44	10	2895	21	17485	99	314	12	24	2	86	3
1	7/23/2019	9:50:33	Blank				Blank	Blank	PPM	0	7	0	335	0	32	7	2	0	21	0	219	0	35	0	9
2	7/23/2019	9:51:53	Nist2711a				Nist2711a	Nist2711a	PPM	90	6	39	7	0	47	166	5	24043	122	552	17	1411	10	404	6
3	7/23/2019	9:56:52	B-105 R1	B	105	R1	Sample	B-105-R1	PPM	4	1	0	356	0	47	565	9	22462	122	438	17	14	2	90	3
4	7/23/2019	10:06:02	Precision				Precision	Precision	PPM	4	1	0	318	0	40	549	8	17932	96	330	14	11	1	83	3
5	7/23/2019	10:07:29	Precision				Precision	Precision	PPM	0	11	0	316	0	41	552	8	17727	102	346	14	15	1	71	3
6	7/23/2019	10:08:22	Precision				Precision	Precision	PPM	0	11	0	320	0	41	554	8	17934	96	341	14	14	1	73	3
7	7/23/2019	10:09:49	Precision				Precision	Precision	PPM	0	11	0	319	0	41	541	8	17814	96	321	14	13	1	76	3
8	7/23/2019	10:10:33	Precision				Precision	Precision	PPM	0	10	0	315	46	12	552	8	17713	102	331	14	13	1	78	3
9	7/23/2019	10:11:14	Precision				Precision	Precision	PPM	0	11	0	317	37	12	545	8	17870	96	345	14	14	1	76	3
10	7/23/2019	10:12:37	Precision				Precision	Precision	PPM	0	11	0	320	0	41	557	8	17810	103	327	14	14	1	76	3
11	7/23/2019	10:13:20	Precision				Precision	Precision	PPM	0	10	0	317	0	41	551	8	17815	96	343	14	13	1	72	3
12	7/23/2019	10:14:04	Precision				Precision	Precision	PPM	0	11	0	318	59	12	556	8	17716	95	325	14	15	1	70	3
13	7/23/2019	10:14:54	Precision				Precision	Precision	PPM	4	1	0	316	0	41	549	8	17684	95	305	13	13	1	77	3
3	7/29/2019	10:47:57	Smelter Brick				Brick	Smelter Brick	PPM	35	2	0	340	94	14	868	11	16335	110	277	14	159	3	234	5
4	7/29/2019	10:49:08	Smelter Brick				Brick	Smelter Brick	PPM	13	3	0	768	0	90	350	14	6814	106	92	22	65	5	158	8
5	7/29/2019	10:50:07	Smelter Brick				Brick	Smelter Brick	PPM	10	2	0	368	0	50	953	12	9326	69	93	11	71	2	137	4
6	7/29/2019	10:51:13	Smelter Brick				Brick	Smelter Brick	PPM	18	2	0	304	95	13	1904	16	10447	69	281	13	98	3	372	5
7	7/29/2019	10:52:54	Smelter Brick				Brick	Smelter Brick	PPM	67	3	0	301	82	12	6511	39	12039	76	228	12	304	4	586	7
8	7/29/2019	10:53:59	Smelter Brick				Brick	Smelter Brick	PPM	36	2	0	301	111	13	5525	35	12724	80	192	11	171	3	377	6
9	7/29/2019	10:54:50	Smelter Brick				Brick	Smelter Brick	PPM	17	2	0	320	159	15	3782	27	11860	78	159	12	138	3	277	5
10	7/29/2019	10:55:54	Smelter Brick				Brick	Smelter Brick	PPM	79	3	0	322	113	14	4557	31	16568	103	298	14	325	5	656	8
11	7/29/2019	10:56:46	Smelter Brick				Brick	Smelter Brick	PPM	23	2	0	337	63	13	547	9	15190	99	295	14	156	3	588	8
12	7/29/2019	10:57:53	Smelter Brick				Brick	Smelter Brick	PPM	30	2	0	325	189	15	1861	16	10892	70	169	12	160	3	254	5

Notes: Conc. = Concentration

Highlighted cells indicate exceedance of the deicsion criterion for copper

APPENDIX B-2

Cumulative XRF Data by Grid Node

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
6/27/2019	14:03	B-001 R1	6746	37	26635	127	SK	None
7/1/2019	9:04	B-001 R2	5647	32	25350	122	YM	None
7/2/2019	9:04	B-001 R3	11758	37	35486	104	YM	None
7/2/2019	12:11	B-001 R4	907	10	14942	83	YM	None
6/27/2019	14:07	B-002 R1	18211	88	34997	169	SK	None
7/1/2019	8:15	B-002 R2	333	6	28110	129	YM	None
7/1/2019	8:25	B-003 R1	1571	14	25469	119	YM	None
6/27/2019	13:58	B-004 R1	14445	67	30769	142	SK	None
7/1/2019	9:00	B-004 R2	1301	13	21333	109	YM	None
6/27/2019	14:05	B-005 R1	31567	147	43567	206	SK	None
7/1/2019	8:11	B-005 R2	4922	29	29145	134	YM	None
7/2/2019	9:44	B-005 R3	508	7	20066	99	YM	None
7/1/2019	8:31	B-006 R1	2111	17	29007	140	YM	None
6/27/2019	14:01	B-007 R1	11253	58	29697	145	SK	None
7/1/2019	8:51	B-007 R2	204	5	23114	117	YM	None
6/27/2019	13:53	B-008 R1	16506	79	22577	116	SK	None
7/1/2019	8:56	B-008 R2	15429	73	30963	149	YM	None
7/2/2019	8:56	B-008 R3	1912	9	27896	80	YM	None
6/27/2019	13:49	B-009 R1	16958	80	37267	173	SK	None
7/1/2019	8:06	B-009 R2	5249	31	28839	135	YM	None
7/2/2019	9:58	B-009 R3	22265	108	41350	200	YM	None
7/2/2019	10:49	B-009 R4	237	3	18321	55	YM	None
7/1/2019	8:36	B-010 R1	8148	43	27891	134	YM	None
7/2/2019	10:04	B-010 R2	8888	28	35053	100	YM	None
7/2/2019	10:54	B-010 R3	3886	15	20132	64	YM	None
n/s		B-011						Outside project boundary
6/27/2019	14:00	B-012 R1	1564	13	17679	88	SK	None
6/27/2019	14:10	B-013 R1	2400	18	27442	130	SK	None
7/1/2019	7:56	B-014 R1	3047	21	23203	113	YM	None
7/1/2019	8:40	B-015 R1	2182	17	27328	132	YM	None
7/16/2019	11:57	B-016 R1	186	5	34795	168	YM	5-acre area
n/s		B-017						Outside project boundary
6/27/2019	13:56	B-018 R1	3036	21	29726	137	SK	None
6/27/2019	14:08	B-019 R1	8212	43	31494	144	SK	None
6/28/2019	13:17	B-019 R2	4388	26	25154	118	SK	None
7/1/2019	7:51	B-020 R1	7162	39	34229	160	YM	None
7/2/2019	10:12	B-020 R2	316	6	28730	129	YM	None
7/16/2019	8:20	B-021 R1	60	3	16867	87	YM	5-acre area
7/16/2019	12:03	B-022 R1	701	9	31858	150	YM	5-acre area
n/s		B-023 R1						Outside project boundary
6/28/2019	13:13	B-024 R1	1544	14	19632	100	SK	None
6/27/2019	13:55	B-025 R1	267	6	8681	60	SK	None
6/27/2019	13:51	B-026 R1	241	6	32762	151	SK	None
7/16/2019	8:10	B-027 R1	476	8	17688	94	YM	5-acre area
7/16/2019	8:17	B-028 R1	5953	35	22334	118	YM	5-acre area

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
7/16/2019	9:04	B-028 R2	62	3	22660	115	YM	5-acre area
7/17/2019	6:56	B-029 R1	1738	15	22071	110	YM	5-acre area
7/19/2019	6:09	B-030 R1	138	5	17150	94	YM	5-acre area
7/15/2019	11:50	B-031 R1	3842	24	25177	119	YM	5-acre area
6/28/2019	13:06	B-032 R1	1145	12	21530	106	SK	None
6/28/2019	13:01	B-033 R1	190	5	16198	85	SK	None
6/28/2019	13:12	B-034 R1	2115	17	26171	124	SK	None
7/15/2019	16:02	B-035 R1	1880	15	27433	127	YM	5-acre area
7/15/2019	16:13	B-036 R1	4940	29	28384	130	YM	5-acre area
7/15/2019	17:05	B-036 R2	694	9	23657	114	YM	5-acre area
7/15/2019	17:09	B-037 R1	1777	16	26800	132	YM	5-acre area
7/16/2019	9:10	B-038 R1	1593	15	30578	150	YM	5-acre area
7/17/2019	6:45	B-039 R1	179	5	11124	68	YM	5-acre area
7/15/2019	12:01	B-040 R1	6620	38	27162	136	YM	5-acre area
7/17/2019	6:51	B-040 R2	131	4	24302	122	YM	5-acre area
n/s		B-041						Outside project boundary
6/28/2019	13:16	B-042 R1	4203	26	25701	123	SK	None
6/28/2019	13:14	B-043 R1	3649	23	22288	108	SK	None
7/1/2019	9:29	B-044 R1	2556	18	21321	104	YM	None
7/15/2019	16:06	B-045 R1	10829	59	24919	134	YM	5-acre area
7/15/2019	17:20	B-045 R2	2498	19	25124	120	YM	5-acre area
7/15/2019	16:10	B-046 R1	5688	32	27710	128	YM	5-acre area
7/15/2019	17:16	B-046 R2	1549	14	30349	138	YM	5-acre area
7/15/2019	17:12	B-047 R1	1526	14	29413	142	YM	5-acre area
7/17/2019	6:41	B-048 R1	2240	18	19662	101	YM	5-acre area
7/15/2019	12:08	B-049 R1	4376	29	21760	116	YM	5-acre area
7/10/2019	7:10	B-050 R1	12525	60	32583	150	YM	5-acre area
7/10/2019	11:24	B-050 R2	3648	24	22980	115	YM	5-acre area
7/10/2019	7:06	B-051 R1	1179	12	28661	132	YM	5-acre area
6/15/2019	10:16	B-052 R1	1144	8	19326	63	YM	None
7/9/2019	8:41	B-053 R1	7215	37	29534	133	YM	None
7/9/2019	9:16	B-053 R2	703	9	27198	126	YM	None
n/s		B-054						Outside project boundary
n/s		B-055						Outside project boundary
n/s		B-056						Outside project boundary
n/s		B-057						Outside project boundary
n/s		B-058						Outside project boundary
7/15/2019	16:19	B-059 R1	6693	41	29645	158	YM	5-acre area
7/17/2019	6:32	B-059 R2	2135	16	24591	116	YM	5-acre area
7/18/2019	6:37	B-060 R1	279	7	15731	101	YM	5-acre area
7/19/2019	6:43	B-061 R1	4729	29	25703	125	YM	5-acre area
7/19/2019	14:02	B-061 R2	889	11	13272	77	YM	5-acre area
7/15/2019	12:17	B-062 R1	4824	30	22189	116	YM	5-acre area
7/16/2019	9:17	B-062 R2	1162	12	22707	110	YM	5-acre area
7/10/2019	7:14	B-063 R1	2559	20	25113	125	YM	5-acre area

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
7/10/2019	7:02	B-064 R1	2111	18	25914	132	YM	5-acre area
6/15/2019	10:11	B-065 R1	3795	14	23987	68	YM	None
n/s		B-066						Outside project boundary
n/s		B-067						C&D
n/s		B-068						C&D
n/s		B-069						C&D
n/s		B-070						C&D
n/s		B-071						C&D
n/s		B-072						C&D Steep slope E. edge
7/18/2019	6:53	B-073 R1	2830	22	26808	136	YM	5-acre area
7/16/2019	9:21	B-074 R1	5552	35	26531	138	YM	5-acre area
7/16/2019	10:36	B-074 R2	4409	30	26728	139	YM	5-acre area
7/15/2019	15:25	B-075 R1	2578	20	20363	106	YM	5-acre area
7/10/2019	6:47	B-076 R1	6373	37	22891	118	YM	5-acre area
7/10/2019	11:18	B-076 R2	578	10	19742	119	YM	5-acre area
7/10/2019	6:57	B-077 R1	3757	26	30877	149	YM	5-acre area
7/10/2019	13:27	B-078 R1	436	7	22118	107	YM	5-acre area
6/15/2019	10:05	B-079 R1	5537	18	24320	66	YM	None
6/17/2019	16:41	B-079 R2	11598	42	28144	100	YM	None
6/18/2019	10:47	B-079 R3	6021	20	34328	91	YM	None
6/18/2019	10:54	B-079 R4	3646	13	29299	76	YM	None
6/15/2019	9:58	B-080 R1	10511	30	24445	68	YM	None
6/17/2019	16:36	B-080 R2	9990	29	26672	74	YM	None
6/18/2019	11:00	B-080 R3	3896	15	28496	81	YM	None
n/s		B-081						C&D
n/s		B-082						C&D
n/s		B-083						C&D
n/s		B-084						C&D
n/s		B-085						C&D Steep slope E. edge
7/15/2019	14:50	B-086 R1	4348	28	24563	126	YM	5-acre area
7/20/2019	12:10	B-087 R1	81	4	21643	112	YM	5-acre area
7/19/2019	6:22	B-088 R1	134	4	26787	127	YM	5-acre area
7/10/2019	13:35	B-089 R1	666	10	24277	125	YM	5-acre area
7/10/2019	7:25	B-090 R1	12642	63	36328	170	YM	5-acre area
7/10/2019	11:13	B-090 R2	999	11	27205	133	YM	5-acre area
7/10/2019	7:21	B-091 R1	1851	16	25272	124	YM	5-acre area
7/2/2019	14:35	B-092 R1	35	2	27842	78	YM	None
7/2/2019	14:30	B-093 R1	53	2	31547	98	YM	None
7/2/2019	14:25	B-094 R1	48	2	23506	63	YM	None
n/s		B-095						Rip rap slope
n/s		B-096						Rip rap slope
6/15/2019	9:42	B-097 R1	6950	21	29784	79	YM	None
6/17/2019	16:16	B-097 R2	5672	19	26540	72	YM	None
6/18/2019	11:17	B-097 R3	3092	13	25176	75	YM	None
6/15/2019	9:47	B-098 R1	6775	22	26567	76	YM	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
6/17/2019	16:22	B-098 R2	7368	26	27649	89	YM	None
6/18/2019	11:11	B-098 R3	2680	12	34095	105	YM	None
6/15/2019	9:52	B-099 R1	9597	28	30652	82	YM	None
6/17/2019	16:30	B-099 R2	6794	24	30447	90	YM	None
6/18/2019	11:06	B-099 R3	2750	12	22858	72	YM	None
n/s		B-100						C&D
n/s		B-101						C&D
n/s		B-102						C&D
n/s		B-103						C&D Steep slope E. edge
n/s		B-104						C&D Steep slope E. edge
7/23/2019	9:56	B-105 R1	565	9	22462	122	YM	5-acre area
7/10/2019	6:30	B-106 R1	7891	45	31226	158	YM	5-acre area
7/10/2019	8:15	B-106 R2	7832	45	31986	164	YM	5-acre area
7/10/2019	9:46	B-106 R3	7720	40	29499	136	YM	5-acre area
7/10/2019	12:43	B-106 R4	542	8	18442	98	YM	5-acre area
7/11/2019	13:03	B-107 R1	174	5	27810	129	YM	5-acre area
7/10/2019	7:35	B-108 R1	5247	31	30188	143	YM	5-acre area
7/10/2019	13:12	B-108 R2	6140	35	38950	176	YM	5-acre area
7/10/2019	17:45	B-108 R3	7122	38	29192	135	YM	5-acre area
7/11/2019	13:01	B-108 R4	5042	30	26669	129	YM	5-acre area
7/11/2019	13:37	B-108 R5	6281	36	27918	138	YM	5-acre area
7/11/2019	14:31	B-108 R6	5283	31	22332	110	YM	5-acre area
7/12/2019	7:30	B-108 R7	2483	19	39344	178	YM	5-acre area
7/10/2019	11:37	B-109 R1	2181	17	20618	105	YM	5-acre area
6/26/2019	11:58	B-110 R1	6380	37	47242	215	SK	None
6/27/2019	12:55	B-110 R2	408	7	30242	140	SK	None
n/s		B-111						Rip rap slope
n/s		B-112						Rip rap slope
n/s		B-113						Rip rap slope
n/s		B-114						Rip rap slope
6/26/2019	12:43	B-115 R1	777	10	37613	178	SK	None
6/15/2019	9:34	B-116 R1	4857	16	29394	78	YM	None
6/18/2019	11:39	B-116 R2	4869	18	30928	92	YM	None
6/18/2019	11:44	B-116 R3	19853	63	31754	102	YM	None
6/18/2019	11:50	B-116 R4	392	4	9736	35	YM	None
6/15/2019	9:27	B-117 R1	529	5	32935	99	YM	None
6/15/2019	9:21	B-118 R1	10442	32	30035	87	YM	None
6/18/2019	12:33	B-118 R2	5080	20	26183	90	YM	None
6/18/2019	14:09	B-118 R3	4679	17	23748	69	YM	None
6/18/2019	14:12	B-118 R4	4140	16	31094	95	YM	None
n/s		B-119						Outside project boundary
n/s		B-120						Outside project boundary
n/s		B-121						Outside project boundary
n/s		B-122						Outside project boundary
7/15/2019	15:10	B-123 R1	11356	60	36339	177	YM	5-acre area

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
7/16/2019	8:01	B-123 R2	4216	27	25075	125	YM	5-acre area
7/17/2019	6:25	B-124 R1	7579	42	26491	132	YM	5-acre area
7/19/2019	6:30	B-124 R2	5090	33	25708	135	YM	5-acre area
7/19/2019	7:26	B-124 R3	5356	36	25947	146	YM	5-acre area
7/19/2019	7:52	B-124 R4	8089	43	25827	126	YM	5-acre area
7/19/2019	14:15	B-124 R5	755	10	19218	99	YM	5-acre area
7/10/2019	6:40	B-125 R1	3396	23	26923	132	YM	5-acre area
7/9/2019	14:36	B-126 R1	7263	41	30981	152	YM	5-acre area
7/10/2019	12:55	B-126 R2	70	4	15236	86	YM	5-acre area
7/10/2019	6:24	B-127 R1	8051	42	30943	143	YM	5-acre area
7/10/2019	17:04	B-127 R2	14202	71	37444	179	YM	5-acre area
7/10/2019	17:40	B-127 R3	447	8	11357	74	YM	5-acre area
7/10/2019	7:40	B-128 R1	9462	48	31701	146	YM	5-acre area
7/10/2019	10:11	B-128 R2	7480	40	30254	142	YM	5-acre area
7/10/2019	11:40	B-128 R3	134	5	16943	92	YM	5-acre area
7/10/2019	13:00	B-129 R1	16050	78	30275	147	YM	5-acre area
7/10/2019	16:57	B-129 R2	25821	122	27143	137	YM	5-acre area
7/10/2019	17:17	B-129 R3	98	4	6509	50	YM	5-acre area
7/9/2019	16:17	B-130 R1	10996	57	44067	204	YM	5-acre area
7/10/2019	10:57	B-130 R2	27771	139	51211	252	YM	5-acre area
7/10/2019	16:47	B-130 R3	7116	40	28762	140	YM	5-acre area
7/10/2019	16:50	B-130 R4	4569	27	27699	128	YM	5-acre area
7/10/2019	17:28	B-130 R5	4648	28	25809	124	YM	5-acre area
7/10/2019	17:31	B-130 R6	7052	39	22802	116	YM	5-acre area
7/11/2019	8:18	B-130 R7	3539	24	23726	119	YM	5-acre area
n/s		B-131						Pipeline
6/26/2019	12:03	B-132 R1	7826	41	31249	142	SK	None
6/27/2019	12:58	B-132 R2	7824	41	31500	144	SK	None
6/28/2019	13:09	B-132 R3	2961	20	27472	128	SK	None
6/26/2019	11:51	B-133 R1	1976	16	34019	155	SK	None
6/26/2019	12:21	B-134 R1	4762	28	33270	150	SK	None
6/27/2019	12:56	B-134 R2	5288	31	35074	160	SK	None
6/28/2019	13:07	B-134 R3	3717	23	30045	136	SK	None
6/26/2019	12:39	B-135 R1	4080	26	34072	162	SK	None
6/26/2019	12:46	B-136 R1	860	10	44212	196	SK	None
6/26/2019	12:41	B-137 R1	791	10	37577	169	SK	None
6/26/2019	12:11	B-138 R1	1003	11	38930	177	SK	None
6/15/2019	8:47	B-139 R1	2146	11	26998	82	YM	None
6/15/2019	8:53	B-140 R1	4080	15	29172	82	YM	None
6/15/2019	8:59	B-141 R1	1918	9	26591	72	YM	None
6/15/2019	9:04	B-142 R1	5374	18	30456	82	YM	None
6/18/2019	12:02	B-142 R2	6765	23	28993	88	YM	None
6/18/2019	12:18	B-142 R3	7185	25	32616	103	YM	None
6/18/2019	12:23	B-142 R4	2582	12	25297	84	YM	None
n/s		B-143						C&D

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
n/s		B-144						C&D
7/15/2019	15:00	B-145 R1	6487	41	19729	116	YM	5-acre area
7/15/2019	16:49	B-145 R2	6248	36	18459	100	YM	5-acre area
7/16/2019	10:26	B-145 R3	2386	23	17670	119	YM	5-acre area
7/15/2019	15:04	B-146 R1	602	9	17827	100	YM	5-acre area
7/15/2019	11:14	B-147 R1	2874	21	19109	99	YM	5-acre area
7/9/2019	14:31	B-148 R1	8846	47	31917	152	YM	5-acre area
7/10/2019	6:35	B-148 R2	2527	21	24934	132	YM	5-acre area
7/9/2019	14:38	B-149 R1	6238	36	27188	133	YM	5-acre area
7/10/2019	8:08	B-149 R2	5993	35	26563	131	YM	5-acre area
7/10/2019	9:52	B-149 R3	11740	60	42799	198	YM	5-acre area
7/10/2019	11:46	B-149 R4	97	4	12093	81	YM	5-acre area
7/10/2019	7:51	B-150 R1	8852	46	32869	153	YM	5-acre area
7/10/2019	10:02	B-150 R2	1999	17	28621	138	YM	5-acre area
7/10/2019	7:48	B-151 R1	6849	41	32826	167	YM	5-acre area
7/10/2019	10:07	B-151 R2	1579	14	14608	82	YM	5-acre area
7/10/2019	8:03	B-152 R1	2473	19	31815	152	YM	5-acre area
7/9/2019	16:08	B-153 R1	2614	20	31484	153	YM	5-acre area
7/9/2019	15:56	B-154 R1	1910	16	25719	124	YM	5-acre area
7/9/2019	15:51	B-155 R1	995	11	22315	112	YM	5-acre area
7/9/2019	15:46	B-156 R1	1362	13	18789	95	YM	5-acre area
6/26/2019	12:25	B-157 R1	398	7	20819	104	SK	None
6/26/2019	12:01	B-158 R1	356	6	19016	90	SK	None
7/18/2019	12:08	B-159 R1	3545	23	20876	103	YM	None
n/s		B-160						Pipeline
7/4/2019	9:14	B-161 R1	2238	10	27236	74	YM	None
6/26/2019	12:10	B-162 R1	3371	23	31374	154	SK	None
6/26/2019	12:13	B-163 R1	2299	17	30480	134	SK	None
6/26/2019	12:35	B-164 R1	3435	22	29376	133	SK	None
n/s		B-165						Arch structure
6/15/2019	7:05	B-166 R1	1221	7	22650	66	YM	None
6/15/2019	7:10	B-167 R1	1317	7	25626	72	YM	None
6/15/2019	7:17	B-168 R1	934	6	23142	66	YM	None
6/15/2019	7:23	B-169 R1	4615	18	30021	97	YM	None
6/20/2019	8:40	B-169 R2	1949	16	28157	130	YM	None
6/20/2019	8:50	B-170 R1	7550	51	29693	180	YM	None
6/20/2019	11:30	B-170 R2	7479	41	33383	161	YM	None
6/20/2019	16:14	B-170 R3	10595	53	32130	152	YM	None
6/20/2019	16:16	B-170 R4	220	5	26189	136	YM	None
n/s		B-171						C&D
n/s		B-172						C&D
n/s		B-173						C&D
7/15/2019	11:22	B-174 R1	5649	34	23812	120	YM	5-acre area
7/15/2019	16:45	B-174 R2	179	5	6362	52	YM	5-acre area
7/15/2019	11:19	B-175 R1	12687	67	37508	187	YM	5-acre area

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
7/15/2019	16:55	B-175 R2	9240	48	27814	135	YM	5-acre area
7/16/2019	7:54	B-175 R3	3624	24	20322	104	YM	5-acre area
7/15/2019	11:10	B-176 R1	604	9	19051	101	YM	5-acre area
7/9/2019	14:27	B-177 R1	1514	16	17635	105	YM	5-acre area
7/9/2019	14:42	B-178 R1	1382	14	16477	90	YM	5-acre area
7/9/2019	15:24	B-179 R1	8218	43	26171	127	YM	5-acre area
7/10/2019	9:27	B-179 R2	2641	19	26930	128	YM	5-acre area
7/9/2019	15:20	B-180 R1	11398	57	31774	150	YM	5-acre area
7/10/2019	9:23	B-180 R2	2056	17	26896	129	YM	5-acre area
7/9/2019	15:30	B-181 R1	11598	57	36787	169	YM	5-acre area
7/11/2019	8:51	B-181 R2	5846	36	35338	174	YM	5-acre area
7/11/2019	10:12	B-181 R3	319	6	27803	124	YM	5-acre area
7/9/2019	15:33	B-182 R1	7606	42	37277	171	YM	5-acre area
7/10/2019	8:24	B-182 R2	2026	16	26234	121	YM	5-acre area
7/9/2019	15:36	B-183 R1	6995	37	34027	153	YM	5-acre area
7/10/2019	8:30	B-183 R2	2655	19	28468	133	YM	5-acre area
7/9/2019	15:40	B-184 R1	13709	75	41449	210	YM	5-acre area
7/10/2019	8:38	B-184 R2	6424	35	26848	126	YM	5-acre area
7/10/2019	16:40	B-184 R3	1702	15	18778	97	YM	5-acre area
6/26/2019	12:30	B-185 R1	1073	11	20206	103	SK	None
6/24/2019	11:50	B-186 R1	2708	11	18925	55	YM	None
6/21/2019	11:57	B-187 R1	1661	9	34869	96	YM	None
6/24/2019	11:24	B-188 R1	608	5	20343	60	YM	None
6/24/2019	11:19	B-189 R1	691	5	23081	65	YM	None
6/25/2019	11:03	B-190 R1	2528	19	26923	128	SK	None
6/25/2019	11:01	B-191 R1	2087	16	23430	113	SK	None
n/s		B-192						Pipeline
n/s		B-193						Pipeline
6/26/2019	12:28	B-194 R1	4251	28	29525	144	SK	None
6/26/2019	12:44	B-195 R1	4740	29	28060	132	SK	None
6/27/2019	12:53	B-195 R2	3244	22	29077	134	SK	None
6/14/2019	15:32	B-196 R1	164	3	17772	54	YM	None
6/14/2019	15:39	B-197 R1	702	5	15145	48	YM	None
6/14/2019	15:45	B-198 R1	1516	8	26710	72	YM	None
6/14/2019	15:52	B-199 R1	1798	9	27357	76	YM	None
6/15/2019	7:29	B-200 R1	16792	45	25649	71	YM	None
6/20/2019	8:28	B-200 R2	4369	28	24014	123	YM	None
6/20/2019	8:59	B-201 R1	26163	121	30987	152	YM	None
6/20/2019	11:23	B-201 R2	25046	114	32738	155	YM	None
6/20/2019	15:55	B-201 R3	272	3	32214	87	YM	None
6/20/2019	11:38	B-202 R1	11911	59	35874	167	YM	None
7/1/2019	12:17	B-202 R2	6068	34	31518	143	YM	None
7/2/2019	8:25	B-202 R3	6220	20	31782	85	YM	None
7/2/2019	10:33	B-202 R4	521	8	31347	148	YM	None
6/17/2019	14:36	B-203 R1	389	4	26973	75	YM	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
n/s		B-204						C&D
n/s		B-205						C&D
7/15/2019	11:00	B-206 R1	15901	76	38078	177	YM	5-acre area
7/15/2019	15:16	B-206 R2	3850	25	17913	94	YM	5-acre area
7/15/2019	10:56	B-207 R1	444	8	13406	88	YM	5-acre area
7/9/2019	14:24	B-208 R1	1036	12	20770	106	YM	5-acre area
7/9/2019	14:46	B-209 R1	1293	14	16204	92	YM	5-acre area
7/9/2019	15:09	B-210 R1	13220	68	26319	137	YM	5-acre area
7/11/2019	8:57	B-210 R2	4007	25	16759	90	YM	5-acre area
7/9/2019	15:06	B-211 R1	8802	46	32135	149	YM	5-acre area
7/10/2019	9:35	B-211 R2	316	7	28204	139	YM	5-acre area
7/9/2019	15:14	B-212 R1	4172	26	34949	158	YM	5-acre area
6/21/2019	16:17	B-213 R1	2140	10	25365	73	YM	None
6/26/2019	12:15	B-214 R1	825	10	22540	111	SK	None
6/21/2019	12:10	B-215 R1	4249	15	26119	71	YM	None
6/25/2019	11:48	B-216 R1	8525	43	24319	117	SK	None
6/27/2019	13:00	B-216 R2	7156	37	21081	102	SK	Swept until no soil present for R3 test
6/21/2019	11:48	B-217 R1	10160	29	19603	56	YM	None
6/21/2019	14:19	B-217 R2	31580	144	37048	175	YM	None
6/21/2019	16:37	B-217 R3	6648	20	21291	57	YM	None
6/24/2019	8:02	B-217 R4	9353	27	17250	51	YM	None
6/25/2019	11:52	B-217 R5	8263	42	18791	94	SK	None
6/27/2019	13:02	B-217 R6	8265	43	17226	90	SK	Swept until no soil present for R7 test
6/21/2019	12:03	B-218 R1	1550	8	19453	56	YM	None
6/24/2019	11:04	B-219 R1	659	5	22590	69	YM	None
6/24/2019	11:13	B-220 R1	327	4	19417	57	YM	None
6/24/2019	12:47	B-221 R1	3350	14	26744	80	YM	None
6/25/2019	11:14	B-222 R1	6313	32	18126	87	SK	None
6/26/2019	12:47	B-222 R2	1463	13	18326	89	SK	None
6/25/2019	11:05	B-223 R1	4037	27	34022	161	SK	None
n/s		B-224						Pipeline
n/s		B-225						Pipeline
6/14/2019	14:39	B-226 R1	3140	12	27510	74	YM	None
6/14/2019	14:32	B-227 R1	142	3	30398	83	YM	None
6/14/2019	13:06	B-228 R1	2318	11	29520	81	YM	None
6/14/2019	13:31	B-229 R1	1821	9	30779	84	YM	None
6/15/2019	7:34	B-230 R1	1205	7	21558	60	YM	None
6/20/2019	9:06	B-231 R1	9155	49	31176	155	YM	None
6/20/2019	11:17	B-231 R2	5341	33	29757	151	YM	None
6/20/2019	15:45	B-231 R3	156	3	27389	84	YM	None
6/20/2019	11:43	B-232 R1	422	7	25752	130	YM	None
7/1/2019	12:10	B-233 R1	5119	30	32961	147	YM	None
7/1/2019	12:12	B-233 R2	4716	27	37088	154	YM	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
7/2/2019	8:33	B-233 R3	6080	19	31255	82	YM	None
7/2/2019	10:38	B-233 R4	980	11	28235	130	YM	None
6/17/2019	14:43	B-234 R1	746	6	23179	68	YM	None
n/s		B-235						C&D
n/s		B-236						C&D
7/15/2019	10:48	B-237 R1	2263	19	25183	129	YM	5-acre area
7/15/2019	10:52	B-238 R1	2392	19	29550	139	YM	5-acre area
7/9/2019	14:19	B-239 R1	2962	21	29890	142	YM	5-acre area
7/9/2019	14:49	B-240 R1	275	6	24143	122	YM	5-acre area
7/9/2019	14:53	B-241 R1	21250	95	25334	123	YM	5-acre area
7/10/2019	13:50	B-241 R2	1430	14	18374	97	YM	5-acre area
6/21/2019	16:09	B-242 R1	1449	8	25142	71	YM	None
6/21/2019	10:47	B-243 R1	1247	7	23186	65	YM	None
6/21/2019	10:41	B-244 R1	2966	12	29390	82	YM	None
6/21/2019	10:36	B-245 R1	155	3	15010	46	YM	None
6/21/2019	10:31	B-246 R1	25200	72	52617	147	YM	None
6/21/2019	12:52	B-246 R2	22141	107	40351	194	YM	None
6/21/2019	13:55	B-246 R3	9352	48	31363	147	YM	None
6/21/2019	16:25	B-246 R4	348	4	27443	76	YM	None
6/21/2019	10:25	B-247 R1	4552	16	25978	71	YM	None
6/21/2019	12:18	B-247 R2	5393	18	26710	73	YM	None
6/21/2019	12:23	B-247 R3	5009	17	25787	70	YM	None
6/21/2019	14:02	B-247 R4	7857	43	20525	107	YM	None
6/21/2019	16:30	B-247 R5	131	2	24605	68	YM	None
6/21/2019	10:16	B-248 R1	4364	15	24344	68	YM	None
6/21/2019	10:08	B-249 R1	1114	7	25726	74	YM	None
6/24/2019	10:54	B-250 R1	2887	12	20279	60	YM	None
6/24/2019	10:46	B-251 R1	2349	11	20107	66	YM	None
6/24/2019	12:43	B-252 R1	10902	31	30258	82	YM	None
6/26/2019	12:33	B-252 R2	3304	22	22401	108	SK	None
6/25/2019	11:09	B-253 R1	2682	19	23644	111	SK	None
6/24/2019	13:43	B-254 R1	3554	13	23735	66	YM	None
6/26/2019	12:08	B-255 R1	2774	20	39223	172	SK	None
7/18/2019	11:11	B-256 R1	2473	18	26156	121	YM	None
6/14/2019	15:24	B-257 R1	838	6	30547	80	YM	None
6/14/2019	13:45	B-258 R1	136	3	15830	50	YM	None
6/14/2019	13:20	B-259 R1	798	6	27326	74	YM	None
6/14/2019	13:37	B-260 R1	1169	7	19572	56	YM	None
6/15/2019	7:40	B-261 R1	5705	19	32282	87	YM	None
6/20/2019	8:18	B-261 R2	2171	17	18448	99	YM	None
6/20/2019	9:11	B-262 R1	2083	17	34068	168	YM	None
6/20/2019	9:18	B-263 R1	1636	16	12991	85	YM	None
6/20/2019	11:55	B-264 R1	1921	16	24390	120	YM	None
6/20/2019	12:06	B-265 R1	2223	18	31182	153	YM	None
6/17/2019	14:52	B-266 R1	3845	15	33597	98	YM	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
6/17/2019	14:57	B-267 R1	106	2	29502	77	YM	None
6/20/2019	14:18	B-268 R1	214	3	21124	66	YM	None
7/15/2019	10:37	B-269 R1	4918	30	28400	136	YM	5-acre area
7/15/2019	16:39	B-269 R2	913	10	24128	115	YM	5-acre area
7/15/2019	10:26	B-270 R1	9853	56	26263	141	YM	5-acre area
7/16/2019	7:07	B-270 R2	1447	15	27115	141	YM	5-acre area
7/9/2019	14:03	B-271 R1	2751	20	21871	110	YM	5-acre area
6/21/2019	15:50	B-272 R1	1075	7	22675	80	YM	None
6/21/2019	15:56	B-273 R1	1282	8	26012	76	YM	None
6/21/2019	11:03	B-274 R1	4221	15	28895	77	YM	None
6/21/2019	10:57	B-275 R1	7866	23	33534	87	YM	None
6/21/2019	13:05	B-275 R2	4122	15	34807	95	YM	None
6/21/2019	9:54	B-276 R1	6606	23	34619	99	YM	None
6/21/2019	13:01	B-276 R2	7872	24	30864	82	YM	None
7/1/2019	16:11	B-276 R3	3277	21	28323	130	YM	None
6/21/2019	10:00	B-277 R1	4880	18	28413	81	YM	None
6/21/2019	12:57	B-277 R2	2565	19	27798	134	YM	None
6/24/2019	11:32	B-278 R1	1326	7	29221	78	YM	None
6/24/2019	10:33	B-279 R1	2213	10	24694	67	YM	None
6/24/2019	10:40	B-280 R1	2604	11	25697	71	YM	None
6/24/2019	12:39	B-281 R1	1441	7	23789	64	YM	None
6/24/2019	12:55	B-282 R1	3468	13	22629	65	YM	None
6/24/2019	13:39	B-283 R1	2818	11	29039	78	YM	None
6/25/2019	11:25	B-284 R1	2120	16	23451	112	SK	None
6/14/2019	16:22	B-285 R1	1127	7	23036	68	YM	None
6/14/2019	16:15	B-286 R1	530	5	11125	39	YM	None
6/14/2019	16:09	B-287 R1	1113	7	26484	72	YM	None
6/14/2019	16:02	B-288 R1	1089	7	27576	75	YM	None
6/15/2019	7:46	B-289 R1	973	7	28649	82	YM	None
6/15/2019	8:20	B-290 R1	2672	12	35704	97	YM	None
6/15/2019	8:13	B-291 R1	703	5	28794	78	YM	None
6/20/2019	11:59	B-292 R1	1936	17	32425	157	YM	None
6/20/2019	12:13	B-293 R1	1427	14	30925	154	YM	None
6/20/2019	14:05	B-294 R1	1377	8	31655	100	YM	None
6/20/2019	14:11	B-295 R1	2827	12	38029	100	YM	None
6/17/2019	15:07	B-296 R1	997	6	18274	55	YM	None
6/17/2019	15:15	B-297 R1	1368	8	19996	61	YM	None
6/20/2019	14:31	B-298 R1	615	5	23558	67	YM	None
6/21/2019	15:28	B-299 R1	1089	8	22885	73	YM	None
6/21/2019	15:38	B-300 R1	1023	7	26008	74	YM	None
6/21/2019	15:45	B-301 R1	1035	7	22945	68	YM	None
6/21/2019	9:33	B-302 R1	1314	8	24786	75	YM	None
6/21/2019	9:40	B-303 R1	5491	19	30191	84	YM	None
6/21/2019	13:13	B-303 R2	6704	23	30234	87	YM	None
6/24/2019	14:04	B-303 R3	378	4	24504	68	YM	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
6/21/2019	9:46	B-304 R1	224	3	26964	80	YM	None
6/25/2019	10:58	B-305 R1	2868	19	21611	100	SK	None
6/26/2019	11:55	B-306 R1	3534	22	22802	106	SK	None
n/s		B-307						Arch structure
6/24/2019	13:22	B-308 R1	4666	28	29258	136	YM	None
7/2/2019	12:57	B-308 R2	1998	16	22715	113	YM	None
6/14/2019	16:30	B-309 R1	1936	9	27387	72	YM	None
6/14/2019	16:36	B-310 R1	4098	16	29712	83	YM	None
6/14/2019	16:42	B-311 R1	6517	22	35468	99	YM	None
6/18/2019	14:25	B-311 R2	1823	9	35205	107	YM	None
6/14/2019	16:50	B-312 R1	4280	17	27375	87	YM	None
6/14/2019	16:56	B-313 R1	1929	9	21843	64	YM	None
6/15/2019	7:55	B-314 R1	2535	11	27916	75	YM	None
7/20/2019	12:37	B-315 R1	827	10	35249	170	YM	None
6/15/2019	8:05	B-316 R1	2760	11	30076	78	YM	None
6/20/2019	12:23	B-317 R1	1232	12	29341	144	YM	None
6/20/2019	13:38	B-318 R1	3183	12	30439	81	YM	None
6/20/2019	13:55	B-319 R1	4727	16	28226	76	YM	None
6/20/2019	13:59	B-319 R2	2013	9	29644	80	YM	None
6/20/2019	14:59	B-320 R1	3367	13	24845	71	YM	None
6/20/2019	15:10	B-321 R1	5703	18	28929	76	YM	None
6/21/2019	7:14	B-321 R2	7538	24	31473	88	YM	None
6/21/2019	15:11	B-321 R3	3760	24	30511	138	YM	None
6/20/2019	15:18	B-322 R1	3752	16	25804	84	YM	None
6/20/2019	15:32	B-323 R1	7643	24	29826	81	YM	None
6/21/2019	15:19	B-323 R2	341	4	23984	69	YM	None
6/21/2019	7:19	B-324 R1	3648	15	29195	85	YM	None
6/21/2019	7:25	B-325 R1	4068	15	28120	80	YM	None
6/21/2019	7:34	B-326 R1	6442	21	30850	86	YM	None
6/24/2019	7:36	B-326 R2	4999	17	27083	75	YM	None
6/24/2019	13:56	B-326 R3	4564	16	30220	82	YM	None
6/24/2019	13:59	B-326 R4	1488	8	25910	70	YM	None
6/21/2019	7:39	B-327 R1	5195	18	26904	78	YM	None
6/24/2019	7:40	B-327 R2	2273	11	26117	77	YM	None
6/25/2019	11:40	B-328 R1	3516	23	24513	119	SK	None
6/15/2019	12:00	B-329 R1	141	2	29939	79	YM	None
6/17/2019	9:13	B-330 R1	9534	38	32598	123	YM	None
6/18/2019	14:31	B-330 R2	2623	12	30706	97	YM	None
6/15/2019	12:06	B-331 R1	2185	10	26056	73	YM	None
6/15/2019	12:12	B-332 R1	1268	9	21089	76	YM	None
6/15/2019	12:18	B-333 R1	2052	10	25938	71	YM	None
6/15/2019	12:33	B-334 R1	865	6	39017	99	YM	None
6/15/2019	12:40	B-335 R1	702	5	21633	63	YM	None
6/17/2019	12:35	B-336 R1	417	4	30552	83	YM	None
6/17/2019	12:27	B-337 R1	785	6	33718	103	YM	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
6/25/2019	11:35	B-338 R1	3646	22	19601	94	SK	None
6/25/2019	11:37	B-339 R1	3109	20	22671	105	SK	None
6/15/2019	12:50	B-340 R1	2822	11	29308	79	YM	None
6/17/2019	9:08	B-341 R1	3189	12	29549	79	YM	None
6/17/2019	14:25	B-342 R1	4048	15	29259	78	YM	None
6/17/2019	7:42	B-343 R1	349	4	20201	61	YM	None
6/17/2019	12:51	B-344 R1	1017	7	22545	67	YM	None
6/17/2019	12:45	B-345 R1	1017	6	22184	63	YM	None
6/17/2019	12:40	B-346 R1	1789	9	23325	67	YM	None
6/17/2019	12:16	B-347 R1	1394	8	24492	72	YM	None
6/17/2019	12:21	B-348 R1	2194	19	31341	167	YM	None
6/25/2019	11:46	B-349 R1	4961	28	20199	97	SK	None
6/26/2019	11:47	B-349 R2	800	9	17444	87	SK	None
6/25/2019	11:42	B-350 R1	4603	27	21445	102	SK	None
6/26/2019	11:49	B-350 R2	2589	18	23123	106	SK	None
6/15/2019	13:12	B-351 R1	4636	19	33024	108	YM	None
6/18/2019	14:47	B-351 R2	316	3	30662	94	YM	None
6/15/2019	12:55	B-352 R1	2886	12	28643	78	YM	None
6/17/2019	9:02	B-353 R1	3523	13	29705	79	YM	None
6/17/2019	7:57	B-354 R1	2163	10	23728	69	YM	None
6/17/2019	7:50	B-355 R1	803	6	20974	64	YM	None
6/17/2019	11:49	B-356 R1	1322	8	23391	67	YM	None
6/17/2019	11:54	B-357 R1	1215	7	23053	66	YM	None
6/17/2019	12:00	B-358 R1	875	6	21445	62	YM	None
6/17/2019	12:07	B-359 R1	165	3	16512	53	YM	None
6/25/2019	11:18	B-360 R1	3777	23	19912	95	SK	None
6/25/2019	11:16	B-361 R1	2356	17	22093	105	SK	None
6/15/2019	13:07	B-362 R1	463	4	22120	64	YM	None
6/15/2019	13:01	B-363 R1	1214	8	29344	86	YM	None
6/17/2019	9:21	B-364 R1	1575	8	28772	78	YM	None
6/17/2019	9:32	B-365 R1	1751	9	26179	78	YM	None
6/17/2019	11:15	B-366 R1	1795	9	24681	71	YM	None
6/17/2019	11:09	B-367 R1	1270	8	21564	68	YM	None
6/17/2019	11:03	B-368 R1	947	6	21834	66	YM	None
6/17/2019	10:57	B-369 R1	782	6	33709	89	YM	None
6/17/2019	14:14	B-370 R1	495	5	21176	65	YM	None
6/25/2019	11:22	B-371 R1	3480	23	20577	103	SK	None
6/25/2019	11:20	B-372 R1	3959	23	23343	106	SK	None
6/17/2019	9:26	B-373 R1	401	4	30698	82	YM	None
6/17/2019	9:37	B-374 R1	5063	17	33907	90	YM	None
6/17/2019	9:41	B-374 R2	356	4	28179	79	YM	None
6/17/2019	9:49	B-375 R1	4749	17	30131	84	YM	None
6/18/2019	15:17	B-375 R2	3166	13	32549	101	YM	None
6/17/2019	9:55	B-376 R1	4560	17	26321	76	YM	None
6/18/2019	15:23	B-376 R2	1523	8	26464	85	YM	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
6/17/2019	10:03	B-377 R1	7133	24	30308	88	YM	None
6/18/2019	15:29	B-377 R2	5157	22	28741	103	YM	None
6/18/2019	15:42	B-377 R3	1528	8	28488	78	YM	None
6/17/2019	10:08	B-378 R1	5526	20	33212	93	YM	None
6/18/2019	15:34	B-378 R2	842	6	26292	84	YM	None
6/17/2019	10:42	B-379 R1	1784	9	26974	77	YM	None
6/24/2019	13:30	B-380 R1	3342	12	19523	56	YM	None
6/25/2019	11:29	B-381 R1	2419	17	16921	85	SK	None
6/24/2019	10:09	B-382 R1	4731	18	22809	75	YM	None
6/27/2019	13:04	B-382 R2	2826	19	20889	101	SK	None
6/25/2019	11:39	B-383 R1	4647	27	19339	95	SK	None
6/26/2019	12:37	B-383 R2	785	9	20886	98	SK	None
6/24/2019	10:02	B-384 R1	7312	25	20814	67	YM	None
6/25/2019	11:27	B-384 R2	5206	29	20527	100	SK	None
6/26/2019	12:18	B-384 R3	2889	18	20417	93	SK	None
6/24/2019	9:57	B-385 R1	394	4	18104	61	YM	None
7/2/2019	13:17	B-386 R1	2019	9	17331	53	YM	None
7/2/2019	13:28	B-387 R1	694	5	18638	57	YM	None
6/24/2019	9:50	B-388 R1	258	3	15071	56	YM	None
6/24/2019	9:24	B-389 R1	9168	31	21569	71	YM	None
6/25/2019	11:31	B-389 R2	7959	41	20915	102	SK	Swept until no soil present for R3 test
6/24/2019	9:32	B-390 R1	6611	22	13526	46	YM	None
6/25/2019	11:33	B-390 R2	186	4	16683	81	SK	None
6/24/2019	9:40	B-391 R1	1371	8	22365	73	YM	None
n/s		B-392						Outside project boundary
6/24/2019	8:54	B-393 R1	4591	16	16019	49	YM	None
6/24/2019	8:58	B-393 R2	1252	7	15532	49	YM	None
6/24/2019	9:07	B-394 R1	659	5	18370	64	YM	None
6/24/2019	8:24	B-395 R1	5289	17	18110	51	YM	None
6/24/2019	8:45	B-395 R2	2812	11	16709	48	YM	None
6/24/2019	8:36	B-396 R1	793	5	19245	55	YM	None
6/15/2019	10:33	B-397 R1	4741	18	32315	93	YM	None
6/17/2019	15:47	B-397 R2	1539	9	23948	74	YM	None
6/15/2019	10:39	B-398 R1	14620	40	26348	75	YM	None
6/17/2019	15:37	B-398 R2	12509	36	30784	87	YM	None
6/18/2019	10:41	B-398 R3	2557	12	19200	62	YM	None
6/15/2019	10:45	B-399 R1	1152	7	30772	84	YM	None
6/15/2019	10:51	B-400 R1	5540	19	32113	91	YM	None
6/18/2019	11:32	B-400 R2	269	3	26650	79	YM	None
6/15/2019	11:04	B-401 R1	20894	74	48219	167	YM	None
6/17/2019	16:05	B-401 R2	24569	83	38209	130	YM	None
6/18/2019	11:24	B-401 R3	4138	16	28879	91	YM	None
6/15/2019	11:12	B-402 R1	832	6	23791	66	YM	None
6/15/2019	11:18	B-403 R1	1135	7	33404	89	YM	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
6/15/2019	11:25	B-404 R1	284	3	37851	100	YM	None
6/17/2019	8:39	B-405 R1	3391	14	22224	66	YM	None
6/17/2019	8:49	B-406 R1	2433	11	22980	68	YM	None
6/15/2019	14:34	B-407 R1	7541	24	35439	96	YM	None
6/17/2019	16:52	B-407 R2	635	5	33564	104	YM	None
6/17/2019	16:58	B-408 R1	4334	16	31293	87	YM	None
6/15/2019	14:30	B-409 R1	2212	11	26255	78	YM	None
6/15/2019	14:24	B-410 R1	10695	33	31682	93	YM	None
6/18/2019	15:05	B-410 R2	818	6	20923	61	YM	None
6/15/2019	14:18	B-411 R1	1128	7	33123	105	YM	None
6/15/2019	14:14	B-412 R1	5148	21	32408	109	YM	None
6/18/2019	14:41	B-412 R2	1001	6	34730	106	YM	None
6/15/2019	14:07	B-413 R1	24324	127	47856	246	YM	None
6/18/2019	14:54	B-413 R2	247	3	33764	108	YM	None
6/15/2019	14:08	B-414 R1	24102	69	47402	134	YM	None
6/28/2019	12:51	B-414 R2	10694	54	33285	154	SK	NW Wedge
7/9/2019	11:04	B-414 R3	148	4	32232	147	YM	None
7/4/2019	11:12	B-415 R1	2122	17	27834	131	YM	None
7/15/2019	10:41	B-416 R1	6477	36	28729	135	YM	5-acre area
7/15/2019	16:33	B-416 R2	99	4	23211	116	YM	5-acre area
7/15/2019	10:44	B-417 R1	2230	18	22444	112	YM	5-acre area
7/15/2019	11:05	B-418 R1	3075	22	18303	99	YM	5-acre area
n/s		BX-001						Outside project boundary
n/s		BX-002						Outside project boundary
n/s		BX-003						Outside project boundary
n/s		BX-004						Outside project boundary
n/s		BX-005						Outside project boundary
n/s		BX-006						Outside project boundary
n/s		BX-007						Outside project boundary
n/s		BX-008						Outside project boundary
n/s		BX-009						Outside project boundary
n/s		BX-010						Outside project boundary
n/s		BX-011						Outside project boundary
n/s		BX-012						Outside project boundary
n/s		BX-013						Outside project boundary
n/s		BX-014						Outside project boundary
n/s		BX-015						Outside project boundary
n/s		BX-016						Outside project boundary
n/s		BX-017						Outside project boundary
n/s		BX-018						Outside project boundary
n/s		BX-019						Outside project boundary
n/s		BX-020						Outside project boundary
n/s		BX-021						Outside project boundary
n/s		BX-022						Outside project boundary
n/s		BX-023						Outside project boundary

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
n/s		BX-024						Outside project boundary
n/s		BX-025						Outside project boundary
n/s		BX-026						Outside project boundary
n/s		BX-027						Outside project boundary
n/s		BX-028						Outside project boundary
n/s		BX-029						Outside project boundary
n/s		BX-030						Outside project boundary
n/s		BX-031						Outside project boundary
n/s		BX-032						Outside project boundary
n/s		BX-033						Outside project boundary
n/s		BX-034						Outside project boundary
n/s		BX-035						Outside project boundary
n/s		BX-036						Outside project boundary
n/s		BX-037						Outside project boundary
6/28/2019	13:20	BX-038 R1	7644	39	21901	107	SK	Asphalt oil south of C&D
7/9/2019	13:45	BX-038 R2	451	7	20484	102	YM	None
n/s		BX-039						Outside project boundary
n/s		BX-040						Outside project boundary
n/s		BX-041						Outside project boundary
n/s		BX-042						Outside project boundary
n/s		BX-043						Outside project boundary
n/s		BX-044						Outside project boundary
n/s		BX-045						Outside project boundary
n/s		BX-046						Outside project boundary
n/s		BX-047						Outside project boundary
n/s		BX-048						Outside project boundary
n/s		BX-049						Outside project boundary
n/s		BX-050						Outside project boundary
n/s		BX-051						Outside project boundary
n/s		BX-052						Outside project boundary
n/s		BX-053						Outside project boundary
n/s		BX-054						Outside project boundary
n/s		BX-055						Outside project boundary
n/s		BX-056						Outside project boundary
n/s		BX-057						Outside project boundary
n/s		BX-058						Outside project boundary
n/s		BX-059						Outside project boundary
n/s		BX-060						Outside project boundary
n/s		BX-061						Outside project boundary
n/s		BX-062						Outside project boundary
7/10/2019	13:06	BX-063 R1	1398	14	23045	117	YM	5-acre area
n/s		BX-064						Outside project boundary
7/9/2019	16:12	BX-065 R1	29454	152	67325	337	YM	5-acre area
7/10/2019	10:29	BX-065 R2	2681	18	28134	126	YM	5-acre area
7/10/2019	11:02	BX-066 R1	1631	14	20940	103	YM	5-acre area

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
n/s		BX-067						Outside project boundary
n/s		BX-068						Outside project boundary
n/s		BX-069						Outside project boundary
6/26/2019	12:05	BX-070 R1	1986	17	28469	137	SK	None
7/18/2019	12:43	BX-071 R1	3389	22	20579	101	YM	None
n/s		BX-072						Outside project boundary
n/s		BX-073						Pipeline
n/s		BX-074						Outside project boundary
n/s		BX-075						Outside project boundary
n/s		BX-076						Outside project boundary
6/26/2019	11:56	BX-077 R1	522	7	27180	131	SK	None
n/s		BX-078						Outside project boundary
7/2/2019	14:40	BX-079 R1	44	2	29157	79	YM	None
n/s		BX-080						Outside project boundary
n/s		BX-081						Outside project boundary
n/s		BX-082						Outside project boundary
n/s		BX-083						Outside project boundary
n/s		BX-084						Outside project boundary
n/s		BX-085						Rip rap slope
n/s		BX-086						Outside project boundary
6/26/2019	12:24	BX-087 R1	1230	13	38696	189	SK	None
n/s		BX-088						Outside project boundary
n/s		BX-089						Outside project boundary
n/s		BX-090						Outside project boundary
n/s		BX-091						Outside project boundary
n/s		BX-092						Outside project boundary
n/s		BX-093						Outside project boundary
n/s		BX-094						Outside project boundary
n/s		BX-095						Outside project boundary
n/s		BX-096						Outside project boundary
n/s		BX-097						Outside project boundary
6/24/2019	10:26	BX-098 R1	1974	11	26372	96	YM	None
n/s		BX-099						Outside project boundary
n/s		BX-100						Outside project boundary
n/s		BX-101						Outside project boundary
n/s		BX-102						Outside project boundary
n/s		BX-103						Outside project boundary
n/s		BX-104						Outside project boundary
n/s		BX-105						Outside project boundary
n/s		BX-106						Outside project boundary
n/s		BX-107						Outside project boundary
n/s		BX-108						Outside project boundary
n/s		BX-109						Outside project boundary
n/s		BX-110						Outside project boundary
6/26/2019	12:32	BX-111 R1	4651	27	15477	80	SK	None

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
6/27/2019	12:51	BX-111 R2	3965	24	19407	96	SK	None
n/s		BX-112						Outside project boundary
n/s		BX-113						Outside project boundary
n/s		BX-114						Outside project boundary
n/s		BX-115						Outside project boundary
6/25/2019	11:23	BX-116 R1	3529	22	15037	79	SK	None
n/s		BX-117						Outside project boundary
n/s		BX-118						Outside project boundary
n/s		BX-119						Outside project boundary
6/25/2019	11:44	BX-120 R1	2616	18	19256	93	SK	None
6/25/2019	11:11	BX-121 R1	4245	26	20938	102	SK	None
6/25/2019	11:50	BX-122 R1	2478	17	18669	88	SK	None
n/s		BX-123						Outside project boundary
n/s		BX-124						Outside project boundary
n/s		BX-125						Outside project boundary
n/s		BX-126						Outside project boundary
n/s		BX-127						Outside project boundary
n/s		BX-128						Outside project boundary
n/s		BX-129						Outside project boundary
n/s		BX-130						Outside project boundary
n/s		BX-131						Outside project boundary
n/s		BX-132						Outside project boundary
n/s		BX-133						Outside project boundary
6/20/2019	13:45	BX-134 R1	1267	7	33937	105	YM	None
n/s		BX-135						Outside project boundary
n/s		BX-136						Outside project boundary
n/s		BX-137						Outside project boundary
n/s		BX-138						Outside project boundary
n/s		BX-139						Outside project boundary
n/s		BX-140						Outside project boundary
n/s		BX-141						Outside project boundary
n/s		BX-142						Outside project boundary
n/s		BX-143						Outside project boundary
n/s		BX-144						Outside project boundary
n/s		BX-145						Outside project boundary
n/s		BX-146						Outside project boundary
n/s		BX-147						Outside project boundary
n/s		BX-148						Outside project boundary
n/s		BX-149						Outside project boundary
n/s		BX-150						Outside project boundary
n/s		BX-151						Outside project boundary
n/s		BX-152						Outside project boundary
n/s		BX-153						Outside project boundary
n/s		BX-154						Outside project boundary
n/s		BX-155						Outside project boundary

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
n/s		BX-156						Outside project boundary
n/s		BX-157						Outside project boundary
n/s		BX-158						Outside project boundary
n/s		BX-159						Outside project boundary
n/s		BX-160						Outside project boundary
n/s		BX-161						Outside project boundary
n/s		BX-162						Outside project boundary
n/s		BX-163						Not on map?
n/s		BX-164						Outside project boundary
n/s		BX-165						Outside project boundary
n/s		BX-166						Outside project boundary
n/s		BX-167						Outside project boundary
n/s		BX-168						Outside project boundary
6/28/2019	12:49	BX-169 R1	11648	58	36120	168	SK	NW Wedge
7/9/2019	10:49	BX-169 R2	244	6	31105	147	YM	None
n/s		BX-170						Outside project boundary
6/28/2019	12:57	BX-171 R1	8081	44	36672	172	SK	NW Wedge
7/9/2019	10:45	BX-171 R2	3010	21	30794	142	YM	None
6/28/2019	12:59	BX-172 R1	14447	71	38192	179	SK	NW Wedge
7/9/2019	10:42	BX-172 R2	2216	17	30669	141	YM	None
n/s		BX-173						Outside project boundary
n/s		BX-174						Outside project boundary
6/28/2019	12:53	BX-175 R1	12789	64	37535	175	SK	NW Wedge
7/9/2019	10:36	BX-175 R2	7776	48	52692	261	YM	None
7/9/2019	13:04	BX-175 R3	230	5	16575	88	YM	None
n/s		BX-176						Outside project boundary
n/s		BX-177						Outside project boundary
n/s		BX-178						Outside project boundary
n/s		BX-179						Outside project boundary
n/s		BX-180						Outside project boundary
n/s		BX-181						Outside project boundary
n/s		BX-182						Outside project boundary
n/s		BX-183						Outside project boundary
n/s		BX-184						Outside project boundary
n/s		BX-185						Outside project boundary
n/s		BX-186						Outside project boundary
n/s		BX-187						Outside project boundary
6/28/2019	12:47	BX-188 R1	14367	71	36515	172	SK	NW Wedge
7/9/2019	10:29	BX-188 R2	8635	47	36515	173	YM	None
7/9/2019	11:55	BX-188 R3	1282	13	27613	138	YM	None
n/s		BX-189						Outside project boundary
n/s		BX-190						Outside project boundary
n/s		BX-191						Outside project boundary
n/s		BX-192						Outside project boundary
n/s		BX-193						Outside project boundary

Date	Time	Sample ID	Cu		Fe		Analyst	Comments
			DC=4500	+/-		+/-		
n/s		BX-194						Outside project boundary
6/28/2019	13:04	BX-195 R1	8957	47	33715	157	SK	NW Wedge
7/9/2019	8:29	BX-195 R2	22360	126	44428	247	YM	None
7/9/2019	11:51	BX-195 R3	938	11	33506	154	YM	None
n/s		BX-196						Outside project boundary
n/s		BX-197						Outside project boundary
n/s		BX-198						Outside project boundary
n/s		BX-199						Outside project boundary
n/s		BX-200						Outside project boundary
n/s		BX-201						Outside project boundary
n/s		BX-202						Outside project boundary
n/s		BX-203						Outside project boundary
n/s		BX-204						Outside project boundary
n/s		BX-205						Outside project boundary
n/s		BX-206						Outside project boundary
n/s		BX-207						Outside project boundary
n/s		BX-208						Outside project boundary
n/s		BX-209						Outside project boundary

Note: Unless otherwise noted, all runs are 60-second duration, recorded in parts per million, using Olympus Vanta M XRF, on samples collected 0-1" & sieved to 2 mm

Red - Copper concentration exceeded Decision Criteria of 4500 ppm

APPENDIX C

Technical Memorandum: Quality Control and Split Sample Analysis (CEL Work Product)

CRAWFORD ENVIRONMENTAL LLC

TECHNICAL MEMORANDUM

ate:	October 22, 2019	**Golder No.:**	18102605
To:	Kent Johnejack.	**Company:**	Golder Associates, Inc.
From:	Diane Crawford		
Email:	dianec@crawfordenvironmental.net		
RE:	**XRF Quality Control and Split Sample Analysis for B-Ranch IRA**		

1.0 INTRODUCTION

This technical memorandum summarizes the calibration and quality control (QC) checks conducted on the XRF analyses in accordance with EPA Method 6200 (EPA 2007) in support of an Interim Remedial Action (IRA) to remove soil from the B-Ranch property north of Hurley, New Mexico. The scope of the IRA was presented in a Field Implementation Plan (FIP)[1] and then adjusted in the field by Chino Mines Company (Chino). The work was conducted as part of the Smelter Tailing Soil Investigation Unit (STSIU) under the Administrative Order on Consent (AOC) between Chino and the New Mexico Environment Department (NMED). The scope of the IRA was to remove soils exceeding the decision criteria (DC).

The single constituent of potential concern (COPC), copper, was selected by Arcadis and approved by Chino. The DC for copper was 5,000 milligrams per kilogram (mg/kg), as indicated in FIP[1]. However, a buffer of 500 mg/kg was subtracted, resulting in a value of 4,500 mg/kg actually implemented in the field. Iron was also analyzed for information only but had no DC and was not a COPC.

The samples discussed in this evaluation are the XRF samples that verified the extent of removal was acceptable to Chino. There were 582 project samples collected.. Several other types of samples were run on the XRF during this project that were not project samples (e.g., courtesy samples) that are not included in the QC analyses presented in this technical memorandum.

XRF analyses were conducted using an Olympus Vanta series M handheld XRF. The field engineer conferred with Olympus technical experts to optimize features and software for this project. The device was preset to report the COPC using 90-second tests.

2.0 CALIBRATION AND QUALITY CONTROL CHECKS

The calibration checks and quality control evaluations are described below, including blank samples, standard reference materials, precision runs, and an overall evaluation of XRF data quality.

[1] Arcadis 2019. B-Ranch Investigation Area Field Implementation Plan. Memo to Michael Steward and Pam Pinson (Freeport McMoRan) from Rebecca Lindeman (Arcadis). May 30.

2.1 MANUFACTURER CALIBRATION CHECKS

The XRF Vanta instrument came with manufacturer-installed fundamental parameters calibration. This factory calibration is standard for the XRF, and no additional field calibration is necessary, in accordance with EPA Method 6200.

2.2 BLANK SAMPLE CHECKS

The following are the EPA Method 6200[2] requirements for blank samples:

- Frequency: run daily, and at least every 20 samples (5% of total project samples)
- QC: results should be less than 10% of the lower detection limit for each COPC (if established for the project), or lower than the lowest observed XRF sample concentration from the project samples

As shown in Table C-1, blank samples were analyzed at least once daily, and frequently more than once. There were 582 total project samples collected, and 60 blank samples analyzed, representing 10% of the total samples collected. This is well above the required 5% for blank sample frequency.

The lower detection limits for the XRF Vanta unit (determined by testing time, sample matrix, and presence of interferences) were not specifically determined for the soil and sediment tested during this project. Therefore, the lowest observed XRF project sample concentrations are compared to the blank results (Table C-2).

The blank results are summarized below:

- Blank results for copper were non-detect for 50% of the blank samples
- The maximum blank result for copper was less than the lowest observable XRF project sample result by more than half

While some blank results had detections, most results were non-detects. Some interferences can occur while testing blank samples in the field, including dust or an unclean cover on the sample cup, which may occasionally affect blank results.

2.3 CALIBRATION VERIFICATION CHECKS ON SRMS

The calibration verification checks are conducted on standard reference materials (SRM) in order to evaluate the accuracy of the XRF. The following are the EPA Method 6200 requirements for SRM samples:

- Frequency: run daily, and every 20 samples (5% of total project samples)

[2] EPA, 2007. SW-846 Test Method 6200: Field Portable XRF Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment. Rev. 0. February 2007.

- QC: XRF results should be within +/- 20% difference (20%D) of the certified results for the SRM.

Table C-1 shows that the NIST samples were run at least once daily, and frequently more than once daily. A total of 59 NIST samples were analyzed over the duration of the project, representing 10% of the total project samples collected. This is well above the required 5% for blank sample frequency.

The calibration verification checks were conducted using a NIST 2711A SRM. The NIST sample results for copper were compared to the certified results for the SRM NIST 2711A for copper (40 ppm) to calculate the %D values for the COPC (Table C-3). The results are summarized below:

- Copper %D results were greater than 20% for 2 of 59 NIST results, representing 3% of the NIST results. The two NIST results exceeding 20% had %D of 22% and 24%

2.4 PRECISION RUNS

Precision runs were conducted to assess the method precision and repeatability on a given sample for COPC concentrations. A precision run is a series of seven consecutive XRF measurements taken from one randomly selected project sample.

The following are the EPA Method 6200 requirements for SRM samples:

- Frequency: run daily, and every 20 samples (5% of total project samples)
- QC: results should ideally be <20% relative standard deviation (RSD), but <30% is also acceptable.

As shown in Table C-1, precision runs of were conducted at least once per day that project samples were run, with the exception of two sample collection days. On June 14, 2019, no precision runs were conducted, however three precision runs were conducted on the following day. On July 17, 2019, no precision runs were made, but only six samples were analyzed that day. A precision run was conducted on the following day after five additional samples were run.

A total of 35 samples were selected for precision runs, representing 6% of the 582 total project samples, which is above the required 5% precision runs.

Table C-4 provides the results of the RSDs of the project precision runs for each COPC are as follows:

- Copper had acceptable RSDs (< 20%) in 100% of the precision runs

2.5 OVERALL ASSESSMENT OF XRF DATA

The PARCC parameters (precision, accuracy, representativeness, completeness, and comparability) are used to assess overall data quality. These parameters are summarized below:

- Precision – Precision is a measure of the agreement between replicate measurements. The evaluation of the precision runs, as presented in Section 2.4, indicated that the XRF data exhibits acceptable precision.
- Accuracy – Accuracy is the degree of agreement between a measurement and an accepted or true reference value. The evaluation of blank and SRM samples with certified ("true") results compared to project samples, as presented in Sections 2.2 and 2.3, indicated that the XRF data are of acceptable accuracy.
- Representativeness – Representativeness is the evaluation of how well the data characterizes the media of concern. This is determined by the selection of and adherence to the appropriate sampling plan, protocols, procedures, and analytical methods. The collection and analysis of project samples was conducted in accordance with the FIP[1], and subsequent field changes made by Chino, Arcadis, and the field engineer.
- Comparability – Comparability is evaluated by review of the sample collection and analytical procedures for comparability with other possibly related data sets. The comparability of the XRF data in this project was assessed by the continued use of XRF sampling and analytical techniques, procedures, and QA/QC protocol, as well as the use of field technicians that conducted similar work in and for other Chino AOC investigation units.
- Completeness – Completeness refers to the rate of successful sampling. The XRF completed analysis of 100% of the sample locations within the project area that were directed by Chino, Arcadis, and the field engineer for confirmation XRF analysis. In addition, all frequency requirements for the precision and accuracy QC were fulfilled (Sections C.2 through C.4).

It can be concluded that the XRF data are acceptable for the nature of the removal decisions being made with the data.

3.0 SPLIT SAMPLE ANALYSIS

The XRF measurements to support the B-Ranch IRA require site-split sample analysis as part of quality assurance/quality control procedures specified in EPA SW 846 Test Method 6200 at a rate of 5% of all field samples collected.

A total of 582 project samples were collected and analyzed with the XRF in the period from June 12 through July 23, 2019. A total of 60 of those samples (10%) were shipped to Silver Valley Analytical Laboratory (SVL) for split analysis of copper and iron.

3.1 DATA VERIFICATION

The SVL split sample data were analyzed by SVL in three groups: 20 samples in Group X9G0331, 21 samples in Group XG0332, and 19 samples in Group X9H0099. The SVL data were verified by Crawford

Environmental, LLC (CEL) and found to be acceptable for their intended use. The SVL data reports and their corresponding data verification summaries are included in Attachment A.

3.2 ANALYSIS OF XRF AND LABORATORY RESULTS

The results of the laboratory and their corresponding XRF measurements were compared using linear regression, to evaluate how well the XRF results can predict the laboratory results. The results are plotted in Figure 1 for copper. The graph includes the DC for copper (5,000 mg/kg), which divides each plot into four quadrants. The following summarizes the quadrants:

- A Type I error, or false positive, occurred when the XRF result incorrectly predicted that the sample result was below the DC (remediation not needed), when in fact it exceeded the DC (remediation needed). The consequence of this decision is that remediation may not have occurred when it was needed. To be protective of the environment, the magnitude of the Type I error is of most concern, since it leads to not remediating when remediation should occur.
- A True Positive result indicates that both the XRF and laboratory results for a sample exceeded the DC. The consequence is that the XRF result correctly predicted that remediation was needed and was confirmed by the laboratory result.
- A Type II error, or false negative, occurs when the XRF result incorrectly predicted that the sample result exceeded the DC (remediation needed) when in fact it was below the DC (remediation not needed). The consequence of this decision is that areas that did not need remediation may have been remediated.
- A True Negative result indicates that both the XRF and laboratory results for a sample were below the DC. The consequence is that the XRF result correctly predicted that remediation was not needed and was confirmed by the laboratory result.

The trendline for copper shows that the calculated r^2 value for the XRF and SVL samples is 0.98, which indicates acceptable correlation. All but six results occur within the True Negative or True Positive quadrants, indicating that the XRF result resulted in the same decisions as that SVL results. The six exceptions all occurred in the Type II Error (False Negative) quadrant, which means that the XRF result incorrectly indicated that the DC was exceeded when the SVL result indicated that the DC was not exceeded. The decisions made from these errors would be to remediate when remediation was potentially not needed.

3.3 CONCLUSIONS

The correlation is acceptable for the nature of the removal decisions being made with the data. The XRF results exhibit an r^2 value of 0.98 for copper, thus showing good correlation.

4.0 CLOSING

This report was prepared by Crawford Environmental, LLC. If there are any questions or comments, please call 206-713-5878.

Sincerely,

Diane Crawford
Senior Consultant
Crawford Environmental, LLC

Attachments:

Attachment A: Data Verification Reports
Table C-1 Daily Summary of XRF Analyses and Precision Runs
Table C-2 Analysis of XRF Results for Blanks
Table C-3 Analysis of XRF Results for NIST 2711A
Table C-4 Summary of Relative Standard Deviations for Each Precision Run Data Set
Figure C-1 Laboratory vs. XRF for Copper

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

GOLDER PROJECT #:	18102605	SITE :	B-Ranch, Chino Mines
LABORATORY:	SVL	LABORATORY ID (LAB WORKGROUP #):	X9G0331
		MATRIX :	Soil (20)

SAMPLE Numbers:			
B-197-R1	B-333-R1	B-203-R1	B-231-R1
B-312-R1	B-412-R1	B-098-R2	B-265-R1
B-314-R1	B-353-R1	B-099-R3	B-298-R1
B-117-R1	B-377-R1	B-142-R4	B-324-R1
B-398-R1	B-359-R1	B-375-R2	B-248-R1

DATA ASSESSMENT SUMMARY

REVIEW ITEM	Metals by ICP/ AES (EPA 200.7)	Hg by CV (EPA 245.1)	Anions by IC (EPA 300.0)	Physical Properties (SM Part 2000)
1. Data Completeness	o	na	na	na
2. Holding Times	o	na	na	na
3. Calibration	na	na	na	na
4. Interference Check Sample	na	na	na	na
5. Blanks	o	na	na	na
6. Duplicate RPD	na	na	na	na
7. Field Duplicate RPD	na	na	na	na
8. LCS, Blank Spike, MFS	o	na	na	na
9. Matrix Spike, MSD	x	na	na	na
10. GFAA, MSA, Serial Dil.	na	na	na	na
11. Other QC	na	na	na	na
12. Result Verification	na	na	na	na
13. Overall Summary	x	na	na	na

O = Data had no problems
X = Problems, but do not affect data
Θ = Data qualified due to minor problems [typically estimated data (J or UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R)].

Comments/Qualified Results:
The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

Verified by: Diane Crawford Date: October 14, 2019

Reviewed by: _____ Date: _____

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

1. Date Package Completeness

_/_ Case narrative
_/_ Chain of Custody
_/_ Sample Results
_o_ ICV/CCV Results
_/_ Blank Results
_o_ ICP Interference Check Results
_/_ Spike Recovery Results
_/_ Duplicate Results
_/_ LCS Results
_o_ Standard Addition Results
_o_ ICP Serial Dilution

__ICP Linear Ranges

__/__ Instrument Det. Limits
__o__ ICP Correction Factors
__o__ ICP Linear Ranges
__o__ Preparation Logs
__o__ Analysis Run Logs
__o__ ICP Raw Data
__o__ GFAA Raw Data
__o__ Hg Raw Data
__o__ Cyanide Raw Data
__o__ Other_____

/ Acceptable
x Absent
o Not required for data package requested.

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

2. Holding Times (Check all that apply)…….. *Acceptable: Yes or No*

_√_ ICP/GFAA metals completed within 6 months of sample collection
__ Mercury analysis completed within 28 days of sample collection
__ Cyanide analysis completed within 14 days of sample collection
__ Anion analysis completed within 28 days of sample collection
__ Nitrate-N, Nitrite-N, and O-Phosphate-P analysis completed within 2 days of sample collection
__ Microbiological analysis for Total Coliform and *E. coli* initiated within 24 hours of sample collection

Comments/Qualified Results: none

3. Calibrations (Check all that apply)…….. *Acceptable: Yes or No*

__ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)
__ICV/CCV %R 80-120% for Hg, results accepted
__ICV/CCV %R for Hg, 65%-79% or 121%-135%, results estimated (J/UJ)
__ICV/CCV %R 85-115% for Cyanide, results acceptable
__ICV/CCV %R 70-84% or 116-130%, results estimated (J/UJ)
__ICV/CCV %R <70% or >130%, reject pos results (R)

Comments/Qualified Results: not applicable

4. Interference Checks (Check all that apply)…….. *Acceptable: Yes or No*

__ICS A/B Recoveries Acceptable
__AI, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: not applicable

5. Blanks (Check all that apply)…….. *Acceptable: Yes or No*

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

_√_ All parameters analyzed were reported as ND (not detected) or at levels less than the PQL.
__Detects reported in ICB/CCB list:
__Detects in preparation blanks, list:
__Detects in field blanks, list

Qualified as undetected (U) all sample concentrations ≤10X any associated blank concentrations and less than the PQL, or J+ for samples greater than the PQL.

Comments/Qualified Results: none

6. Duplicate (Check all that apply)…….. ***Acceptable: Yes or No***

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

7. Field Duplicates …… ***Acceptable: Yes or No***

__Field duplicate RPD ≤20% (≤35% for soils)

Comments/Qualified Results: no field duplicates analyzed

8. Laboratory Control Samples, Blank Spikes (Check all that apply)… ***Acceptable: Yes or No***

_√_ LCS %R 80-120%
__LCS %R 50-79% or >120%, results >IDL estimated (J)
__LCS %R 50-79% and results <IDL estimated (UJ)
__LCS %R <50% and all results rejected (R/UR)

Comments/Qualified Results: none

9. Spike Recovery (Check all that apply)…….. ***Acceptable: Yes or No***

__Spike %R with 75-125%
__Spike %R 30-74%, >125%, results > IDL estimated (J)
__Spike %R 30-74% results <IDL estimated (UJ)
__Spike %R <30%, results <IDL rejected (UR)
__Field blanks used for spike analysis

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

10. GFAA Performance, MSA, or Serial Dilutions…… ***Acceptable: Yes or No***

__Duplicate injection RSD <20%
__Duplicate injection RSD >20%, results > CRDL estimated (J)
__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

Comments/Qualified Results: not applicable

11. Other QC

Comments/Qualified Results: none

12. Result Verification…… ***Acceptable: Yes or No***

__All results supported in raw data

Comments/Qualified Results: not applicable

13. Overall Assessment…… ***Acceptable: Yes or No***

Comments/Qualified Results:

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

GOLDER PROJECT #:	18102605	SITE :	B-Ranch, Chino Mines
LABORATORY:	SVL	LABORATORY ID (LAB WORKGROUP #):	X9G0332
		MATRIX :	Soil (21)

SAMPLE Numbers:			
B-218-R1	B-326-R4	BX-111-R2	B-005-R3
B-247-R4	B-361-R1	B-008-R1	B-386-R1
B-213-R1	B-338-R1	B-013-R1	BX-079-R1
B-393-R1	B-349-R2	B-134-R3	
BX-098-R1	B-162-R1	B-009-R2	
B-186-R1	BX-111-R1	B-001-R2	

DATA ASSESSMENT SUMMARY

REVIEW ITEM	Metals by ICP/ AES (EPA 200.7)	Hg by CV (EPA 245.1)	Anions by IC (EPA 300.0)	Physical Properties (SM Part 2000)
1. Data Completeness	o	na	na	na
2. Holding Times	o	na	na	na
3. Calibration	na	na	na	na
4. Interference Check Sample	na	na	na	na
5. Blanks	o	na	na	na
6. Duplicate RPD	na	na	na	na
7. Field Duplicate RPD	na	na	na	na
8. LCS, Blank Spike, MFS	o	na	na	na
9. Matrix Spike, MSD	x	na	na	na
10. GFAA, MSA, Serial Dil.	na	na	na	na
11. Other QC	na	na	na	na
12. Result Verification	na	na	na	na
13. Overall Summary	x	na	na	na

O = Data had no problems
X = Problems, but do not affect data
Θ = Data qualified due to minor problems [typically estimated data (J or UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R)].

Comments/Qualified Results:
The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

Verified by: Diane Crawford Date: October 14, 2019

Reviewed by:_____ Date:_____

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

1. Date Package Completeness

_/_ Case narrative
_/_ Chain of Custody
_/_ Sample Results
_o_ ICV/CCV Results
_/_ Blank Results
_o_ ICP Interference Check Results
_/_ Spike Recovery Results
_/_ Duplicate Results
_/_ LCS Results
_o_ Standard Addition Results
_o_ ICP Serial Dilution

__ICP Linear Ranges

__/__ Instrument Det. Limits
__o__ ICP Correction Factors
__o__ ICP Linear Ranges
__o__ Preparation Logs
__o__ Analysis Run Logs
__o__ ICP Raw Data
__o__ GFAA Raw Data
__o__ Hg Raw Data
__o__ Cyanide Raw Data
__o__ Other_____

/ Acceptable
x Absent
o Not required for data package requested.

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

2. Holding Times (Check all that apply)…….. *Acceptable: Yes or No*

_√_ ICP/GFAA metals completed within 6 months of sample collection
__ Mercury analysis completed within 28 days of sample collection
__ Cyanide analysis completed within 14 days of sample collection
__ Anion analysis completed within 28 days of sample collection
__ Nitrate-N, Nitrite-N, and O-Phosphate-P analysis completed within 2 days of sample collection
__ Microbiological analysis for Total Coliform and *E. coli* initiated within 24 hours of sample collection

Comments/Qualified Results: none

3. Calibrations (Check all that apply)…….. *Acceptable: Yes or No*

__ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)
__ICV/CCV %R 80-120% for Hg, results accepted
__ICV/CCV %R for Hg, 65%-79% or 121%-135%, results estimated (J/UJ)
__ICV/CCV %R 85-115% for Cyanide, results acceptable
__ICV/CCV %R 70-84% or 116-130%, results estimated (J/UJ)
__ICV/CCV %R <70% or >130%, reject pos results (R)

Comments/Qualified Results: not applicable

4. Interference Checks (Check all that apply)…….. *Acceptable: Yes or No*

__ICS A/B Recoveries Acceptable
__AI, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: not applicable

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

5. Blanks (Check all that apply)…….. ***Acceptable: Yes or No***

_√_ All parameters analyzed were reported as ND (not detected) or at levels less than the PQL.
__Detects reported in ICB/CCB list:
__Detects in preparation blanks, list:
__Detects in field blanks, list

Qualified as undetected (U) all sample concentrations ≤10X any associated blank concentrations and less than the PQL, or J+ for samples greater than the PQL.

Comments/Qualified Results: none

6. Duplicate (Check all that apply)…….. ***Acceptable: Yes or No***

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

7. Field Duplicates …… ***Acceptable: Yes or No***

__Field duplicate RPD ≤20% (≤35% for soils)

Comments/Qualified Results: no field duplicates analyzed

8. Laboratory Control Samples, Blank Spikes (Check all that apply)… ***Acceptable: Yes or No***

_√_ LCS %R 80-120%
__LCS %R 50-79% or >120%, results >IDL estimated (J)
__LCS %R 50-79% and results <IDL estimated (UJ)
__LCS %R <50% and all results rejected (R/UR)

Comments/Qualified Results: none

9. Spike Recovery (Check all that apply)…….. ***Acceptable: Yes or No***

__Spike %R with 75-125%
__Spike %R 30-74%, >125%, results > IDL estimated (J)
__Spike %R 30-74% results <IDL estimated (UJ)
__Spike %R <30%, results <IDL rejected (UR)
__Field blanks used for spike analysis

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

10. GFAA Performance, MSA, or Serial Dilutions…… ***Acceptable: Yes or No***

__Duplicate injection RSD <20%
__Duplicate injection RSD >20%, results > CRDL estimated (J)
__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

Comments/Qualified Results: not applicable

11. Other QC

Comments/Qualified Results: none

12. Result Verification…… ***Acceptable: Yes or No***

__All results supported in raw data

Comments/Qualified Results: not applicable

13. Overall Assessment…… ***Acceptable: Yes or No***

Comments/Qualified Results:

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

GOLDER PROJECT #:	18102605	SITE :	B-Ranch, Chino Mines
LABORATORY:	SVL	LABORATORY ID (LAB WORKGROUP #):	X9H0099
		MATRIX :	Soil (19)

SAMPLE Numbers:			
BX-169-R2	B-106-R2	B-146-R1	B-016-R1
B-148-R1	B-151-R2	B-174-R1	B-256-R1
B-180-R1	B-149-R4	B-206-R2	B-124-R5
BX-065-R1	B-130-R3	B-145-R2	B-105-R1
B-050-R1	B-181-R2	B-027-R1	

DATA ASSESSMENT SUMMARY

REVIEW ITEM	Metals by ICP/ AES (EPA 200.7)	Hg by CV (EPA 245.1)	Anions by IC (EPA 300.0)	Physical Properties (SM Part 2000)
1. Data Completeness	o	na	na	na
2. Holding Times	o	na	na	na
3. Calibration	na	na	na	na
4. Interference Check Sample	na	na	na	na
5. Blanks	o	na	na	na
6. Duplicate RPD	na	na	na	na
7. Field Duplicate RPD	na	na	na	na
8. LCS, Blank Spike, MFS	o	na	na	na
9. Matrix Spike, MSD	x	na	na	na
10. GFAA, MSA, Serial Dil.	na	na	na	na
11. Other QC	na	na	na	na
12. Result Verification	na	na	na	na
13. Overall Summary	x	na	na	na

O = Data had no problems
X = Problems, but do not affect data
Θ = Data qualified due to minor problems [typically estimated data (J or UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R)].

Comments/Qualified Results:
The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

Verified by: Diane Crawford Date: October 14, 2019

Reviewed by: _____ Date: _____

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

1. Date Package Completeness

_/_ Case narrative
_/_ Chain of Custody
_/_ Sample Results
_o_ ICV/CCV Results
_/_ Blank Results
_o_ ICP Interference Check Results
_/_ Spike Recovery Results
_/_ Duplicate Results
_/_ LCS Results
_o_ Standard Addition Results
_o_ ICP Serial Dilution

__ICP Linear Ranges

__/__ Instrument Det. Limits
__o__ ICP Correction Factors
__o__ ICP Linear Ranges
__o__ Preparation Logs
__o__ Analysis Run Logs
__o__ ICP Raw Data
__o__ GFAA Raw Data
__o__ Hg Raw Data
__o__ Cyanide Raw Data
__o__ Other_____

/ Acceptable
x Absent
o Not required for data package requested.

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

2. Holding Times (Check all that apply)…….. *Acceptable: Yes or No*

_√_ ICP/GFAA metals completed within 6 months of sample collection
__ Mercury analysis completed within 28 days of sample collection
__ Cyanide analysis completed within 14 days of sample collection
__ Anion analysis completed within 28 days of sample collection
__ Nitrate-N, Nitrite-N, and O-Phosphate-P analysis completed within 2 days of sample collection
__ Microbiological analysis for Total Coliform and *E. coli* initiated within 24 hours of sample collection

Comments/Qualified Results: none

3. Calibrations (Check all that apply)…….. *Acceptable: Yes or No*

__ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)
__ICV/CCV %R 80-120% for Hg, results accepted
__ICV/CCV %R for Hg, 65%-79% or 121%-135%, results estimated (J/UJ)
__ICV/CCV %R 85-115% for Cyanide, results acceptable
__ICV/CCV %R 70-84% or 116-130%, results estimated (J/UJ)
__ICV/CCV %R <70% or >130%, reject pos results (R)

Comments/Qualified Results: not applicable

4. Interference Checks (Check all that apply)…….. *Acceptable: Yes or No*

__ICS A/B Recoveries Acceptable
__AI, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: not applicable

5. Blanks (Check all that apply)…….. *Acceptable: Yes or No*

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

_√_ All parameters analyzed were reported as ND (not detected) or at levels less than the PQL.
__Detects reported in ICB/CCB list:
__Detects in preparation blanks, list:
__Detects in field blanks, list

Qualified as undetected (U) all sample concentrations ≤10X any associated blank concentrations and less than the PQL, or J+ for samples greater than the PQL.

Comments/Qualified Results: none

6. Duplicate (Check all that apply)…….. ***Acceptable: Yes or No***

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

7. Field Duplicates …… ***Acceptable: Yes or No***

__Field duplicate RPD ≤20% (≤35% for soils)

Comments/Qualified Results: no field duplicates analyzed

8. Laboratory Control Samples, Blank Spikes (Check all that apply)… ***Acceptable: Yes or No***

_√_ LCS %R 80-120%
__LCS %R 50-79% or >120%, results >IDL estimated (J)
__LCS %R 50-79% and results <IDL estimated (UJ)
__LCS %R <50% and all results rejected (R/UR)

Comments/Qualified Results: none

9. Spike Recovery (Check all that apply)…….. ***Acceptable: Yes or No***

__Spike %R with 75-125%
__Spike %R 30-74%, >125%, results > IDL estimated (J)
__Spike %R 30-74% results <IDL estimated (UJ)
__Spike %R <30%, results <IDL rejected (UR)
__Field blanks used for spike analysis

INORGANIC ANALYSIS
Data Verification Summary Checklist
October 14, 2019 Lab Data

Comments/Qualified Results: The % recovery of the spiked sample not applicable because the spike level is less than 30% of the sample concentration.

10. GFAA Performance, MSA, or Serial Dilutions…… ***Acceptable: Yes or No***

__Duplicate injection RSD <20%
__Duplicate injection RSD >20%, results > CRDL estimated (J)
__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

Comments/Qualified Results: not applicable

11. Other QC

Comments/Qualified Results: none

12. Result Verification…… ***Acceptable: Yes or No***

__All results supported in raw data

Comments/Qualified Results: not applicable

13. Overall Assessment…… ***Acceptable: Yes or No***

Comments/Qualified Results:

Table C-1: Daily Summary of XRF Analyses and Precision Runs

Sample Date	Sample Count	Split Count	Blank Count	NIST Count	Precision Run Count	Precision Runs N	Precision Run Sample IDs
6/12/2019	0		3	2	0		
6/14/2019	21	2	1	1			
6/15/2019	51	5	4	4	3	8,8,8	B-290-R1, B-097, B-351-R1
6/16/2019							
6/17/2019	51	5	4	4	1	7,8	B-379-R1, B-375-R1
6/18/2019	29	3	3	2	2	8	B-097-R3
6/19/2019							
6/20/2019	34	3	3	3	2	5,8	B-231-R2, Precision
6/21/2019	45	5	3	3	2	8, 7	Precision, Precision
6/22/2019							
6/23/2019							
6/24/2019	38	4	3	3	2	7, 10	Precision, Precision
6/25/2019	27	2	1	1	1	7	B-217-R5
6/26/2019	30	3	1	1	1	7	B-222-R1
6/27/2019	21	3	1	1	1	7	B-382-R1
6/28/2019	16	1	1	1	1	7	BX-038-R1
6/29/2019							
6/30/2019							
7/1/2019	18	2	2	2	1	11	Precision
7/2/2019	20	3	2	2	1	11	Precision
7/3/2019							
7/4/2019	2		2	2	1	6	B-161-R1
7/5/2019							
7/6/2019							
7/7/2019							
7/8/2019	0		3	3	1	8, 7	Precision, Precision
7/9/2019	39	4	3	3	1	7	Precision
7/10/2019	57	5	4	4	2	7, 7	Precision, Precision
7/11/2019	8	1	2	2	1	8	Precision
7/12/2019	1		1	1	1	6	B-108-R7
7/13/2019							
7/14/2019							
7/15/2019	38	4	5	5	2	8, 7	Precision, Precision
7/16/2019	14	2	2	2	2	8, 7	Precision, Precision
7/17/2019	6		1	1			
7/18/2019	5	1	1	1	1	7	Precision
7/19/2019	8	1	2	3	2	8, 7	Precision, Precision
7/20/2019	2		1	1	1	11	Precision
7/21/2019							
7/22/2019							
7/23/2019	1	1	1	1	1	10	Precision
Total	**582**	**60**	**60**	**59**	**35**	**263**	
5% of Total Samples	**29.1**						
Percent of Total Samples		**10%**	**10%**	**10%**	**6%**	**NA**	

Notes:

N = Total number of samples collected

NIST = National Institute of Standards and Technology

Table C-2: Analysis of XRF Results for Blanks

Date	Time	Sample ID	Units	Copper (ppm)
6/12/2019	8:18:38	Blank	PPM	4
6/12/2019	13:54:09	Blank	PPM	4
6/12/2019	13:58:34	Blank	PPM	4
6/14/2019	12:49:24	Blank	PPM	8
6/15/2019	6:39:57	Blank	PPM	6
6/15/2019	8:36:32	Blank	PPM	0
6/15/2019	11:30:40	Blank	PPM	10
6/15/2019	13:24:56	Blank	PPM	0
6/17/2019	7:30:19	Blank	PPM	6
6/17/2019	11:22:24	Blank	PPM	6
6/17/2019	13:45:52	Blank	PPM	5
6/17/2019	15:28:32	Blank	PPM	6
6/18/2019	10:02:28	Blank	PPM	13
6/18/2019	10:05:44	Blank	PPM	5
6/18/2019	12:59:01	Blank	PPM	7
6/20/2019	7:52:09	Blank	PPM	0
6/20/2019	12:59:54	Blank	PPM	0
6/20/2019	16:25:09	Blank	PPM	7
6/21/2019	7:04:06	Blank	PPM	7
6/21/2019	11:12:21	Blank	PPM	0
6/21/2019	12:27:38	Blank	PPM	8
6/24/2019	7:32:40	Blank	PPM	0
6/24/2019	11:53:30	Blank	PPM	7
6/24/2019	14:32:30	Blank	PPM	6
6/25/2019	10:48:19	Blank	PPM	0
6/26/2019	11:39:27	Blank	PPM	0
6/27/2019	12:47:05	Blank	PPM	0
6/28/2019	12:41:16	Blank	PPM	8
7/1/2019	7:48:50	Blank	PPM	14
7/1/2019	10:58:13	Blank	PPM	0
7/2/2019	8:05:40	Blank	PPM	0
7/2/2019	11:40:21	Blank	PPM	0
7/4/2019	9:10:37	Blank	PPM	0
7/4/2019	14:35:06	Blank	PPM	0
7/8/2019	10:13:03	Blank	PPM	7
7/8/2019	11:44:43	Blank	PPM	0
7/8/2019	12:51:25	Blank	PPM	0
7/9/2019	8:14:20	Blank	PPM	0
7/9/2019	14:05:20	Blank	PPM	0
7/9/2019	14:57:47	Blank	PPM	0
7/10/2019	6:09:48	Blank	PPM	0
7/10/2019	7:53:56	Blank	PPM	0
7/10/2019	10:41:06	Blank	PPM	12
7/10/2019	13:58:51	Blank	PPM	0
7/11/2019	7:48:16	Blank	PPM	0
7/11/2019	13:42:23	Blank	PPM	6
7/12/2019	7:26:12	Blank	PPM	0
7/15/2019	10:16:38	Blank	PPM	0

Table C-2: Analysis of XRF Results for Blanks

Date	Time	Sample ID	Units	Copper (ppm)
7/15/2019	11:27:29	Blank	PPM	12
7/15/2019	12:22:43	Blank	PPM	0
7/15/2019	16:23:57	Blank	PPM	8
7/15/2019	17:23:44	Blank	PPM	10
7/16/2019	6:47:42	Blank	PPM	8
7/16/2019	10:44:36	Blank	PPM	0
7/17/2019	6:20:35	Blank	PPM	0
7/18/2019	6:27:05	Blank	PPM	7
7/19/2019	6:05:30	Blank	PPM	0
7/19/2019	14:30:05	Blank	PPM	0
7/20/2019	12:03:27	Blank	PPM	8
7/23/2019	9:50:33	Blank	PPM	7
Count of Blank Results				**60**
Count of Blank Results = 0				**30**
Percent of Blank Results = 0				**50%**
Minimum Observed Blank Result				**0**
Maximum Observed Blank Result				**14**
Lowest Observed XRF Result				**35**
Maximum Blank < Lowest XRF?				**Yes**

Table C-3: Analysis of XRF Results for NIST 2711A

Date	Time	Sample ID	Units	Copper (ppm)	%D
NIST 2711A Certified Result (mg/kg)				**140**	
6/12/2019	8:21:13	Nist2711a	PPM	148	5.7%
6/12/2019	14:02:48	Nist2711a	PPM	149	6.4%
6/14/2019	12:53:00	Nist2711a	PPM	150	7.1%
6/15/2019	6:42:01	Nist2711a	PPM	153	9.3%
6/15/2019	8:38:40	Nist2711a	PPM	163	16.4%
6/15/2019	11:31:53	Nist2711a	PPM	168	20.0%
6/15/2019	13:25:59	Nist2711a	PPM	140	0.0%
6/17/2019	7:32:27	Nist2711a	PPM	157	12.1%
6/17/2019	11:24:20	Nist2711a	PPM	155	10.7%
6/17/2019	13:50:41	Nist2711a	PPM	147	5.0%
6/17/2019	15:30:26	Nist2711a	PPM	161	15.0%
6/18/2019	10:07:10	Nist2711a	PPM	154	10.0%
6/18/2019	13:00:49	Nist2711a	PPM	153	9.3%
6/20/2019	8:03:52	Nist2711a	PPM	141	0.7%
6/20/2019	13:01:06	Nist2711a	PPM	154	10.0%
6/20/2019	16:26:20	Nist2711a	PPM	151	7.9%
6/21/2019	7:06:44	Nist2711a	PPM	145	3.6%
6/21/2019	11:13:27	Nist2711a	PPM	154	10.0%
6/21/2019	12:30:31	Nist2711a	PPM	147	5.0%
6/24/2019	7:34:34	Nist2711a	PPM	149	6.4%
6/24/2019	11:54:55	Nist2711a	PPM	163	16.4%
6/24/2019	14:34:35	Nist2711a	PPM	156	11.4%
6/25/2019	10:50:17	Nist2711a	PPM	156	11.4%
6/26/2019	11:42:08	Nist2711a	PPM	164	17.1%
6/27/2019	12:49:09	Nist2711a	PPM	161	15.0%
6/28/2019	12:42:58	Nist2711a	PPM	165	17.9%
7/1/2019	7:50:08	Nist2711a	PPM	160	14.3%
7/1/2019	10:59:33	Nist2711a	PPM	156	11.4%
7/2/2019	8:08:32	Nist2711a	PPM	146	4.3%
7/2/2019	11:42:09	Nist2711a	PPM	152	8.6%
7/4/2019	9:12:05	Nist2711a	PPM	149	6.4%
7/4/2019	14:41:58	Nist2711a	PPM	148	5.7%
7/8/2019	10:17:01	Nist2711a	PPM	161	15.0%
7/8/2019	11:45:53	Nist2711a	PPM	152	8.6%
7/8/2019	12:53:06	Nist2711a	PPM	150	7.1%
7/9/2019	8:16:40	Nist2711a	PPM	148	5.7%
7/9/2019	14:06:33	Nist2711a	PPM	150	7.1%
7/9/2019	14:58:44	Nist2711a	PPM	153	9.3%
7/10/2019	6:11:14	Nist2711a	PPM	159	13.6%
7/10/2019	7:54:56	Nist2711a	PPM	149	6.4%
7/10/2019	10:42:59	Nist2711a	PPM	159	13.6%
7/10/2019	14:00:06	Nist2711a	PPM	163	16.4%
7/11/2019	7:50:53	Nist2711a	PPM	143	2.1%
7/11/2019	13:43:47	Nist2711a	PPM	153	9.3%
7/12/2019	7:27:18	Nist2711a	PPM	145	3.6%
7/15/2019	10:17:53	Nist2711a	PPM	149	6.4%
7/15/2019	11:28:34	Nist2711a	PPM	156	11.4%
7/15/2019	12:24:20	Nist2711a	PPM	153	9.3%
7/15/2019	16:24:55	Nist2711a	PPM	160	14.3%
7/15/2019	17:25:08	Nist2711a	PPM	147	5.0%

Table C-3: Analysis of XRF Results for NIST 2711A

Date	Time	Sample ID	Units	Copper (ppm)	%D
NIST 2711A Certified Result (mg/kg)				**140**	
7/16/2019	6:49:18	Nist2711a	PPM	171	22.1%
7/16/2019	10:46:34	Nist2711a	PPM	152	8.6%
7/17/2019	6:22:00	Nist2711a	PPM	148	5.7%
7/18/2019	6:29:12	Nist2711a	PPM	157	12.1%
7/19/2019	6:06:43	Nist2711a	PPM	150	7.1%
7/19/2019	6:07:21	Nist2711a	PPM	174	24.3%
7/19/2019	14:31:24	Nist2711a	PPM	156	11.4%
7/20/2019	12:04:31	Nist2711a	PPM	161	15.0%
7/23/2019	9:51:53	Nist2711a	PPM	166	18.6%
Minimum %D (absolute values)					0.0%
Maximum %D (absolute values)					24.3%
Number of Results					59
Number > [20%]					2
Percent > 20%					3.4%

Notes:

% D = $((C_s-C_k)/C_k)*100$

Where: %D = percent differnce

C_s = Sample concentration from XRF measurement (ppm)

C_k= Certified concentration from NIST standard (mg/kg)

Cells with green fill have %Ds > 20%

NIST = National Institute of Standards and Technology

Table C-4: Summary of Relative Standard Deviations for Each Precision Run Data Set

Date	Sample ID	N	Copper (ppm)	Iron (ppm)
6/15/2019	B-290-R1	**8**	**3.9%**	**1.6%**
6/15/2019	B-097	**8**	**6.2%**	**3.1%**
6/15/2019	B-351-R1	**8**	**1.9%**	**2.1%**
6/17/2019	B-379-R1	**7**	**1.2%**	**0.5%**
6/17/2019	B-375-R1	**8**	**2.7%**	**1.0%**
6/18/2019	B-097-R3	**8**	**3.6%**	**3.4%**
6/20/2019	B-231-R2	**5**	**0.5%**	**2.1%**
6/20/2019	Precision	**8**	**0.3%**	**0.3%**
6/21/2019	Precision	**8**	**0.9%**	**0.5%**
6/21/2019	Precision	**7**	**1.6%**	**0.5%**
6/24/2019	Precision	**7**	**0.7%**	**0.5%**
6/24/2019	Precision	**10**	**1.9%**	**0.4%**
6/25/2019	B-217-R5	**7**	**0.6%**	**0.2%**
6/26/2019	B-222-R1	**7**	**0.8%**	**0.4%**
6/27/2019	B-382-R1	**7**	**5.9%**	**0.5%**
6/28/2019	BX-038-R1	**7**	**0.6%**	**0.5%**
7/1/2019	Precision	**11**	**0.5%**	**0.4%**
7/2/2019	Precision	**11**	**1.4%**	**0.6%**
7/4/2019	B-161-R1	**6**	**0.7%**	**0.3%**
7/8/2019	Precision	**8**	**0.6%**	**0.2%**
7/8/2019	Precision	**7**	**0.7%**	**0.7%**
7/9/2019	Precision	**7**	**0.4%**	**0.5%**
7/10/2019	Precision	**7**	**0.3%**	**0.3%**
7/10/2019	Precision	**7**	**1.6%**	**0.5%**
7/11/2019	Precision	**8**	**1.0%**	**0.4%**
7/12/2019	B-108-R7	**6**	**0.5%**	**0.3%**
7/15/2019	Precision	**8**	**0.9%**	**0.6%**
7/15/2019	Precision	**7**	**2.5%**	**0.8%**
7/16/2019	Precision	**8**	**0.7%**	**0.6%**
7/16/2019	Precision	**7**	**0.6%**	**0.7%**
7/18/2019	Precision	**7**	**1.0%**	**0.5%**
7/19/2019	Precision	**8**	**0.7%**	**0.5%**
7/19/2019	Precision	**7**	**1.1%**	**0.5%**
7/20/2019	Precision	**11**	**0.6%**	**0.6%**
7/23/2019	Precision	**10**	**0.9%**	**0.5%**
Sample Count			**35**	**35**
Result Count[1]			**35**	**35**
Number < 20% RSD			**35**	**35**
Percent < 20% RSD			**100%**	**100%**
Number < 30% RSD			**35**	**35**
Percent < 30% RSD			**100%**	**100%**

Notes:

N = number of samples in a precision run

RSD = relative standard deviation

Precision Sample ID given when exact Sample ID is not known

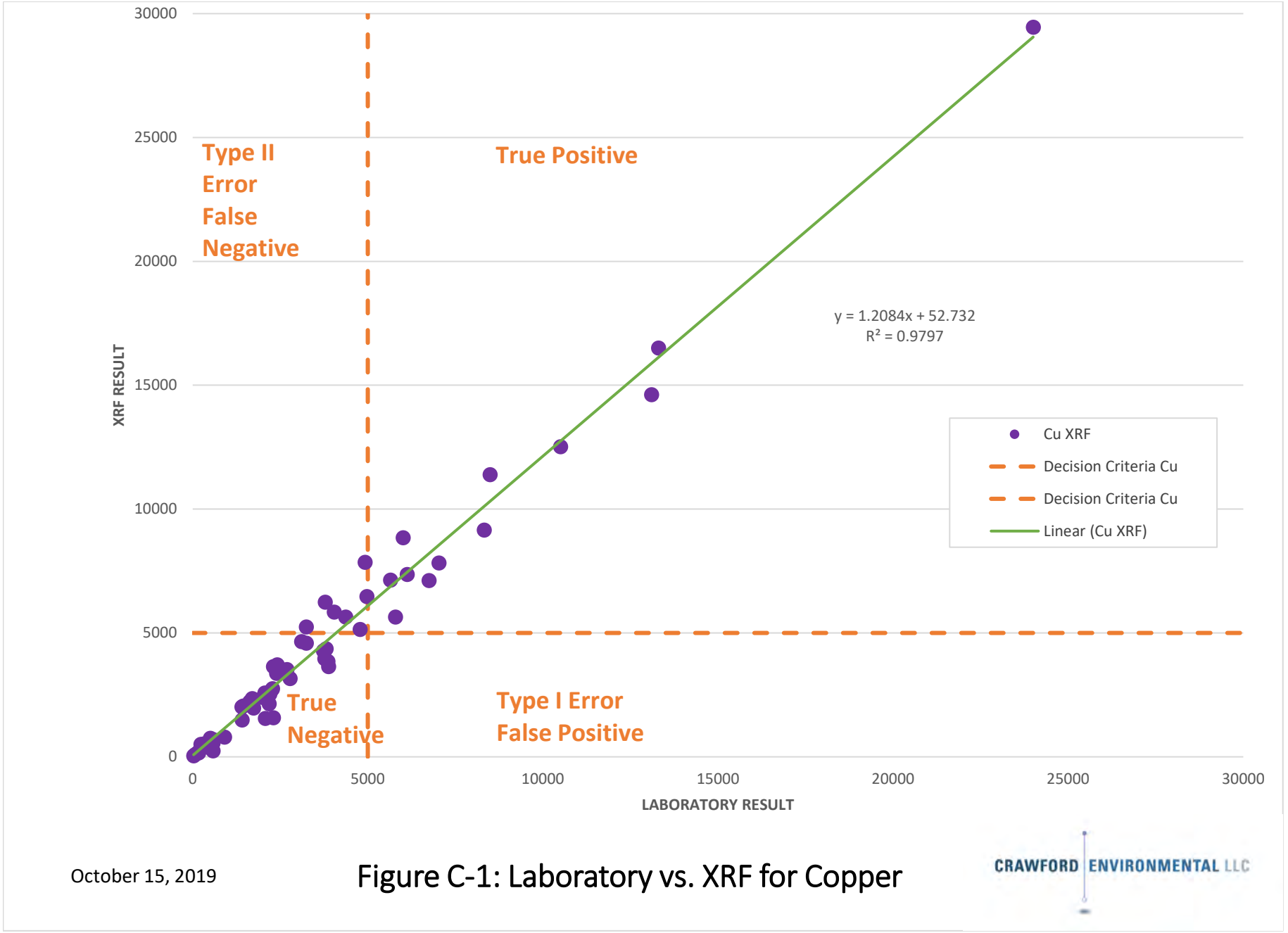

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Figure C-1: Laboratory vs. XRF for Copper

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