Appendix B

Year 5 Report on pH Monitoring to Evaluate the Effect of White Rain on the Smelter/Tailing Soils Investigation Unit

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Administrative Order on Consent Year 5 Report on pH Monitoring to Evaluate the Effect of the White Rain on the Smelter/Tailing Soils Investigation Unit

Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

March 2023

Administrative Order on Consent Year 5 Report on pH Monitoring to Evaluate the Effect of the White Rain on the Smelter/Tailing Soils Investigation Unit

Freeport-McMoRan Chino Mines Company
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Acronyms and Abbreviations

µm	microns
ABA	acid-base accounting
ACZ	ACZ Laboratories, Inc.
AGP	acid generation potential
ANOVA	analysis of variance
ANP	acid neutralization potential
AOC	Administrative Order on Consent
ARCADIS	ARCADIS U.S., Inc.
bgs	below ground surface
BSPM	backscatter photomicrograph
$CaCO_3$	calcium carbonate
Chino	Freeport-McMoRan Chino Mines Company
CuS	copper monosulfide
EDS	energy dispersive spectroscopy
EMPA	electron microprobe analysis
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
FeS_2	pyritic sulfide
FS	Feasibility Study
GCDNM	Gila Cliffs Dwelling National Monument
HCl	hydrochloric acid
HNO_3	nitric acid
ICP-AES	inductively coupled plasma-atomic emission spectroscopy
LEGS	Laboratory for Environmental and Geological Studies
m	meter
m^2	square meters

mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MMD	New Mexico Mining and Minerals Division
N	Normal
NMED	New Mexico Environment Department
NNP	net neutralization potential
NPR	neutralization potential ratio
NRCS	Natural Resources Conservation Service
PAG	potentially acid-generating
pCu	cupric ion activity
QAPP	Quality Assurance Project Plan
RAC	Remedial Action Criteria
RI	Remedial Investigation
STSIU	Smelter Tailings Soils Investigation Unit
SVL	SVL Analytical, Inc.
t $CaCO_3$/kt	tons calcium carbonate per kiloton
UCSD	University of California Sand Diego
USDA	United States Department of Agriculture
Work Plan	AOC pH Monitoring Plan, Smelter/Tailing Soils Investigation Unit

Executive Summary

This Technical Report on the “white rain” for the Smelter and Tailing Soils Investigation Unit (STSIU, **Figure 1**) has been prepared in accordance with the Administrative Order on Consent (AOC) between Freeport-McMoRan Chino Mines Company (Chino) and the New Mexico Environment Department (NMED). An approved Remedial Investigation (RI) Report for STSIU summarized results for a number of investigations showing depressed pH and elevated copper in shallow (0 to 6-inch depth) soil (Chino 1995, SRK 2008). On January 7, 2008, however, an alkaline “white rain” fell on shallow soil within the STSIU, and subsequent increases in soil pH were measured. Once analyzed, the white rain was found to contain a milky substance with a pH of 7.2 and a calcium concentration of 5.8 milligrams per liter (mg/L; **Figure 2**). The site-wide and STSIU-specific ecological risk assessments (ERAs, Newfields 2005, Newfields 2008) linked the toxic action of copper in soil on plants (and wildlife) to cupric ion activity (quantified as pCu), which is decreased by higher pH. Therefore, any potential change in pH from the milky substance is important to further evaluate. After discussion with NMED in May 2010, Chino submitted a Soil pH Monitoring Plan (Work Plan), which proposed to monitor pH (and other parameters) of the shallow soil within STSIU for 5 years, starting in fall 2010. NMED commented on the Work Plan in June 2010, and approved the Work Plan in July 2010 (ARCADIS 2010a).

During implementation of the Work Plan in 2011, NMED issued a Pre-Feasibility Study Remedial Action Criterion (Pre-FS RAC) for shallow soil within the STSIU of pCu[1] $\geq$ 5, where total copper in soil is > 327 milligrams per kilogram (mg/kg), to reduce soil toxicity to plants from copper (NMED 2011). In setting the pre-FS RAC, NMED noted:

> *Two significant events have occurred which may reduce the area where cupric ion activity is toxic to plants; the “white rain” event in January 2008 and the demolition of the smelter in 2007. The white rain event resulted in increase of pH in soil and since the smelter is no longer in use, additional acidic emissions no longer are contributing to lowering pH in soils...*

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[1] pCu = -log{Cu}, and is inversely correlated to cupric ion activity.

> *New information can be used to refine RACs and selection of alternatives, if sufficient information becomes available that all parties agree upon. This is supported by the NCP in §300.430(e)(2)(i) which states "establish remedial action objectives specifying contaminants and media of concern, potential exposure pathways, and remediation goals. Initially, preliminary remediation goals are developed based on readily available information….and should be modified, as necessary, as more information becomes available during the RI/FS."*

Consistent with the Work Plan and NMED (2011) correspondence, specific objectives of this report are to: (1) assess the magnitude of the white rain effect on soil pH and pCu, (2) determine if the pH and pCu increase is persistent, and (3) evaluate the effect of the white rain in remediating adverse effects of depressed pH and elevated copper on the ecosystem. This report summarizes the results related to the white rain analyses at the conclusion of the 5-year monitoring period, and provides new information that can be used by NMED in drafting the Record of Decision (ROD).

The results show that the white rain increased soil pH initially by approximately 1.2 standard units (S.U.) on average for locations in the STSIU with low pH (< 5.5); it had little to no effect on higher pH soils. For soils with an original pH of > 5.5, some natural buffering capacity may have existed before the white rain, conferring resistance in those soils to pH changes. In contrast, the originally acidic soils (pH < 5. 5) had lower buffering capacity, and the white rain resulted in an increased soil pH. The pH shift was sustained through 2014, and future persistence is benefitted by the following:

1. Future sources of potential acidity from smelting and windblown tailings have largely been eliminated by decommissioning the smelter and reclaiming most of the tailing ponds.
2. Typically, the acid soil (pH ≤ 5.5) whose pH increased to > 5.1 from the white rain had either positive net neutralization potential (NNP) values or those that met the New Mexico Mining and Minerals Division (MMD) topsoil suitability requirement of "Good" for plant establishment (> -5 kg $CaCO_3$/t).

3. Evaluation of soil mineralogy indicates that a proportion of total sulfide occurs as copper sulfides with lower reactivity relative to pyrite.

4. White rain events of various magnitude will likely occur in the future (one occurred in eastern Washington, eastern Oregon, and parts of Idaho in February 2015). The likelihood of such future events occurring in the project area is not known, however.

5. Natural pedogenic (soil-forming) processes will continue to function, and soil pH is expected to recover to baseline levels for soils of the area (pH = 6.1 to 8.4) at some time in the future.

However, persistence in the future cannot be predicted with certainty, nor likelihood of future white rain events, if any. This study evaluated persistence of a change in soil pH over a five-year period, and the report will be considered during the develop ment of remedies in the Feasibility Study (FS) for the STSIU. It is recommended that future periodic monitoring of soil pH, as a component of the overall STSIU site remedy, be included to confirm persistence of the generally higher soil pH. The frequency of pH monitoring will be determined during the FS process.

In contrast to pH, the total copper concentration present in shallow soil is not expected to change as a result of the white rain, though other causes of natural attenuation (source reduction or source removal, clean dust deposition, and erosion) may result in decreases in soil copper concentrations over time. Current data suggest that soil copper concentrations decreased during the 5-year duration of this study. The decreases in total copper, in addition to increases in pH, increased pCu as well. Copper concentrations in soil are spatially heterogeneous, making it difficult to be certain if the decrease in copper over time is real, and the mechanism for copper decrease has not been studied.

Increases in pH can lead to increased binding of copper in soil by secondary soil minerals, such as iron hydroxides, and reduce copper uptake into plants and the food chain (Mortvedt 2000). The effect of the pH shift from the white rain on plants and wildlife was assessed by evaluating copper concentrations in tissues of plants and terrestrial invertebrates before and after the white rain event. These data had been collected during other investigations (ARCADIS 2010b, 2014a). In locations showing an improvement (increase) in soil pH, the tissue copper concentrations decreased after the white rain by more than 60 percent for the plants and by up to 40 percent for the insects. Also, plant richness improved after the white rain on the untreated plots associated with an amendment study conducted for the STSIU (ARCADIS 2014a).

These results suggest that the nature and extent of elevated copper and depressed pH in shallow soil has changed since the Remedial Investigation and ERA reports were approved by NMED (SRK 2008; Newfields 2005, 2008). Along with the cessation of historical mineral processing operations and reclamation activities, natural attenuation from the white rain has increased soil pH and pCu, since the issuance of the Pre-FS RAC. The results suggest that, if areas continue to consistently show improvement in pCu over time, monitoring the natural attenuation of mining impacts may be a viable option to include in the set of alternatives to be evaluated for remediation in the FS.

1. Introduction

This draft Technical Report on the “white rain” for the Smelter and Tailing Soils Investigation Unit (STSIU, **Figure 1**) has been prepared in accordance with the Administrative Order on Consent (AOC) between Freeport-McMoRan Chino Mines Company (Chino) and the New Mexico Environment Department (NMED). An approved Remedial Investigation (RI) Report for STSIU summarized results for a number of investigations showing depressed pH and elevated copper in shallow (0 to 6-inch depth) soil (Chino 1995, SRK 2005). On January 7, 2008, however, an alkaline “white rain” fell on shallow soil within the STSIU, and subsequent increases in pH were measured.

Once analyzed, the white rain was found to contain a milky substance with a pH of 7.2 and a calcium concentration of 5.8 milligrams per liter (mg/L; **Figure 2**). The site-wide and STSIU-specific ecological risk assessments (ERAs; Newfields 2005, Newfields 2008) linked the toxic action of total copper detected in shallow soil on plants (and wildlife) to cupric ion activity (quantified as pCu), which is decreased by higher pH. Therefore, any potential change in pH from the milky substance is important to further evaluate. After discussion with NMED in May 2010, Chino submitted a Soil pH Monitoring Plan (Work Plan), which proposed to monitor pH (and other parameters) of the shallow soil within the STSIU for 5 years, starting in fall 2010. NMED commented on the Work Plan in June 2010, and approved the Work Plan in July 2010 (ARCADIS 2010a).

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Consistent with the Work Plan and the NMED (2011) correspondence, the specific objectives of this report are to: (1) assess the magnitude of the white rain effect on soil pH and pCu, (2) determine if the pH and pCu increase is persistent, and (3) evaluate the effect of the white rain in remediating adverse effects of the historical acid and copper deposition on plant and wildlife communities. This report describes the objectives and methods of the monitoring and summarizes the 5 years of monitoring results.

1.1 Background

Briefly, historical mineral processing (milling and smelting) in Hurley occurred from 1939 to 2002, and the historical smelter stacks were demolished in 2007. Prior to 2007, however, Chino completed an RI of the STSIU, including an evaluation of the nature and extent of pH and total copper in shallow soil (SRK 2008). On January 7, 2008, a white rain event took place and, during the event, a milky alkaline rain containing a large amount of suspended solids with calcium oxides, calcium hydroxides (e.g., lime), and other calcium-rich minerals was deposited across southwestern New Mexico, including the STSIU.

An upward shift in soil pH and calcium was observed in the field several months after the white rain event during sampling for the STSIU Amendment Study (ARCADIS 2014a; **Table 1**). The Amendment Study was designed to assess the effectiveness of remedial options including liming (see ARCADIS 2014a). The data collected for that study coincidentally bookended this white rain event before any pilot treatments had taken place, and alerted Chino to the possible substantial effect of this rain event on soil chemistry. Subsequently, Chino submitted a Technical Memorandum to NMED in 2008, which included an evaluation of all data available associated with the white rain event as well as a geochemical conceptual site model that described the possible effect of the white rain on the STSIU. This memorandum has been updated and is presented in **Appendix A.**

The source of the suspended solids in the white rain was found to be evaporites and dust in playas to the southwest of Chino. The University of California San Diego (UCSD) found that 75 percent of the mostly submicron particulate residues in a white rain sample taken at Gila Cliffs Dwellings National Monument (GCDNM) matched the chemical signatures of the evaporites in the Willcox playa in southeastern Arizona and the Lordsburg playa in western New Mexico (**Appendix A**). The white rain water had a pH of 7.2, as reported at the weather station located 40 miles north of Chino at GCDNM (**Figure 2a**), which is higher than had been observed in rainfall in the preceding 20 years (average pH is 4.8 to 5.3, **Figure 2b**). Similarly, the calcium concentration in this rain was higher than had been observed for the preceding 12 years (**Figure 2a**) which, along with the USCD residue analysis, supports that extremely fine (submicron and nanoparticulate) calcium-rich minerals and lime were carried in the rainwater.

The geochemical conceptual model of the effect of the white rain is shown on **Figure 3**. This conceptual model predicts that soil pH will increase and, if the additional buffering capacity from the 0.4 inch of white rain is high enough, the increase will be sustained. Soils exhibit both active and potential acidity (Sobek et al.1978). Potential acidity is the amount of acid that could be liberated, and is partially determined by the minerals in the soil. The amount of alkalinity from dissolved minerals in the rainwater (based on 0.4 inch of rainfall) is low and could neutralize only a small amount of active acidity in poorly buffered soils (see **Appendix B**). It is more likely that most of the alkalinity in the white rain that neutralized active acidity came from the submicron calcium-rich particulates (such as calcite [calcium carbonate], lime [identified by USCD] and dolomite present in the source playas, see **Appendix A**). These particles would have partially dissolved when mixed with the acidic soil water, increasing the buffering capacity and eventually neutralizing not only active but also potential acidity.

Alkaline rains with suspended solids such as Chino’s white rain event are not uncommon in arid regions around the world, as soils and their evaporites that produce dust in arid regions are often high in carbonate (CO_3^{2-}), bicarbonate (HCO_3^-), and calcium (Ca^{2+}; Zhang et al. 2012). For example, dust storm-related alkaline precipitation events have been documented in Tibet (Zhang et al. 2012), India (Mouli et al. 2005), South Africa (Resane et al. 2004), Zimbabwe (Nyika et al. 1996), and as recently as February 2015 in eastern Washington, eastern Oregon, and the Idaho panhandle (Sistek 2015). The chemical makeup of the precipitation depends on the concentrations of the soil constituents and the chemical transformations that occur during cloud formation (Mouli et al. 2005). The scientific evidence, therefore, supports the concept that playa dust combined with rainwater in the region may accelerate attenuation of historical impacts at Chino (**Appendix A**). This report assesses whether the January 7, 2008 white rain has accelerated the natural attenuation of such impacts.

In 2009, shallow upland soils (0 to 6 inches below ground surface [bgs]) were sampled at various locations in the STSIU (n = 33) for pH and total copper to preliminarily assess the potential spatial extent of the pH change due to the white rain event. This preliminary assessment suggested an upward shift in soil pH in large areas of the STSIU. Pre-[3] and post-white[4] rain pH contour maps (with estimated 1 S.U. pH "zones") created with the natural neighbor algorithm in ARCGIS were compared. This comparison of contours is only valid for the areas containing sample points in both years. In such areas, the maps suggest that the white rain reduced the footprint of the low pH zones (pH < 5; compare **Figure 4a** of pre-white rain pH contours to **Figure 5** of post-white rain pH contours in areas with samples on **Figure 5**; also see **Figure 4b** for pCu pre-white rain contours).

In contrast to pH, total copper present in shallow soil is not expected to change as a result of the white rain, though other mechanisms (source reduction or source removal, clean dust deposition, and erosion) may result in decreases in soil copper concentrations over time.

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[3] The pre-white rain data included to create the contour maps are shown in **Appendix E**.

[4] Note that the 2009 data (as well as the 5 years of long-term monitoring data collected in this Study) are too limited in number of locations (33) to accurately assess spatial extent of the change from the white rain across the STSIU, and the post-white rain map with contours is very preliminary, used only to design the pH monitoring program. A full spatial analysis of pH and pCu post-white rain will be documented in the STSIU FS Report. Because the 2009 data were not collocated with pre-white rain data, this report does not use the 2009 data to evaluate initial magnitude of the white rain, but instead relies upon soil pH from 1999 or 2006 as pre-white rain data to compare against data from the same locations sampled post-white rain from 2008 and 2010.

1.2 Objectives

1.2.1 Magnitude of the Effect of White Rain on Soil pH and pCu

The first objective of this report is to assess the magnitude of the white rain effect on soil pH and pCu by comparing chemistry of soils in the same location before and after the white rain. Soil pH (in combination with copper) strongly influences pCu, a key compliance metric. Therefore, Chino's ultimate objective was to estimate changes in soil pCu before and after the white rain event and the persistence of the change, as discussed further in the next section. Throughout this report, pCu is calculated from soil pH and copper concentrations (using the "upland with reference" equation in Newfields 2005), rather than empirically estimated using electrodes. Though not expected to change from the white rain, copper concentrations also are compared before and after the white rain.

1.2.2 Persistence of pH and pCu Change: 5-Year Monitoring

A second objective is to determine whether the increase in pH in upland soils that resulted from the white rain event is temporary or will persist in the future. Following the Work Plan (ARCADIS 2010a), soil pH was monitored at the same locations for 5 years from 2010 to 2014 to evaluate whether the pH improvement from the white rain was sustained. If the white rain neutralized or reduced both the active and potential acidity, the pH change should have been sustained through 2014.

The longer-term potential for pH persistence beyond 5 years also was evaluated with acid-base accounting (ABA), mineralogical analysis, and an assessment of buffering capacity. Buffering capacity, which confers resistance to pH change, was evaluated to assess the potential for future pH decreases after 2014. This capacity was determined by the:

1. Soil pH response to the white rain
2. Acid neutralization potential (ANP, as calcium carbonate available in the soil)
3. Maps showing distribution of soils on the STSIU with historically high calcium carbonates from rock.

Because sulfides in soils, particularly if they are similar to pyrite, can oxidize and produce acid in the future, ABA analyses included estimating percent of pyritic/sulfide sulfur in soils.

In the mineralogical analysis, the exact species of copper sulfide minerals in the soil were identified because sulfide species with high resistance to weathering are less likely to generate acid and alter pH. The more easily weathered sulfide minerals may cause the pH to decrease over time if sufficient ANP is not available to offset the acidity. Some of the soils in the STSIU may have an inherent capacity to buffer pH changes due to soil parent material being high in calcium carbonate (e.g., high ANP). Other soils may have poor buffering capacity, which may have increased after the white rain increased calcium-rich minerals in the soil.

As mentioned above, using initial data collected in spring 2008 through 2009, the white rain appeared to effectively buffer soils with calcium dissolved solids, removing the active acidity and increasing the pH to 5 or greater in many areas (**Figure 5**). Soils with a pH ≥ 5 in 2009 appeared to be acid-neutralizing based on initial 2009 ABA results (ARCADIS 2010a, **Appendix C, Table C-1**). Soil samples that exhibited pH < 5 were acid-generating (ARCADIS 2010a), consistent with their classification as very strongly acidic soils (pH 4.5 to 5.0) and extremely acidic soils (pH 3.5 to 4.4), as defined by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS 1998). The ABA parameters were monitored during the 5-year period to confirm this threshold for acid generation at a pH of 5.

If the initial pH increase after the white rain is persistent, the upward shift in pCu should also be persistent if copper concentrations do not increase. With cessation of historical mineral processing operations in 2002 and ongoing reclamation activities, there is no reason copper concentrations should increase; if anything, they should decrease. If pH or pCu do not change back to the pre-white rain condition, but the white rain effect diminishes over time, the amount it diminishes will also be evaluated.

1.2.3 The Effect of White Rain on Plants and Wildlife

The shift in pH, resulting in an increase in pCu and less bioavailable copper (Mortvedt 2000), has the potential to decrease copper uptake by plants and insects due to the increase in copper adsorption by secondary soil minerals (such as iron hydroxides) at higher pH values. If the shift is determined to persist, the plant and insect tissue copper concentrations are expected to decrease post-white rain, reducing toxic effects in plants and in the food chain. Results from the Insect Study (ARCADIS 2010a) and the final Amendment Report (ARCADIS 2014a) were evaluated to determine if there was a decrease in copper uptake resulting from the white rain in: (1) plants and (2) dietary items for small ground-feeding birds. These biotic media were evaluated because quality of the vegetation community in terms of cover and richness is important to wildlife habitat and rangeland, and the small ground-feeding bird is the wildlife receptor identified as of concern in the site-wide and STSIU-specific ERAs (Newfields 2005, 2008).

2. Datasets and Data Analysis Methods

The following sections provide an overview of the datasets, soil sampling design, analytical methods, and data analysis. The white rain was an unanticipated event; therefore, no study or formal work plan had been designed before the white rain to rigorously evaluate the magnitude of its effect. Instead, STSIU soil samples collected for other purposes (that often-used different field sampling methods) were used to the practical extent possible. Variability inherent in using data derived from different field sampling methods (e.g., composites vs. average of random samples) is evaluated in Section 3.4.

2.1 Datasets and Soil Sampling Design and Methods

2.1.1 Magnitude of Effect of White Rain Event on Soil pH and pCu

2.1.1.1 Initial Magnitude of Effect

In order to evaluate the initial magnitude of effect, appropriate and comparable datasets were identified for before and after the 2008 event. Shallow soil samples were identified for this purpose for 18 locations that had been sampled before and not long after the white rain event (0.5 to 2.5 years later). These locations came from the site-wide ERA (ERA locations, Newfields 2005) and amendment study locations (ARCADIS 2014a). Locations selected for the comparison were the: (1) “primary white rain effect” dataset and (2) the “validation-plus white rain effect” dataset. The “primary white rain effect” dataset includes ERA locations; the” validation-plus white rain effect” dataset includes these same ERA locations plus amendment study locations to validate results. Amendment plot data were too few to use solely as the validation dataset; rather, the amendment plot data were added to the ERA dataset to validate that the ERA dataset alone was giving reliable results. The samples in each dataset are described below for before and after the 2008 event:

<u>Before January 2008 “primary white rain effect” dataset:</u>

- 1999 soil samples at 14 upland ERA locations
    - These soil samples were collected in fall 1999 for the ERA (ARCADIS 2001).
    - Included were locations ERA 2 through ERA 15.
    - At the ERA locations, three shallow soil samples (0 to 6 inches bgs) were collected from each end and the center of a 50-meter transect and averaged[5]:

<u>After January 2008 “primary white rain effect” dataset:</u>

- 2010 samples at the same 14 upland ERA locations (0 to 6 inches bgs):
    - These soils were collected in September 2010 as part of an insect study (ARCADIS 2010b).
    - For each 2010 ERA location, one composite of 15 shallow samples (0 to 6 inches bgs) was collected within a 100-meter-radius plot.

<u>Before 2008 “validation-plus white rain effect” dataset:</u>

- Applies to pH data only and included the ERA locations above
- 2006 amendment study samples on four amendment plot locations also included, for which:
    - No copper data were available before the white rain, but pH data were available and included.

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[5] Total copper (and thus calculated pCu) was not available from the amendment plot data; therefore, analyses were first restricted to only the 14 ERA locations as the “primary white rain effect” dataset for all three (pH, copper, pCu) parameters.

  - The samples of soil were collected before any treatment in spring 2006 (ARCADIS 2014a).

  - Included were North, Northeast, East, and West Amendment Plot locations.

  - Soil samples were collected at one random shallow location (0 to 4 inches or 0 to 5 inches bgs) in each 100-foot-by-100-foot plot.

  - Reference plots adjacent to amendment plots were not available in 2006.

After January 2008 "validation-plus white rain effect" dataset:

- May/June 2008 samples of pH from the same four amendment study plot locations:

  - Samples of soil were collected before any amendment or tilling in the spring of 2008 (ARCADIS 2014a).

  - In the same plots that were sampled pre-white rain in 2006, soils were sampled and sieved (< 2mm) for paste pH in the field at 10 sub-locations in each plot in May or early June 2008, and the data were averaged per plot.

  - Soils were sampled for pH[6] for lab analysis at two sub-locations in each plot from three (east, north, northeast) of the same plots in May 2008.

  - The field- and lab-analyzed pH data were pooled and averaged for the post-white rain pH analyses. For the West Amendment Plot, pH was averaged over the field sample values only because no lab pH data were collected in 2008.

This validation dataset has 18 locations total.

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[6] Copper was also sampled post-white rain in 2008 on amendment plots and shown in graphs and tables of this report, but could not be included for the pre- and post- white rain statistical comparison for magnitude of effects because no copper data were collected pre-white rain in 2006 (nor on the West Amendment Plot in 2008, which had 2010 West Reference plot data reported as the first-post-white rain estimate).

2.1.1.2 Final Magnitude of Effect

To estimate the magnitude of the white rain effect at the study conclusion (particularly if the effect diminished), part of the “primary white rain effect” and “validation-plus white rain effect” datasets described above could be used. However, only a subset containing five locations in the “primary white rain effect” dataset and a subset containing nine locations in the “validation-plus white rain effect” dataset could be compared before the white rain and over the years after the white rain. These locations were sampled pre- (1999 or 2006) and early post-white rain (2008 or 2010) and in 2012, 2013, and 2014 (see Section 2.1.2 for methods used to sample these locations from 2012 to 2014). Because these datasets are limited and less representative, any suggestion of the white rain effect being diminished by 2014 (i.e., between 2010 and 2014) using these data was considered reliable only if the permanence monitoring dataset of 2010 to 2014 also showed a lack of persistence through time.

<u>These subset datasets include:</u>

- Primary subset: ERA 2, 3, 4, 10, and 13
- Validation-plus subset: Primary subset plus West, North, Northeast, and East Amendment (2006 and 2008) or the Reference Plots adjacent to the Amendment Plots (2010-2014; latter referred to as Reference #1, #2, #3, and #4 in the Work Plan [ARCADIS 2010a]).

The Amendment Study’s amendment plots were used for the 2006 pre-white rain data (because no adjacent reference plot data exist pre-white rain) and 2008 post-white rain data. This approach assumes that amendment plots exhibited pH estimates similar to those of the plots immediately adjacent, which were the plots that had data available for evaluating white rain effects from 2010 to 2014. The change in copper and pCu was not evaluated in the “validation-plus white rain effect” subset because the amendment plots lacked copper data pre-white rain.

2.1.2 Persistence of the pH and pCu Change: 5-Year Monitoring

The approved Work Plan was designed to evaluate the persistence of the pH and pCu change. Parameters monitored in the soil to track such changes include pH, total copper, and ABA, each monitored annually during the fall season from 2010 to 2014. Cupric ion activity, as pCu, was calculated from the pH and total copper results, as discussed earlier.

As proposed in the Work Plan, areas within three estimated pH zones (pH 4 to 5, 5 to 6, and 6 to 7) post-white rain, shown on **Figure 5**, were targeted for monitoring (ARCADIS 2010a). The zones had a lower pH prior to the white rain event. A minimum of six locations in each of the three pH zones were targeted to meet sample size criteria (see ARCADIS 2010a), which totaled 18 locations selected for long-term monitoring over a 5-year period. Four additional locations already monitored in the Amendment Study, reference plots were added to increase the total number of locations to 22 in 2010. The pre- and preliminary post-white rain pH and pCu zones used to select the 22 selected locations are shown in **Table 2**, along with five ERA locations, which were added in 2012 to comprise the long-term monitoring dataset.

Soil was excavated at four of the original sample locations in summer 2011 (FID 23, 43, 103, 104). Therefore, during the 2011 fall sampling event, only 18 of the initial 22 long-term monitoring locations were sampled. One additional location (FID 17) in 2013 was also excavated and dropped from sampling in 2013 and 2014 (**Figures 1** and **5** show their former locations). The primary excavation activities were conducted in support of reclamation of the older tailing impoundments. The excavations resulted in a final set of 17 locations that were monitored every year from 2010 to 2014 and were evaluated statistically for trends. This dataset of 17 is the “permanence monitoring” dataset.

Five new monitoring sites, which were collocated at previously sampled ERA locations, were added and sampled from 2012 to 2014 (ERA 2, ERA 3, ERA 4, ERA 10, and ERA 13).[7] These five locations met the selection criteria of low pH pre-white rain (≤ 5.5) and showed an improvement in pH post-white rain, when sampled in 2010 for the Insect Study (ARCADIS 2010b). The objective of monitoring these ERA locations differs from those objectives associated with the other locations. Adding the ERA

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[7] The five new monitoring sites, however, cannot be included with the other 17 pH monitoring locations when statistically evaluating annual changes across the target pH zones from 2010 to 2014 because they were not sampled in 2011 and were sampled using a different method in 2010. Specifically, the area of the sampling locations used to composite soil was much larger in the 2010 Insect Study (31,416 square meters [m^2]; ARCADIS 2010b) than the area sampled from 2010 to 2014 based on the approved Work Plan (2,500 m^2; ARCADIS 2010a), and only samples that met the rigorous standards of the Work Plan were included (unlike the retrospective magnitude analysis, which required using any suitable locations with pre- and post-2008 data, even if they were not sampled using the same methods).

locations allows interpretation of longer-term changes due to the white rain by evaluating trends from 1999 to 2014 and assessing changes in the final magnitude of effect as described in Section 2.1.1.2[8]. The final numbers of locations sampled during each year of the 5-year monitoring program were 22, 18, 23, 22, and 22 locations for 2010, 2011, 2012, 2013, and 2014, respectively.

Each of the soil locations monitored from 2010 to 2014 (including amendment reference plots) in the long-term monitoring dataset was a composite of five grab samples within a 50-meter (m) by 50 m square area. The five grab samples were collected at the centers and the four corners of the 50 m by 50 m squares, as described in the Work Plan (ARCADIS 2010a). The grab samples were offset in a different cardinal direction by 5 feet each year to avoid sampling the exact same location that was disturbed the year before and still provide samples closely collocated over time for a 5-year period.

2.1.3 Effect of White Rain on Plants and Wildlife

2.1.3.1 Vegetation Tissue Sampling

ARCADIS (2014a) evaluated the change in copper concentrations in aboveground plant tissue (seeds and foliage) that represented conditions just before and after (in 2013) the white rain on the plots of the Amendment Study. They also compared copper concentrations in tissue of plants growing on ERA locations with low pH soils (< 5.5 in 1999) before and after the white rain.

Datasets used in that report included:

- Plant tissue collected on West, North, Northeast, and East Amendment (represents before white rain) and Reference (after white rain) Plots

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[8] These locations were not originally included in the design of the approved Work Plan because they were not randomly located, represent only flat areas, under-represent locations that had very low pH (2 to 3) pre-white rain and, therefore, under-represent locations of post-white rain in the targeted pH zones of 4 to 5 and 5 to 6 (most ERA locations have a pH > 6 initially post-white rain).

- Plant tissue collected on ERA 1, 2, 3, 4, 7, 9, 10, and 13

Details on the sampling are provided in ARCADIS (2014a).

2.1.3.2 Invertebrate Tissue Sampling

ARCADIS (2010b) evaluated the change in copper concentrations in terrestrial invertebrate tissue before (1999) and after (2010) the white rain fell on 14 ERA locations.

Datasets from that study evaluated for this report included:

- Insect tissue collected on ERAs 2 through 15.

Details on invertebrate sampling methods are provided in ARCADIS 2010b.

2.2 Analytical Laboratory Methods

Samples collected pre- and post-white rain and as part of the pH monitoring program were analyzed using the following laboratory methods.

2.2.1 Magnitude of Effect of White Rain Event on Soil pH and pCu

Soil samples from the “primary white rain effect” dataset (1999 and 2010 ERA locations) were analyzed for total copper and pH by ACZ Laboratories, Inc. (ACZ), located in Steamboat Springs, Colorado. Samples were air-dried at 34 degrees Celsius before analysis, and all estimates were based on dry weight. In contrast, the 2006 and 2008 Amendment Study plot samples added to create the “validation-plus white rain effect” dataset (plus 2010 West Reference Plot substituting for missing copper value of 2008 West Amendment Plot), were analyzed for total copper (in 2008 only) and pH (2006 and 2008) by SVL Analytical, Inc. (SVL) in Coeur d'Alene, Idaho (except the West Reference Plot was analyzed by ACZ); those SVL soils were not air-dried, and results by dry weight were calculated. For both laboratories, total copper in soil was determined by subjecting samples to acid digestion using United States Environmental Protection Agency (EPA) 3050B protocol followed by inductively coupled plasma-atomic emission spectroscopy (ICP-AES) analysis (EPA 6010B) with a method detection limit of 1 mg/kg. Soil pH analysis was conducted with deionized water using a 1:1 soil to solution ratio (EPA 9045C) or, when sampled in the field, by saturated 1:1 soil to distilled water paste (ARCADIS 2001, ARCADIS 2010b, ARCADIS 2014a).

As described in the Amendment Study Report (ARCADIS 2014a), the amendment samples in the “validation-plus white rain effect” dataset collected historically (2006 to 2010) were not sieved, though the pre-FS RAC is based on sieved (< 2 mm) results. In order to conduct valid statistical analysis, all data were adjusted as if they were sieved for the 2 mm size fraction, a conservative adjustment. Regression equations displaying strong, significant relationship between sieved and unsieved soils were developed for this report by analyzing sieved and unsieved results for pH and copper from spring 2011 Amendment Study (analyzed by SVL, ARCADIS 2014a) and fall 2010 pH monitoring (by SVL and ACZ). These soils were analyzed twice, as sieved and unsieved, for the purpose of developing these regressions[9]. A comparison between sieved and unsieved soil pH data is shown on **Figure 6a**, and a comparison between sieved and unsieved soil copper data is shown on **Figure 6b**.

All pH and copper measured in years for which soils were not sieved were adjusted to estimate sieved values using these regressions. The results presented in the tables and text for this report are based on sieved or estimated sieved values. Raw unsieved data for copper collected to evaluate the white rain effect in 2009 are provided in **Appendix C** as well as other 2009 sieved data**. Appendix C** has pH and copper data that are not part of the white rain effects or permanence datasets but are included in that appendix to be available as supplemental information that illustrates the same general trends observed using the main datasets (see **Figure C-1** and Statistical Analysis in **Tables F-5, F-6, and F-7**).

2.2.2 Persistence of the pH and pCu Change: 5-Year Monitoring

This section discusses analytical methods employed to analyze the soil chemistry (pH, copper, pCu), ABA results, and mineralogy to monitor and evaluate persistence.

2.2.2.1 Soil Chemistry and Acid Generation Potential

ACZ analyzed the composite soil samples collected for the approved Work Plan for pH, total copper, and ABA, including sulfur forms. The copper and pH data were used to calculate pCu. The Work Plan states that samples analyzed for copper and pH will be sieved to less than 2 mm. This protocol was followed, except in 2010, when the four

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[9] $pH_{sieved} = 1.191pH_{unsieved} - 1.5781$, $r^2 = 0.90$, $P < 0.001$; $Cu_{sieved} = 1.0129Cu_{unsieved} + 232.43$, $r^2 = 0.88$, $P < 0.001$.

amendment study reference plot soil samples (Reference 1 through 4) were inadvertently not sieved prior to analysis by SVL. These samples, reported on a wet weight basis, were adjusted to represent copper and pH of air-dried sieved samples using the regression equations described in Section 2.2.1.

The analytical methods used for soil chemistry (pH, copper, and ABA) include:

- Soil pH analysis using deionized water (EPA 9045C or saturated paste)

- Total copper analysis by acid digestion using EPA 3050B followed by ICP-AES (EPA 6010B) with a method detection limit of 1 mg/kg

- Samples were air-dried at 34 degrees Celsius before analysis, and all estimates were based on dry weight. Soils subjected to ABA analysis were sieved to < 250 microns (µm) following standard procedures.

- The ABA analysis included measurement of neutralization potential and sulfur forms (total sulfur, pyritic/sulfide sulfur, sulfate sulfur, and organic/insoluble sulfur) using the Modified Sobek procedure (EPA M600/2-78-054), specifically:

  - Neutralization potential in percent as calcium carbonate ($CaCO_3$) was determined using EPA M600/2-78-054 3.2.3, with a 0.1 percent method detection limit. The laboratory calculated ANP in tons $CaCO_3$ per kiloton (t $CaCO_3$/kt) by multiplying the neutralization potential by 10.

  - Sulfur forms (total, pyritic/sulfide sulfur, sulfate sulfur, and organic/insoluble sulfur) were determined using EPA M600/2-78-054 3.2.4 with a 0.01 percent detection limit. Total sulfur content was determined by combustion via Leco furnace. Sulfur forms were analyzed on separate sample aliquots, with a subsample being digested in 4.8 Normal (N) hydrochloric acid (HCl) and another being digested in 2 N nitric acid (HNO_3). ACZ uses the terms pyritic/sulfide sulfur; however, this methodology does not distinguish between true pyritic (FeS_2) and non-pyritic sulfide minerals. For example, copper monosulfide and covellite (CuS) are included in the pyritic/sulfide sulfur category, and the ABA analysis conservatively assumes that all sulfides are highly acid-generating, similar to pyrite (not true as discussed in Section 3.3).

  - ARCADIS calculated acid-generating potential (AGP) in t $CaCO_3$/kt by multiplying the sulfide sulfur content (reported as pyritic/sulfide sulfur by ACZ) in percent by a conversation factor of 31.25 based on acidity generated by pyrite oxidation (i.e., conservatively assuming that all sulfide sulfur oxidation is represented by pyrite oxidation).

- ABA results were used to determine the neutralization potential ratio (NPR = ANP/AGP) and net neutralization potential (NNP = ANP - AGP). These criteria are commonly used to categorize material into potentially acid-generating (PAG) or non-potentially acid-generating (non-PAG) categories.

Numerous interpretation schemes have been developed to assess the potential for acid generation using either criterion. For example, a sample with an NPR < 1.0 will typically be characterized as PAG; whereas an NPR > 2.0 represents a non-PAG sample (i.e., at least twice as much ANP as AGP, Steffen et al. 1992). A sample with NPR values between these designations is considered to have uncertain acid-generating characteristics and should be evaluated further. The New Mexico Mining and Minerals Division (MMD) soil and overburden suitability guidelines, which are directly applicable, rate soil material as good based on an NNP of -5 t $CaCO_3$/kt or greater and unacceptable based on an NNP of < -5 t $CaCO_3$/kt (MMD 1996).

2.2.2.2 Mineralogical Analysis

The sulfur form analysis does not provide information on the specific minerals and their acid-generating potential, which varies from mineral to mineral. In 2009, 12 of the 2009 soil sample locations on **Figure 5** were sampled for a mineralogical analysis of the form (species) of minerals containing copper. This information supplements the sulfur form data. Note, this analysis focused on species of copper in the soil, and included iron sulfide minerals lacking copper only if sorbed with copper. Dr. John Drexler's Laboratory for Environmental and Geological Studies (LEGS) at University of Colorado at Boulder performed the speciation analysis on the samples under an electron microprobe to evaluate the types of copper minerals present. Specifically, his laboratory used a JOEL 8600 electron microprobe, with four wavelength dispersive detectors (TAP, LIF, PET, LdB, LdC, and Ld1 crystals) and an energy dispersive detector. The system includes backscatter and secondary detectors for imaging and can produce both x-ray spectra and photomicrographs in TIF format.

The standard operating procedure for metal speciation is available at: http://www.colorado.edu/GeolSci/legs/speciation.html[10]. Certified mineral standards for all elements of concern were applied for electron microprobe analysis (EMPA) standardization. Representative backscatter photomicrographs (BSPMs) illustrating sample characteristics were acquired. Energy dispersive spectroscopy (EDS) spectra were also acquired. **Appendix D, Table D-1** provides the relative copper mass of species of copper in the soil samples. **Appendix D** also provides images from the spectra and frequency of occurrence of the copper species.

2.2.3 Evaluation of the Effect of White Rain on Plants and Wildlife

Plant tissue samples collected representing pre-white rain (unwashed) and post-white rain (washed and unwashed) tissues were subjected to total copper analysis similar to the soil samples. The samples were subjected to acid digestion using EPA 3050B followed by ICP-AES analysis (EPA 6010B) with a reporting limit of 1 mg/kg.

Invertebrate samples collected pre-white rain (unwashed) and post-white rain (washed) were analyzed for total copper by ICP-AES (USEPA Method 3050B / 6010B) of a homogenized subsample of insects collected. All estimates were initially based on wet weight. Percent moisture was determined for the 2010 post-white rain event tissues so that final insect tissue concentrations could be presented on a dry weight basis. Dry weight concentrations were estimated for the 1999 pre-white rain event tissues using 71 percent moisture, based on the average moisture of the 2010 insects.

2.3 Data Analysis

In addition to plotting the data to evaluate trends, statistical methods were employed to evaluate the magnitude and persistence of the white rain event impacts as discussed below. Parametric tests were employed unless assumptions of the test were not met, even after data were transformed[11]. When assumptions were not met, the non-parametric equivalent test was employed. Statistical analysis and calculations used the

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[10] Last referenced in 2015.

[11] Transformation decisions were guided by calculating the lambda in Box-Cox transformation tests.

detection limits when values were lower than the detection limits. Additionally, the primary for each duplicate was used for the analyses.

2.3.1 Magnitude of Effect of White Rain Event on Soil pH and pCu

As discussed above in Section 2.1.1, pH, total copper, and pCu (calculated from pH and copper) were compared at locations sampled before and after the white rain event to evaluate the initial and final magnitude of the effect of the white rain. Using the “primary white rain effect” dataset ($n = 14$ for pH, copper and pCu, **Table 3**), the data were compared pre- and early post-white rain with two-tailed paired t tests to evaluate the initial effect. To evaluate whether the final magnitude of the effect diminished over time, the pre-white rain samples for the “subset of primary white rain effect” dataset were compared to samples from the early post-white rain period (2010) and the years 2012 to 2014, using repeated measures analysis of variance (ANOVA).[12] If the ANOVA was significant, a post-hoc pairwise comparison was conducted to assess which years significantly differed. All statistical tests in this report assumed significance if $p < 0.05$.

The white rain may not have much of a measurable effect (or at least a long-term effect) on the pH of soils that contained low acidity before the white rain (i.e., pH ≥ 5.5). Therefore, these analyses were also split into two groups of those with pH ≤ 5.5 ($n = 7$) and those with pH > 5.5 ($n = 7$) before the white rain event, based on observations of locations in the former group showing increased pH, but not those in the latter group. Finally, the pH analyses were re-run with the larger “validation-plus white rain effect” ($n = 18$) dataset to verify that the results are consistent with the primary dataset.

2.3.2 Persistence of the pH and pCu Change: 5-Year Monitoring

To evaluate whether the decreased acidity in post-white rain soils remained unchanged over the monitoring period, the repeated measures ANOVA test was run on the “permanence monitoring dataset” to test for significant changes over time for pH,

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[12] A parametric repeated measure ANOVA requires both normality and sphericity of residuals. Normality was met, but the Greenhouse-Geisser or Huynh-Feldt correction was applied to all three parameters to meet the test assumption of sphericity in the main ANOVA.

copper, and pCu from 2010 to 2014. If the test was significant, post-hoc pairwise comparisons were performed to identify which years were significant.[13]

In addition to comparing samples collocated in time, all 17 samples were pooled to evaluate the overall trend in the mean over time of pH, copper, and pCu. The non-parametric Mann-Kendall trend analysis, which does not require linearity, was performed to determine if a monotonic increasing, decreasing, or stable temporal trend was apparent for any of the three parameters for the “permanence monitoring” dataset.

2.3.3 Analysis of Acid Base Accounting Results

Because the NNP and NPR data from the ABA did not meet repeated measures test assumptions, even when transformed (data were non-normal), the non-parametric Friedman test of repeated measurements on collocated samples was used to test for significant changes from 2010 to 2014 for NNP and NPR at the 17 sites in the “permanence monitoring” dataset. Additionally, to best understand the potential for acid generation that would reduce pH across the STSIU, ABA results for 32 of the 33 2009 locations sampled allowed assessment of percentage of the STSIU area with sulfide-producing minerals and that might become more acidic. This “2009 dataset” (see **Appendix C, Table C-1**) contains many of the “permanence monitoring” locations but also includes many other locations. Of note, 12 of these 2009 locations (see **Appendix D, Table D-**1) were further sampled for mineralogical analysis to evaluate the most common copper sulfide-producing minerals, as discussed above.

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[13] A Bonferroni correction to the post-hoc comparison test p value of 0.05 was not applied to conservatively avoid Type II errors (the error of stating not significantly different when is different). Consequently, some of the significant post-hoc comparison test results may be spurious (because using 95 percent confidence level results in 5 percent of tests being significant by chance); this report mentions this when that might be the case. To meet repeated measure ANOVA test assumptions, the natural log transformation and Greenhouse-Geisser correction were applied to the pH data. The Box-Cox transformation ($\lambda = -0.16$) and Huynh-Feldt correction were applied to the copper data. The Greenhouse-Geisser correction was applied to the pCu calculated values.

2.3.4 Spatial Analysis of pH and pCu Persistence

To support the statistical analyses that test for persistence of the pH change, maps showing pH and pCu values at sampled locations in 2010 and 2014 were created. These maps were examined to evaluate whether all local areas monitored showed no change in pH or pCu during the post-white rain period, which would suggest consistent persistence. If some areas of the STSIU changed over time in a manner different from other local areas, then the change may not remain persistent in some areas, even if no pH change is observed on average across the STSIU[14].

2.3.5 Effect of White Rain on Plants and Wildlife

Statistical analyses conducted to compare plant tissue copper concentrations before and after the white rain are detailed in ARCADIS 2014a. However, the pre- and post-white rain copper concentrations in insect tissue were not statistically compared in the 2010 Insect Study because the white rain was not the focus of that study (ARCADIS 2010b). Therefore, a two-sided paired t test was employed to evaluate the significance and magnitude of the white rain effect. The 1999 insects were not originally washed, however, and the copper data were adjusted to remove the effect of soil on the 1999 unwashed insects. A comparison of the weight of a subset of the 2010 unwashed insects that were then washed suggests that the weight of the insects from soil is no more than 0.4 percent (ARCADIS 2011c). Therefore, the 1999 copper concentration data in ARCADIS 2010b were adjusted to account for 0.4 percent of the weight having soil copper concentrations at the locations sampled.

3. Results

Results from the data analysis described in Section 2 are summarized below.

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[14] These maps do not represent a complete picture of the current distribution of pH and pCu, which will not become available until the STSIU FS report is submitted to NMED. The STSIU FS report will include contour maps based on a different and very large sample dataset specifically designed and collected for this purpose.

3.1 Magnitude of Effect of White Rain Event on Soil pH and pCu

3.1.1 Initial Magnitude

Using the “primary white rain effect” dataset (n = 14), soil pH significantly increased from 6.1 before the white rain in 1999 to 6.6 not long after the white rain in 2010 (increased by 0.5 S.U., paired t test, p = 0.04; see **Tables 3 and 4**). **Figure 7** illustrates that soils with pH ≤ 5.5 consistently increased in pH early after the white rain, but that was not true of locations with pH > 5.5. For locations in this dataset with high pH (>5.5), the data showed no significant increase in soil pH (7.3 pre- and 7.1 S.U. post-white rain, p = 0.1; **Table 4**). Conversely, for locations with low pH (≤ 5.5), the increase in soil pH was significant and large, with a 1.2 S.U. initial increase (from 4.8 to 6.0, p = 0.0004). The larger validation-plus dataset, which included the amendment plots (n = 18), produced the same results but with larger increases in pH of 0.7 S.U. increase using all data, 1.25 S.U. increase for only the soils with pH ≤ 5.5, and no significant change (p = 0.9) for soils when pH > 5.5 (**Table 4**). West Reference Plot 1, which increased from a pH of 6.5 to the 7 to 8 range, was the notable exception to high pH soils not increasing in pH after the white rain (**Figure 7**).

In contrast to pH, pre- and early post-white rain copper concentrations in 2010 did not quite show a significant change in concentrations based on the “primary white rain effect” dataset (497 mg/kg before and 434 mg/kg after, paired t test, p = 0.08; **Tables 3 and 4).** Copper concentrations at individual locations also showed no consistent pattern of change from the white rain (**Figure 8**).

Using the same “primary white rain effect” dataset, mean calculated pCu for pre- and early post-white rain periods significantly increased from 6.0 to 6.6 (0.6 unit increase, p = 0.02; **Tables 3 and 4**). Similar to pH results, locations with low pH (≤ 5.5) and correspondingly low pCu (≤ 6, **Figure 9**) showed an even higher significant increase of 1.4 pCu units (from 4.6 to 6.0, p < 0.0001) than the 0.6 average increase for all the data. Further, locations with high pH (> 5.5) showed no significant increase in soil pCu (p = 0.8).

3.1.2 Final Magnitude of Effect of White Rain Event

Statistical analysis results (discussed further in Section 3.2 below) indicate that the pH increase just after the white rain was sustained and persistent through 2014. The ancillary 2009 pH data added to other years of data also support no significant change in pH from 2009 through 2014[15]. The final magnitude of the pH effect in 2014 is concluded to be similar to the initial magnitude in acidic soils reported in Section 3.1.1. While pH remained the same, however, copper concentrations decreased during the early post-white rain period from 2010 to 2011, and the calculated pCu correspondingly significantly increased in 2011 and stayed high (increased by 0.5, see results in Section 3.2). This pCu increase is due to the copper decrease, not a delayed positive effect of the white rain. These conclusions are based on the robust “permanence monitoring” dataset representative of variable terrain and soils with altered pH.

The subset of “primary white rain effects” dataset also supports that the white rain continued to produce beneficial effects 7 years later (by 2014). Similar to the robust permanence monitoring dataset, this smaller subset (n = 5) of the “primary white rain effects” dataset showed no significant change in pH after the white rain through 2013. However, this dataset showed a significant decrease in the magnitude of the pH shift from the white rain in 2014, dropping from an initial pH increase of 1.4 S.U. to a diminished increase of 0.8 S.U. (repeated measures post-hoc comparisons test, $p < 0.05$; **Appendix F, Tables F-1 to F-4**, **Figure F-1**). This inconsistent finding with the rest of the results is not strongly supported because the three amendment plots that were originally acidic (North, Northeast, and East in the “validation plus white rain effects” subset) do not appear to indicate lower pH in 2014 than that observed in earlier years after the white rain (see **Figure C-1, Appendix C**). Therefore, the decrease is not consistent among locations (three of the eight locations in the subset of “validation-plus white rain effects” dataset do not decrease in 2014), and most likely represents year-to-year fluctuations.

3.2 Persistence of the Change: 5-Year Monitoring of pH, Copper, and pCu

Over the 5-year monitoring period, soil pH for the 17 collocated locations of the “permanence monitoring” dataset did not change significantly (repeated measures ANOVA, $p = 0.2$; **Table 5, Figure 10**). When restricted to locations that likely had low

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[15] **Figure C-1 in Appendix C** provides additional supporting information using 2009 and some 2008 post-white rain data compared to collocated data in later years (later years are from the “permanence monitoring” dataset). These data show a sustained higher pH and pCu trend over the 6- or 7-year period. The pH does not significantly change during this post-white rain period from 2008 or 2009 to 2014 (**see Appendix F, Table F-5;** also see **Tables F-6 and F-7** for copper and pCu changes, respectively, with 2009 data included).

pH before the white rain (e.g., those that had pH post-white rain in 2010 of < 6.4; n = 12), the same result was obtained (p = 0.3). Overall, the means averaged over all data do not support a consistent trend downward (Mann-Kendall p = 0.7, **Figure 11, Table 6**), suggesting that the higher pH from the white rain is persisting[16]**.** The mean pH values for the 17 locations were similar at 5.45, 5.24, 5.27, 5.46, and 5.22 in 2010, 2011, 2012, 2013, and 2014, respectively (**Table 6**). The combined mean pH of the monitored locations over the 5-year period was 5.33[17].

Over the 5-year monitoring period, however, soil copper concentrations for the same “permanence monitoring” dataset changed significantly (repeated measures ANOVA, p < 0.0001) (**Table 5, Figure 12**). Total copper concentrations were significantly lower in 2011, 2012, 2013, and 2014 than in 2010 (post-hoc comparisons test, p < 0.05, **Table 6**). The 2010 mean was 478 mg/kg higher than the average of the four later years. Specifically, the mean total copper concentration for the dataset was 1,296 mg/kg in 2010 vs. 873 mg/kg, 851 mg/kg, 682 mg/kg, and 867 mg/kg in 2011, 2012, 2013, and 2014, respectively. Mann-Kendall analysis did not reveal a significant smooth upward or downward trend in means averaged over all data (p = 0.4, **Figure 13, Table 6**). Both statistical tests (repeated measures and Mann-Kendall) indicate that the trend is not a steady linear or monotonic change; instead, the change is largely due to a step function change after 2010, where total copper concentration dropped between 2010 and 2011 at most locations and remained at a consistently lower level through 2014.[18]

Copper concentrations in soil are heterogeneous spatially, resulting in high variability during each sampling period and increasing uncertainty in observed trends. Notably, during the lower copper concentration period of 2011 to 2014, copper was significantly

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[16] The year 4 pH monitoring report (ARCADIS 2014b) indicated a significant change in pH from 2010 to 2013. This is driven by a drop in pH between 2010 and 2011 that was likely spurious because increases in pH observed in later years (i.e., 2011 to 2013) appear to have stabilized and made insignificant what appeared to be an initial downward trend (see **Appendix F, Table F-9**).

[17] This mean pH value is not representative of the entire STSIU, only locations where pH shifted and was monitored. The representative 2009 randomly selected samples show the STSIU average pH is estimated to be 6.7 (average of field pH data in **Table C-1, Appendix C**).

reduced again in 2013, and then significantly increased by 2014 back to the previous 2011 and 2012 level (post-hoc comparisons test, $p < 0.05$, **Appendix F, Table F-9**). Such temporary reductions illustrate fluctuations may be temporary. The significant decrease in copper between 2010 and 2011, however, has been sustained to 2014. The 2010 fall soil samples were analyzed by both SVL and ACZ (to develop a sieved and unsieved relationship) and after sieving adjustments to make the data comparable, results show similar trends of higher copper in 2010 than 2011, which supports that laboratory conditions are not responsible for the shift. It is possible that the decrease is a result of high spatial variability of copper, however, as discussed in Section 3.4.

Although there was not a significant change in pH over the 5-year monitoring period, the decrease in total copper caused a significant increase in soil pCu using the "permanence monitoring" dataset (repeated measures ANOVA, $p = 0.006$). Soil pCu was significantly higher in 2011, 2012, and 2013 (by 0.5 on average) than in 2010 (post-hoc comparisons test, $p < 0.05$; **Table 5, Figures 14 and 15**). Specifically, mean pCu values for the 17 locations in the dataset were 4.48, 4.77, 4.83, 5.26, and 4.67 in 2010, 2011, 2012, 2013, and 2014, respectively (**Table 6**). The combined mean pCu over the 5-year monitoring period was 4.80[19]. Mann-Kendall analysis of all data did not reveal a significant smooth upward or downward trend ($p = 0.4$, **Table 6**) because the decrease was mostly a step function caused by the reduction in copper by 2011. Consequently, similar to copper but in the reverse direction, an increase in pCu from 2010 to 2011 was observed, and pCu remained at a higher level through the rest of the years monitored.[20] Because the shift from 2010 to 2011 is based on the uncertain copper shift, this shift in pCu between 2010 and 2011 also is uncertain.

3.2.1 Spatial Analysis of pH and pCu Persistence

Figures 16 to 19 show the spatial distribution of soil pH and pCu results post-white rain for the 22 monitoring locations sampled in 2010 and 2014. These maps are based

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[19] This mean pCu value is not representative of the entire STSIU, only in locations where pH shifted and was monitored. The representative 2009 randomly selected samples show that the STSIU average pCu is estimated to be 6.2 (average of pCu data in **Table C-1, Appendix C**).

[20] Following copper concentration changes, pCu significantly increased again in 2013, and then significantly decreased by 2014 back to the previous 2011 and 2012 levels (post-hoc pairwise comparisons test, $p < 0.05$, **Appendix F, Table F-10**).

on a small set of location data[21] and are only provided in this report for the purpose of comparing 2010 to 2014 data to assess whether some local areas changed in pH or pCu more than other local areas in the STSIU. The maps do not show evidence of major shifts in pH back to pre-white rain values and support that persistence of the pH change was not confined to a localized area (compare **Figures 16 and 18**). **Figures 17 and 19** show that the change in pCu between 2010 and 2014 also was not constrained to any local areas. Also, the magnitude of the shift in pH from the white rain was not associated with any particular vegetation zone (**Figure 20**), nor to any geologic unit (**Figure 21**)[22].

Spatial changes in total copper concentrations can be investigated best by looking at the bar graphs showing changes over time for individual locations. The decrease in copper concentrations that caused pCu to increase, particularly between 2010 and 2011, was consistent across the STSIU (**Figure 12**) except for FID 10, FID 17, and North Reference Plot 2. It is unclear why these three locations did not show a decrease, but they are very close to or just north of the smelter (**Figure 1**). However, the northeast Reference Plot 3, FID 15, and FID 16 are also near those three locations and did show a decrease, indicating that geographic location is probably not the reason copper did not show a decrease in the three plots. Overall, most of the monitored STSIU locations showed some decrease in copper concentrations over the monitoring period (**Figure 12**). Given the high variability of copper, it is unclear if this decrease, unrelated to the white rain, is spurious.

3.2.2 Acid-Base Accounting

Total sulfur content in the soil samples collected in the STSIU from 2009 to 2014 ranged from 0.01 to 1.02 percent, with a mean of 0.16 percent (**Table 7, Appendix C, Table C-1**). These concentrations are low and fall within the range of background concentrations for sulfur in soil in the western United States (from < 0.08 to 4.8 percent, with a mean of 0.19 percent; Shacklette and Boerngen 1984). Pyritic/sulfide

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[21] See **Appendix E** for locations and data used to create pre- and post-white rain maps.

[22] Note that, though **Figure 21** does not show the west side of mining facilities as Gila Conglomerate Formation, this geologic unit does occur at depth in that area, creating calcareous soils (prior to mining) as shown on **Figure D-1 of Appendix D.** Sitewide Abatement Stage 1 (Golder unpublished) shows that the soil samples on the west side are more alkaline.

sulfur content was low, with levels low enough to be difficult for the laboratory to accurately quantify. For example, 50 to > 90 percent of the samples from each year exhibited detected results below the practical quantitation limit of 0.1 percent. These were flagged as estimates due to the low sulfur content (**Table 7**). The sulfur data also showed high variability, which is consistent with the inherent heterogeneity typical of soil samples.

It follows that the NNP and NPR values, calculated from the pyritic/sulfide sulfur data below the 0.1 percent practical quantitation limit, were also flagged as estimates. Partly because of high variability, the mean NNP and NPR estimates did not significantly differ at the same 17 locations over the 5-year monitoring period, even though the mean in 2010 was high, as shown below (permanence monitoring dataset, $p > 0.7$, Friedman test, **Table 7**). The mean estimates were:

- Mean NNP = 23.2, 8.7, 10.8, 15.6, and 5.9 t $CaCO_3$/kt for 2010, 2011, 2012, 2013, and 2014, respectively ($p = 0.7$).

- Mean NPR = 51.8, 10.5, 10.9, 18.3, and 14.3 for 2010, 2011, 2012, 2013, and 2014, respectively ($p = 0.9$).

Post-white rain in 2010 to 2014, 53, 47, 29, 47, and 44 percent of the 17 locations exhibited NPR less than 1.0 (meaning they are identified as PAG), and 53, 59, 29, 53, and 69 percent exhibited NPR less than 2.0 and could be identified as either “uncertain” or PAG (**Table 7**, **Figure 22**). From 2010 through 2014, however, only six, six, zero, six, and one of the samples (subjected to ABA) with pyritic/sulfide sulfur content greater than the 0.1 percent practical quantitation limit are in the uncertain or PAG NPR range. This equates to only 35, 35, 0, 35, and 6 percent of the 17 samples each year being of potential concern due to higher pyritic sulfur and being PAG.

The percentages provided above are based on monitoring locations and do not represent the entire STSIU. Of the larger, more representative, random sample of 32 soils collected throughout the STSIU in 2009 and analyzed, only 16 percent exhibited NPR < 2.0 and 12.5 percent exhibited < 1.0 (includes those with pyritic sulfide sulfur below the practical quantitation limit, see **Appendix C, Table C-1**). For this 2009 estimate, ARCADIS had to assume 60 percent of total sulfur is pyritic/sulfide sulfur, given the sulfur forms were not evaluated that year. The 60 percent estimate was used because, on average, pyritic sulfide sulfur makes up 60 percent (range of 55 to 70 percent) of the total sulfur content in samples collected from 2010 to 2014.

The ABA results for each location plotted on scatter plots of NPR or NNP against pyritic/sulfide percentages or pH for each year from 2009 to 2014 provides insight into the range of sulfide percentages associated with uncertain and PAG soils (using NPR < 2 criteria, **Figures 22 to 24**). Generally, the category of pyritic/sulfide sulfur ranged from 0.01 to 0.6 percent for PAG samples with NPR < 1 (**Figure 23**), which is a very wide range (see Price 2009) and confirms that the sulfur form analysis, with variable results from year to year, is not very helpful for identifying PAG samples.

Additionally, the soils monitored over time did not have the same PAG status every year, confirming the variability in the ABA results and soil heterogeneity. Only four of the soils that were sampled more than once (n = 25 from 2009 to 2014) exhibited an NPR consistently < 2.0 every year sampled, which were FID 16, 23, 101, and ERA 10. Another four samples exhibited an NPR of > 2.0 for 17 to 25 percent of the years sampled (FID 17, 18, 102, and East Reference #4). The rest (68 percent) were always or often NPR of > 2. The data show that soils with NPR values < 2.0 are not only inconsistently classified as PAG but often had low pyritic/sulfide sulfur content and low ANP; therefore, it is more important to consider NNP soil guidelines than to focus on NPR.

NNP data were plotted against pH to illustrate the pH range of locations higher than the MMD NNP criteria of -5 t $CaCO_3$/kt. In almost every year since 2009, almost all the samples meet the MMD criteria of “Good” and acceptable for topsoil suitability of greater than or equal to -5 T $CaCO_3$/Kt (**Figures 23 and 24**). In 2009, 2010, 2011, 2012, 2013, and 2014, only one, five, two, one, zero, and one sample, respectively, were below this MMD threshold (**Table 7, Figure 24**). More importantly, with only one exception (**FID 8 in 2010)**, all acid soils (pH < 5.5) where pH increased to >5.1 by the white rain exhibit NNP values greater than the MMD criteria of -5 T $CaCO_3$/Kt required for suitable plant establishment. Despite the high variability in NNP shown on **Figure 24**, almost all the soil NNP values never changed their classification relative to the threshold over 6 years of monitoring with respect to acid generation. Only one sample, FID 102, was lower than the MMD criteria for more than 2 years (below criteria for 3 of 5 years sampled)**.** The high variability is in part due to the near-detection levels of sulfide-sulfur, which in itself speaks for a very limited capacity of the soils to generate acid regardless of their NNP. Therefore, the ABA results support that soil with pH > 5.1 generally are not likely to be acid generating.

Finally, the buffering capacity appeared to be sufficient to resist changes from the white rain in higher pH soils (> 5.5). The low pH soils that increased in pH to > 5.5 with the addition of calcium-rich minerals after the white rain appear to have higher buffering capacity. Locations with mean pH values > 5.5 averaged ANP of 26 t $CaCO_3$/kt compared to 3 t $CaCO_3$/kt for locations with mean pH < 5.5 (using annual means of data in **Tables 5 and 7).**

3.2.3 Mineralogical Analysis

Sulfide minerals, whether copper or iron sulfides, can weather and generate acidity in soils. A primary focus of the mineralogical study in the STSIU soils was to identify the presence of copper-bearing minerals, which could potentially contribute to the future release of both acidity and copper to the soil solution. Both copper and iron sulfides are expected to be present in the STSIU soils, and this assumption for copper was confirmed by the mineralogical analysis. Ranked in order from high to low abundance, the copper sulfide content in 12 of the 2009 upland STSIU soil samples consisted of cubanite ($CuFe_2S_3$), chalcopyrite ($CuFeS_2$), bornite (Cu_5FeS_4), and covellite (CuS) (**Appendix D, Table D-1).** Other sulfide minerals, such as pyrite (FeS_2) and pyrrhotite (FeS), were not identified in the 12 STSIU soil samples from 2009 because they are not associated with copper phases, which was the focus of the mineralogical assessment. However, in the adjacent Hurley IU, a mineralogical assessment was performed that also focused on copper speciation but reported that pyrite was present (Golder 2002). It is likely that pyrite is also present in STSIU soils. In the STSIU soils, copper sulfides are expected to be more abundant than iron sulfides because the smelter was processing primarily copper ore, and iron sulfides originating from tailings weather, becoming depleted more rapidly compared to copper sulfides. Though copper sulfides are expected to be the primary sulfide-bearing minerals in STSIU soils based on the available information, sulfide-sulfur results from ABA testing could represent a combination of copper- and iron-bearing sulfides.

Copper was also found to be associated with several secondary minerals commonly found in soils, such as iron and manganese hydroxides (FeOOH, MnOOH). These secondary minerals are typical weathering products derived from oxidation of sulfides introduced from smelter fallout and windblown tailings. They also are products from weathering of major minerals (feldspars and phyllosilicates) that occur naturally in the soils. Especially for iron oxides, these secondary minerals have the capacity to attenuate copper through surface adsorption processes, which becomes more effective with increasing pH. Consequently, the net effect of the soil pH increase from the white rain is to decrease copper mobility and bioavailability by decreasing the cupric ion activity in solution.

The STSIU soils also contain an assemblage of acid-neutralizing minerals that can potentially act to counteract any acidity generated by sulfide mineral oxidation. The current investigation indicates that the important acid-neutralizing minerals contributed to the soils from the white rain are in the form of nanoparticulate calcium oxide and calcium hydroxide, which were directly identified in samples of the white rain (**Appendix A**). These minerals will eventually convert to calcite (calcium carbonate mineral) upon reaction with carbon dioxide in the soil. Because the primary focus of the white rain investigation was to identify the composition of the entrained rainwater particulates, additional acid-neutralizing minerals present in the soils were not identified. Available mineralogical data for two soil series (Abrazo and Lonti soil) within the STSIU indicate that their mineralogy is dominated by primary quartz and feldspar minerals and aluminosilicates including montmorillonite, mica, and kaolinite (NRCS Soil Survey). Although the primary minerals and aluminosilicates may contribute to the overall acid neutralizing capacity of the soils, their rates of dissolution and subsequent acid neutralization are slow relative to carbonates and other calcium minerals added by the white rain (White et al. 1999). Therefore, the white rain addition of calcite had an important effect on the acid neutralizing capacity of the soils.

3.2.4 Mineralogical Interpretation of ABA Results

Concern might be raised that oxidative weathering of sulfide minerals in STSIU soils could eventually liberate acidity and subsequently decrease soil pH. However, the ability of a soil to generate acidity upon weathering depends on both the net capacity for acid generation (NNP) in conjunction with the relative rates of acid generation and acid neutralization. Sulfide minerals are less likely to generate acid when their ratio of metal to sulfide is high (≥1), they have high resistance to weathering, they do not contain iron or arsenic, and the oxidant is oxygen rather than ferric iron (Fe^{3+}) (Kalinnikov et al. 2001, Moncur et al. 2009, EPA 1994). The copper sulfide minerals in the STSIU soils generally meet these criteria and are thus expected to have slower weathering rates and be less likely to generate acid compared to pyrite in the STSIU soils. In addition, copper sulfides also generate less acid per amount of sulfur compared to pyrite. For example, oxidation of pyrite to iron hydroxide generates 2 moles of H^+/mole sulfur:

$$FeS_2(s) + 3.75O_2(g) + 3.5H_2O(l) \rightarrow Fe(OH)_3(s) + 2SO_4^{2-}(aq) + 4H^+(aq)$$

Cubanite ($CuFe_2S_3$) only produces 1.3 moles of H^+/moles sulfur, and chalcopyrite ($CuFeS_2$) only produces 1 mole of H^+/mole sulfur upon oxidation:

$$CuFe_2S_3(s) + 6.5O_2(g) + 5H_2O(l) \rightarrow 2Fe(OH)_3 + Cu^{2+}(aq) + 3SO_4^{2-}(aq) + 4H^+(aq)$$[23]

$$CuFeS_2(s) + 4.25O_2(g) + 2.5H_2O(l) \rightarrow Fe(OH)_3(s) + Cu^{2+}(aq) + 2SO_4^{2-}(aq) + 2H^+(aq)$$

As noted in Section 2.2.2.1, the AGP (expressed as $CaCO_3$/kt) is calculated by multiplying the sulfide-sulfur content by a factor of 31.25, which assumes that all sulfide-sulfur exists as pyrite. Therefore, the AGP values would be overestimated for samples containing appreciable copper sulfides; consequently, the NPR values shown on **Figure 22** and the predominantly positive NNP values depicted on **Figures 23** and **24** could be underestimated and are thus conservative.

Although pyrite may be a minor component of the total sulfide-sulfur in the STSIU soils, this has not been confirmed; therefore, the sulfide-sulfur identified by ABA analysis could represent a combination of both iron and copper sulfide minerals. Regardless, the relative rates of acid neutralization will remain greater than the rates of acid generation, even if all acid generating minerals are conservatively assumed to be pyrite. The initial step of acid generation by pyrite as described in **Appendix A** is:

$$2FeS_2(s) + 7O_2(g) + 2H_2O(l) \rightarrow 2Fe^{2+}(aq) + 4SO_4^{2-}(aq) + 4H^+(aq)$$

Considering the site-specific mineralogy of minerals introduced into the soil from the white rain (calcite, calcium oxide, calcium hydroxide), these minerals (e.g., for calcite) will neutralize the acidity (H^+) produced by sulfide mineral oxidation as follows:

$$CaCO_3(s) + 2H^+(aq) = Ca^{2+}(aq) + CO_2(g) + 2H_2O(l)$$

The relative rates of these two competing reactions ultimately determines whether a soil with positive NNP will become net acidic or net alkaline. A compilation of weathering rate data normalized to mineral surface area indicates that calcite dissolves much more rapidly than pyrite (or chalcopyrite) under oxic conditions (Herbert and Kova 1998). These relative rates suggest that, if calcite or other soluble acid-neutralizing minerals are present in sufficient amounts, as indicated by the positive NNP values in soils with pH ≥ 5.1 (**Figure 24**), the acid-neutralizing minerals will dissolve rapidly enough to consume the acidity released from sulfide minerals and thus maintain net alkaline conditions (Herbert and Kovar 1998). All of these

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[23] (s) = solid, (g) = gas, (l) = liquid, (aq) = aqueous ion

factors combined may explain why soil re-acidification, indicated by downward pH shifts, have not been observed during the 5-year monitoring period.

3.3 The Effect of White Rain on Plants and Wildlife

For plants, ARCADIS 2014a estimated that, after the white rain fell on the three low pH plots in the amendment study (Reference Plots 2, 3, and 4), mean copper tissue levels significantly decreased by about two thirds to 31 mg/kg, only 11 mg/kg higher than the maximum of the nutritional requirement range of 8 to 20 mg/kg copper for agricultural plants (Schulte and Kelling 1991). On the two West Control Plots in this study (includes Reference 1, which also exhibited soil pCu increase from the white rain), copper also was reduced by about the same amount (60%) to approximately this level in plants (35 to 37 mg/kg). Though this result is based on a limited sample size (four locations with 13 samples before and 26 samples total after the white rain) and some uncertain adjustments for season, the increase is consistent with the conceptual model that lime would reduce cupric ion activity and uptake of copper into plant tissue. Plant richness also increased after the white rain (ARCADIS 2014a).

Insects also showed decreases in tissue copper after the white rain. Total copper concentrations in the 2010 insect samples were significantly lower than those in the pre-white rain 1999 samples (paired t test, $p = 0.03$, **Table 4**), averaging 203 mg/kg in 1999 before the white rain and 132 mg/kg in 2010 after the white rain (35 percent decrease, **Table 10**); 71 percent of the 2010 locations exhibited lower insect copper concentrations than in 1999 (**Figure 9**). Of those locations with low soil pH pre-white rain ($\leq$ 5.5), the insect copper concentrations decreased from an average of 194 mg/kg to 117 mg/kg (40 percent decrease), though that decrease was not quite significant ($p = 0.1$), potentially because of the high mobility of flying insects (not always tied to the collocated low pH soils). The lower plant and insect copper concentrations post-white rain provide evidence that the increase in pH and pCu is reducing uptake of copper into these organisms.

3.4 Soil Data Variability

Reliability in the results depends on repeatability of the results. There are different types of variability, depending on spatial scale sampled, that reduce repeatability (ITRC 2012). The variability ranges from the smallest scale of variability in laboratory subsample duplicates to variability in field sample duplicates (within sample variability), to spatial variability in the sampled field area, and/or variability in sampling methods.

The variability in (1) field sample duplicates and (2) sampling errors in the field when sampling method changed were evaluated. For the field duplicates, the variability in pH and total copper is shown in **Table 8**. Relative percent difference in pH compared to the mean of the primary and duplicate samples in the “permanence dataset” over the 5-year monitoring period varied between 0 and 15 percent, and total copper varied between 1 and 32 percent. Additionally, if copper concentrations are on a log scale, similar to pH log scale (and often the scale of statistical analyses on copper), then the variability of copper is only 0 to 6%. The variability was within the acceptable limits set forth in the AOC Quality Assurance Project Plan for Chino (QAPP, SRK 1997), which is a relative percent difference of +/-50 percent for soil if results are greater than five times the reporting limits. This duplicate variability is consistent with the expected inherent soil heterogeneity within the composite samples.

Duplicate results in the “permanence dataset” support that variability in ANP (0 to 200 percent) and pyritic/sulfide sulfur (0 to 67 percent) in some years (**Table 8**) was relatively high, resulting in high calculated NNP and NPR variability above QAPP standards; therefore, the capability to detect differences in ABA is low. Variability in ANP and sulfur forms (used to determine AGP) was likely due to inherent soil heterogeneity and because measured values of pyritic/sulfide sulfur are very close to the detection and practical quantitation limits (0.01 and 0.1 percent, respectively), as mentioned previously. The ABA results are still useful if most of the samples, despite high variability, exhibit high NNP relative to MMD thresholds for topsoil suitability, which is the case.

After determining the laboratory variability, the variability created by using different field sampling methods was assessed. Spatial heterogeneity in soil parameters during field sampling using different sampling methods was high, as seen by comparing 0 to 6 inch bgs soil results from the same four reference locations in the Amendment Study area at the same time using three different sampling methods (**Table 9, Figure 25**). For the first method, the pH monitoring program used composite sampling in a 50 m x 50 m plot that extended beyond the original 100-foot by 100-foot amendment reference plot (2.6 times larger area sampled) but sampled in similar locations (four corners and center of 50 m x 50 m plot) each year. For the second, random sampling of three to eight samples was used for the Amendment Study to capture the average condition in the each 100-foot x 100-foot reference plot (ARCADIS 2014a). For the third method, one sample was selected at each reference plot as part of a phytotoxicity study in 2013 (ARCADIS 2014c). Comparing the pH monitoring method and Amendment Study method on the reference plots at the same time from 2010 to 2013, differences in pH and total copper can vary up to 37 and 86 percent, respectively (**Table 9, Figure 25**).

Similarly, comparing the pH monitoring method and single sample method on the reference plots in October 2013, differences in pH and copper can vary up to 27 and 91 percent, respectively. The high spatial variability in copper is one reason that the decrease in copper observed between 2011 and 2012, though statistically significant, might be uncertain. The decrease to a lower copper concentration in 2011 that does not bounce back appears to be more obvious in the pH monitoring dataset for the four plots in **Figure 25b** than in the amendment monitoring dataset, though the amendment dataset does tend to show reductions in three of the plots between 2011 and 2012.

The persistence of the pH change relies on the accuracy and precision of the pH data identified with the duplicate variability, not the method variability (method was consistent from 2010 to 2014). The finding of no significant change in pH during the monitoring period in Section 3.2 is considered reliable because the variability in the pH duplicates meets the criteria of the QAPP. The finding of a statistically significant change in copper concentrations over time, despite some variability of the copper concentrations in duplicates (30% relative percent difference), indicates that the copper shift observed after 2010 is likely to be real. The ABA data, on the other hand, are not precise enough to assess annual changes but useful to compare to threshold MMD criteria.

4. Discussion

This report summarizes the results of the effect (after 7 years) of the January 7, 2008 white rain event on the STSIU soils. The monitoring results (previously also reported in annual reports: ARCADIS 2011b, 2012, 2013, and 2014b) evaluate whether the change from the white rain in soil chemistry appears to be persistent.

4.1.1 Magnitude of the Effect of White Rain on Soil pH and pCu

The white rain event in January 2008 neutralized some of the acidity in the more poorly buffered soils of the STSIU. The white rain increased soil pH in low pH soils by an average of 1.2 S.U and pCu by an average of 1.4 units, but had little effect on high pH soils. This suggests that soils with pH > 5.5 had some natural buffering capacity before the white rain event. The exception was the high pH soil of the West Reference Plot 1, which increased from a pH of 6.5 to the 7 to 8 range (**Table 4**).

4.2 Persistence of pH and pCu Change: 5-Year Monitoring

The 1.2 S.U. magnitude of increase in pH (on average) in the monitored low pH ($\leq$ 5.5) sample locations was sustained through 2014, 7 years after the white rain event, as supported by the “permanence monitoring” dataset. The four amendment plots alone bookend the January 2008 white rain event (sampled in 2006 and May 2008), and the three originally acidic plots of these four (East, North, Northeast) show a similar increase that was sustained through 2014 (**Figure C-1 in Appendix C**). Overall, the white rain has had a beneficial effect on the STSIU by increasing soil pH in acidic areas, and most data support that the initial increase has persisted on average. This suggests that the white rain’s alkalinity and calcium-rich minerals increased the buffering capacity of even the poorly buffered soils. This increase in soil pH is expected to persist in the future because:

1. Soils whose pH increased to greater than or equal to 5.5 no longer contain active acidity (Thomas 1996).
2. Future sources of potential acidity have largely been eliminated.
3. Soils whose pH increased to greater than 5.1 exhibit either positive NNP values or meet the MMD acceptance criteria of “Good” for topsoil suitability (NNP > -5 t $CaCO_3$/kt).

The STSIU soils formerly with a pH <5.5 contained active acidity in the form of free H^+, and also potential acidity in the form of exchangeable aluminum (Al^{3+}) and sulfide-sulfur. The white rain increased the pH of acid soils (pH ≤ 5.5) by approximately 1.2 pH units (on average from 4.8 to 6.0); therefore, active acidity from H^+ and potential acidity from exchangeable aluminum has been completely neutralized (above pH of 5.5, active acidity is essentially gone, Thomas 1996). Additional sources of potential acidity from smelting and windblown tailings have largely been eliminated by decommissioning the smelter and reclaiming most of the tailings ponds. In the absence of additional future sources, all soils with existing pH values greater than 5.1 have little to no risk of generating additional acidity based on their existing ABA status and rapid rates of acid neutralization compared to acid generation as discussed in Section 3.2.4. Additionally, sulfide contents are low, even in soils with a pH less than 5, and some copper exists in mineral forms that are less reactive, which supports the likelihood that the white rain benefit will persist, even in more acidic areas. Moreover, some of the most acidic and potentially acid-generating soils were removed during reclamation activities in 2011 (FID 23, FID 43, FID 103), which further reduces concern over future acid generation.

The addition of acidity from future rainfall is also not expected to change the potential acidity of the soils because the soil acidity likely is driven by weathering of sulfide minerals, not rainfall. The sulfide minerals, even at very low amounts, overwhelm the small contribution from the rain (see **Appendix B**). Rainwater chemistry has generally improved in the southwestern U.S. during the past two to three decades, notably becoming less acidic. For example, at the National Atmospheric Deposition Program's monitoring station in GCDNM (National Trends Network Site NTN NM01, the NTN site nearest to the STSIU), the pH of precipitation has increased from approximately 4.8 to 5.4 since 1988 (**Figure 2b**; see NM01 site at http://nadp.isws.illinois.edu/data/sites/). Concurrent with the decreased acidity at that site, sulfate deposition has steadily decreased by approximately 75 percent (i.e., the precipitation contains less sulfuric acid); and the depositions of calcium, magnesium, sodium, and potassium (base cations that indicate alkaline contributions to the buffering of acids) have remained approximately constant at a combined total of about 1 kg/ha/year (equivalent to 46.6 moles of alkalinity per ha per year based on 1985 to 2012 data in **Appendix B, Table B-2**). The pH increase and sulfate decrease are likely a result of decreased sulfuric acid emissions from power plants in the southwestern U.S. Other monitoring stations in New Mexico and Arizona have recorded similar trends of increasing pH, decreasing sulfate deposition, and approximately constant base-cation deposition since the mid-1990s (e.g., NTN NM07 – Bandelier National Monument; NTN NM12 – Capulin Volcano National Monument; NTN AZ03 – Grand Canyon National Park; NTN AZ06 – Organ Pipe Cactus National Monument; see the same NTN webpage cited above). Therefore, annual average rain chemistry at the STSIU can be expected to continue to be increasingly less acidic and contain increased net alkalinity (i.e., the difference between alkaline and acidic inputs), thereby not countering the neutralization of soil pH by occasional white rain events.

Finally, the buffering capacity appeared to be sufficient to resist changes from the white rain in most higher pH soils (> 5.5). The low pH soils that increased in pH to > 5.5 with the addition of calcium carbonate/oxides after the white rain should now also have higher buffering capacity, increasing their resistance to pH change, whether from acidic or alkaline inputs. Soils influenced by the Gila Conglomerate Formation (**Figure 21**) and those that have developed naturally to contain high calcium carbonates likely have the highest buffering capacity and resistance to change (i.e., FID 22, FID 28 [in Gila Group], and West Reference Plot 1 have highest mean ANP as calcium carbonate, **Table 7 and Appendix C, Table C-2**). **Figure D-1** shows calcium carbonate concentrations in soils without factoring in mining effects (from NRCS soil survey), showing higher calcium carbonate concentrations on the west side of the STSIU. With time, natural pedogenic processes will continue to function and soils are expected to eventually recover to baseline soil conditions. The pH of natural soils in the area ranges from 6.1 to 7.3 in Luzena soils, 6.6 to 7.3 in Muzzler soils, 7.9 to 8.4 in Plack soils, and 6.1 to 8.4 in Lonti soils (NRCS Soil Survey).

A ramification of the pH increase from the white rain has been not only an increase in soil pCu initially, but the pCu increase has been sustained or increased by 2014. The pCu improvement was enhanced by a reduction in copper over time, with the significant reduction (unrelated to the white rain) occurring mostly between 2010 and 2011 and persisting through 2014. A reduction in total copper reduces the amount of free cupric ion in the soil. An increase in pH also increases the extent of copper adsorption to secondary minerals such as iron hydroxide, and further reduces free cupric ion availability for uptake by plants.

The statistically significant reduction in copper concentration in the soil between 2011 and 2012 is uncertain as to whether it is real or is an artifact due to high variability of copper that affects sampling (see **Figure C-1 in Appendix C** for data from 2008 to 2014). Any change in copper concentrations is unlikely a result of the white rain. The white rain-deposited minerals could decrease leachability of copper from the soil (**see Appendix A**), but is not expected to decrease copper concentraitons. If the change is not an artifact of high variability, the decrease is possibly from the cessation of the smelter operation in 2002 and the reclamation of historical tailing impoundments, followed by natural erosion of upland soils removing the historical copper. Additionally, after capping tailings, clean dust is now blowing and depositing on the soils, diluting the copper. In 2011, one or more of these factors may have accelerated the reduction in copper concentrations that year. Unusually large storms in 2011 may have eroded soils on steep and rugged terrain. Storms and their effects are highly localized on the STSIU, making it difficult to ascertain from precipitation records if storms were a contributor.

Alternatively, sampling that year may have coincidentally been on locations with higher copper concentrations than later years, or the laboratory calibration of analytical equipment may have created systematic errors. Many of the fall 2010 concentrations appear high relative to fall 2009 and fall 2011 concentrations (see **Table C-2 and Figure C-1 in Appendix C**). However, in 2010, the reference plot locations of the Amendment Study were analyzed by a different laboratory (SVL) than the other locations (which were analyzed by ACZ), yet both sets of samples show a decrease between fall 2010 and fall 2011 for many of the locations (see **Figure C-1**). This and comparing SVL and ACZ data as discussed in Section 3.2., suggests that the change is not due to a laboratory bias. If the decrease is real, the combination of the 2008 white rain event and cessation of the smelter with soil erosion might be increasing pH, decreasing copper, and subsequently increasing pCu throughout the STSIU.

4.3 Effect of White Rain on Plants and Wildlife

The extent of copper adsorption to secondary minerals such as iron hydroxides increases with increasing pH, causing a decrease in the cupric ion activity, which increases the pCu of the soil solution. Thus, an increase in pCu resulting from the white rain event is expected to benefit the plant and animal community by reducing bioavailability of copper in the soil to plants. This will reduce direct absorption of copper into the tissue of living organisms (and into other organisms through the food chain) and reduce toxic effects. Such a benefit should be apparent through a decrease in copper in plant and terrestrial invertebrate tissue concurrent with the soil decrease in cupric ion activity.

For plants, ARCADIS 2014a estimated that, after the white rain fell, copper concentrations in plant tissue significantly decreased by up to two thirds on average on plots in the Amendment Study. Similarly, total copper concentrations in insects on affected locations decreased up to 40 percent. Though these datasets are not extensive and have some limitations, the lower plant and insect copper concentrations post-white rain provide evidence that the increase in pH and decrease in copper in soil is reducing uptake of copper into these organisms.

Benefits of reduced uptake of copper into plant tissues include greater survival, growth, and reproduction of the plant species making up the vegetation communities, creating improved rangeland and wildlife habitat on the STSIU. The FS will assess the expected improvement on plant communities from the pCu increase due to the white rain based on dose-response relationships with plant and vegetation community endpoints currently being developed for a phytotoxicity study using site plant species. ARCADIS 2014a has already shown that the white rain was a large factor responsible for the improvement in vegetation community richness (but not necessarily cover) on the plots in the Amendment Study. The improvement occurred in both fair and poor rangeland soils.

A benefit of reduced copper in insect and plant tissues is reduced dietary exposure to copper for wildlife, such as the sensitive small ground-feeding bird identified in the site-wide ERA. This benefit has already been discussed in ARCADIS 2011c, which evaluated and showed reduced risk to insectivorous birds using soil and insect data collected after the white rain event.

4.4 Potential Frequency of White Rains

The frequency of white rain events in southwestern New Mexico containing lime or calcium carbonate particulates that can neutralize or buffer acidic soils is unknown. Understanding the frequency would help with understanding the rate of natural attenuation of acidic impacts on the STSIU. The frequency of alkaline rains with high pH and dissolved calcium similar to the 2008 white rain may be an indicator of the possible frequency of white rains at the site, where a white rain is defined as a rain that contains a high suspended solid load of calcium-rich minerals. The 2008 white rain exhibited a pH of > 7 (7.2) in the GCDNM rainfall and concurrently high calcium concentrations of > 5 mg/L (5.8 mg/L). More than 25 years ago, on November 8, 1988, the pH of rainwater at GCDNM was 7.25, and the calcium concentration was 5.12 mg/L, similar to the 2008 white rain. This 1988 alkaline rain is a possible candidate for having been a white rain event. More recently, a rain event on October 27, 2009 exhibited a pH of 7.07 and a calcium concentration of 2.7 mg/L, both lower than the 2008 white rain event but significantly higher than the average values for precipitation in the Chino area. Thus, three alkaline rain candidates for being white rains occurred in 26 years (**Figure 2a**). It is unknown if these two other highly alkaline rains of high pH and dissolved calcium concentrations also carried dust from playas that served as nanoparticulate calcium-rich minerals that can further neutralize acidity. No reports of such a white rain that deposited a milky or liquid paper-like substance during 1988 and 2009 are known, and these events may have carried lighter suspended solids loads than the 2008 white rain.

White rain events of the magnitude seen in January 2008 may be rare and may not re-occur for a long time, or could potentially re-occur in the near future if the right conditions for dust storms and rain prevail, as was seen in the Washington, Oregon, and Idaho area in February 2015. Whether a true white rain or not, the 1988 and 2009 alkaline events mark the fact that highly alkaline rains potentially containing some calcium hydroxides (lime, the factor that drives up the rainwater pH), oxides, or carbonates are falling on the mine site more regularly now that emissions have been reduced from coal-fired plants in the region (as shown on **Figure 2b).** The alkaline rains, particularly if they typically contain nanoparticulates of calcium-containing minerals, could be steadily contributing to natural attenuation of the STSIU soils. Such attenuation could further accelerate now that the smelter is no longer operating and the historical tailings impoundments have been capped (only Tailing Pond 7 remains active).

Chino recognizes that the frequency of future white rain events cannot be predicted with a high degree of certainty; however, unless the Willcox playa becomes completely inundated with water, and/or unless localized wind patterns were to change dramatically, white rain events are still likely to occur in the future.

5. Conclusions and Recommendations

The results show that the white rain increased soil pH initially by approximately 1.2 S.U. on average for locations in the STSIU with low pH (< 5.5); it had little to no effect on higher pH soils. For soils with pH originally at > 5.5, some natural buffering capacity may have existed before the white rain, conferring resistance in those soils to pH changes. In contrast, the originally acidic soils (pH < 5.5) had lower buffering capacity, and the white rain resulted in an increased soil pH. The pH shift was generally sustained through 2014, and future persistence is benefitted by the following:

1. Future sources of potential acidity from smelting and windblown tailings have largely been eliminated by decommissioning the smelter and reclaiming most of the tailing ponds.
2. Typically, the acid soil (pH ≤ 5.5) whose pH increased to > 5.1 from the white rain have either positive NNP values or those that met the MMD topsoil suitability requirement of “Good” for plant establishment (> -5 kg $CaCO_3$/t).
3. Evaluation of soil mineralogy indicates a proportion of total sulfide occurs as copper sulfides with lower reactivity relative to pyrite.
4. White rain events of various magnitude will likely occur in the future (one occurred in eastern Washington, eastern Oregon, and parts of Idaho in February 2015). The likelihood of such future events occurring in the project area is not known however.
5. Natural pedogenic (soil-forming) processes will continue to function and soil pH is expected to recover to baseline levels for soils of the area (pH = 6.1 to 8.4) at some time in the future.

However, persistence in the future cannot be predicted with certainty, nor the likelihood of future white rain events, if any. This study evaluated persistence of a change in soil pH over a 5-year period, and the report will be considered during the development of remedies in the Feasibility Study (FS) for the STSIU. It is recommended that future periodic monitoring of soil pH, as a component of hte ogverall STSIU site remedy, be included to confirm persistence of the generally higher soil pH. The frequency of pH monitoring will be determined during the FS process.

As a result of the pH increase, pCu also increased, and the increase was persistent. In contrast to pH, total copper present in shallow soil is not expected to change as a result of the white rain, though other causes of natural attenuation (source reduction or source removal, clean dust deposition, and erosion) may result in decreases in soil copper concentrations over time. Current data suggest that soil copper concentrations decreased over time during the 5-year duration of this study. This copper decrease is uncertain due to high variability of copper in the STSIU soils. The apparent decrease in total copper, in addition to increases in pH, increased pCu as well because pCu is calculated from pH and copper concentrations.

Chino assessed the effect of the pH shift from the white rain on plant and wildlife communities by evaluating copper concentrations in tissues of plants and terrestrial invertebrates before and after the white rain event. These data had been collected during other investigations (ARCADIS 2010b, 2014a). In locations showing an improvement (increase) in soil pH, the tissue copper concentrations decreased after the white rain by an estimated 60 percent or more for the plants and up to 40 percent for the insects. Also, plant richness improved after the white rain on the untreated plots associated with an Amendment Study conducted for the STSIU (ARCADIS 2014a).

In conclusion, the white rain event of January 7, 2008 greatly benefitted the STSIU soils by increasing the pH and pCu of the acidic soils, making copper less bioavailable due to the increase in copper adsorption by secondary soil minerals, such as iron hydroxide, at higher pH values. This increase in pCu has led to a decrease in the uptake of copper into living organisms. The ultimate result appears to be reduced toxicity to wildlife and their food sources and improved wildlife and rangeland habitat. Based on MMD guidelines and mineralogical analysis, the potential of STSIU soils to generate acid is consistently low in most areas. Persistence in the future cannot be predicted with certainty, and continued monitoring as part of the STSIU FS and for the site remedy is recommended to confirm the prediction that the pH increase should be sustained.

As NMED (2011) indicated, new information can be used to refine the pCu RAC and selection of remedial alternatives. This report provides new information on the current soil pH and pCu across the STSIU that should be evaluated further in the FS. These results suggest that the nature and extent of depressed pH and elevated copper has changed since the Remedial Investigation and ERA reports approved by NMED (SRK 2008; Newfields 2005, 2008).

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Tables

Table 1
Change in pH and Calcium in Soils of Amendment Plots After White Rain

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Amendment Plot	pH (SU)			Calcium (mg/kg)	
	Pre-white rain	Post-white rain	Post-white rain	Pre-white rain	Post-white rain
	July 2006	May 2008	June 2008	July 2006	May 2008
	(0-4")	(0-6")	(0-6")	(0-4")	(0-6")
West	6.46	NA	8.16	15400	NA
North	3.78	6.02	6.72	2375	8085
Northeast	5.42	5.65	5.98	2870	4450
East	4.81	5.68	5.68	3596	3870

Notes:

NA = not available

Data originally presented in ARCADIS (2014a)

Table 2
Zones of pH and pCu of Selected Locations for Design of Long-Term Monitoring

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Location	pH Zone			pCu Zone		
	Pre-white rain	Preliminary Post-white rain 2009	Preliminary Post-white rain 2014	Pre-white rain	Preliminary Post-white rain 2009	Preliminary Post-white rain 2014
FID 18*	3-4	4-5	4-5	3-4	5-6	4-5
FID 23*[3]	3-4	4-5[2]	4-5	4-5	5-6	5-6
FID 43[3]	3-4	4-5	4-5	3-4	4-5	4-5
FID 101*	3-4	4-5	4-5	3-4	5-6	4-5
FID 102*	3-4	4-5	3-4	3-4	4-5	4-5
FID 103[3]	3-4	4-5	4-5	4-5	5-6	5-6
FID 8	3-4	5-6	4-5	3-4	5-6	4-5
FID 16*	4-5	5-6	4-5	2-3	5-6	3-4
FID 22	4-5	5-6	6-7	4-5	6-7	6-7
FID 37*	4-5	5-6	4-5	4-5	5-6	4-5
Reference 4 (East)*	4-5	5-6	5-6	4-5	5-6	4-5
FID 104*[3]	3-4	5-6	4-5	2-3	5-6	4-5
FID 105*	4-5	5-6	4-5	4-5	5-6	3-4
ERA 2[4]	5-6	6-7	4-5	5-6	5-6	3-4
ERA 3*[4]	4-5	6-7	5-6	4-5	5-6	5-6
ERA 4[4]	4-5	6-7	5-6	4-5	5-6	5-6
Reference 3 (Northeast)	5-6	6-7	5-6	3-4	5-6	3-4
FID 7	5-6	6-7	5-6	5-6	7-8	4-5
FID 10	5-6	6-7	4-5	3-4	5-6	< 3
FID 15*	4-5	6-7	5-6	3-4	5-6	3-4
FID 17*[3]	4-5	6-7	4-5	2-3	3-4	3-4
FID 106*	4-5	6-7	4-5	4-5	7-8	4-5
FID 28	6-7	6-7	> 8	7-8	6-7	7-8
ERA 10*[4]	4-5	7-8	5-6	4-5	7-8	5-6
ERA 13[4]	4-5	7-8	5-6	4-5	7-8	5-6
Reference 1 (West)	7-8	7-8	7-8	6-7	6-7	6-7
Reference 2 (North)	5-6	7-8	7-8	3-4	6-7	5-6

Notes:

*Neutralization Potential Ratio < 2 at least 60% of years sampled, meaning potentially acid generating (PAG) or uncertain PAG.

[1] Monitoring locations were selected to be well-distributed among four pH zones in gray shades.

[2] This plot created a single point zone of 4-5 that falls within a 5-6 zone (see ARCADIS 2010a).

[3] These plots were excavated and removed in 2011 or 2013 (FID 17)

[4] These plots were added in 2012

These zones are preliminary, based on contour intervals of pre-white rain and 2009 maps, used only to design the monitoring study

Table 3
Historical ERA and Amendment Location Soil Results Compared to Post-White Rain Results ("Primary White Rain Effect" Dataset)

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Soil Sample Location	Soil pH (0 to 6 inches) S.U.					Soil Cu (0 to 6 inches) mg/kg					Soil pCu (0 to 6 inches) calculated				
	Pre-White Rain[1]	Post-White Rain[2]	2012	2013	2014	Pre-White Rain[1]	Post-White Rain[2,3]	2012	2013	2014	Pre-White Rain	Post-White Rain	2012	2013	2014
ERA 2	4.80	6.20	6.40	7.00	6.00	811	860	960	420	1000	4.10	5.34	5.40	6.90	4.98
ERA 3	4.97	6.50	6.40	6.00	5.90	709	625	624	807	652	4.41	5.98	5.89	5.22	5.37
ERA 4	4.83	6.30	5.80	6.40	5.40	541	508	514	215	562	4.60	6.03	5.56	7.12	5.08
ERA 5	6.54	6.40	--	--	--	421	238	--	--	--	6.48	7.00	--	--	--
ERA 6	6.67	6.30	--	--	--	499	622	--	--	--	6.40	5.80	--	--	--
ERA 7	5.47	6.70	--	--	--	789	758	--	--	--	4.75	5.95	--	--	--
ERA 8	6.97	7.00	--	--	--	710	643	--	--	--	6.27	6.41	--	--	--
ERA 9	4.35	4.60	--	--	--	562	291	--	--	--	4.10	5.09	--	--	--
ERA 10	4.53	5.40	5.70	5.20	5.30	485	197	299	232	310	4.45	6.29	6.09	5.91	5.67
ERA 11	7.73	7.00	--	--	--	276	277	--	--	--	8.07	7.38	--	--	--
ERA 12	7.77	7.80	--	--	--	204	215	--	--	--	8.44	8.42	--	--	--
ERA 13	4.78	6.30	6.60	5.60	5.50	126	186	292	91	282	6.23	7.19	6.95	7.36	5.97
ERA 14	7.73	7.50	--	--	--	109	129	--	--	--	9.14	8.73	--	--	--
ERA 15	7.73	7.80	--	--	--	712	529	--	--	--	6.98	7.38	--	--	--
Amendment Plot or Reference #1 (West)*	6.46	8.16	7.60	7.50	8.00	--	1116	1120	605	882	--	6.85	6.33	6.95	6.98
Amendment Plot or Reference #2 (North)*	3.78	6.60	5.80	6.00	6.20	--	1946	1170	578	760	--	4.77	4.61	5.61	5.48
Amendment Plot or Reference #3 (Northeast)*	5.42	5.92	5.10	6.70	5.40	--	2714	2250	1090	1540	--	3.76	3.21	5.53	3.92
Amendment Plot or Reference #4 (East)*	4.81	5.68	4.80	6.00	4.90	--	1099	1210	923	1020	--	4.57	3.64	5.07	3.93

Notes:

[1] ERA samples were collected in 1999 (ARCADIS 2001) while Amendment Study Plot locations were sampled in 2006 before they were amended (ARCADIS 2013). Sampling protocols (average of three samples on 50-meter transects or one to two samples within 100-foot by 100-foot amendment plots) differed from pH monitoring plan protocols.

[2] ERA samples were collected post-white rain in 2010 (ARCADIS 2010b), while amendment reference plot locations were sampled in May or early June 2008 just after the January 2008 white rain (ARCADIS 2014a) event (except Cu in West plot, which was collected from West Reference plot in 2010). Samples were collected using a different protocol than pH monitoring program, with 15 samples composited over a 100-meter radius area for ERA locations and two samples in a 100-foot by 100-foot plot for amendment plots (before treated).

[3] ERA samples were reported in ARCADIS (2010b) as wet weight, but are in fact dry weight results and presented here as such.

*Only pH was collected at the amendment study plot locations in 2006. In 2006 and 2008, soil samples on amendment reference plots did not exist and only amendment plots (before amending) were sampled (ARCADIS 2014a). In 2010, the adjacent reference plots became available and sampled (since untreated) as part of the pH monitoring program from 2010 to 2014 (see Table 5), but only 2012 to 2014 data in this table are from those reference plots (except West "post-white rain", which is 2010 reference plot because no 2008 data available). The comparison of amendment plot/reference locations assumes similar conditions on amendment plot and reference plots before amendments were applied.

All samples were sieved except pre- (2006) and post-white rain (2008, except West plot is 2010) Amendment Plot Data, which were adjusted to being sieved to less than 2 mm (see main report for adjustment regressions).

-- = not applicable

ERA = ecological risk assessment

mg/kg = milligrams per kilogram

mm = millimeters

pCu = -log (cupric ion activity)

S.U. = standard units

Table 4
Summary of Pre- and Post-White Rain Statistical Results from Paired t-test on "Primary White Rain Effect" Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Parameter	Units	All Data		pH > 5.5[1]		pH ≤ 5.5[2]	
		Mean Difference	Significance (p value)[3]	Mean Difference	Significance (p value)[3]	Mean Difference	Significance (p value)[3]
Pre-White Rain vs. Early Post-White Rain							
pH (primary data set)[4]	S.U.	0.49	0.04	-0.20	0.1	1.2	0.0004
pH (validation-plus data set)[5]	S.U.	0.71	0.005	0.038	0.9	1.25	0.0003
Total Copper	mg/kg	-63	0.08	-54	0.3	-95	0.1906
pCu	unitless	0.61	0.02	-0.065	0.8	1.3	0.0002
Insect Copper	mg/kg dry wt	-72	0.03	-66	0.2	-77	0.1

Notes:

[1] Defined as those sites having pre-white rain pH greater than a threshold of 5.5.

[2] Defined as those sites having pre-white rain pH less than or equal to a threshold of 5.5.

[3] Two-sided paired t-tests were used to compare each set of paired data.

[4] Includes 14 ERA locations.

[5] Includes 14 ERA locations plus 4 Amendment Study reference plots.

-- = not applicable

mg/kg = milligrams per kilogram

pCu = -log (cupric ion activity)

S.U. = standard units

wt = weight

Table 5

2010 to 2014 Long-Term Sample Location Results – pH, Total Copper, and pCu (first 17 are "Permanence Monitoring" Dataset)

Year 5 pH Monitoring Report

Freeport-McMoRan Chino Mines Company

Vanadium, New Mexico

Soil Sample Location	Soil pH (0 to 6 inches) (S.U.)					Soil Cu (0 to 6 inches) (mg/kg)					Soil pCu (0 to 6 inches) (calculated)				
	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
FID 7	5.40	4.80	4.70	5.40	5.10	550	494	514	375	491	5.11	4.67	4.53	5.55	4.96
FID 8	6.50	6.40	5.50	6.50	4.60	545	332	252	358	473	6.14	6.62	6.10	6.62	4.54
FID 10	4.80	4.80	5.00	5.00	4.70	2060	2140	2210	1780	2550	3.03	2.99	3.13	3.38	2.69
FID 15	4.90	4.80	4.60	5.20	5.60	2520	2260	1030	1950	1850	2.89	2.92	3.64	3.46	3.90
FID 16	4.80	4.50	4.30	4.70	4.80	3550	2020	1450	1290	1440	2.40	2.77	2.97	3.47	3.44
FID 17*	5.10	6.00	4.90	--	--	4550	4220	5150	--	--	2.40	3.32	2.07	--	--
FID 18	3.90	4.30	4.40	4.30	4.20	559	254	192	141	310	3.69	4.97	5.39	5.65	4.65
FID 22	6.50	6.20	6.40	6.30	6.90	488	430	308	296	378	6.27	6.13	6.70	6.66	6.93
FID 23*	4.40	--	--	--	--	202	--	--	--	--	5.33	--	--	--	--
FID 28	7.70	6.90	6.70	6.80	7.30	527	400	271	318	423	7.29	6.87	7.13	7.04	7.17
FID 37	4.80	4.60	4.50	5.30	4.70	1210	654	765	432	708	3.64	4.16	3.89	5.29	4.16
FID 43*	6.50	--	--	--	--	636	--	--	--	--	5.96	--	--	--	--
FID 101	4.20	3.80	4.20	4.20	3.90	405	272	290	221	285	4.34	4.43	4.73	5.04	4.47
FID 102	3.80	3.60	3.70	3.70	3.50	358	303	230	171	282	4.11	4.12	4.53	4.87	4.11
FID 103*	4.00	--	--	--	--	443	--	--	--	--	4.05	--	--	--	--
FID 104*	3.80	--	--	--	--	459	--	--	--	--	3.83	--	--	--	--
FID 105	5.60	4.90	6.60	4.70	4.50	1390	668	799	816	834	4.23	4.42	5.79	4.00	3.79
FID 106	5.00	5.00	5.70	4.60	4.40	454	254	408	247	516	4.95	5.62	5.73	5.28	4.25
ERA 2	--	--	6.40	7.00	6.00	--	--	960	420	1000	--	--	5.40	6.90	4.98
ERA 3	--	--	6.40	6.00	5.90	--	--	624	807	652	--	--	5.89	5.22	5.37
ERA 4	--	--	5.80	6.40	5.40	--	--	514	215	562	--	--	5.56	7.12	5.08
ERA 10	--	--	5.70	5.20	5.30	--	--	299	232	310	--	--	6.09	5.91	5.67
ERA 13	--	--	6.60	5.60	5.50	--	--	292	91	282	--	--	6.95	7.36	5.97
Reference #1 (West)[1]	7.76	7.50	7.60	7.50	8.00	2113	597	1120	605	882	5.75	6.96	6.33	6.95	6.98
Reference #2 (North)[1]	6.43	6.00	5.80	6.00	6.20	913	687	1170	578	760	5.48	5.41	4.61	5.61	5.48
Reference #3 (Northeast)[1]	5.31	5.60	5.10	6.70	5.40	2721	1950	2250	1090	1540	3.18	3.84	3.21	5.53	3.92
Reference #4 (East)[1]	5.28	5.40	4.80	6.00	4.90	1669	1130	1210	923	1020	3.72	4.28	3.64	5.07	3.93

Notes:

[1] 2010 reference samples were tested using unsieved soil; therefore, an adjustment regression (see main report) has been applied to account for this discrepency.

*Locations FID 23, FID 43, FID 103, FID 104, and FID 17 were excavated and not sampled.

mg/kg = milligrams per kilogram

pCu = -log (cupric ion activity)

S.U. = standard units

-- = not applicable

Table 6

2010 to 2014 Average pH, Total Copper, pCu, and Acid-Base Accounting based on "Permanence Monitoring" Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Year	pH (S.U.)	Copper (mg/kg)	pCu	NNP ($tCaCO_3$/kt)	NPR
2010	5.45	1296	4.48	23.2	51.8
2011	5.24	873	4.77	8.7	10.5
2012	5.27	851	4.83	10.8	10.9
2013	5.46	682	5.26	15.6	18.3
2014	5.22	867	4.67	5.9	14.3
Mann-Kendall Trend Significance	0.7	0.4	0.4	0.3	0.3

Notes:

Means are for the same 17 locations for all years

NNP - Net Neutralization Potential

NPR - Neutralization Potential Ratio

pCu = -log (cupric ion activity)

S.U. = standard units

Table 7
2010 to 2014 Long-Term Sample Location Results – Acid-base Accounting (first 17 are "Permanence Monitoring" dataset)
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Soil Sample Location	Total Sulfur (%)					Pyritic/Sulfide Sulfur (%)					Sulfate Sulfur (%)					Non-Sulfate Sulfur (%)					Organic Sulfur (%)				
	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
FID 7	0.05	0.07	0.02	0.05	0.04	0.04	0.03	0.02	0.03	0.03	0.01	0.01	<0.01	0.01	0.01	0.04	0.06	0.02	0.04	0.03	<0.01	0.03	<0.01	0.01	<0.01
FID 8	0.68	0.59	0.11	0.34	0.13	0.31	0.26	0.04	0.20	0.08	0.31	0.27	0.07	0.11	0.04	0.37	0.32	0.04	0.23	0.09	0.06	0.06	<0.01	0.03	0.01
FID 10	0.04	0.11	0.05	0.13	0.10	0.03	0.07	0.05	0.11	0.07	0.01	0.02	<0.01	<0.01	0.03	0.03	0.09	0.05	0.13	0.07	<0.01	0.02	<0.01	0.02	<0.01
FID 15	0.11	0.21	0.03	0.28	0.12	0.12	0.17	0.02	0.21	0.08	<0.01	0.02	0.01	0.04	0.03	0.11	0.19	0.02	0.24	0.09	0.01	0.02	<0.01	0.03	0.01
FID 16	0.27	0.26	0.06	0.22	0.10	0.15	<0.01	0.04	0.13	0.05	0.05	0.13	0.02	0.06	0.03	0.22	0.13	0.04	0.16	0.07	0.07	0.14	<0.01	0.03	0.02
FID 17*	0.57	0.48	0.68	--	--	0.37	0.38	0.56	--	--	0.12	0.05	0.07	--	--	0.45	0.43	0.61	--	--	0.08	0.05	0.05	--	--
FID 18	0.30	0.16	0.15	0.08	0.09	0.14	0.11	0.09	0.05	0.06	0.14	0.03	0.06	0.02	0.02	0.16	0.13	0.09	0.06	0.07	0.02	0.02	<0.01	0.01	0.01
FID 22	0.20	0.28	0.10	0.19	0.13	0.13	0.20	0.07	0.11	0.08	0.05	0.05	0.03	0.06	0.03	0.15	0.23	0.07	0.13	0.10	0.02	0.03	<0.01	0.02	0.02
FID 23*	0.11	--	--	--	--	0.07	--	--	--	--	0.04	--	--	--	--	0.07	--	--	--	--	<0.01	--	--	--	--
FID 28	0.18	0.19	<0.01	0.18	0.06	0.17	0.08	0.05	0.17	0.05	<0.01	0.07	<0.01	<0.01	<0.01	0.18	0.12	<0.01	0.18	0.06	0.01	0.04	<0.01	0.02	0.01
FID 37	0.07	0.05	0.02	0.02	0.03	0.02	0.03	0.01	0.02	0.02	0.04	<0.01	0.01	<0.01	0.01	0.03	0.05	0.01	0.02	0.02	0.01	0.02	<0.01	<0.01	<0.01
FID 43*	0.59	--	--	--	--	0.22	--	--	--	--	0.37	--	--	--	--	0.22	--	--	--	--	<0.01	--	--	--	--
FID 101	0.28	0.21	0.15	0.30	0.18	0.19	0.13	0.06	0.14	0.07	0.06	0.06	0.09	0.12	0.08	0.22	0.15	0.06	0.18	0.10	0.03	0.02	<0.01	0.04	0.03
FID 102	0.62	0.92	0.47	0.48	0.54	0.43	0.50	0.16	0.20	0.18	0.14	0.36	0.29	0.25	0.33	0.48	0.56	0.18	0.23	0.21	0.05	0.06	0.02	0.03	0.03
FID 103*	0.06	--	--	--	--	0.03	--	--	--	--	0.03	--	--	--	--	0.03	--	--	--	--	<0.01	--	--	--	--
FID 104*	0.98	--	--	--	--	0.31	--	--	--	--	0.61	--	--	--	--	0.37	--	--	--	--	0.06	--	--	--	--
FID 105	0.17	0.10	0.10	0.16	0.15	0.11	0.05	0.04	0.08	0.05	0.03	0.01	0.05	0.04	0.05	0.14	0.09	0.05	0.12	0.10	0.03	0.04	0.01	0.04	0.05
FID 106	0.04	0.05	0.03	0.02	0.06	0.03	0.02	0.02	0.03	0.02	0.01	0.01	0.01	<0.01	0.02	0.03	0.04	0.02	0.02	0.04	<0.01	0.02	<0.01	<0.01	0.02
ERA 2	--	--	0.15	<0.01	0.12	--	--	0.07	0.05	0.06	--	--	0.06	<0.01	0.04	--	--	0.09	<0.01	0.08	--	--	0.02	0.02	0.02
ERA 3	--	--	0.19	0.28	0.25	--	--	0.05	0.12	0.09	--	--	0.11	0.10	0.09	--	--	0.08	0.18	0.16	--	--	0.03	0.06	0.07
ERA 4	--	--	0.05	<0.01	0.07	--	--	0.03	0.02	0.02	--	--	0.02	<0.01	0.03	--	--	0.03	<0.01	0.04	--	--	<0.01	0.02	0.02
ERA 10	--	--	0.01	0.04	0.03	--	--	0.01	0.05	<0.01	--	--	<0.01	<0.01	0.01	--	--	0.01	0.04	0.02	--	--	<0.01	0.01	0.02
ERA 13	--	--	<0.01	0.02	0.02	--	--	0.02	0.03	0.02	--	--	<0.01	<0.01	<0.01	--	--	<0.01	0.02	0.02	--	--	<0.01	<0.01	<0.01
Reference #1 (West)	0.03	0.09	<0.01	<0.01	0.04	<0.01	0.03	0.03	0.02	<0.01	0.03	0.04	<0.01	<0.01	0.03	<0.01	0.05	<0.01	<0.01	0.01	<0.01	0.02	<0.01	0.02	0.03
Reference #2 (North)	0.02	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.02	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.02	<0.01	0.05	<0.01	<0.01	0.02
Reference #3 (Northeast)	0.07	0.16	0.06	0.12	0.06	0.02	0.07	0.03	0.08	0.05	0.05	0.07	0.03	0.02	0.01	0.02	0.09	0.03	0.10	0.05	<0.01	0.02	<0.01	0.02	<0.01
Reference #4 (East)	0.14	0.23	0.10	0.23	0.11	0.03	0.14	0.06	0.15	0.08	0.11	0.05	0.04	0.05	0.01	0.03	0.18	0.06	0.18	0.10	<0.01	0.04	<0.01	0.03	0.02

Notes:

[1] AGP is calculated from Pyritic Sulfide Sulfur where S(%)*31.25 = AGP. AGP was calculated using the detection limit when Pyritic Sulfide Sulfur was less than 0.1%.

[2] NNP is calculated as ANP-AGP. NNP was calculated using the detection limit when ANP was less than 0.3 $tCaCO_3/kt$.

[3] NPR is calculated as ANP/AGP. NPR was calculated using the detection limit when ANP was less than 0.3 $tCaCO_3/kt$.

*Locations FID 23, 43, 103, 104, and 17 were excavated and not sampled in subsequent years.

AGP = acid generation potential

ANP = acid neutralization potential

NNP = Net Neutralization Potential

NPR = Neutralization Potential Ratio

-- = not applicable

Table 7
2010 to 2014 Long-Term Sample Location Results – Acid-base Accounting

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Soil Sample Location	AGP ($tCaCO_3/kt$)[1] (calculated)					ANP ($tCaCO_3/kt$)					NNP ($tCaCO_3/kt$)[2] (calculated)					NPR (ANP/AGP)[3] (calculated)				
	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
FID 7	1.25	0.94	0.63	0.94	0.94	33	0	8	1	2	31.8	-0.9	7.4	0.1	1.1	26.4	0.0	12.8	1.1	2.1
FID 8	9.69	8.13	1.25	6.25	2.50	0	16	3	17	1	-9.7	7.9	1.8	10.8	-1.5	0.0	2.0	2.4	2.7	0.4
FID 10	0.94	2.19	1.56	3.44	2.19	2	5	1	2	4	1.1	2.8	-0.6	-1.4	1.8	2.1	2.3	0.6	0.6	1.8
FID 15	3.75	5.31	0.63	6.56	2.50	1	0	2	5	3	-2.8	-5.3	1.4	-1.6	0.5	0.3	0.0	3.2	0.8	1.2
FID 16	4.69	0.30	1.25	4.06	1.56	4	0	0	0	0	-0.7	-0.3	-1.3	-4.1	-1.6	0.9	0.0	0.0	0.0	0.0
FID 17*	11.6	11.9	17.5	--	--	0	8	5	--	--	-11.6	-3.9	-12.5	--	--	0.0	0.7	0.3	--	--
FID 18	4.38	3.44	2.81	1.56	1.88	19	0	1	0	2	14.6	-3.4	-1.8	-1.6	0.1	4.3	0.0	0.4	0.0	1.1
FID 22	4.06	6.25	2.19	3.44	2.50	10	16	5	12	9	5.9	9.8	2.8	8.6	6.5	2.5	2.6	2.3	3.5	3.6
FID 23*	2.19	--	--	--	--	0	--	--	--	--	-2.2	--	--	--	--	0.0	--	--	--	--
FID 28	5.31	2.50	1.56	5.31	1.56	137	35	64	90	41	132	32.5	62.4	84.7	39.4	25.8	14.0	41.0	16.9	26.2
FID 37	0.63	0.94	0.31	0.63	0.63	0	1	0	2	2	-0.6	0.06	-0.3	1.4	1.4	0.0	1.1	0.0	3.2	3.2
FID 43*	6.88	--	--	--	--	25	--	--	--	--	18.1	--	--	--	--	3.6	--	--	--	--
FID 101	5.94	4.06	1.88	4.38	2.19	0	2	0	0	0	-5.9	-2.1	-1.9	-4.4	-2.2	0.0	0.5	0.0	0.0	0.0
FID 102	13.4	15.6	5.00	6.25	5.63	0	0	28	2	0	-13.4	-15.6	23.0	-4.3	-5.6	0.0	0.0	5.6	0.3	0.0
FID 103*	0.94	--	--	--	--	2	--	--	--	--	1.1	--	--	--	--	2.1	--	--	--	--
FID 104*	9.69	--	--	--	--	0	--	--	--	--	-9.7	--	--	--	--	0.0	--	--	--	--
FID 105	3.44	1.56	1.25	2.50	1.56	0	8	5	2	0	-3.4	6.4	3.8	-0.5	-1.6	0.0	5.1	4.0	0.8	0.0
FID 106	0.94	0.63	0.63	0.94	0.63	0	0	13	2	0	-0.9	-0.6	12.4	1.1	-0.6	0.0	0.0	20.8	2.1	0.0
ERA 2	--	--	2.19	1.56	1.88	--	--	0	18	5	--	--	-2.2	16.4	3.1	--	--	0.0	11.5	2.7
ERA 3	--	--	1.56	3.75	2.81	--	--	13	3	5	--	--	11.4	-0.8	2.2	--	--	8.3	0.8	1.8
ERA 4	--	--	0.94	0.63	0.63	--	--	8	5	4	--	--	7.1	4.4	3.4	--	--	8.5	8.0	6.4
ERA 10	--	--	0.31	1.56	0.30	--	--	0	3	0	--	--	-0.3	1.4	-0.3	--	--	0.0	1.9	0.0
ERA 13	--	--	0.63	0.94	0.63	--	--	19	6	0	--	--	18.4	5.1	-0.6	--	--	30.4	6.4	0.0
Reference #1 (West)	0.30	0.94	0.94	0.63	0.30	238	101	61	166	58	238	100	60.1	165	57.7	793	108	65.1	266	193
Reference #2 (North)	0.30	0.30	0.30	0.63	0.63	3.6	11	6	5	5	3.3	10.7	5.7	4.4	4.4	12.0	36.7	20.0	8.0	8.0
Reference #3 (Northeast)	0.63	2.19	0.94	2.50	1.56	7.6	13	3	11	0	7.0	10.8	2.1	8.5	-1.6	12.2	5.9	3.2	4.4	0.0
Reference #4 (East)	0.94	4.38	1.88	4.69	2.50	<0.3	0	8	3	4	-0.6	-4.4	6.1	-1.7	1.5	0.3	0.0	4.3	0.6	1.6

Notes:

[1] AGP is calculated from Pyritic Sulfide Sulfur where S(%)*31.25 = AGP. AGP was calculated using the detection limit when Pyritic Sulfide Sulfur was less than 0.1%.

[2] NNP is calculated as ANP-AGP. NNP was calculated using the detection limit when ANP was less than 0.3 $tCaCO_3/kt$.

[3] NPR is calculated as ANP/AGP. NPR was calculated using the detection limit when ANP was less than 0.3 $tCaCO_3/kt$.

*Locations FID 23, 43, 103, 104, and 17 were excavated and not sampled in subsequent years.

AGP = acid generation potential

ANP = acid neutralization potential

NNP = Net Neutralization Potential

NPR = Neutralization Potential Ratio

-- = not applicable

Table 8
Duplicate Analysis of Samples Collected from 2010 to 2014

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Soil Sample Location	Year	Soil pH (0 to 6 inches) (S.U.)	Soil Copper (0 to 6 inches) (mg/kg)	Total Sulfur (%)	Non-Sulfate Sulfur (%)	Pyritic Sulfide Sulfur (%)	Sulfate Sulfur (%)	ANP (tCaCO$_3$/kt)
FID 17	2010	5.1	4550	0.57	0.45	0.37	0.12	0
FID 17 DUP		5.3	3900	0.65	0.58	0.51	0.07	3
Relative percent difference		**4%**	**15%**	**13%**	**25%**	**32%**	**53%**	**200%**
FID 23		4.4	202	0.11	0.07	0.07	0.04	0
FID 23 DUP		4.4	182	0.13	0.08	0.07	0.05	0
Relative percent difference		**0%**	**10%**	**17%**	**13%**	**0%**	**22%**	**0%**
FID 22	2011	6.2	430	0.19	0.15	0.04	0.04	16
FID 22 DUP		6.3	467	0.19	0.15	0.03	0.04	26
Relative percent difference		**2%**	**8%**	**0%**	**0%**	**29%**	**0%**	**48%**
FID 101		3.8	272	0.19	0.13	0.02	0.06	2
FID 101 DUP		3.9	341	0.19	0.13	<0.01	0.06	0
Relative percent difference		**3%**	**23%**	**0%**	**0%**	**67%**	**0%**	**200%**
ERA 2	2012	6.4	960	0.15	0.09	0.07	0.06	0
ERA 2 DUP		6.4	953	<0.01	<0.01	0.05	<0.01	15
Relative percent difference		**0%**	**1%**	**175%**	**160%**	**33%**	**143%**	**200%**
ERA 13		6.6	292	<0.01	<0.01	0.02	<0.01	19
ERA 13 DUP		5.7	257	<0.01	<0.01	0.01	<0.01	13
Relative percent difference		**15%**	**13%**	**0%**	**0%**	**67%**	**0%**	**38%**
FID 37	2013	5.3	432	0.02	0.02	0.02	<0.01	2
FID 37 DUP		5.2	365	0.01	0.01	0.02	<0.01	3
Relative percent difference		**2%**	**17%**	**67%**	**67%**	**0%**	**0%**	**40%**
FID 28		6.8	318	0.18	0.18	0.17	<0.01	90
FID 28 DUP		6.8	230	0.19	0.19	0.19	<0.01	81
Relative percent difference		**0%**	**32%**	**5%**	**5%**	**11%**	**0%**	**11%**
FID 37	2014	4.7	708	0.03	0.02	0.02	0.01	2
FID 37 DUP		4.9	685	0.02	0.02	0.02	<0.01	0
Relative percent difference		**4%**	**3%**	**40%**	**0%**	**0%**	**0%**	**200%**
FID 101		3.9	285	0.18	0.10	0.07	0.08	0
FID 101 DUP		3.9	291	0.21	0.12	0.10	0.09	2
Relative percent difference		**0%**	**2%**	**15%**	**18%**	**35%**	**12%**	**200%**

Notes:

ANP = acid neutralization potential

mg/kg = milligram per kilogram

S.U. - Standard units

Relative percent difference = $((\lvert X_2 - X_1 \rvert)/\text{Mean})*100$

Table 9
Effect of Sampling Method on Samples Collected from 2010 to 2013

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Date	Reference #1 (West)	Reference #2 (North)	Reference #3 (Northeast)	Reference #4 (East)
pH Results (S.U.)				
Amendment Study Method				
Oct-10	8.4	5.6	4.9	4.6
Oct-11	8.8	5.8	4.6	4.7
Oct-12	8.0	6.0	5.5	6.6
Oct-13	7.6	5.8	5.4	6.0
pH Monitoring Method				
Oct-10	7.8	6.4	5.3	5.3
Oct-11	7.5	6.0	5.6	5.4
Oct-12	7.6	5.8	5.1	4.8
Oct-13	7.5	6.0	6.7	6.0
Single Sample Method				
Oct-13	7.7	5.1	5.4	7.6
Copper Results (mg/kg)				
Amendment Study Method				
Oct-10	1116	1257	3357	1222
Oct-11	711	861	3235	1320
Oct-12	1113	1069	2268	1187
Oct-13	1021	760	2023	1100
pH Monitoring Method				
Oct-10	2113	913	2721	1669
Oct-11	597	687	1950	1130
Oct-12	1120	1170	2250	1210
Oct-13	605	578	1090	923
Single Sample Method				
Oct-13	56	501	1200	1120

Notes:

mg/kg = milligram per kilogram

S.U. - Standard units

Table 10
Historic Copper Concentrations in Insect Tissue Compared to Post-White Rain Results

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Location	1999 Insect Tissue Cu (mg/kg dry wt washed)[1]	2010 Insect Tissue Cu (mg/kg dry wt washed)
ERA 2	198	176
ERA 3	252	111
ERA 4	193	92
ERA 5	163	74
ERA 6	233	163
ERA 7	340	68
ERA 8	465	162
ERA 9	175	155
ERA 10	35	100
ERA 11	88	95
ERA 12	66	127
ERA 13	165	116
ERA 14	169	87
ERA 15	305	318
Average	203	132

Notes:

[1] Assumes 0.4% of insect weight is soil that would be removed when washed (ARCADIS 2011c), which gives ~1% of copper in insect was in soil. These tissue samples still include soil in gut or adhered to insect after washing.

ERA = ecological risk assessment

mg/kg = milligrams per kilogram

wt = weight

Figures

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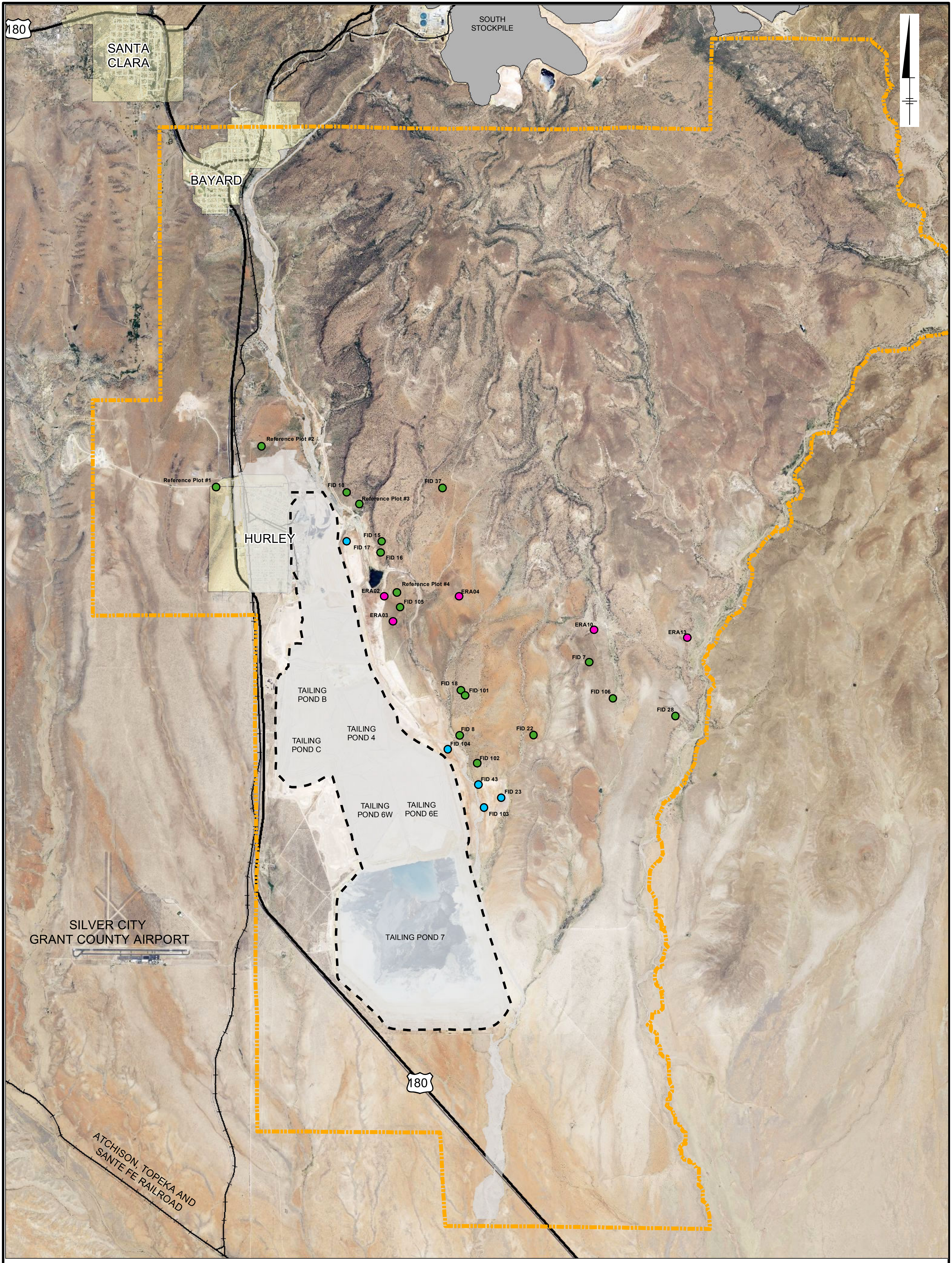


LEGEND:

pH Monitoring Sampling Points

🟢	Sampled 2010 - 2014
🔵	Sampled 2010
🟣	Sampled 2012 - 2014
▭	STSIU Boundary

0 5,000 10,000
Feet

GRAPHIC SCALE

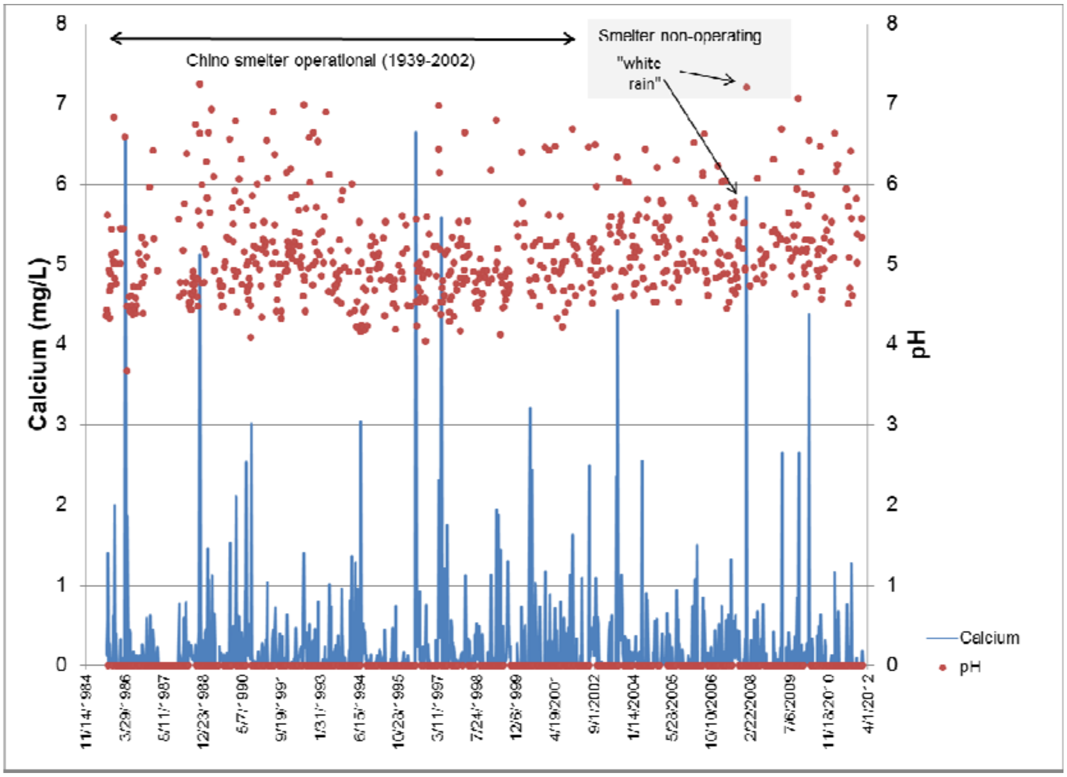
Notes:
1. Aerial orthophotography: USDA, NAIP, 2014.

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
2014 pH MONITORING REPORT

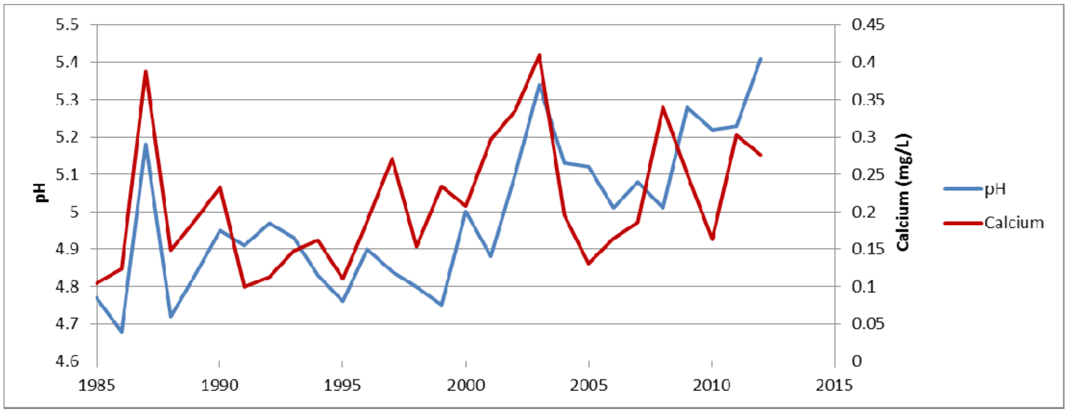
MAP OF STSIU AND MONITORING LOCATIONS

ARCADIS

FIGURE
1



a. Data for pH and calcium in rainwater for the period 1985 – 2012 as measured weekly by the NADP at the Gila Cliffs, NM station (NM01). Data are in Appendix B.



b. Annual average pH and calcium data for rainwater collected by the National Atmospheric Deposition Program at the Gila Cliffs National Monument, NM (station NM01).

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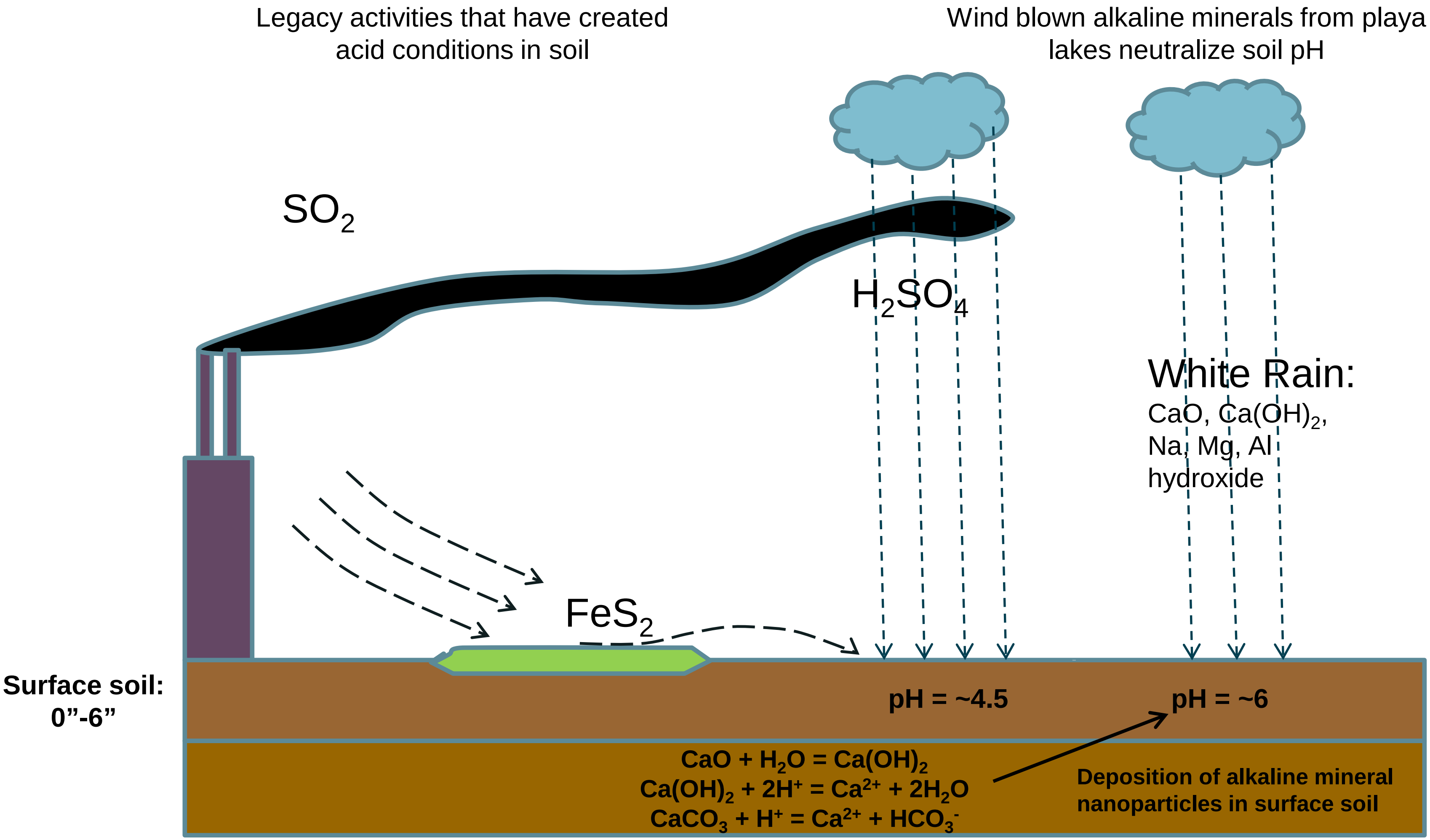
Vanadium, New Mexico
Year 5 pH Monitoring Report

pH and Calcium in Rainwater

ARCADIS

FIGURE
2



Note:
The smelter deposits sulfuric acid (H_2SO_4) on the soils, and the flat green area represents tailings. Iron sulfides blow off these tailings onto the soils, creating more potential acidity. To counteract the acidity, calcium-rich minerals from the Willcox and Lordsburg playa in white rain were deposited in the soil and partially dissolved, but also were present as micro- and nanoparticulates that neutralized acidity from smelter and tailings, resulting in increased pH. Presence of the nanoparticulates, with very high specific surface area, increased buffering capacity of the soil.

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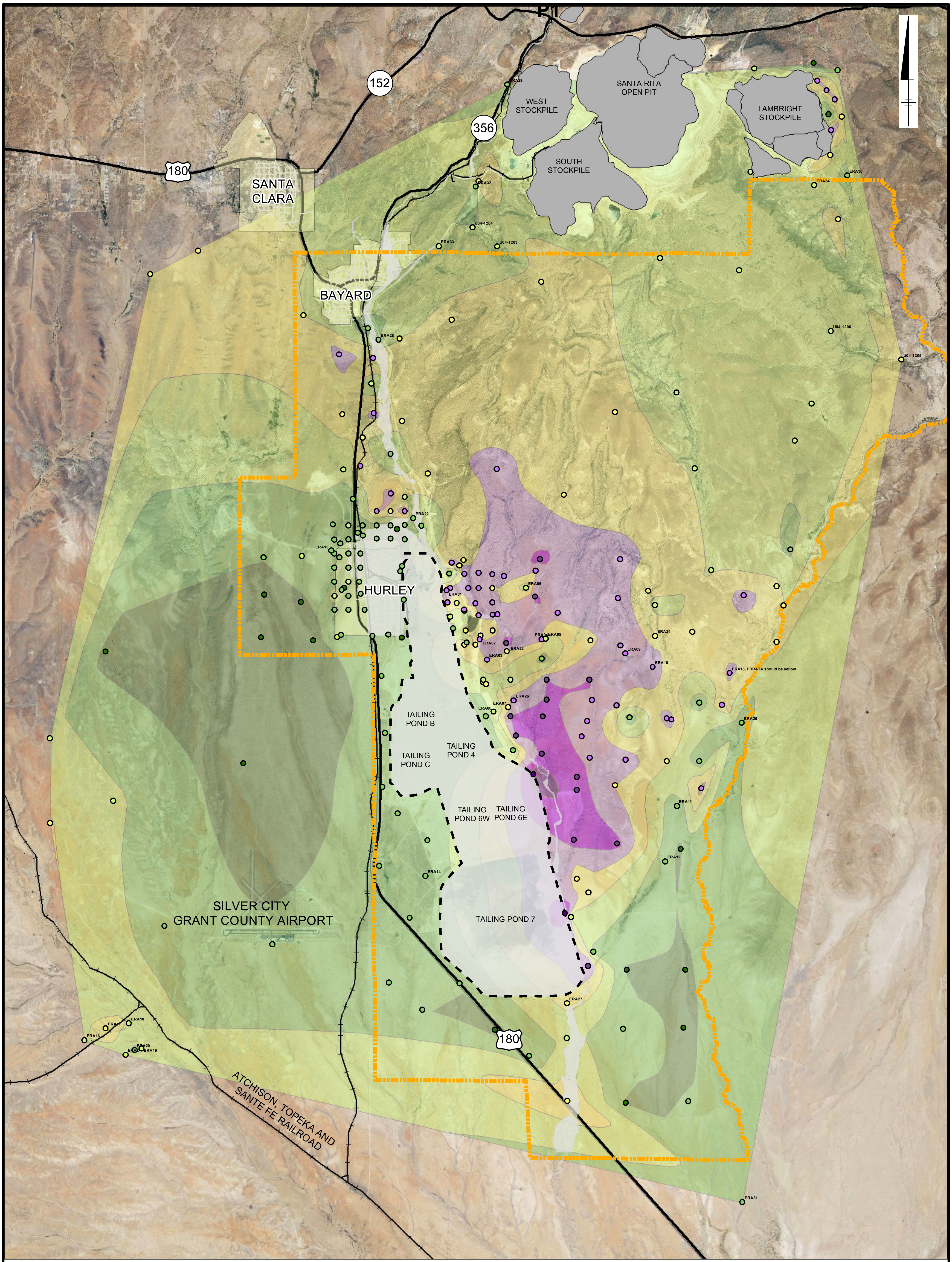
Year 5 pH Monitoring Report

Conceptual Model for the Interaction of Alkaline Minerals in the White Rain with the Surface Soil at the STSIU

ARCADIS

FIGURE
3

OFFICE: LAKEWOOD DB: MB TM: MB PM: AT
PROJECT# B0063543.0000 9/3/2015 9:29:48 PM
Y:_ENV\Chino\2015\MXDs\PreWR_pH_NN.mxd



LEGEND:

Pre-White Rain pH

▨	< 3	▨	5 - 6
▨	3 - 4	▨	6 - 7
▨	4 - 5	▨	7 - 8
		▨	> 8

pre-White Rain pH

●	< 3	●	5 - 6
●	3 - 4	●	6 - 7
●	4 - 5	●	7 - 8
		●	> 8

▭ STSIU Boundary

0 5,000 10,000 Feet
GRAPHIC SCALE

Notes:
1. Aerial orthophotography: USDA, NAIP, 2014.

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

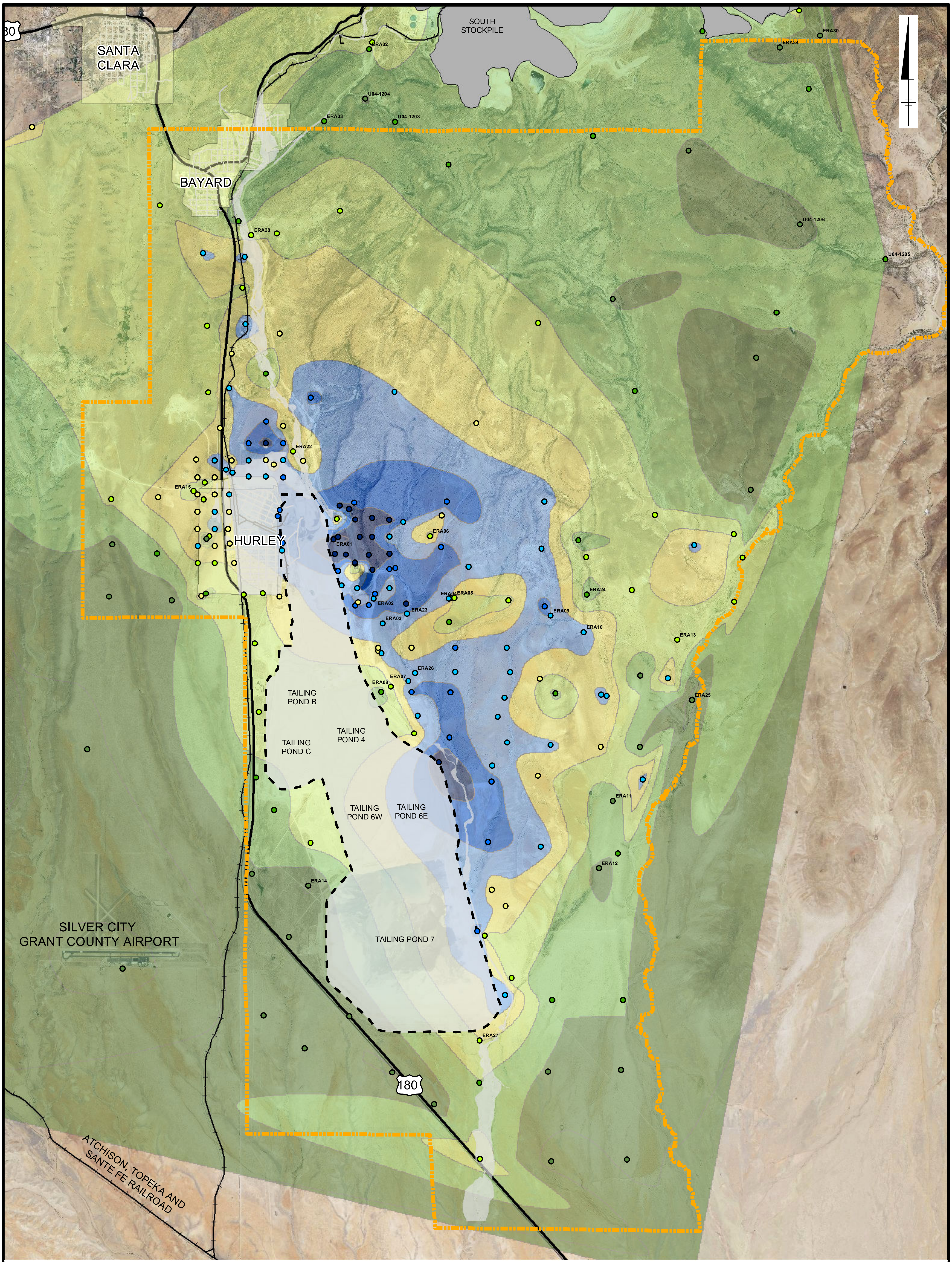
YEAR 5 pH MONITORING REPORT

pH NATURAL NEIGHBOR INTERPOLATION PRE-WHITE RAIN

ARCADIS

FIGURE
4a

OFFICE: LAKEWOOD DB: MLM TM: MB PM: AT
PROJECT# B0063543.0000 9/3/2015 9:52:02 PM
Y:_ENV\Chino\2015\MXDs\PreWR_pCu_NN.mxd



LEGEND:

pre-White Rain pCu

▨ < 3
▨ 3 - 4
▨ 4 - 5
▨ 5 - 6
▨ 6 - 7
▨ 7 - 8
▨ > 8

PreWR_pCu_0915

● < 3
● 3 - 4
● 4 - 5
● 5 - 6
● 6 - 7
● 7 - 8
● > 8

▭ STSIU Boundary

0 5,000 10,000 Feet
GRAPHIC SCALE

Notes:
1. pCu = 7.34 + 0.93*[pH] - 1.15*ln[Cu]
2. Aerial orthophotography: USDA, NAIP, 2014.

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VANADIUM, NEW MEXICO

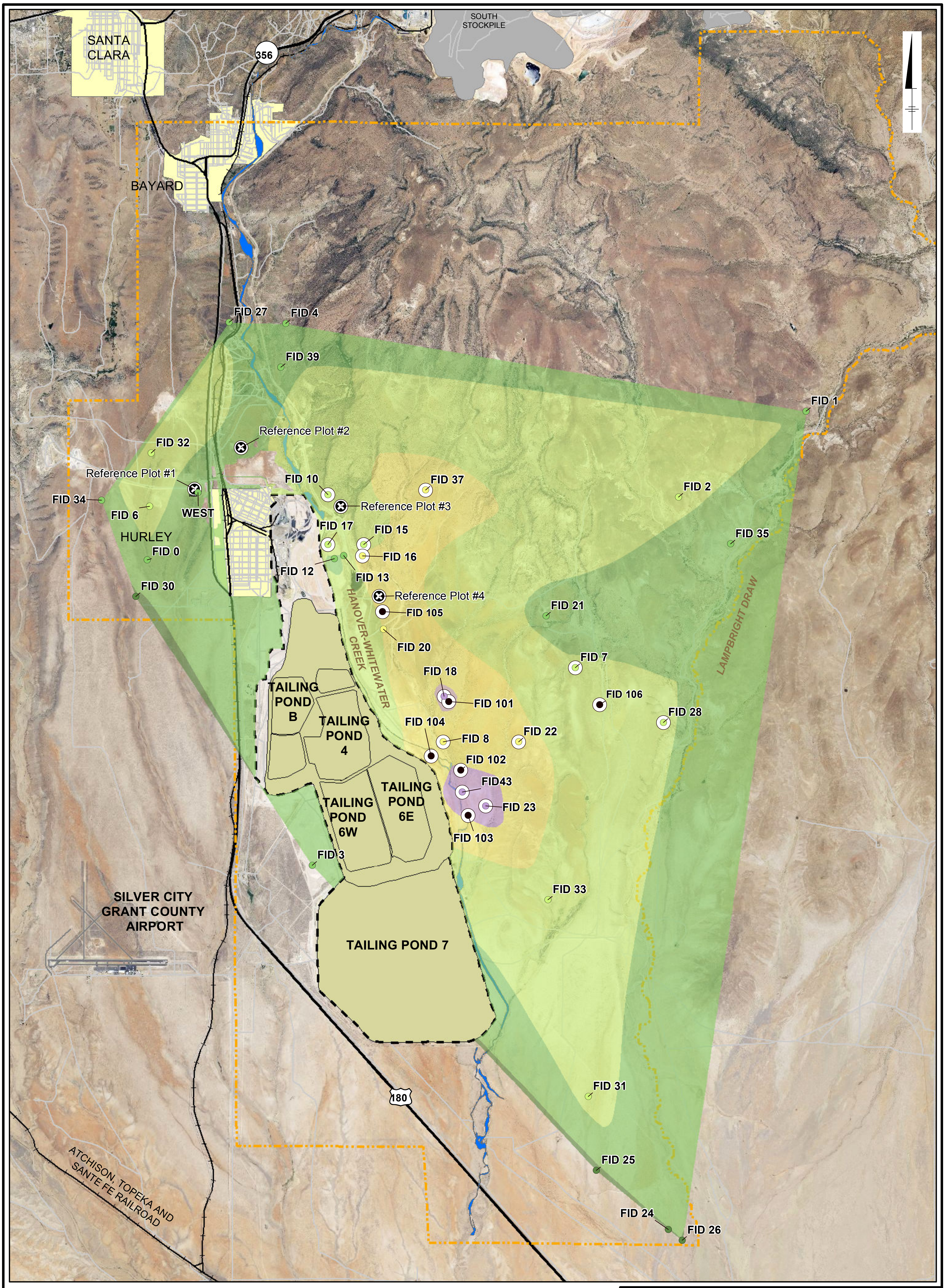
YEAR 5 pH MONITORING REPORT

pCu NATURAL NEIGHBOR INTERPOLATION PRE-WHITE RAIN

ARCADIS

FIGURE
4b

OFFICE: LAKEWOOD DB: MEB TM: MB PM: AT
PROJECT # B0063543.0000 4/16/2015 1:12:46 PM
Y:_ENV\Chino\2015\MXDs\Fig5_pHadj_Post_White_Rain_070610.mxd



LEGEND

pH

● 4-5

● 5-6

● 6-7

● 7-8

● 8-9

● New Monitoring Locations

⊗ Reference Plots

○ Long-Term Monitoring Plots

pH Zones

▨ 4-5

▨ 5-6

▨ 6-7

▨ 7-8

▨ 8-9

0 5,000 10,000 Feet

GRAPHIC SCALE

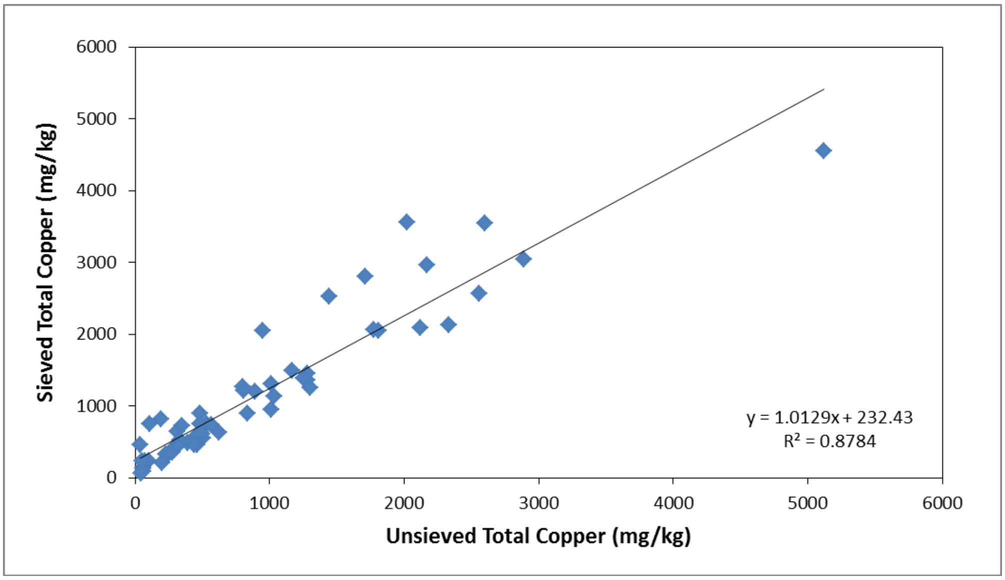
FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

YEAR 5 pH MONITORING REPORT

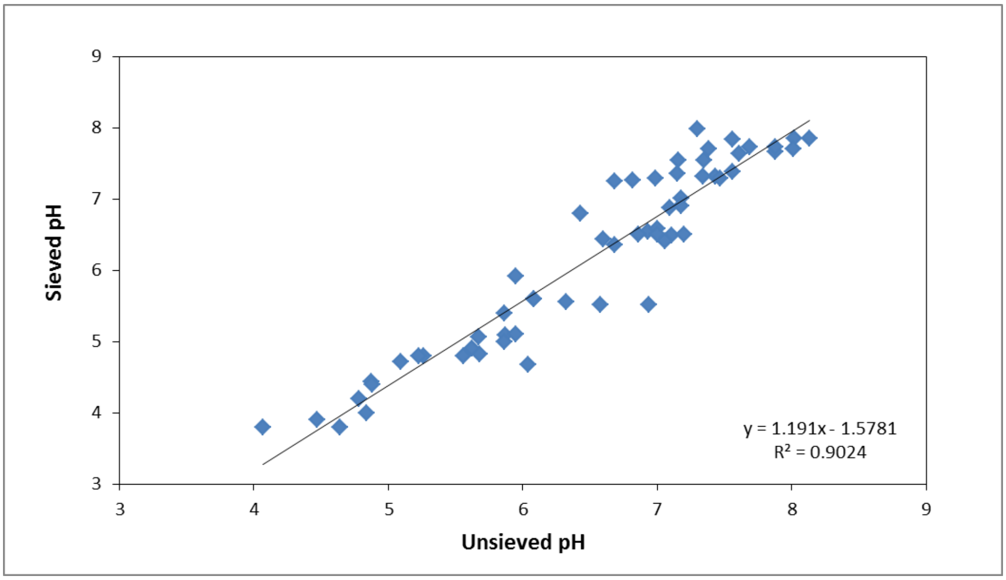
pH ZONES IN 2009 SOILS 0-6" POST-WHITE RAIN USED FOR STUDY DESIGN

ARCADIS

FIGURE
5



a. Relationship between sieved and unsieved copper



b. Relationship between sieved and unsieved pH

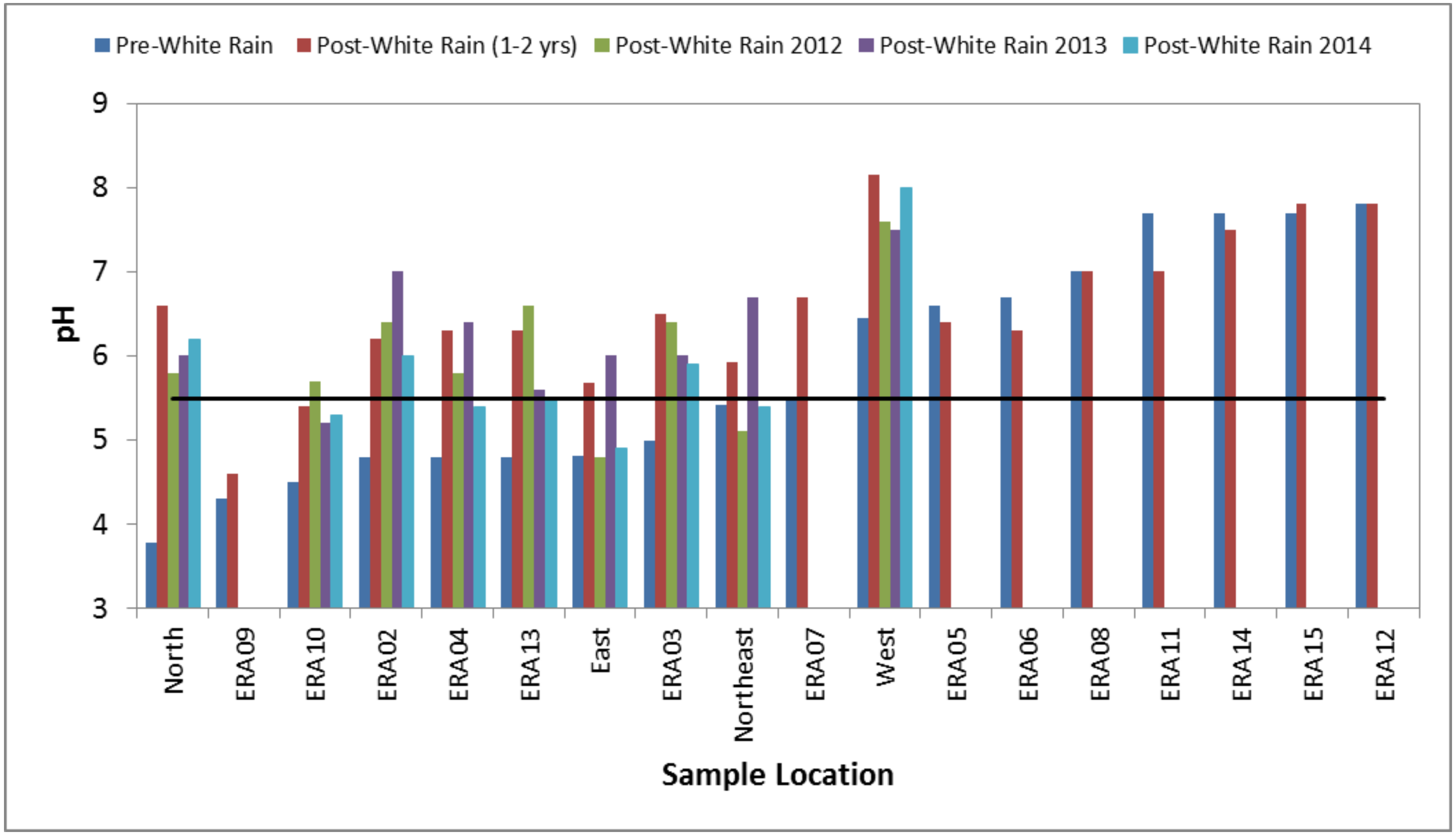
Note:
Figures use all 2010 pH monitoring (this study) and 2011 amendment study (ARCADIS 2014) data.

Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Relationship Between Sieved and Unsieved Copper and pH

ARCADIS

FIGURE
6



Note: pH increased in soils with low pH (≤5.5, line in graph) after the white rain, maintaining the higher pH to 2014.

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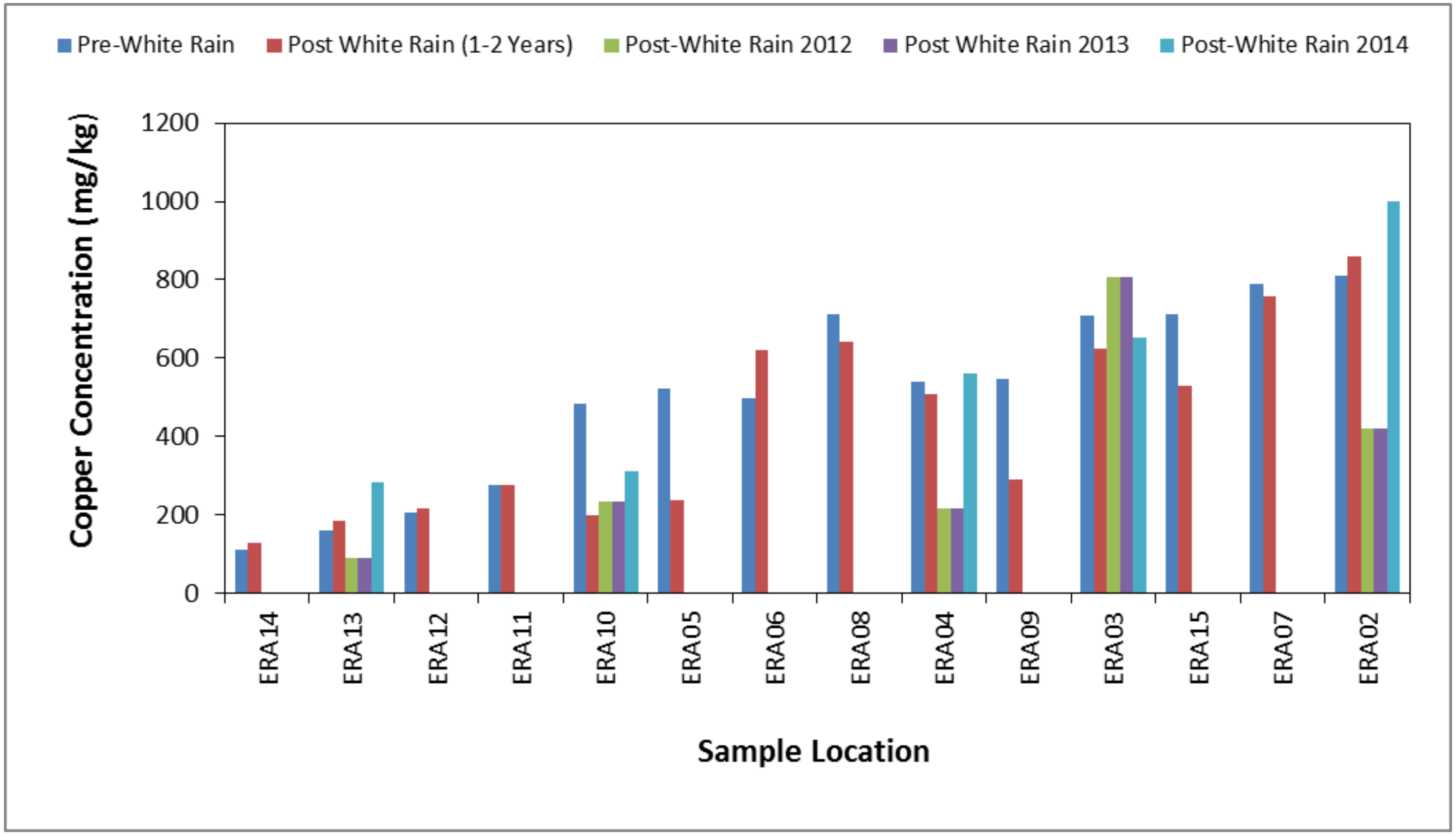
pH Before and After the White Rain

ARCADIS

FIGURE
7

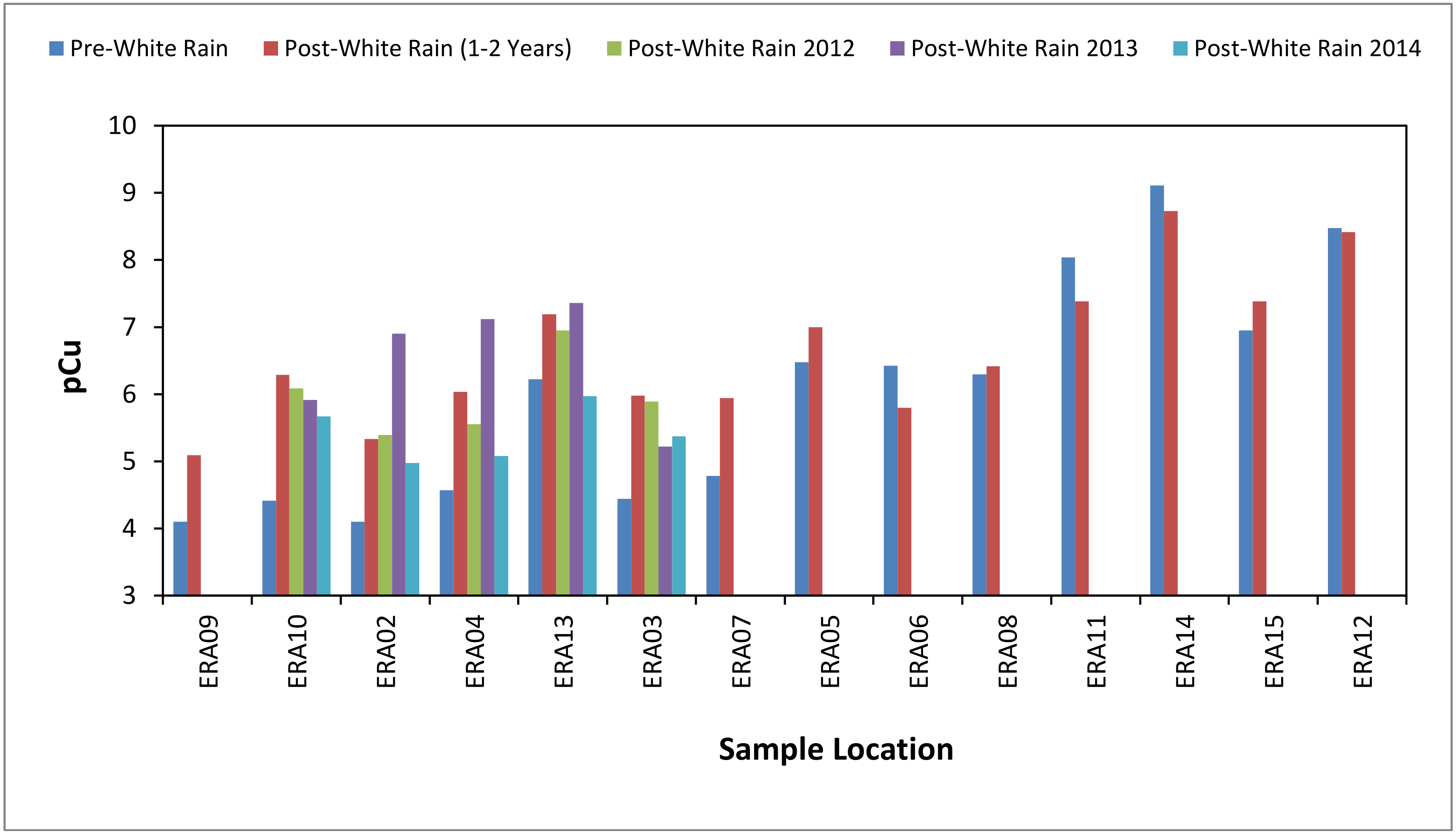


Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Total Copper Before and After the White Rain

ARCADIS

FIGURE
8



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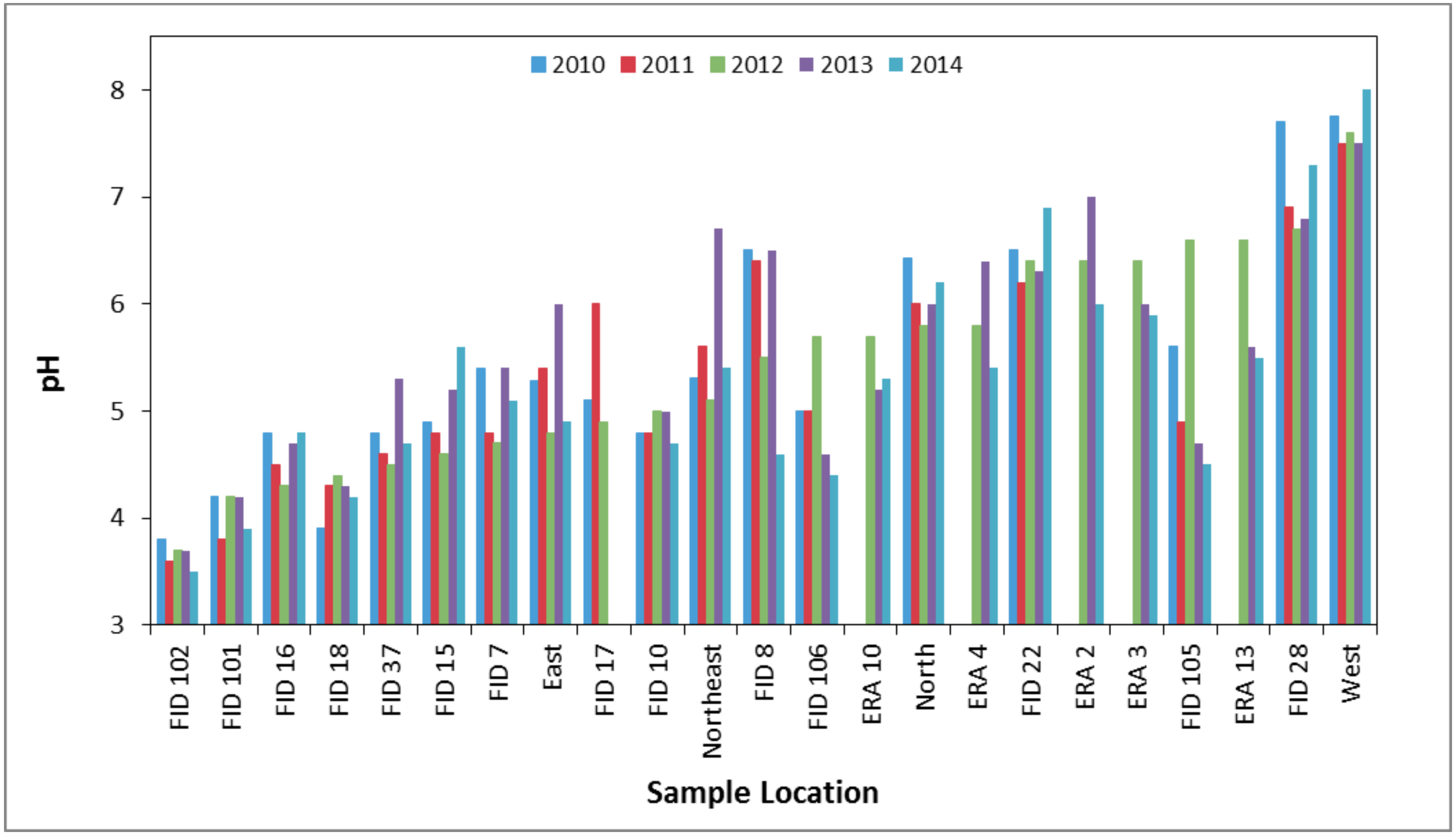
Vanadium, New Mexico
Year 5 pH Monitoring Report

pCu Before and After the White Rain

ARCADIS

FIGURE
9

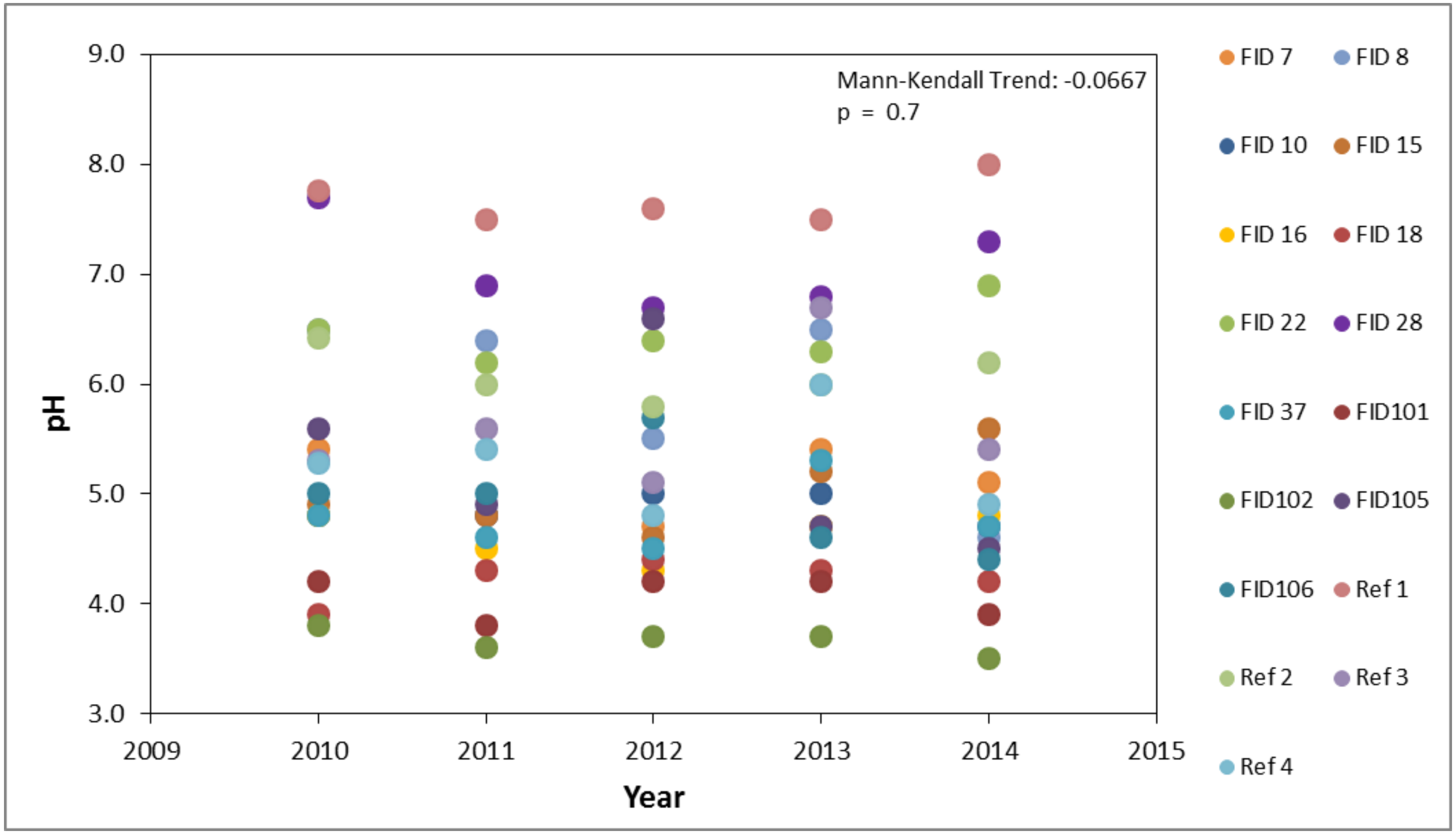


Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

pH of Soils (0 to 6 inches) on All Long-Term Monitoring Sites from 2010 to 2014

ARCADIS

FIGURE
10



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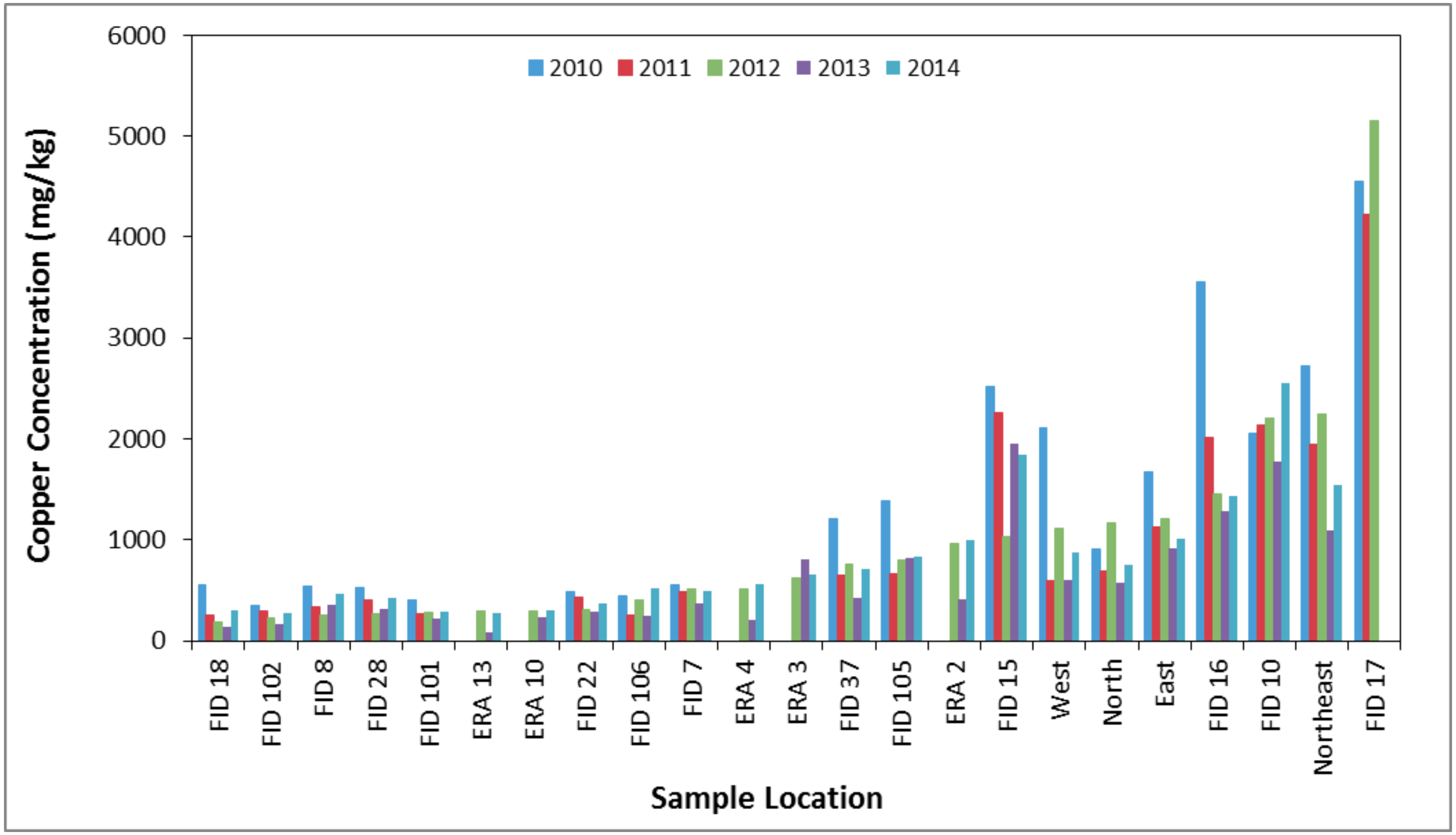
Vanadium, New Mexico
Year 5 pH Monitoring Report

pH Trend of Soils (0 to 6 inches) on 17 Permanence Monitoring Sites from 2010 to 2014

ARCADIS

FIGURE
11

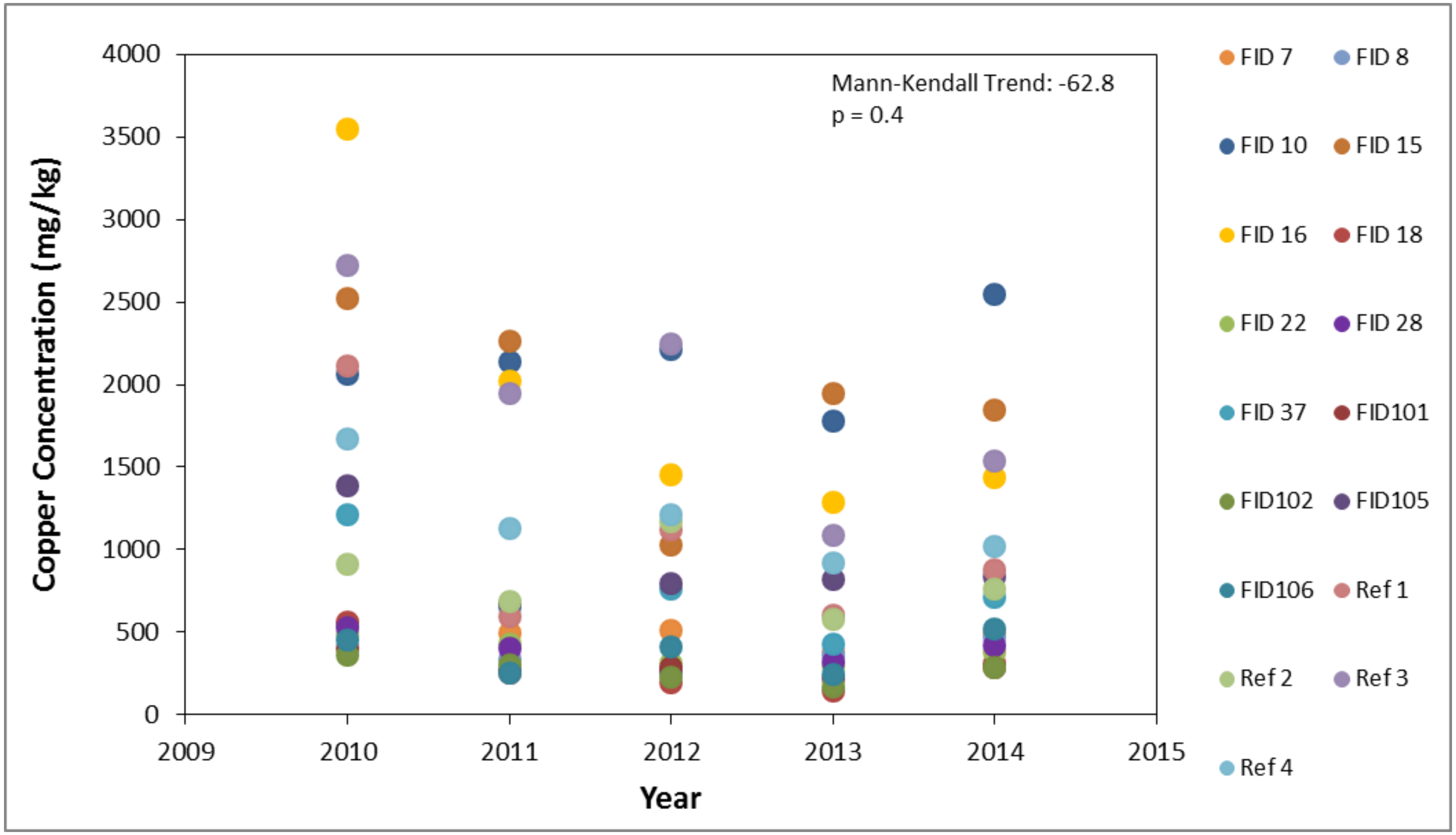


Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Copper Concentration of Soils (0 to 6 inches) on All Long-Term Monitoring Sites from 2010 to 2014

ARCADIS

FIGURE
12

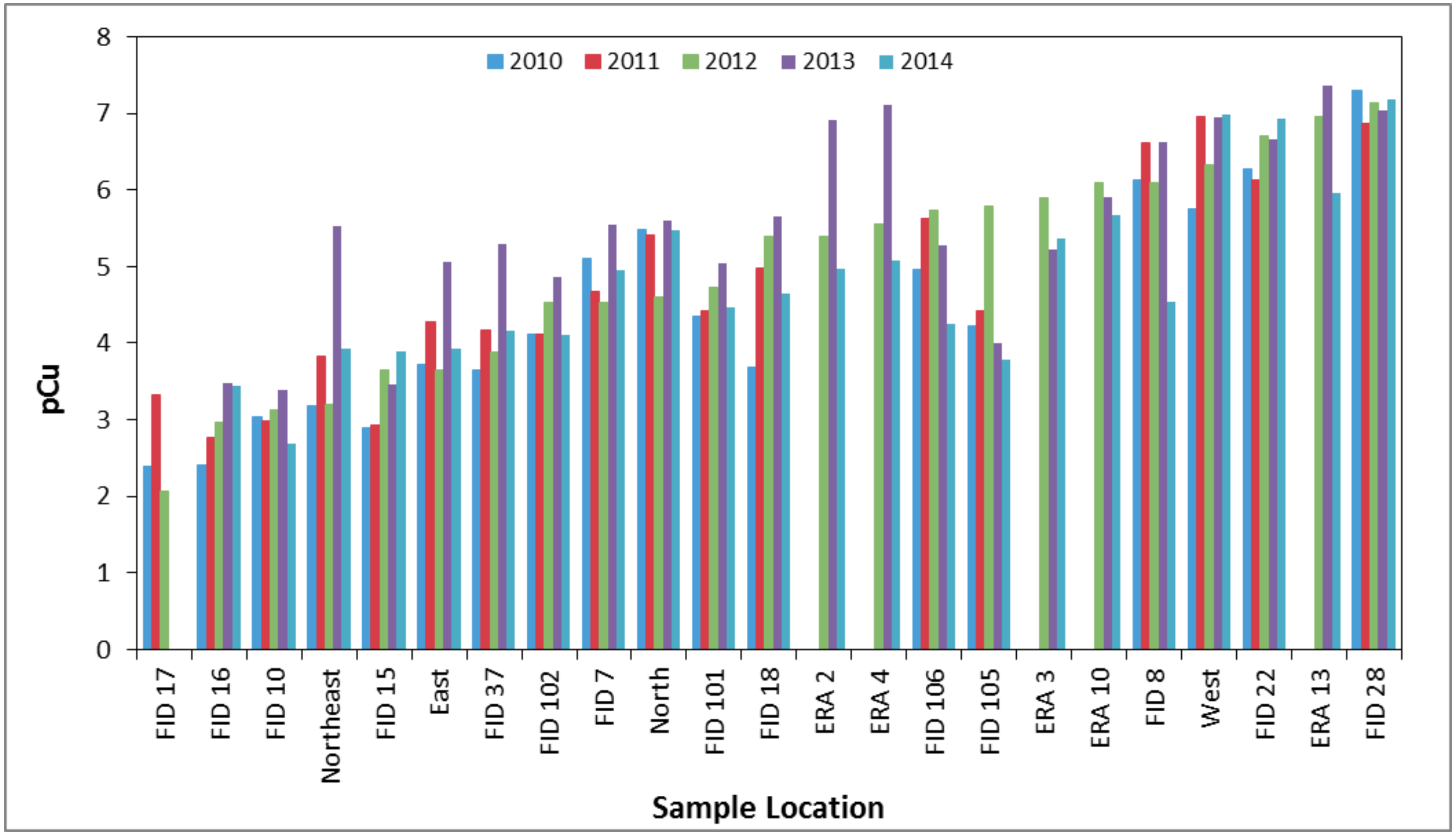


Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Copper Concentration Trend of Soils (0 to 6 inches) on 17 Permanence Monitoring Sites from 2010 to 2014

ARCADIS

FIGURE
13

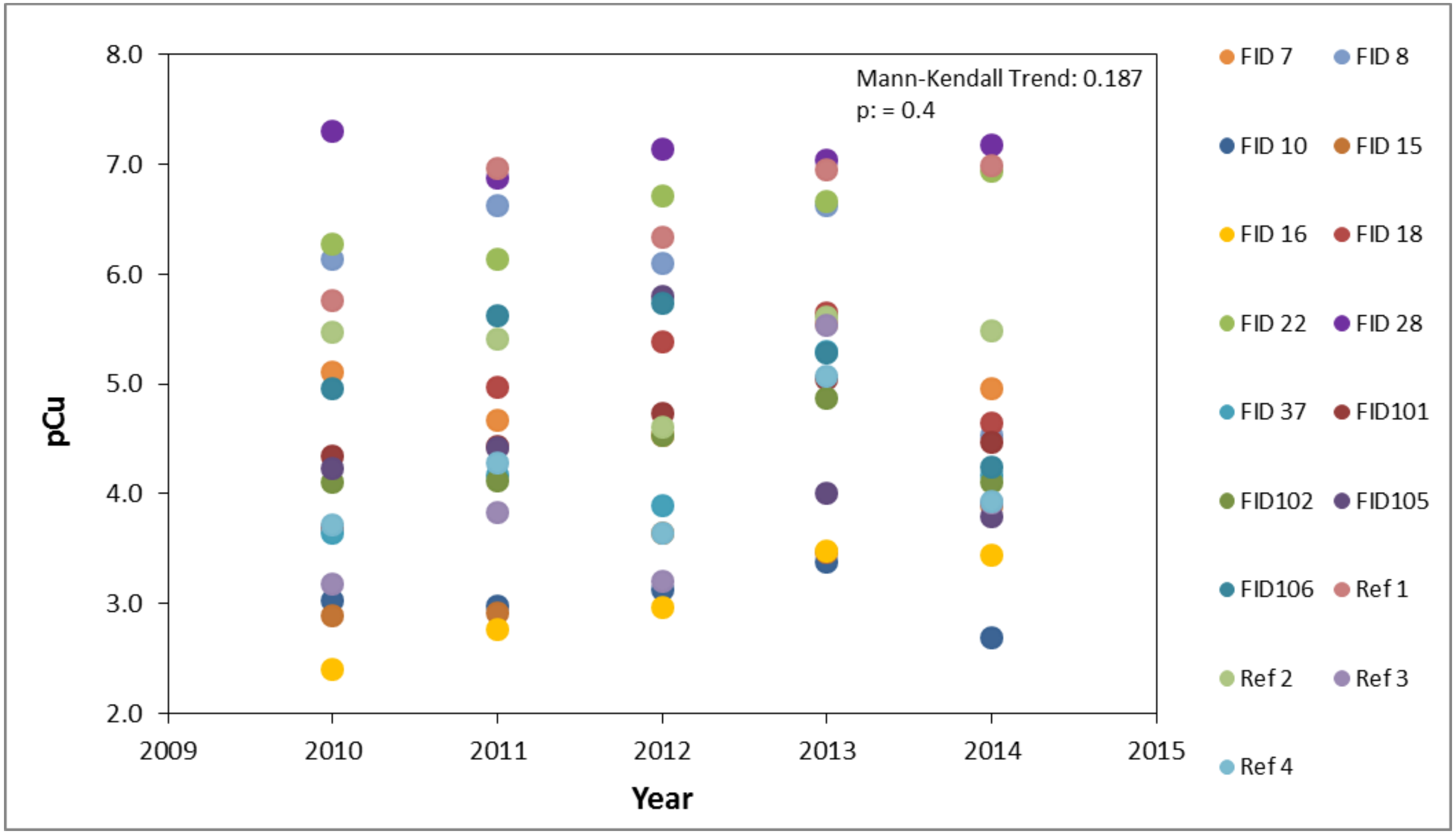


Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

pCu of Soils (0 to 6 inches) on All Long-Term Monitoring Sites from 2010 to 2014

ARCADIS

FIGURE
14



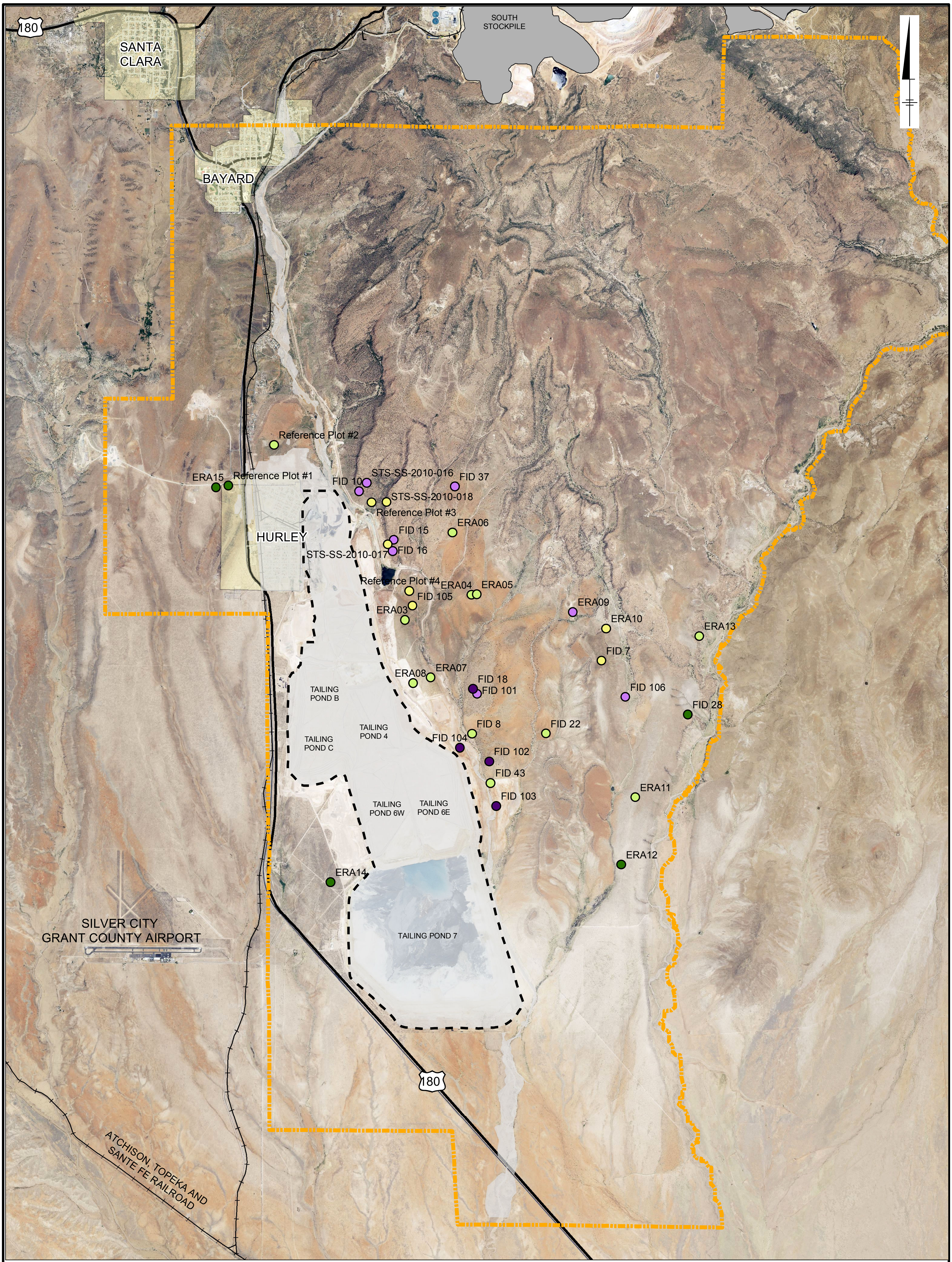
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

pCu Trend of Soils (0 to 6 inches) on 17 Permanence Monitoring Sites from 2010 to 2014

ARCADIS

FIGURE
15

OFFICE: LAKEWOOD DB: MEB TM: MB PM: AT
PROJECT# B0063543.0000 9/4/2015 4:09:19 PM
\\corparcgis\Data\ArcGisData\GISPROJECTS_ENV\Chino\2015\MXDs\2010_pH_NN1.mxd



LEGEND:

pH 2010

● 3 - 4

● 4 - 5

● 5 - 6

● 6 - 7

● > 7

▭ STSIU Boundary

0 5,000 10,000 Feet
GRAPHIC SCALE

Notes:
1. Aerial orthophotography: USDA, NAIP, 2014.

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

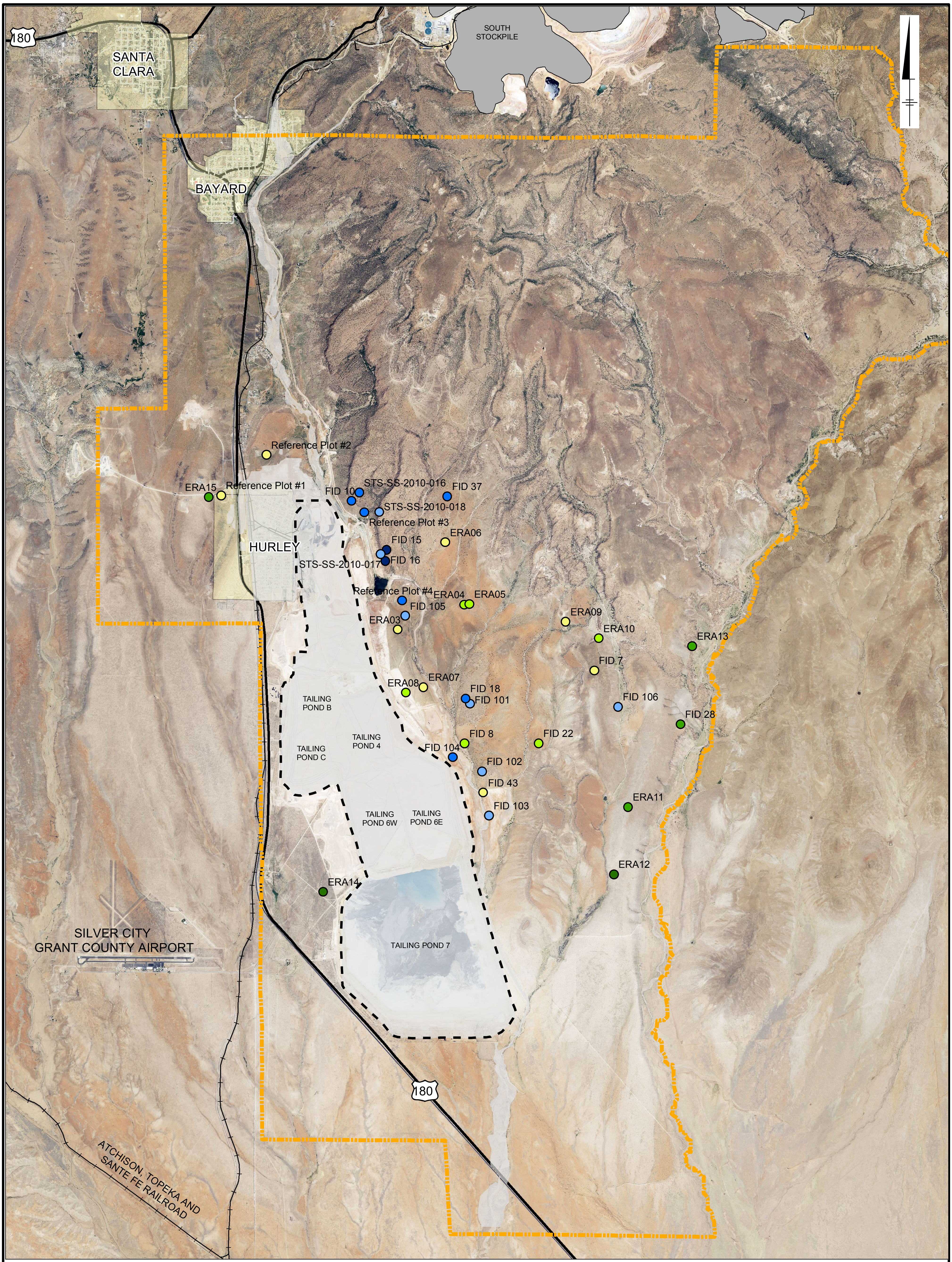
YEAR 5 pH MONITORING REPORT

pH AT SAMPLE LOCATIONS IN 2010

ARCADIS

FIGURE
16

OFFICE: LAKEWOOD DB: MEB TM: MB PM: AT
PROJECT# B0063543.0000 9/4/2015 4:13:27 PM
\\corparcgis\Data\ArcGisData\GISPROJECTS_ENV\Chino\2015\MXDs\2010_pCu_NN.mxd



LEGEND:

2010 pCu

●	< 3
●	3 - 4
●	4 - 5
●	5 - 6
●	6 - 7
●	7 - 8
●	> 8
▭	STSIU Boundary

0 5,000 10,000
Feet
GRAPHIC SCALE

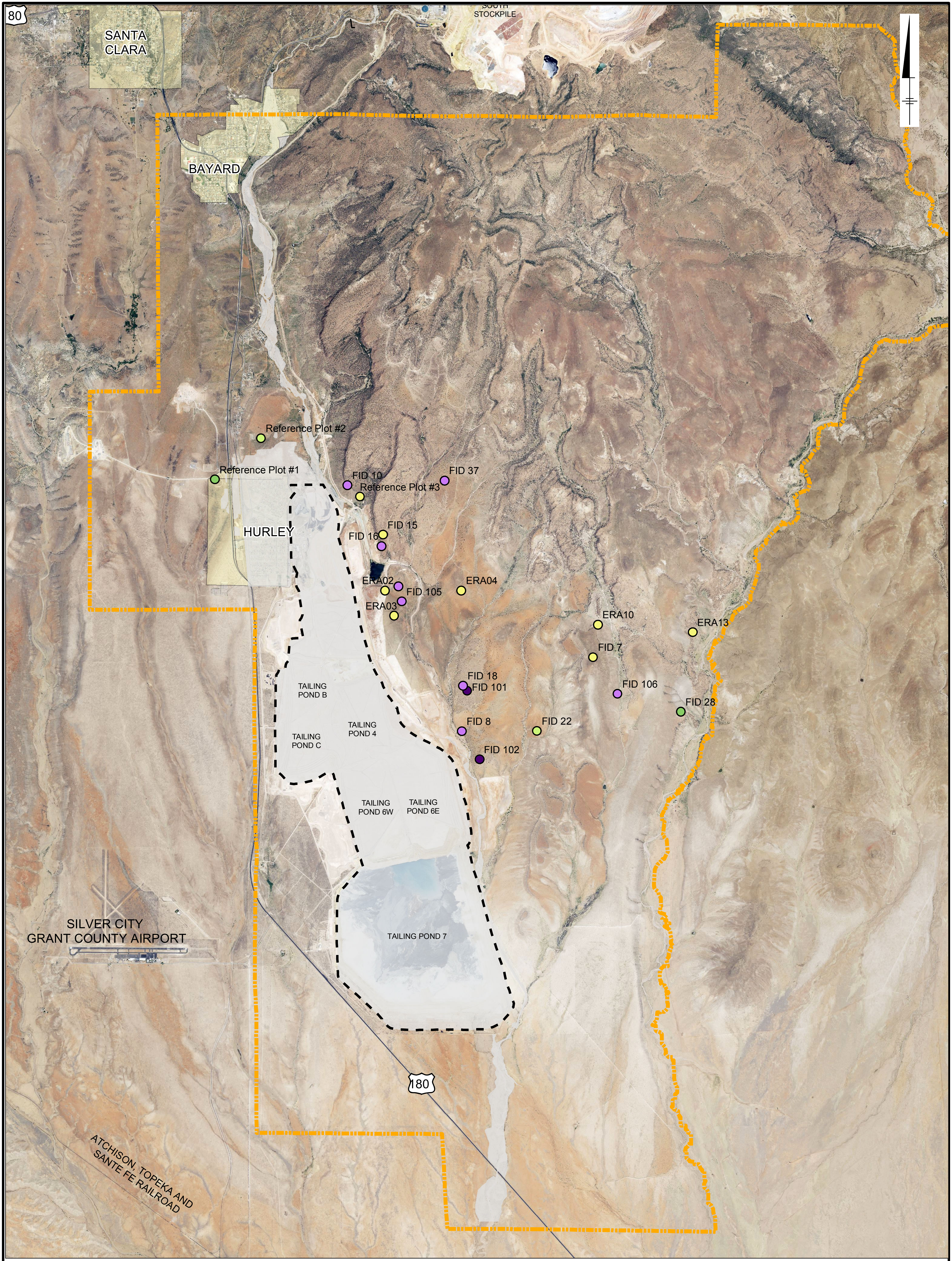
Notes:
1. pCu = 7.34 + 0.93*[pH] - 1.15*In[Cu]
2. Aerial orthophotography: USDA, NAIP, 2014.

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
YEAR 5 pH MONITORING REPORT

pCu AT SAMPLE LOCATIONS IN 2010

ARCADIS

FIGURE
17



LEGEND:

2014 pH

● 3 - 4

● 4 - 5

● 5 - 6

● 6 - 7

● 7 - 8

● > 8

▭ STSIU Boundary

0 5,000 10,000
Feet

GRAPHIC SCALE

Notes:
1. Aerial orthophotography: USDA, NAIP, 2014.

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

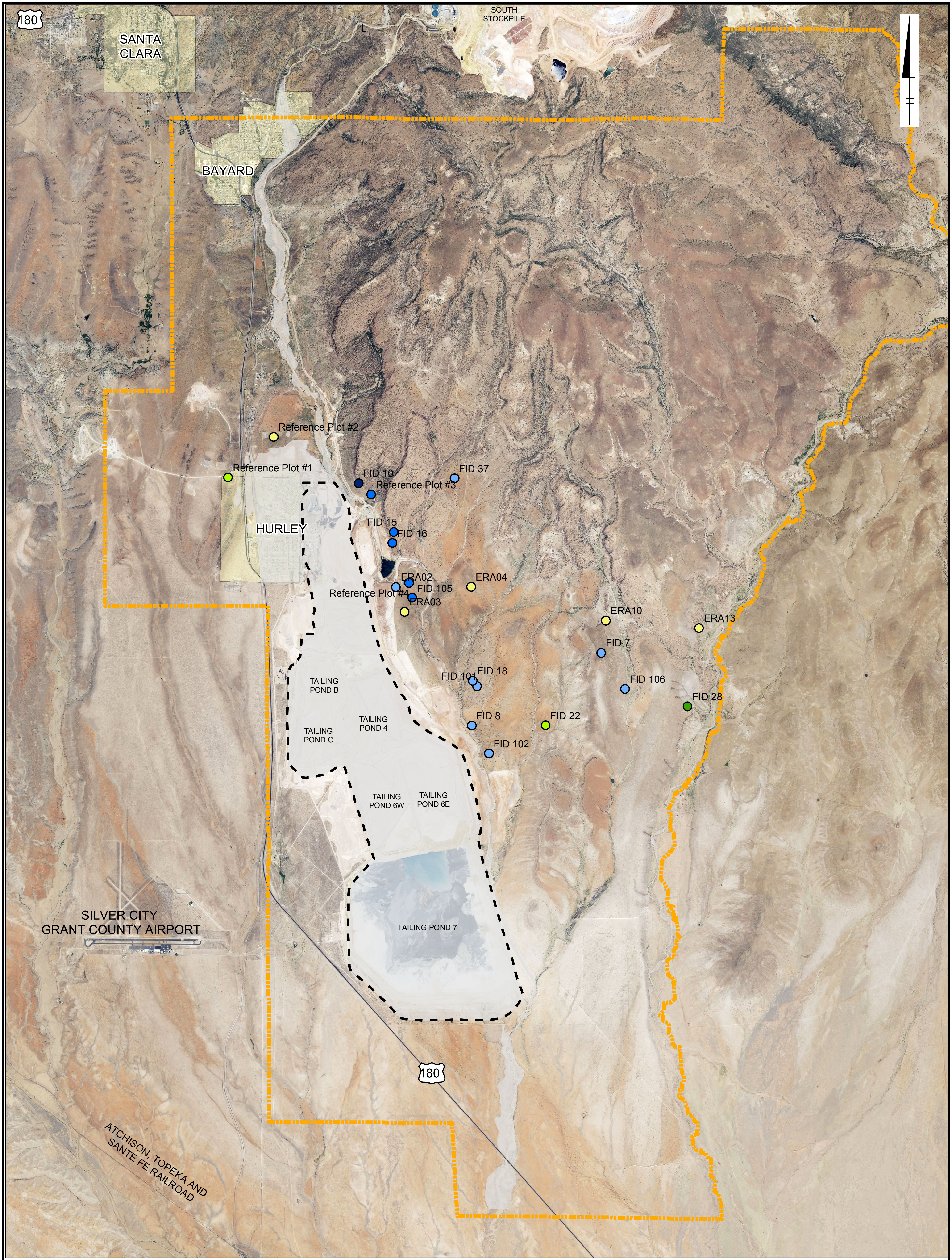
YEAR 5 pH MONITORING REPORT

pH AT SAMPLE LOCATIONS IN 2014

ARCADIS

FIGURE
18

OFFICE: LAKEWOOD DB: MLM TM: MB PM: AT
PROJECT# B0063543.0000 9/4/2015 3:45:53 PM
Document Path: \\corparcgis\Data\ArcGisData\GISPROJECTS_ENV\Chino\2015\MXDs\2014_pCu_NN.mxd



LEGEND:

2014_pCu

● < 3
● 3 - 4
● 4 - 5
● 5 - 6
● 6 - 7
● 7 - 8
● > 8
▨ STSIU Boundary

0 5,000 10,000 Feet

GRAPHIC SCALE

Notes:
1. pCu = 7.34 + 0.93*[pH] - 1.15*ln[Cu]
2. Aerial orthophotography: USDA, NAIP, 2014.

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

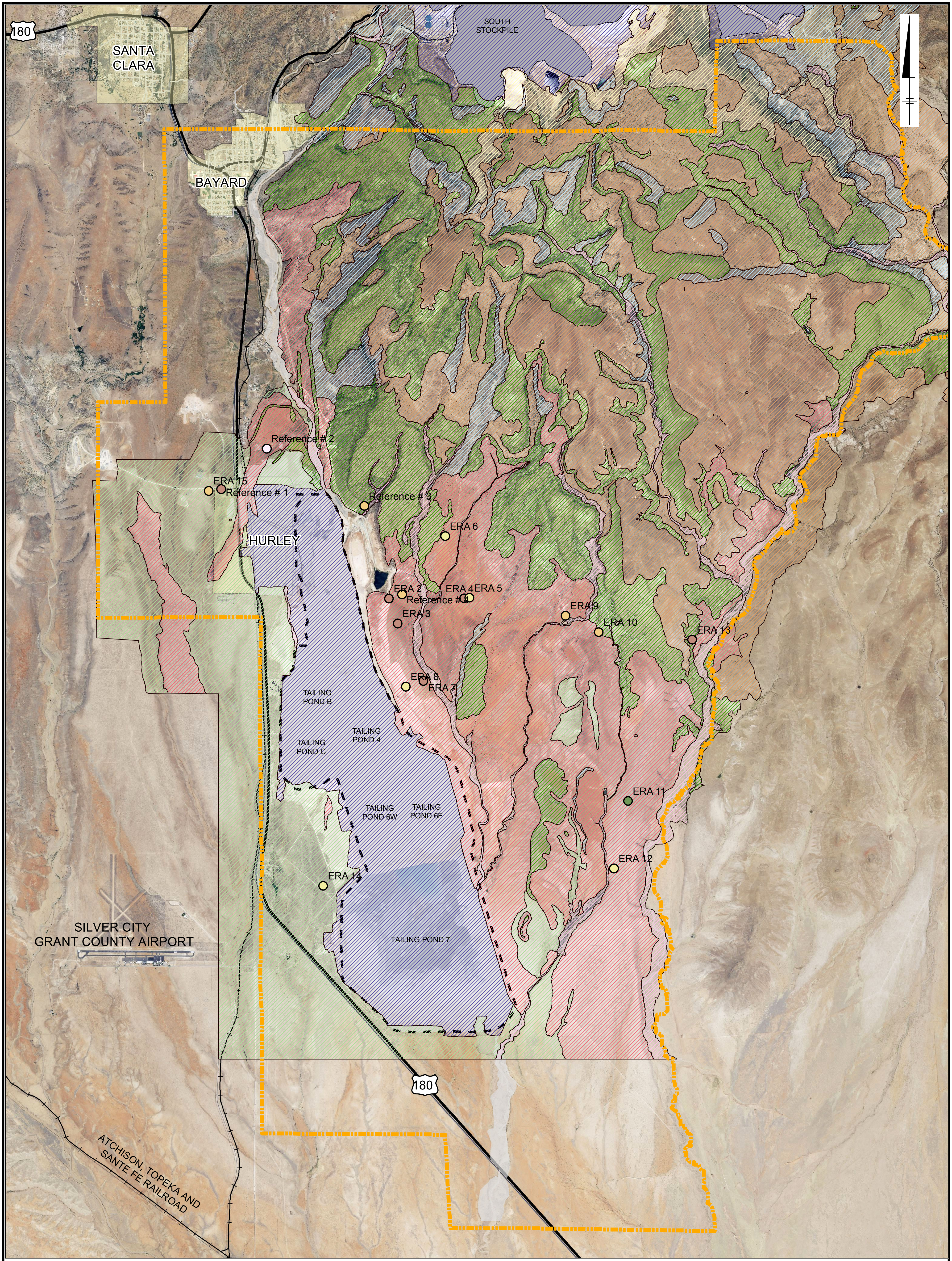
YEAR 5 pH MONITORING REPORT

pCu AT SAMPLE LOCATIONS IN 2014

ARCADIS

FIGURE
19

OFFICE: LAKEWOOD DB: MEB TM: MB PM: AT
PROJECT# B0063543.0000 9/9/2015 4:18:49 PM
Document Path: \\corparcgis\Data\ArcGisData\GISPROJECTS_ENV\Chino\2015\MXDs\Fig20b_PostWR_VegAlliances.mxd



LEGEND:

POST-WHITE RAIN pH MINUS PRE WHITE-RAIN pH

- ● < -0.5
- ● -0.5 - 0
- ● 0 - 1
- ● 1 - 2
- ○ > 2

Vegetation Alliances

- ▨ Alligator Juniper-Oak Woodland Alliance
- ▨ Alligator Juniper-Oak/Grama Woodland Alliance
- ▨ Fluvial Forest and Shrubland Alliance
- ▨ Mesquite/Mixed Grama Shrubland Alliance
- ▨ Mine Facilities/Urban
- ▨ Mixed-Grama Herbacious Alliance
- ▨ Mountain Mahogany Shrubland Alliance
- ▨ Pondrosa Pine-Oak Forest Alliance
- ▭ STSIU Boundary

0 5,000 10,000
Feet

GRAPHIC SCALE

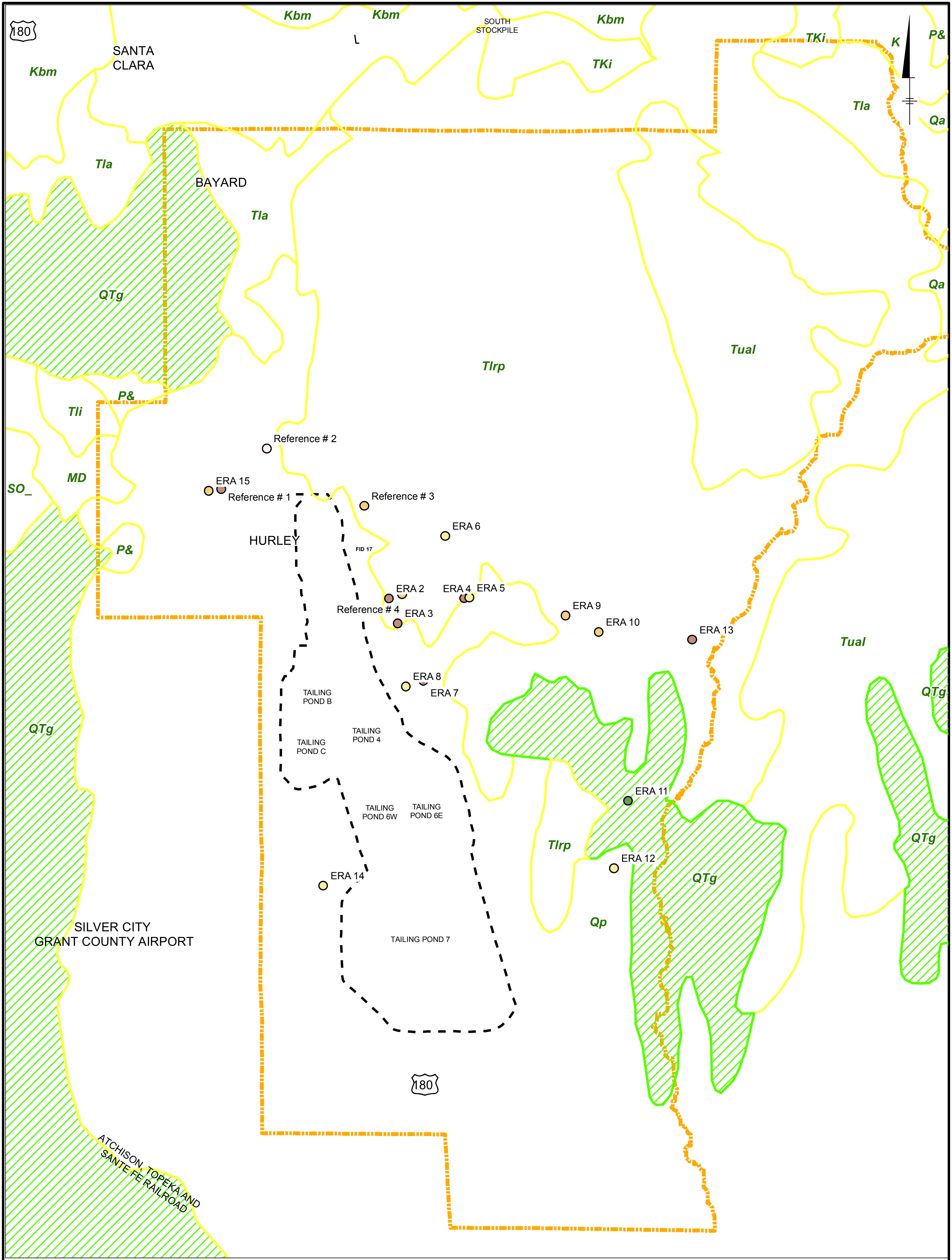
Notes:
1. Aerial orthophotography: USDA, NAIP, 2014.

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
2014 pH MONITORING REPORT

pH INCREASE FROM WHITE RAIN IN VEGETATION ALLIANCES

ARCADIS

FIGURE
20



LEGEND:

POST-WHITE RAIN pH MINUS PRE-WHITE RAIN pH

- ● < -0.5
- ● -0.5 - 0
- ● 0 - 1
- ● 1 - 2
- ○ > 2

Geologic Units

- ▨ Gila Group
- ☐ Other Geologic Units
- ▭ STSIU Boundary

0 5,000 10,000
Feet

GRAPHIC SCALE

Notes:
1. Aerial orthophotography: USDA, NAIP, 2014.

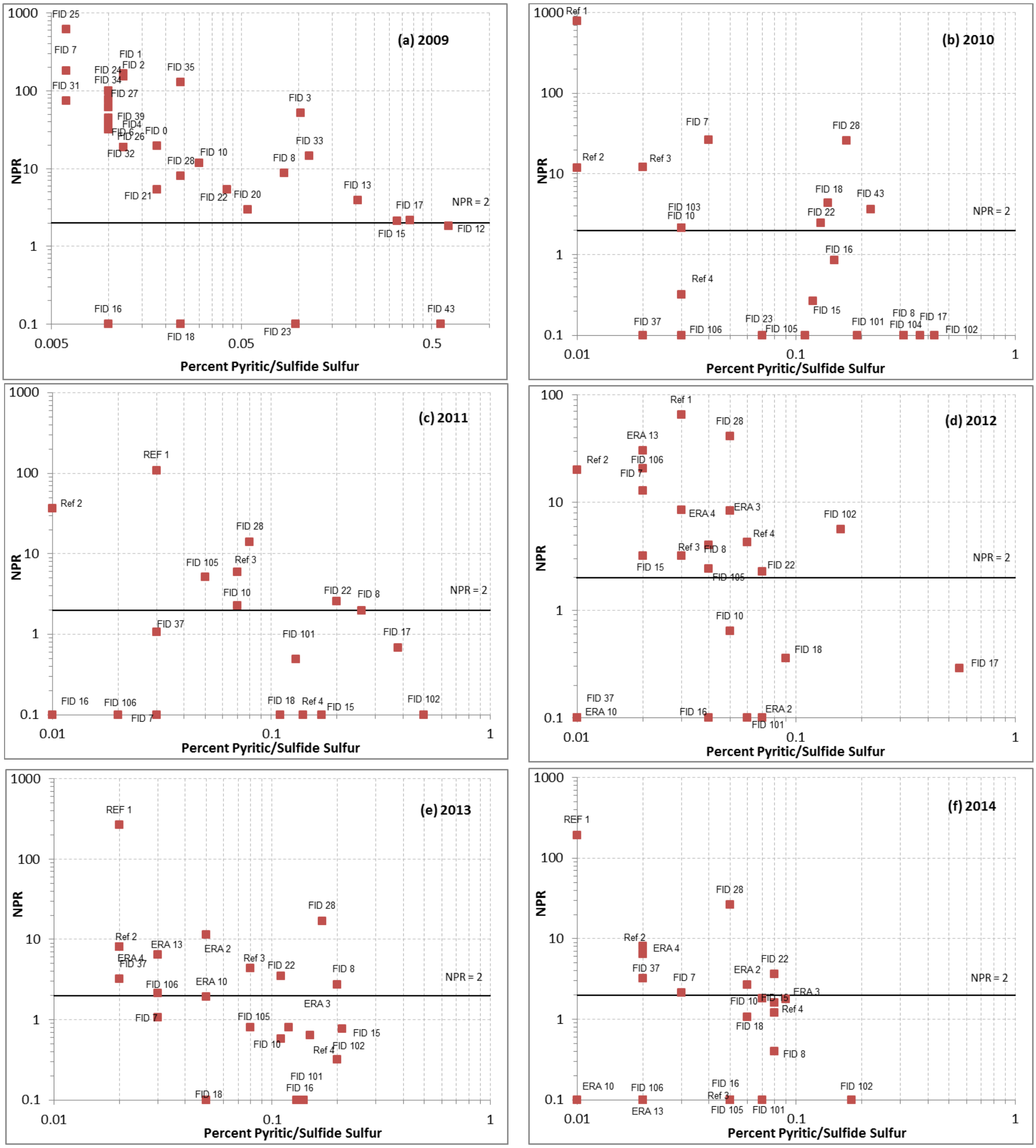
FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

YEAR 5 pH MONITORING REPORT

pH INCREASE FROM WHITE RAIN IN GEOLOGIC UNITS

[redacted]

FIGURE
21

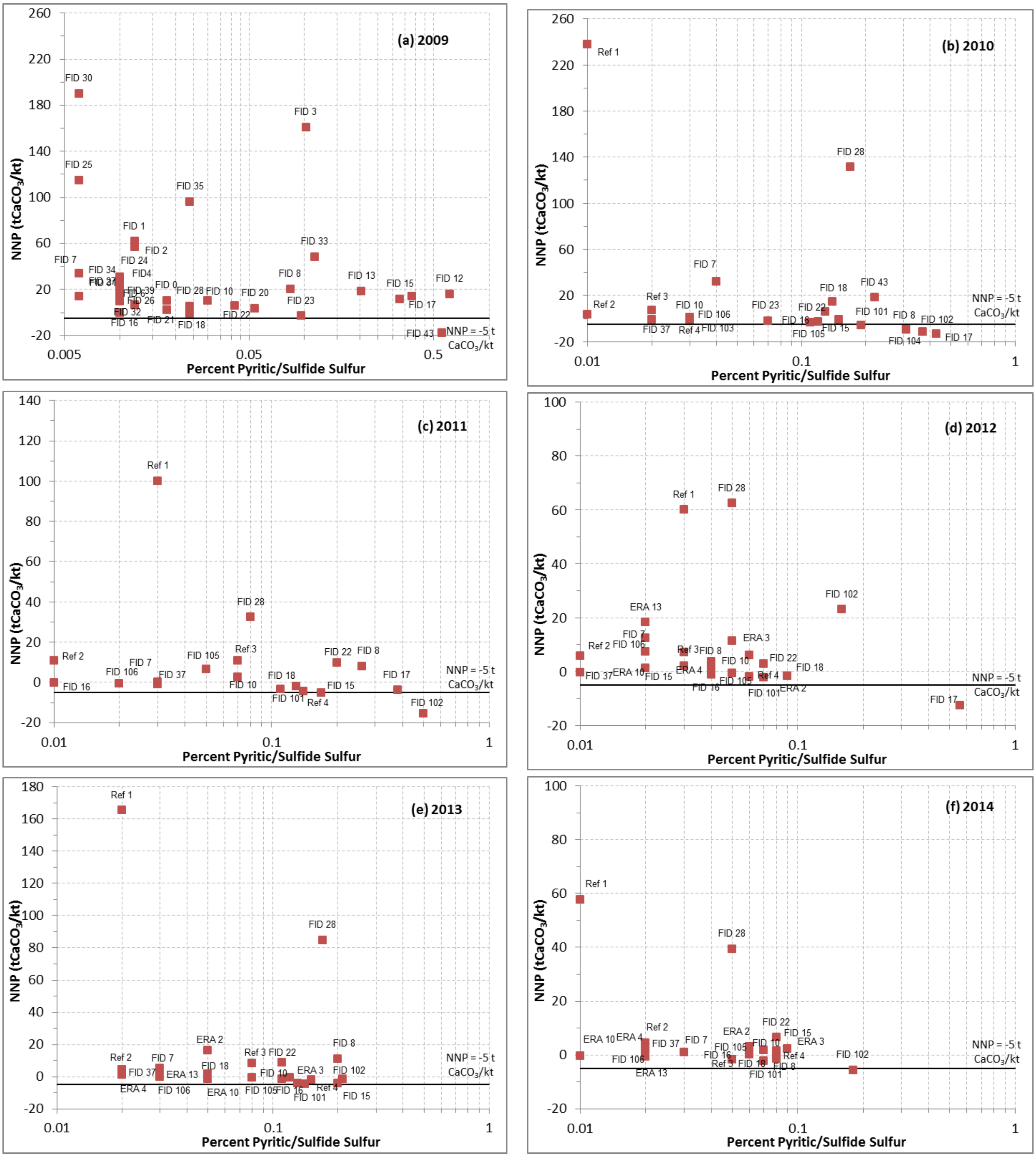


Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Relationship of Percent Sulfide Sulfur and NPR

ARCADIS

FIGURE
22

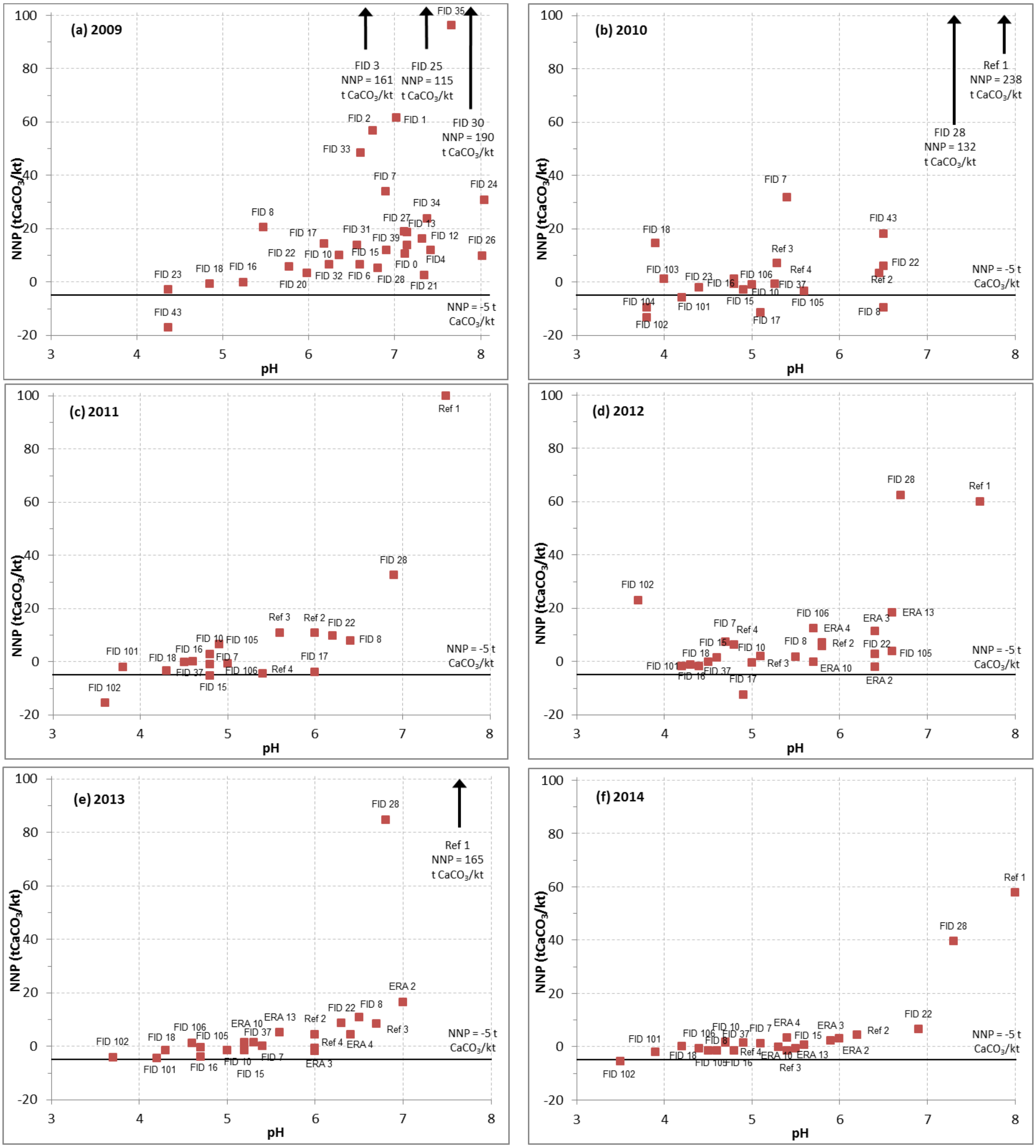


Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Relationship of Percent Sulfide Sulfur and NNP

ARCADIS

FIGURE
23

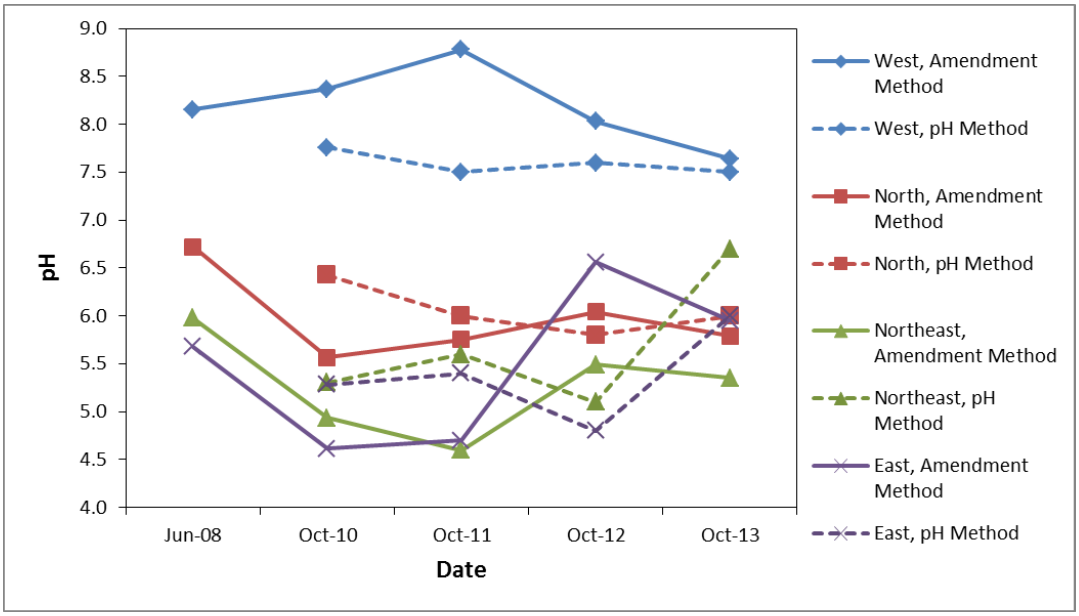


Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

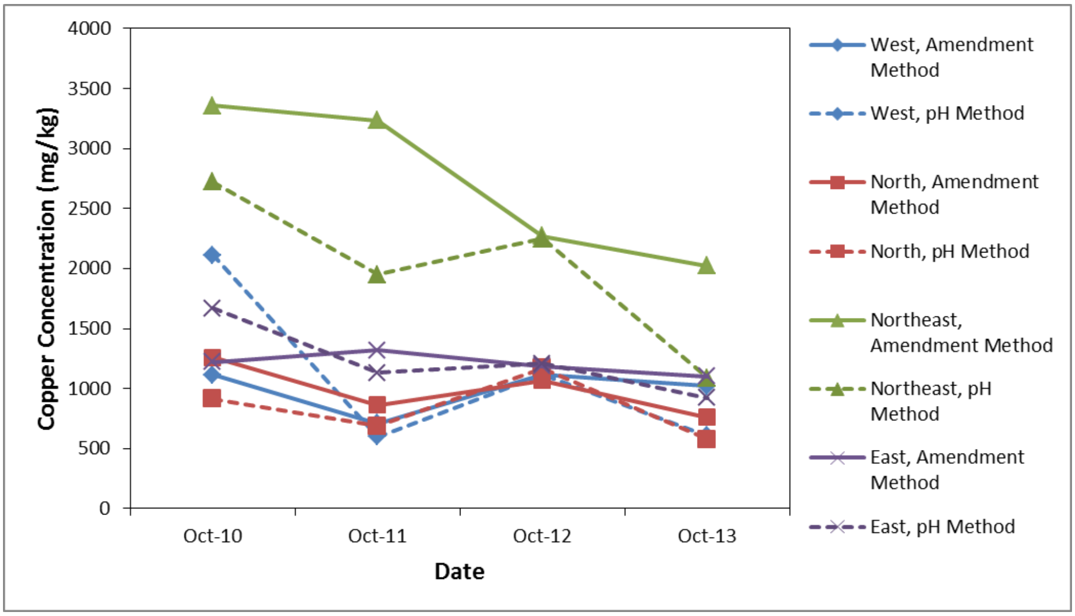
Relationship of pH and NNP

ARCADIS

FIGURE
24



a. Effect of sampling method on pH results collected from 2010 to 2013



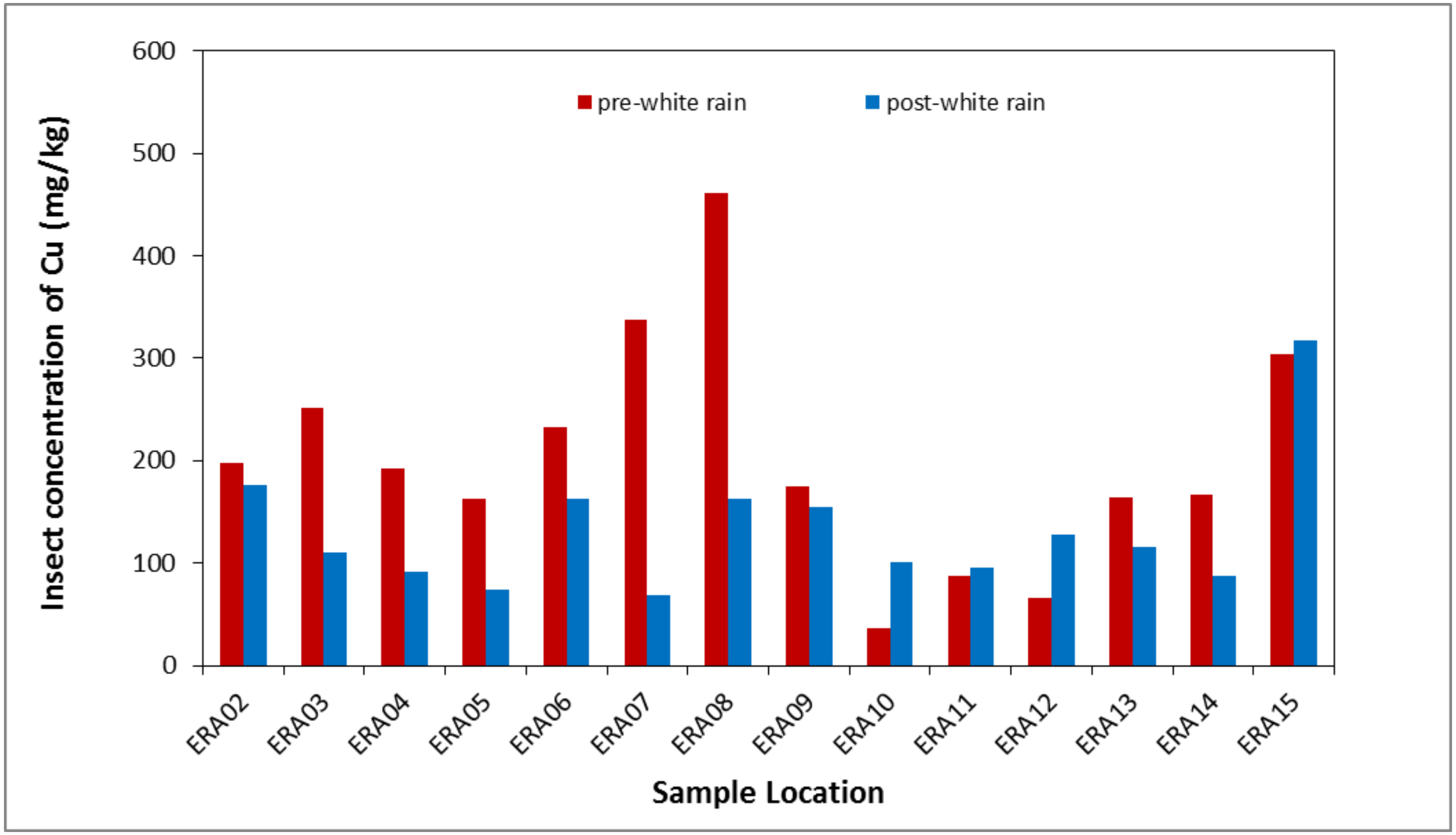
a. Effect of sampling method on copper results collected from 2010 to 2013

Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Effect of Sampling Method on pH and Copper Results Collected from 2010 to 2013

ARCADIS

FIGURE
25



Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Comparison of Copper Concentration in Insect Tissue Before and After the White Rain

ARCADIS

FIGURE
26

ARCADIS

Appendix A

Initial 2008 Investigation of the "White Rain" at Chino

Appendix A – Initial 2008 Investigation of the “White Rain” at Chino

Introduction

Soil within the upland Smelter and Tailing Soil Investigation Units (STSIU) is impacted by historical mineral processing activities including smelter emissions and windblown tailings. The soil pH is variable but can be acidic, and the main constituent of concern is copper, which becomes more mobile under acidic conditions. The STSIU has undergone remedial investigation (RI) and ecological risk assessments, with soil, insect, and plant tissue data collected before the white rain from throughout the Investigation Unit (IU) from 1995 to 2005 (Chino Mines Company 1995, Newfields 2005, 2008; SRK 2008). Chino conducted an Amendment Study to understand whether calcium carbonate/oxides delivered as lime is a possible remediation approach (ARCADIS 2014). On January 7, 2008, prior to implementing the Amendment Study, rain with a high content of suspended solids left a layer of white precipitate in the region (white rain) that may act similar to lime or calcium carbonate. Chino had collected two rounds of pre-Amendment Study data that bookend the event, one round in July 2006 before the white rain event, and one round in May and June 2008 after the white rain event. This appendix discusses the white rain precipitation event and the precipitation and soil data available before and immediately after the event to evaluate the composition of the rain, source of constituents in the rain, and immediate effect on the soil within the STSIU. The objectives of this evaluation are as follows.

Objectives

1) Evaluate all initial 2008 data associated with the white rain event.

2) Assemble a geochemical conceptual site model (CSM) that describes the possible effect of the white rain on the STSIU.

3) Evaluate the potential longevity of soil pH neutralization provided by the event.

STSIU Conceptual Site Model

The CSM presented in the revised RI for the STSIU report prepared by SRK (2008) identifies two sources for copper and depressed pH including emissions from the former smelter stacks and fugitive emissions from mineral processing activities, such as crushing and milling operations, and windblown tailings from the old tailings ponds that have impacted the surficial soils. The Hurley smelter ceased operations in January 2002; demolition and salvage of a number of the facilities within the Hurley operational area began in late 2005, and the stacks were demolished in June 2007.

The soils acidification at the STSIU, therefore, occurs via two mechanisms – acidification by sulfur dioxide (SO_2) present in the former emissions and by dust from mineral processing and tailings. During smelting of sulfidic ore, SO_2, which forms sulfuric acid (H_2SO_4) upon contact with water, was released to the atmosphere via the former smelter stacks. In the gas phase, SO_2 is oxidized by reaction with the hydroxyl radical via an intermolecular reaction as follows:

$$SO_2 + OH\cdot \rightarrow HOSO_2\cdot$$

followed by: $HOSO_2\cdot + O_2 \rightarrow HO_2\cdot + SO_3$

In the presence of water, sulfur trioxide (SO_3) is converted rapidly to sulfuric acid:

$$SO_3(g) + H_2O(l) \rightarrow H_2SO_4(l)$$

The soil was then acidified during emission fallout, mixing with soil pore water and rainfall.

The second process contributing to soils acidification may be due to windblown dust from the old tailings ponds. Soils adjacent to the tailings are extremely variable in pH ranging from 2.92 to higher than 8 before the white rain. Windblown tailings contain sulfide minerals, such as pyrite, and when introduced to oxygen and water, catalyze to form iron(II) ions, sulfate ions, and hydrogen ions, according to the main reaction below:

$$2FeS_2(s) + 7O_2(g) + 2H_2O(l) \rightarrow 2Fe^{2+}(aq) + 4SO_4^{2-}(aq) + 4H^+(aq)$$

The hydrogen and sulfate ions represent the disassociated form of sulfuric acid. The smelter also released some sulfidic minerals and slag that survived the smelting process and were deposited on the soils. The copper and iron sulfide minerals would undergo a similar acidifying reaction as shown above.

The Site-Wide Ecological Risk Assessment (Newfields 2005) depicts the concentrations of pH throughout the IU as highly variable. The pH variability is largely due to soil geochemistry, wind patterns, and the variable ability of the soil to buffer acid over long periods of time. Soil samples were collected prior to and after the white rain event near shallow soil in the test areas identified for an Amendment Study. The change in pH during these two events alerted Chino to the possibility that the white rain event affected soils within STSIU. The data are summarized in **Table 1** of the main report.

The pH and calcium concentration in the soils increased after the white rain event, most strongly in the northernmost plot (north plot). This increase after the January 2008 white rain event was potentially due to deposition of alkaline calcium-rich minerals resulting in the neutralization of the acidic soils.

Neutralization of Acidic Soils

One of the treatments used for acid rock drainage reversal is the amendment of soils by alkaline minerals resulting in neutralization of the acidic conditions. If the pH of the soil is increased, as would happen during contact with basic minerals such as lime (CaO), calcite ($CaCO_3$), or dolomite ($Ca,MgCO_3$) or entry into a soil water of higher pH, then metallic ions such as Fe^{3+} and Cu^{2+}, Zn^{2+}, Pb^{2+}, and As^{3+} will react to eventually form hydroxide precipitates.

White Rain Precipitation Event

On January 7, 2008, “white” rainfall occurred in Grant and Catron Counties, New Mexico. The rainwater was not clear but contained a large amount of suspended solids resulting in a “white” appearance. One plausible explanation of this occurrence points toward windblown dust particles seeding clouds, resulting in white precipitation. The source of the dust particles was initially theorized to be the salt playas in southern Arizona. A high-resolution National Aeronautics and Space Administration (NASA) photograph taken during this period of a large cloud of dust blowing northeast off the Willcox playa toward Silver City supports this explanation (**Figure A-1**, also, see news story in **Attachment A**). The storm track carrying the white rain was back-calculated from the most reliable rainwater sample location (NM01) by University of California San Diego (UCSD) using an air mass trajectory model called Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPIT). The air mass carrying the white rain crossed through the Chino site **(Figure A-2**).

Willcox Playa, a source of the dust in the white rain, is located approximately 100 miles southeast of the Chino Mine and covers approximately 40 square miles (mi^2) in its core area and nearly 200 mi^2 in overall area. Willcox playa is floored with white silt and clay material and is well known for its winds and relatively large sand dunes around its margins. A playa is a dry lakebed containing large amounts of evaporative minerals such as alkali salts. Commonly encountered minerals include calcite, gypsum, halite, trona, and hydroxides of sodium, potassium, and magnesium.

Similar dust storm-related white rain precipitation events have been documented in South Africa in 2003 (Resane et al. 2004) and Zimbabwe in 1992 (Nyika et al. 1996). The probable source of the dust in Johannesburg, South Africa was the Makgadikgadi saltpans in the Kalahari Desert of central Botswana, which are similar to the saltpan playas of Arizona. Based on the evaluation of the weather patterns and composition of the white rain (only a dried sample of fine dust was available for the analysis), the Kalahari Desert was identified as a likely source for the white rain in Bulawayo, Zimbabwe (Nyika et al. 1996).

Data Summary: UTEP and NADP

Samples of the rainwater runoff from rooftops and at various locations, including Hurley and Tyrone, were collected by people living in the area and provided to New Mexico Institute of Mining and Technology (NMT) and the University of Texas El Paso (UTEP). In addition, the National Atmospheric Deposition Program (NADP) maintains a rainwater collection monitoring location at Gila Cliff Dwellings National Monument (Station NM01) which is about 40 miles north of Chino. A total of approximately 10 mm (~0.4 inch) of precipitation was recorded by the NADP at NM01.

Because the NMT/UTEP samples were collected by people living in the area and off rooftops, collection and preservation procedures were not rigorous, whereas NADP maintained rigorous sampling and preservation procedures to assure data quality. Therefore, the most reliable data with respect to water chemistry are the NADP data. For the NADP data, samples were filtered into pre-washed 60-mL high-density polyethylene (HDPE) round bottles using 0.45-micron pore-size polyethersulfone filters following pH and conductivity measurements. Major and trace elements were analyzed by inductively coupled plasma optical emission spectrometry (ICP-OES). Additional information about the analytical procedures is provided in NADP 1999 and 2003 and at http://nadp.sws.uiuc.edu. **Table A-1** provides a summary of all results from UTEP and NADP, including control samples collected immediately after the white rain event. Samples were collected at locations called NM01, AZ99, Rusty's Rooftop (RRR, white rain), Sample #1 at Tyrone, New Mexico (white rain MR1r and control MR1c), and Sample #5 at Hurley, New Mexico (white rain MR5r and control MR5c) and shown on **Figure A-2.** The suspended solids content of the rainwater was not determined (were filtered out), but additional analyses were performed on the whole rainwater samples (unfiltered) by UCSD on samples provided by UTEP. These analyses, however, did not provide information on the total content of calcium and other important cations that would be helpful to this evaluation.

At the three sampling locations evaluated (Rusty's rooftop was not included because it lacked a control sample), pH was more alkaline in the samples collected on January 7, 2008, which contained water from the "white rain" event, than control samples. The most pronounced effect on pH occurred in the samples collected at Gila Cliffs, where background pH of 5.0 increased to 7.2 in the white rain sample. The background pH has historically been close to 5.0, as shown on **Figure 2b** of the main text; the pH recorded here during this event was a very significant departure from the average annual pH. Historical data collected weekly for the period 1985 through 2008 (**Figure 2a** of the main text) show that the white rain event on January 7, 2008 was in fact significant relative to the concentration of calcium and pH, even after the smelter operations were discontinued. The concentration of ions increased in two of the samples, but appeared to remain unchanged at Tyrone. It is unclear why the Hurley and Tyrone locations do not show a similar large magnitude of change in pH compared to Gila Cliffs, but it may be because sample collection procedures were as not rigorous. The total dissolved solids (TDS) estimates appear incorrect for those samples, which makes those samples suspect (plus those samples were collected off rooftops that may contain contaminants other than the white rain). The NM01 data are most reliable and should be the primary data interpreted to evaluate the effect of the white rain. Overall, the rainwater data indicate that the RI data and conclusions of the Site-Wide and STSIU Ecological Risk Assessments may no longer be representative of the nature and extent of pH in the STSIU.

Greater concentrations of calcium could result from dissolution of calcium carbonate or calcium oxide and would indicate that the suspended solids in the rain were partially made up of these minerals. The TDS content was fairly low in all samples; however, the white appearance and the dusty precipitate encountered on surfaces after the rain event suggest that suspended solids were present in the rain. The limited TDS content indicates that only a small amount of the solids was dissolved. Naiman et al. (2000) identified carbonates in soil samples from Willcox playa in the late 1990s. These findings conceptually support the concept that dust from the Willcox playa can provide buffering capacity to the acid-impacted soils.

Data Summary: UCSD

Rainwater collected on January 7, 2008 by UTEP was sent to UCSD for identification of the solids in the white rain. The locations of the samples that Dr. Kerri Pratt analyzed are shown on **Figure A-2**. The analysis was performed using a single-particle aerosol time-of-flight mass spectrometer (ATOFMS); this instrument is unique to UCSD and is capable of measuring the size of submicron particulates in rainwater samples, and can identify the elemental composition of the particulates. Additional information about this method is provided by Holecek et al. (2007). Whole (unfiltered) rainwater samples were analyzed by this instrument for the purpose of identifying the source of the precipitates (e.g., the playa lakes) in the white rain and to understand if the submicron precipitates in the white rain could be significant cloud condensation nuclei.

The results of this analysis are summarized in **Attachment B** and as follows.

- The size of the solids in the white rain are dust-sized nanoparticles (**Figure A-3**). Almost all were < 1 micron. The majority of particles were clustered around 0.040 microns [40 nanometers].

- All of the white rain water samples had positive matches to the Lordsburg and Willcox playa samples, indicating that these are the sources of the particulates. The positive match was achieved by comparing the mass spectrometry results for the white rain samples with samples of precipitates recovered from the surface of the playa lakes. Specifically, 75 percent of insoluble residues in the most reliable rainwater sample (NM01) were characterized by a chemical signature matching the Lordsburg and Willcox playa dust samples. The control samples did not have residues matching the Lordsburg or Willcox playa samples. Comparison of the mass spectral signatures of the rainwater dust residues with the playa dust samples showed high similarity using mass spectral dot products ranging from 0.71 to 0.97 (a value of 1 indicates an exact match; a value of 0 indicates no similarity). Similar results were found with the other white rain samples, but lower similarity, and Rusty's Rooftop had the least similarity (**Attachment B**), possibly due to contamination from the roof.

- The representative particle chemical composition (of white rain residues and playa samples) was as follows: sodium, potassium, calcium, magnesium, aluminosilicates, chloride, some organic nitrogen, phosphate, and nitrate. Ion chromatography analysis also showed sulfate was present (not picked up by ATOFMS in the residues, Pratt 2009). The particle chemistry matches well with the results of the rainwater analyses of dissolved constituents in **Table A-1**.

- A significant fraction of the solids contained CaO and calcium hydroxide ($CaOH_2$).[24]

The peaks of the ATOFMS were typical of playa signatures (e.g., typical signature from other playas shown in **Figure A-4**), for western playas in the United States that have abundant salts and carbonates (Pratt et al. 2010).The significance of these results is discussed further below.

Conceptual Model for Buffering of Soil pH Due to Deposition of White Rain

One of the treatments used for acidic soils is amendment with alkaline minerals, which neutralizes the acid and binds copper. If the pH of the soil is increased, as would happen with contact with alkaline minerals such as CaO, $CaCO_3$, or $CaMg(CO_3)_2$ or entry into a water system of higher pH, then metallic ions such as Fe^{3+} and Cu^{2+}, Zn^{2+}, Pb^{2+}, and As^{3+} will react to eventually form hydroxides as precipitates by the general reaction:

$$M^{n+} + nOH^{-} = M(OH)_n$$

where OH^- is the hydroxyl ion, M^{n+} represents the free metal ion, and $M(OH)_n$ is the metal hydroxide precipitate.

Figure 3 in the main text provides a graphical depiction of the conceptual model for the interaction of the white rain precipitation with the STSIU soils. Calcium-rich minerals from the Willcox and Lordsburg playas were deposited in the soil at the Chino STSIU and were partially dissolved but also present as micro- and nanoparticulates. Deposition of these minerals in the soil resulted in an increased pH; the presence of the nanoparticulates in the soil, with very high specific surface area, resulted in an increase in the buffering capacity of the soil. Dissolution of the minerals is not expected to reach equilibrium in the atmosphere due to the short

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[24] Carbonate is not usually directly detected by ATOFMS.

contact time between the playa deposits and the rainwater. After the nanoparticulate minerals were deposited on the soil surface during the “white rain” event, some of the minerals would likely have dissolved during subsequent rain events and others would have moved further into the soil during these events.

Dissolution of calcite ($CaCO_3$) or dolomite ($CaMg(CO_3)_2$), and trona ($Na_3H[CO_3]_2 \cdot 2H_2O$) results in formation of carbonate ions, and dissolution of calcium hydroxides ($Ca(OH)_2$) forms hydroxyl ions, both of which subsequently neutralize acid. The following pH buffering reactions can occur in the soil due to the deposition of these alkaline solids from the white rain. Dissolution of calcium oxide, calcium hydroxide, calcite, and trona takes up acidity and provides dissolved alkaline species:

$$CaO + H_2O = Ca(OH)_2$$

$$Ca(OH)_2 + 2H+ = Ca^{2+} + 2H_2O$$

$$CaCO_3 = Ca^{2+} + CO_3^{2-}$$

$$Na_3H(CO_3)_2 \cdot 2H_2O = 3Na^+ + HCO_3^{--} + CO_3^{2-} + 2\ H_2O$$

These alkaline species in turn consume more acidity from the soil:

$$CO_3^{2-} + H^+ = HCO_3^-$$

$$HCO_3^- + H^+ = H_2CO_3$$

$$OH^- + H^+ = H_2O$$

The pH buffering capacity supplied by the white rain depends on the composition and the amount of suspended solids in the rain; this is currently unknown because the total suspended solids in the rainwater was not measured. However, it is clear that the deposition of these minerals in the surficial soil will provide buffering capacity over time. The potential for a sustained buffering capacity can be confirmed by monitoring pH, calcium content, and acid-base accounting at various locations over a period of time.

Conclusion

Longevity of the pH increase depends on reaction rates, buffering capacity, and residual acidity of the soil. Alkaline mineral dissolution is expected to be fairly rapid because of the nanoparticles present in the white rain. The buffering capacity supplied by the precipitation event must be determined from longer-term monitoring to see if pH has stabilized at pH > 5 or if the soil acidity produced by sulfide minerals is able to overcome the buffering capacity imparted by the newly deposited alkaline minerals. The 5 years of monitoring data discussed in the main text support that the buffering capacity is sufficient because pH has remained high on locations monitored, and averaged about 5.3.

In addition to providing sustained pH buffering capacity, the calcium, sodium, magnesium, and aluminum hydroxides and silicates deposited in the soil have the ability to bind metals in the soil, specifically copper, through the creation of copper hydroxides. The nanoparticulate minerals can also sorb copper, coat the surfaces of existing copper-containing soil particles, and decrease the leaching of copper from the soil. Finally, the calcium can react with sulfate to form gypsum; this results in passivation of acidic minerals and decreases future releases of acidity (see passivation discussion in **Appendix B**).

In summary, the January 7, 2008 white rain event had the following initial effect on the soil in the STSIU:

- The rainwater had near-neutral pH, significantly higher than historical rainwater pH, resulting in a pH increase in the upper part of the soil.

- The rainwater contained micro- and nanoparticulate suspended solids originating from alkaline playa lakes; these solids have now been deposited into the soil and will react with soil acidity.

The additional 5 years of data support that the higher pH has been sustained, providing a higher buffering capacity of the soil (following the conceptual chemical model) due to the deposition of the alkaline minerals in the soil. Additionally, it has decreased leachability of copper due to reactions of copper- and sulfide minerals in the soil with the alkaline minerals. This information supports a long-term strategy for the soils within the STSIU, and the natural reactions that have had a positive effect on soil pH should be considered as part of the overall stabilization approach.

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Table A-1
Summary of UTEP and NADP Results

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Location		Tyrone		Hurley		Gila Cliffs	
		NMT		NMT		NADP	
		Sample 1		Sample 5		NM01	
Constituent	**Units**	**White Rain**	**Control**	**White rain**	**Control**	**White Rain**	**Control**
pH	s.u.	6.6	5.8	6.6	6.1	7.2	5
Conductivity	uS/cm	91	62	115	85	6.8	47
TDS*	mg/L	43	40	57	45	14.3	1.5
Hardness	mg/L	28	26	37	31	16.1	0.29
Carbonate	mg/L	--	--	--	--	--	--
Bicarbonate	mg/L	36	31	43	39	--	--
Sodium	mg/L	4.4	2.7	5.6	2	3.41	0.022
Potassium	mg/L	<0.5	1.1	<0.5	0.36	0.2	0.017
Magnesium	mg/L	0.89	0.89	0.56	0.97	0.37	0.007
Calcium	mg/L	9.8	9	14	11	5.84	0.104
Bromide	mg/L	<0.1	<0.1	<0.1	<0.1	--	--
Chloride	mg/L	3.3	1.2	4.9	1.6	2.32	0.045
Fluoride	mg/L	0.13	<0.1	0.12	0.099	--	--
Nitrite	mg/L	<0.1	<0.1	<0.1	<0.1	--	--
Nitrate	mg/L	0.95	4	2.1	3.1	--	--
Phosphate	mg/L	<0.5	<0.5	<0.5	<0.5	--	--
Sulfate	mg/L	4.3	4.2	6.6	3.2	2.09	0.457
Total cations	meq/L	0.77	0.67	1	0.76	0.48	0.0084
Total anions	meq/L	0.79	0.69	1.02	0.81	0.11	0.023
% Difference**		-1.77	-1.5	-0.95	-2.78	63*	-46*

Notes:

*TDS and possibly rest of data are unreliable for Sample Locations 1 and 5 because TDS is not sum of ions; NM01 is more reliable, though missing bicarbonate ion data.

*Anion analysis incomplete because carbonate/bicarbonate was not analyzed.

**Percent difference calculated as (cations – anions)/2]/[(cations + anions)/2

NMT = New Mexico Institute of Mining and Technology

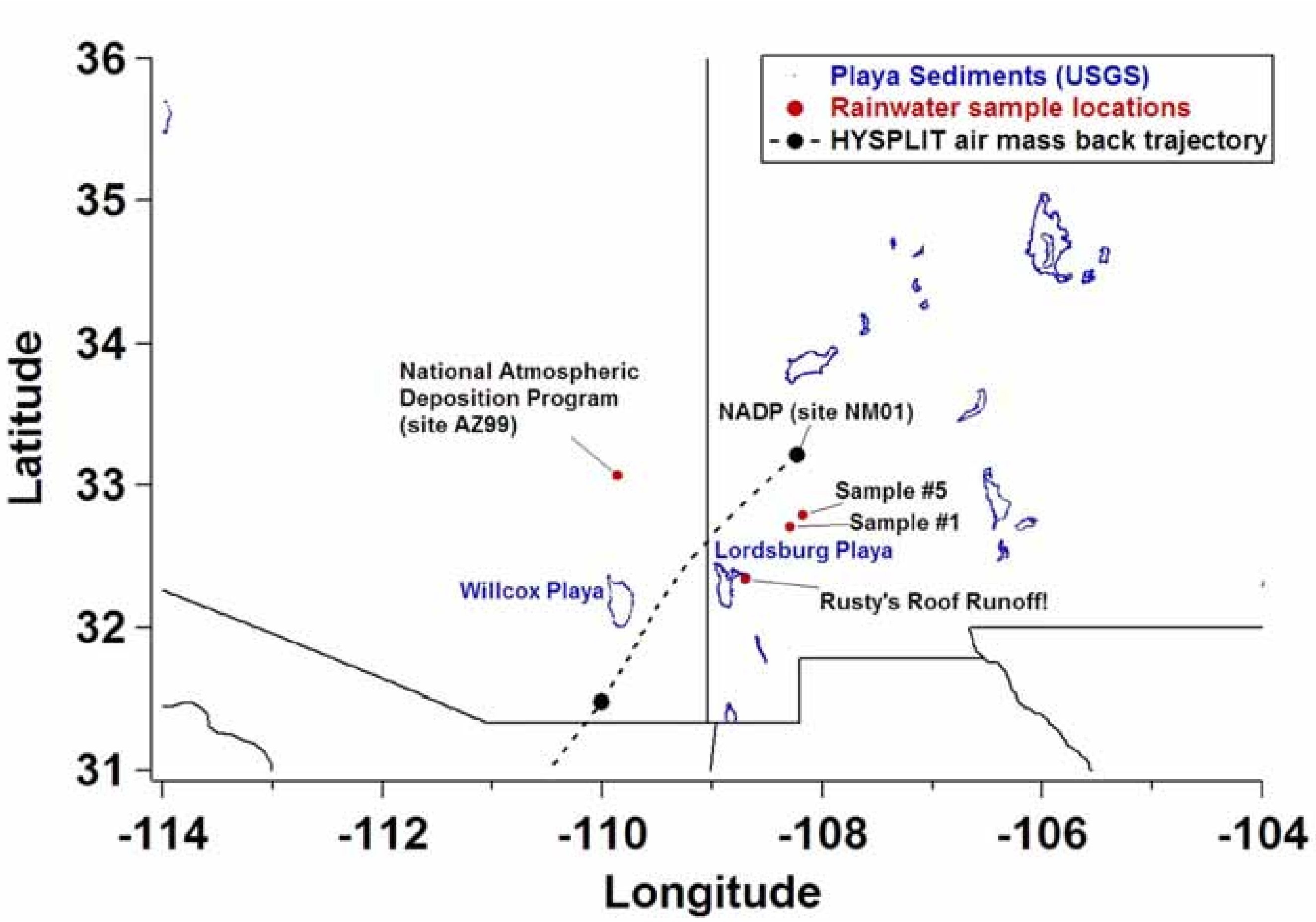
NADP = National Atmospheric Deposition Program

Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

High-Resolution NASA Photograph Taken During the Time Period of the White Rain, Showing Dust Storm Over Willcox Playa (in circle)

ARCADIS

FIGURE
A-1



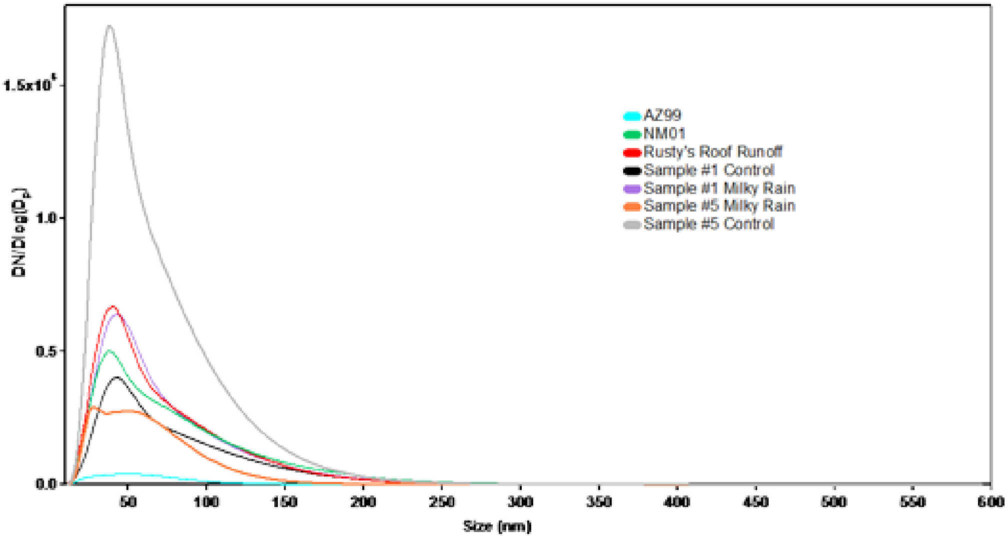
Note:
Dashed line shows the Hybrid Single Particle Lagrangian Integrated Trajectory Model (HYSPLIT) of the air mass and particle track during the early January white rain event.

Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

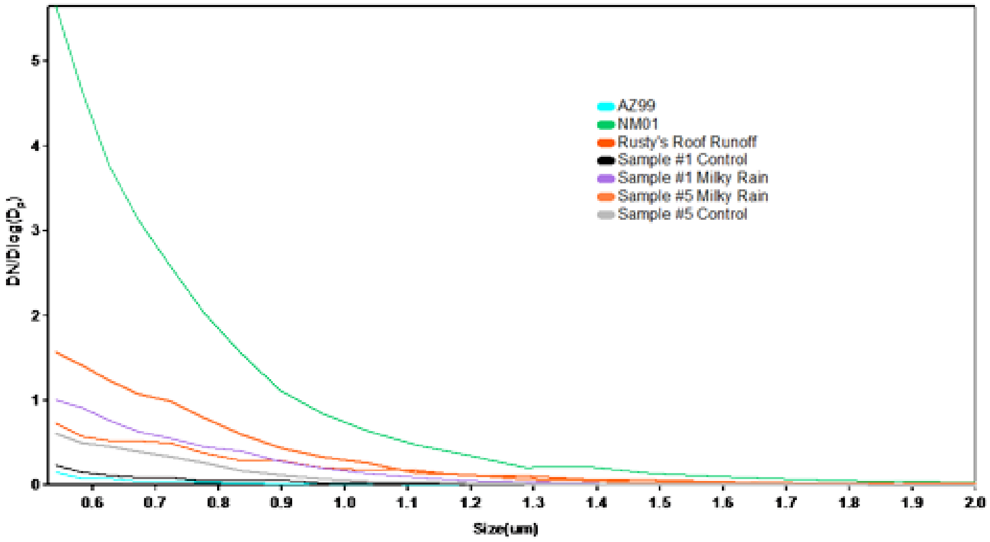
Sample Locations for Analyses Performed by UCSD to Examine the Solid Phase Composition

ARCADIS

FIGURE
A-2



a. Size distributions of 10-600 nanometer particles from Scanning Particle Mobility Sizer.



b. Size distributions of 0.53-2.0 micrometer particles from Aerodynamic Particle Sizer.

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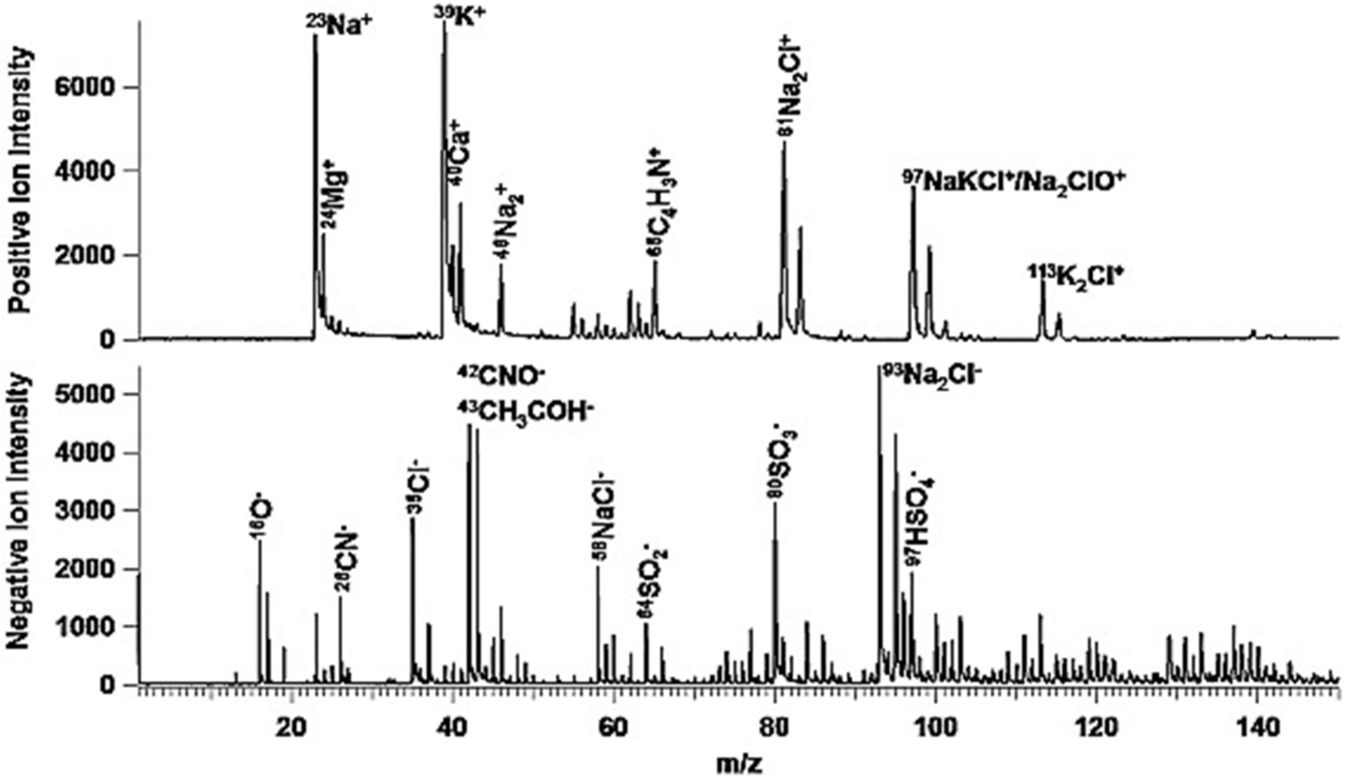
Vanadium, New Mexico
Year 5 pH Monitoring Report

Size Distributions of Rainwater Particles in White Rain Samples

ARCADIS

FIGURE
A-3



Note:
Figure taken from Pratt et al. (2010).

Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico
Year 5 pH Monitoring Report

Typical Playa Dust Signature in Rain Clouds

ARCADIS

FIGURE
A-4

Attachment A: News Story on White Rain

Silver City's White Rain? Dust, Maybe
http://www.abqjournal.com/news/state/279587nm01-24-08.htm

By Rene Romo

LAS CRUCES— A NASA photograph taken from space might be a key to unlocking the meteorological mystery of Silver City's milky rain.

The image taken by a NASA satellite on Jan. 7— the same day the mysterious rain doused much of Grant County— shows a whitish plume of material flowing under the cloud layer over a large dry lake bed south of Willcox, Ariz., according to Joel Gilbert of the University of Texas at El Paso.

The lakebed, known as the Willcox playa, covers 50 to 60 square miles and is about 120 miles southwest of Silver City. A high-wind advisory was in effect in the Willcox area on Jan. 7, and dust was blowing across the area, according to the Arizona Department of Public Safety.

"It looks like there's a plume of dust coming off the Willcox playa, and the Willcox playa has been a significant source of dust in the past," said Gilbert, an environmental science coordinator who is part of a group of scientists studying the milky rain.

"The plume looks like it was blowing in the right direction to Silver City. It's possible the dust seeded the rain clouds and caused the precipitation in the first place."

Finding the cause of the white rainfall appears weeks away, but the NASA image "is the best evidence we have so far," said Gilbert.

Cars and homes across Grant County were drenched with the milky white rain that locals said they had never seen before.

Concerns about what the strange rain contained prompted some Silver City area residents to launch an investigation that has drawn in researchers from the New Mexico Tech, New Mexico State University, UTEP and the state Environment Department.

Courtesy Max Bleiweiss, NMSU

A NASA satellite image shows a dust plume rising from a dry lake bed near Willcox, Ariz., on the same day Grant County, N.M., about 120 miles to the northeast, was doused with milky-white rainfall.

Gilbert said his analysis of six rain samples gathered from Silver City showed high levels of calcium, which is "not too unusual" given the geology of the Southwest.

Additional tests still must still be conducted.

Gilbert said he and other researchers are awaiting the arrival of samples of residue left behind by the milky rain for testing.

New Mexico Environment Department spokeswoman Marissa Stone said that it will be perhaps two weeks before material collected in air quality monitoring devices is analyzed.

In addition, Gilbert said, getting soil samples from the Willcox playa will be an important part of the effort to establish a link between the lakebed and the rain that fell on Silver City.

The investigation, Gilbert noted, could be compromised by one other factor— the quality of the rain samples collected from Silver City.

Some of the rain samples were collected from rooftop run-off, others from rain gauges. Because the rainfall probably mixed with other material while it was collected, the samples might not accurately reflect what fell from the sky that day.

"The data we are getting is still going to be questionable," Gilbert said.

Attachment B: Milky Rain Residual Analysis

The following powerpoint presentation from Dr. Kerry Pratt and associates summarizes the findings on the source of the residue in the white rain. Aerosol Time-of-flight Mass Spectrometer (ATOMFS) analysis was used to obtain spectral signatures (a chemical fingerprint) for each individual particle of the white rain residue. Particle number concentrations obtained from a collocated Aerodynamic Particle Sizer (APS) for coarse particles and from the Scanning Mobility Particle Sizer for finer particles were used to scale the ATOFMS particle counts in order to obtain more accurate particle number concentrations of the ATOFMS particle types (number could not be converted to concentration, however, because the water had evaporated).

Due to the large number of particles present (i.e., millions) a cluster analysis algorithm (called ART-2a, see Rehbein et al. 2012) was used to cluster the spectra into fewer groups. This process was applied to white rain residue and to the Willcox Playa dust and Lordsburg Playa dust. These playas were suspected sources of the residue in the white rain. The average spectral signature of the white rain residue was compared with the average spectra of the Willcox Playa dust and Lordsburg Playa dust. Correlations using mass spectral dot products were performed and the higher the correlation (ranges between 0 and 1), the closer the match. The spectra comparisons are shown for different cluster groups of the five rainwater sample locations in the presentation. The spectra were also evaluated to identify the chemistry of the residues. Lastly, the potential for the dust or salts from the playas to cause cloud condensation nuclei (CCN) was evaluated following methods of Petters and Krendenweis (2007). Dust generally is inactive, whereas salts may activate CCN. The samples from the playa were found to be fairly inactive in regard to forming condensation. The cause of the condensation as the dust cloud rose from the playa and was incorporated into clouds is uncertain.

A summary of the results is as follows:

- 75% of insoluble residues in the NM01 rainwater sample were characterized by a chemical signature matching the Lordsburg & Willcox playa dust samples. The control samples did not have residues matching the Lordsburg or Willcox playa samples.
- Comparison of the mass spectral signatures of the rainwater dust residues with the playa dust samples showed high similarity with mass spectral dot products ranging from 0.71-0.97 (a value of 1 indicates an exact match; a value of 0 indicates no similarity).
- Measured rainwater individual dust residue chemistry included sodium, potassium, calcium, magnesium, aluminosilicates, chloride, organic nitrogen, phosphate, and nitrate.

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Milky Rain Analysis

Dec. 2, 2008

Kerri Pratt, Cassandra Gaston, Kim Prather
UCSD

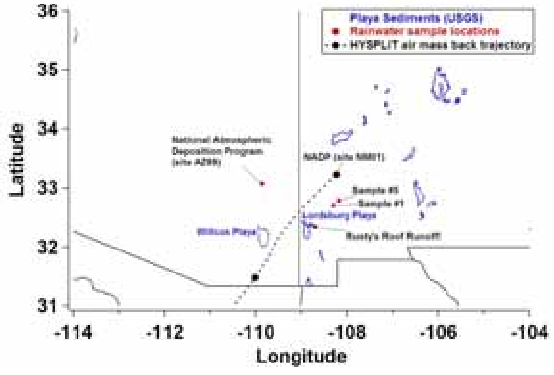
Take-home Points

- All milky rainwater samples (except AZ99) have positive matches to the Lordsburg and Willcox playa samples
- AZ99 appears to be influenced by a different source (also fewer residues present), which makes sense based on location and the HYSPLIT air mass back trajectories
- Control rainwater samples do not have residues that match the Lordsburg or Willcox Playa samples
- Lordsburg & Willcox Playa samples have similar dust signatures in general
- More supermicron particles in the milky rainwater samples compared to controls (also indicating the increased presence of dust in the milky rain
- Representative particle chemical composition (of milky rain residues & playa samples): sodium, potassium, calcium, magnesium, aluminosilicates, chloride, some organic nitrogen and phosphate

Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)

Some Abbreviations

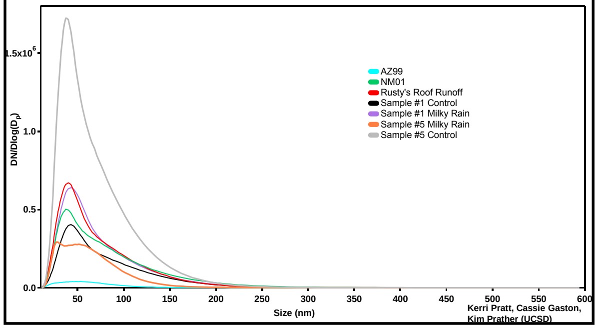
- Rusty's Roof Run-off (RRR)
- Rainwater Sample #1 (Allyson Siwik) milky rain (MR1r)
- Rainwater Sample #1 (Allyson Siwik) control (MR1c)
- Rainwater Sample #5 (Tricia Hurley) milky rain (MR5r)
- Rainwater Sample #5 (Tricia Hurley) control (MR5c)



USGS playa sediments map courtesy of
David Soller & Marith Reheis

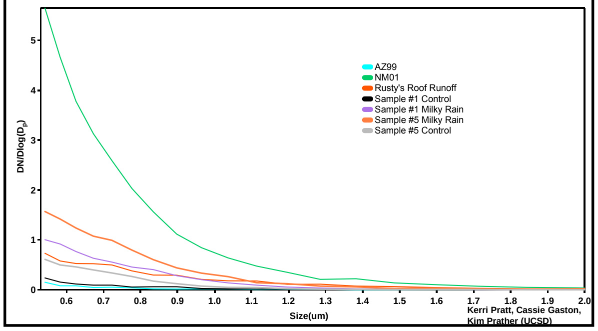
Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)

SMPS – Size distributions and relative concentrations of residues ~10-600 nm



Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)

APS – Size distributions and relative concentrations of residues ~0.53-20 µm



Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)

Residue size distribution notes

- Greatest concentration of supermicron particles: NM01 (consistent with presence of dust)
  - AZ99 = lowest
  - MR1r & MR5r were higher than MR1c & MR5c
- <600 nm residues:
  - Highest MR5c
  - Lowest AZ99

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ATOFMS Analysis

- Characteristic residues of NM01, AZ99, MR1r & MR1c, MR5r & MR5c, RRR
- Characteristic chemical composition of Lordsburg & Willcox Playas
- Spectra shown are groups of individual residues (rather than bulk average composition)
- Mass spectral signatures of playa samples and rainwater residues were compared

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ATOFMS Analysis Methods

- Ran ART-2a on separate samples to cluster together individual mass spectra from single particles (except combined data from MR1r & MR1c, MR5r & MR5c)
  - Intersected samples for MR1 and MR5 to see which clusters were primarily control vs. milky rain
  - Compared top clusters of different samples using mass spectral dot products (defined a match as dot product > 0.70)
- Compared average bulk mass spectra of MR1r vs. MR1c and MR5r vs. MR5c

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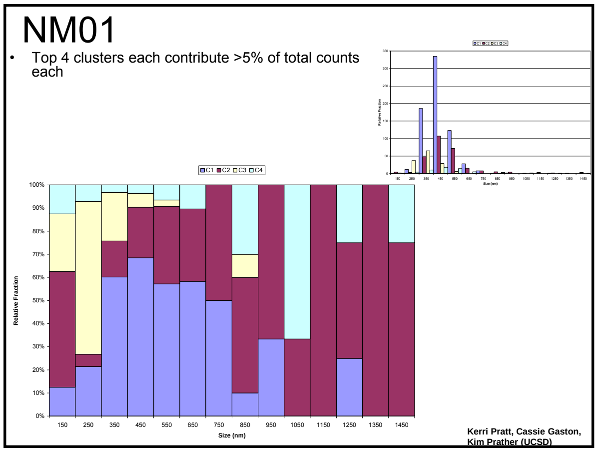
NM01

- Top 4 clusters each contribute >5% of total counts each



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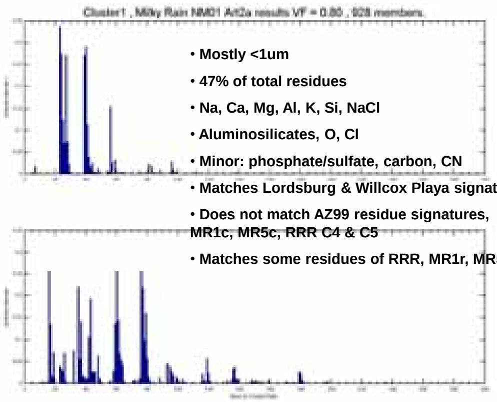

- Mostly <1um
- 47% of total residues
- Na, Ca, Mg, Al, K, Si, NaCl
- Aluminosilicates, O, Cl
- Minor: phosphate/sulfate, carbon, CN
- Matches Lordsburg & Willcox Playa signatures
- Does not match AZ99 residue signatures, MR1c, MR5c, RRR C4 & C5
- Matches some residues of RRR, MR1r, MR5r

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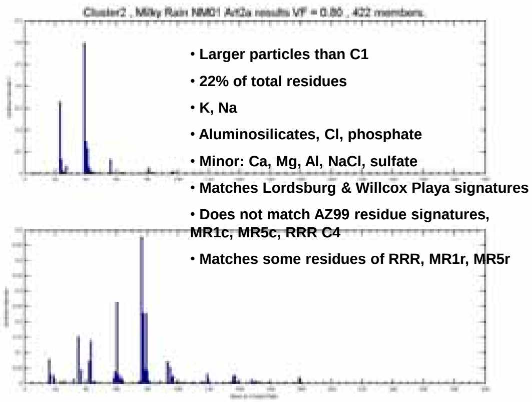

- Larger particles than C1
- 22% of total residues
- K, Na
- Aluminosilicates, Cl, phosphate
- Minor: Ca, Mg, Al, NaCl, sulfate
- Matches Lordsburg & Willcox Playa signatures
- Does not match AZ99 residue signatures, MR1c, MR5c, RRR C4
- Matches some residues of RRR, MR1r, MR5r

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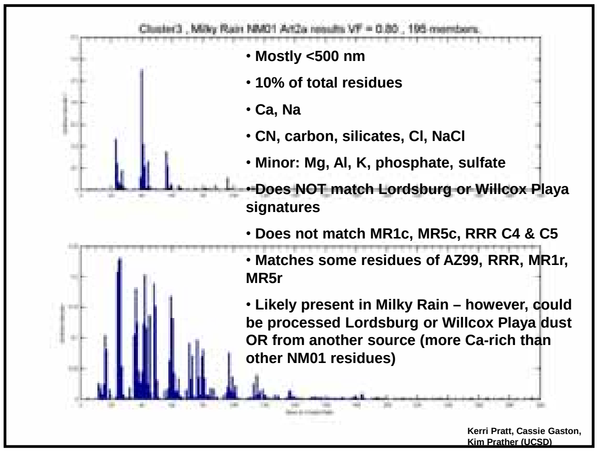

- Mostly <500 nm
- 10% of total residues
- Ca, Na
- CN, carbon, silicates, Cl, NaCl
- Minor: Mg, Al, K, phosphate, sulfate
- Does NOT match Lordsburg or Willcox Playa signatures
- Does not match MR1c, MR5c, RRR C4 & C5
- Matches some residues of AZ99, RRR, MR1r, MR5r
- Likely present in Milky Rain – however, could be processed Lordsburg or Willcox Playa dust OR from another source (more Ca-rich than other NM01 residues)

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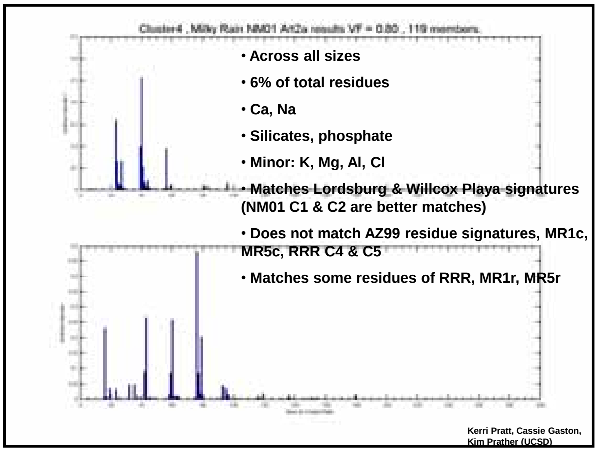

- Across all sizes
- 6% of total residues
- Ca, Na
- Silicates, phosphate
- Minor: K, Mg, Al, Cl
- Matches Lordsburg & Willcox Playa signatures (NM01 C1 & C2 are better matches)
- Does not match AZ99 residue signatures, MR1c, MR5c, RRR C4 & C5
- Matches some residues of RRR, MR1r, MR5r

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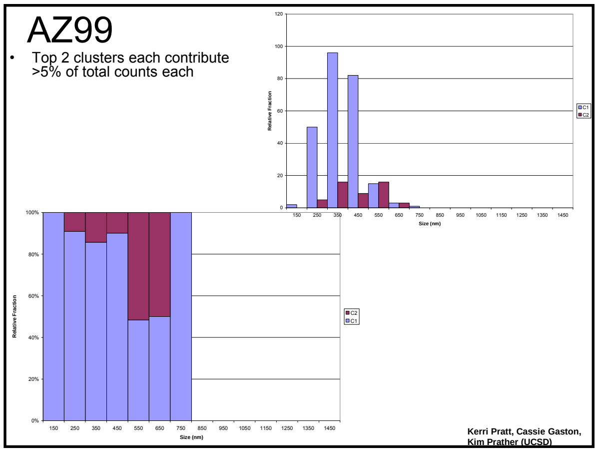

AZ99

- Top 2 clusters each contribute >5% of total counts each

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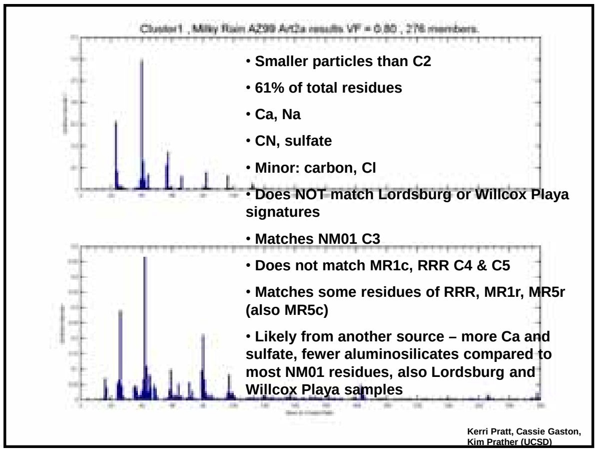

- Smaller particles than C2
- 61% of total residues
- Ca, Na
- CN, sulfate
- Minor: carbon, Cl
- Does NOT match Lordsburg or Willcox Playa signatures
- Matches NM01 C3
- Does not match MR1c, RRR C4 & C5
- Matches some residues of RRR, MR1r, MR5r (also MR5c)
- Likely from another source – more Ca and sulfate, fewer aluminosilicates compared to most NM01 residues, also Lordsburg and Willcox Playa samples

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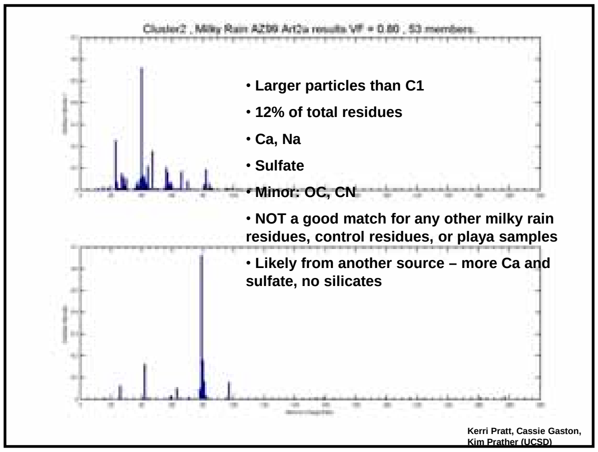

- Larger particles than C1
- 12% of total residues
- Ca, Na
- Sulfate
- Minor: OC, CN
- NOT a good match for any other milky rain residues, control residues, or playa samples
- Likely from another source – more Ca and sulfate, no silicates

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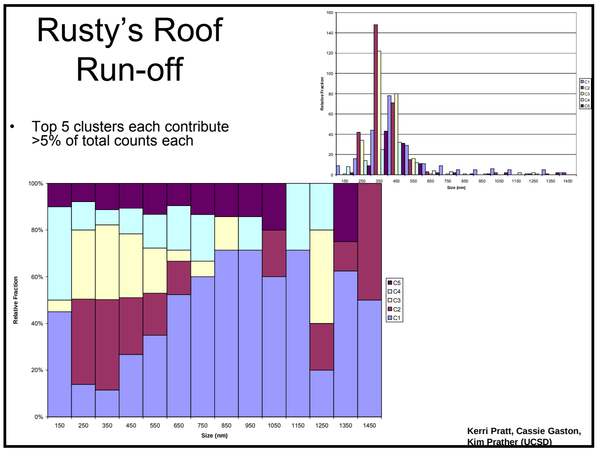

Rusty's Roof Run-off

- Top 5 clusters each contribute >5% of total counts each

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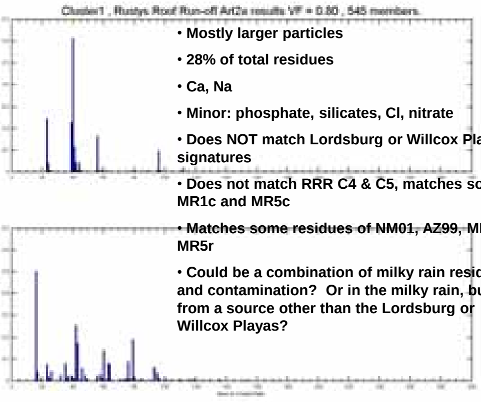

- Mostly larger particles
- 28% of total residues
- Ca, Na
- Minor: phosphate, silicates, Cl, nitrate
- Does NOT match Lordsburg or Willcox Playa signatures
- Does not match RRR C4 & C5, matches some MR1c and MR5c
- Matches some residues of NM01, AZ99, MR1r, MR5r
- Could be a combination of milky rain residues and contamination? Or in the milky rain, but from a source other than the Lordsburg or Willcox Playas?

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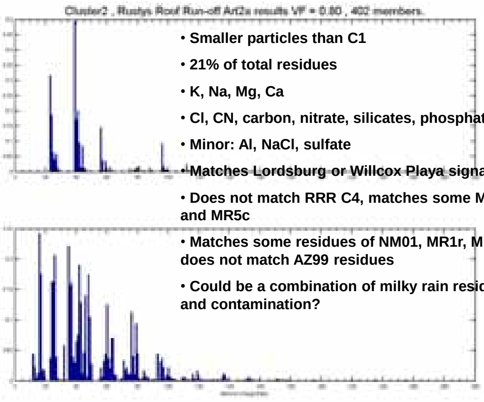

- Smaller particles than C1
- 21% of total residues
- K, Na, Mg, Ca
- Cl, CN, carbon, nitrate, silicates, phosphate
- Minor: Al, NaCl, sulfate
- Matches Lordsburg or Willcox Playa signatures
- Does not match RRR C4, matches some MR1c and MR5c
- Matches some residues of NM01, MR1r, MR5r; does not match AZ99 residues
- Could be a combination of milky rain residues and contamination?

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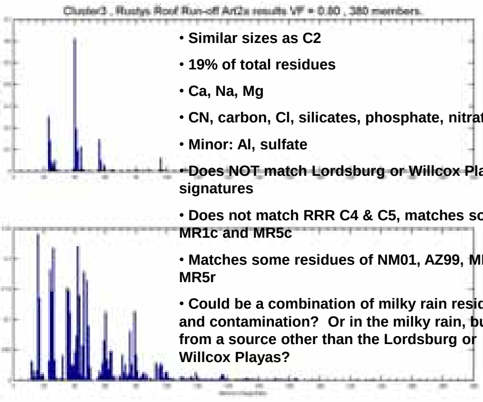

- Similar sizes as C2
- 19% of total residues
- Ca, Na, Mg
- CN, carbon, Cl, silicates, phosphate, nitrate
- Minor: Al, sulfate
- Does NOT match Lordsburg or Willcox Playa signatures
- Does not match RRR C4 & C5, matches some MR1c and MR5c
- Matches some residues of NM01, AZ99, MR1r, MR5r
- Could be a combination of milky rain residues and contamination? Or in the milky rain, but from a source other than the Lordsburg or Willcox Playas?

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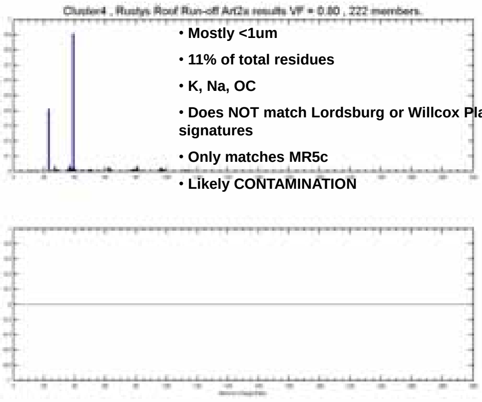

- Mostly <1um
- 11% of total residues
- K, Na, OC
- Does NOT match Lordsburg or Willcox Playa signatures
- Only matches MR5c
- Likely CONTAMINATION

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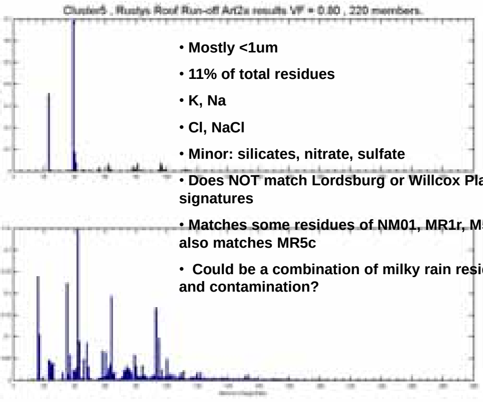

- Mostly <1um
- 11% of total residues
- K, Na
- Cl, NaCl
- Minor: silicates, nitrate, sulfate
- Does NOT match Lordsburg or Willcox Playa signatures
- Matches some residues of NM01, MR1r, M5r; also matches MR5c
- Could be a combination of milky rain residues and contamination?

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MR1r vs. MR1c Notes

- Neither contain ammonium
- Subtraction plots are for all particles
- ART-2a clusters (>5% each)
  - Only Milky Rain: C2, C4
  - Only Control: C6, C7
  - Both: C1, C3, C5

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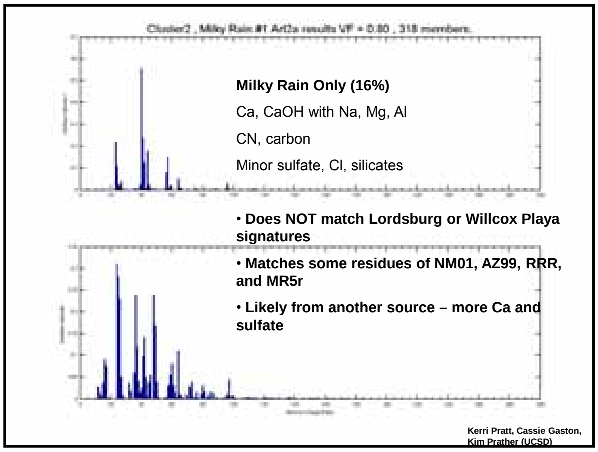

Milky Rain Only (16%)

Ca, CaOH with Na, Mg, Al

CN, carbon

Minor sulfate, Cl, silicates

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Matches some residues of NM01, AZ99, RRR, and MR5r**
- **Likely from another source – more Ca and sulfate**

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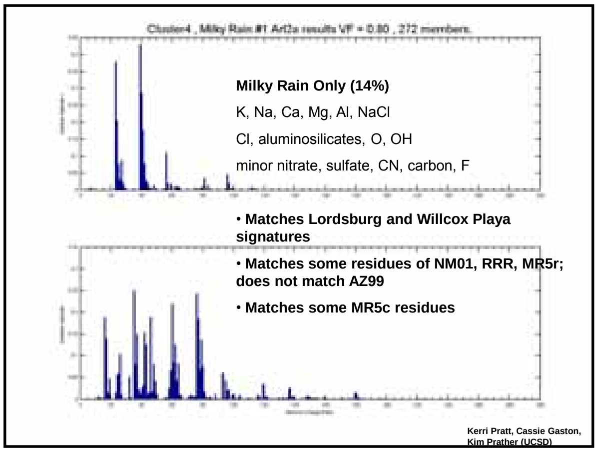

Milky Rain Only (14%)

K, Na, Ca, Mg, Al, NaCl

Cl, aluminosilicates, O, OH

minor nitrate, sulfate, CN, carbon, F

- **Matches Lordsburg and Willcox Playa signatures**
- **Matches some residues of NM01, RRR, MR5r; does not match AZ99**
- **Matches some MR5c residues**

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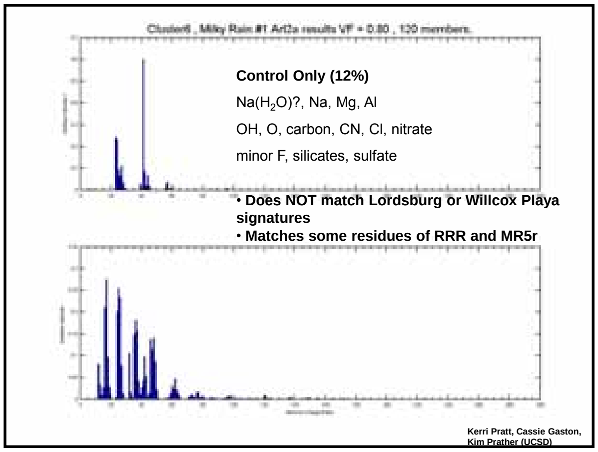

Control Only (12%)

$Na(H_2O)$?, Na, Mg, Al

OH, O, carbon, CN, Cl, nitrate

minor F, silicates, sulfate

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Matches some residues of RRR and MR5r**

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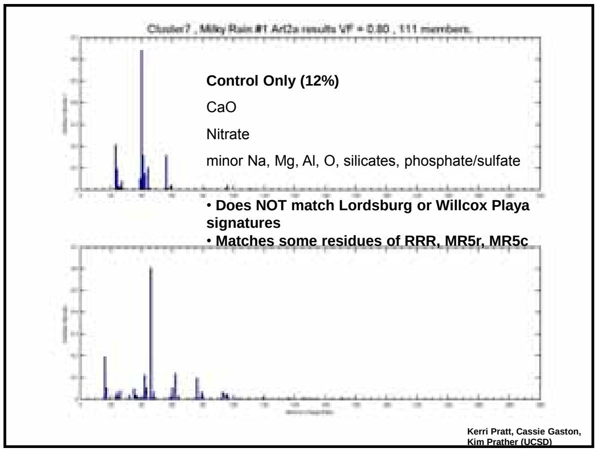

Control Only (12%)

CaO

Nitrate

minor Na, Mg, Al, O, silicates, phosphate/sulfate

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Matches some residues of RRR, MR5r, MR5c**

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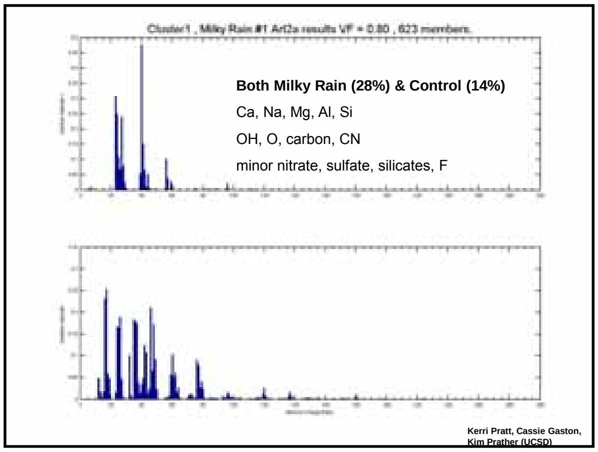

Both Milky Rain (28%) & Control (14%)

Ca, Na, Mg, Al, Si

OH, O, carbon, CN

minor nitrate, sulfate, silicates, F

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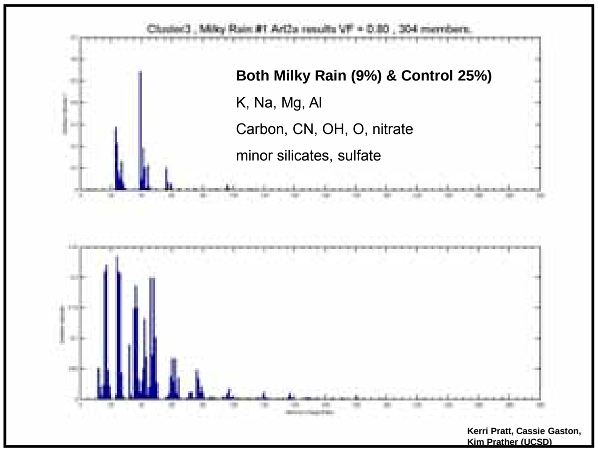

Both Milky Rain (9%) & Control 25%)

K, Na, Mg, Al

Carbon, CN, OH, O, nitrate

minor silicates, sulfate

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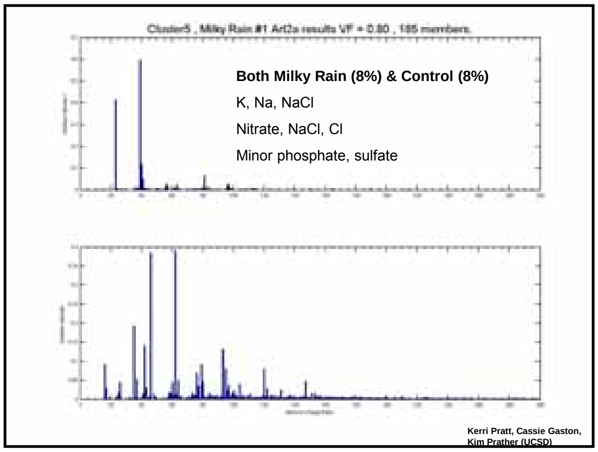

Both Milky Rain (8%) & Control (8%)

K, Na, NaCl

Nitrate, NaCl, Cl

Minor phosphate, sulfate

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MR1r vs. MR1c – Positive Ions

- Enhanced in Milky Rain
  - Significant peaks: Li, Na, Mg, Al, Si, Ca, AlO, Ti, CaO, CaOH, TiO, Na_2Cl, Ba, BaOH
  - Minor peaks: C_3, C_3H, Fe
- Enhanced in Control Rainwater
  - Significant peaks: K, KO
  - Minor peaks: C

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MR1r vs. MR1c – Negative Ions

- Enhanced in Milky Rain
  - Significant peaks: many carbonaceous, O, OH, F, CN, Cl, CNO, AlO/CH_3COH, SiO, CHOO/HCO_2, NaCl, SiO_2, Si_2O, SiO_3, Si_2O_2, $NaCl_2$, $AlSiO_4$, Si_2O_5, HSi_2O_5, Si_3O_4, $AlSi_2O_6$
  - Minor peaks: $AlSiO_3$, Si_2O_3
- Enhanced in Control Rainwater
  - Significant peaks: none
  - Minor peaks: none

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MR5r vs. MR5c Notes

- Neither contain ammonium
- Subtraction plots are for all particles
- ART-2a clusters (>5% each)
  - Only Milky Rain: C1, C2, C4, C6
  - Only Control: C3, C5, C7, C11

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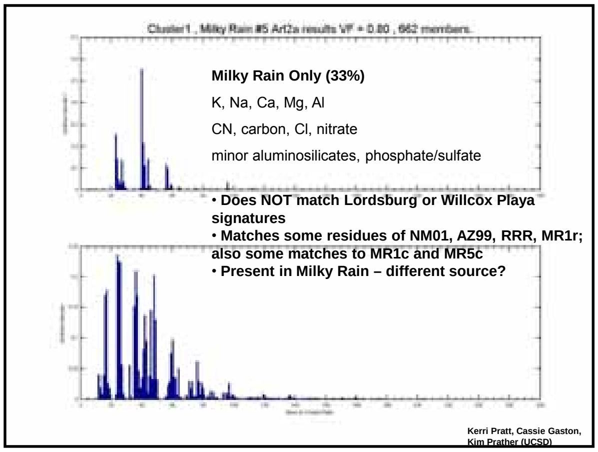

Milky Rain Only (33%)

K, Na, Ca, Mg, Al

CN, carbon, Cl, nitrate

minor aluminosilicates, phosphate/sulfate

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Matches some residues of NM01, AZ99, RRR, MR1r; also some matches to MR1c and MR5c**
- **Present in Milky Rain – different source?**

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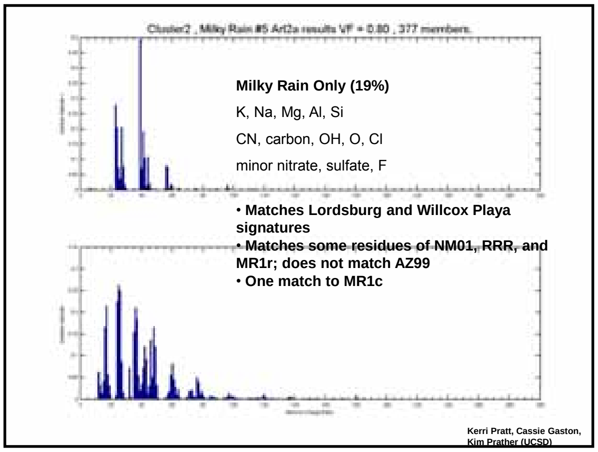

Milky Rain Only (19%)

K, Na, Mg, Al, Si

CN, carbon, OH, O, Cl

minor nitrate, sulfate, F

- **Matches Lordsburg and Willcox Playa signatures**
- **Matches some residues of NM01, RRR, and MR1r; does not match AZ99**
- **One match to MR1c**

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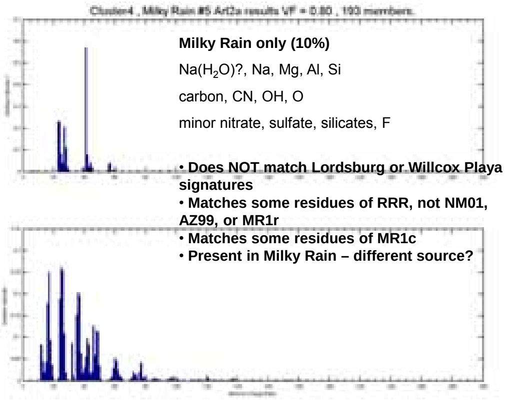

Milky Rain only (10%)

Na(H_2O)?, Na, Mg, Al, Si

carbon, CN, OH, O

minor nitrate, sulfate, silicates, F

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Matches some residues of RRR, not NM01, AZ99, or MR1r**
- **Matches some residues of MR1c**
- **Present in Milky Rain – different source?**

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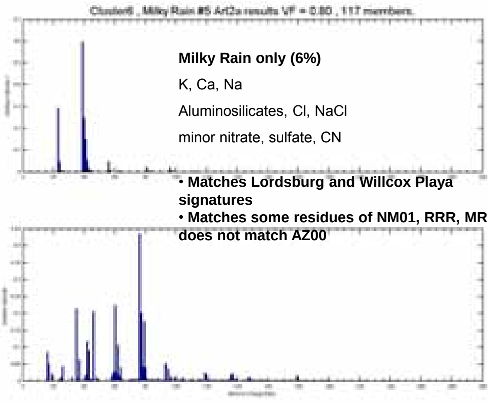

Milky Rain only (6%)

K, Ca, Na

Aluminosilicates, Cl, NaCl

minor nitrate, sulfate, CN

- **Matches Lordsburg and Willcox Playa signatures**
- **Matches some residues of NM01, RRR, MR1r; does not match AZ00**

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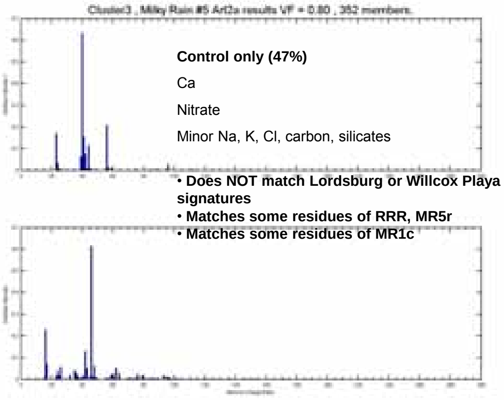

Control only (47%)

Ca

Nitrate

Minor Na, K, Cl, carbon, silicates

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Matches some residues of RRR, MR5r**
- **Matches some residues of MR1c**

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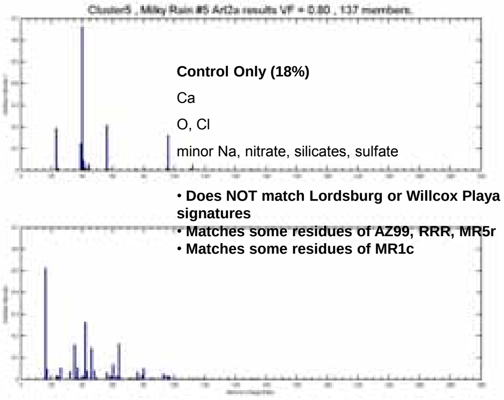

Control Only (18%)

Ca

O, Cl

minor Na, nitrate, silicates, sulfate

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Matches some residues of AZ99, RRR, MR5r**
- **Matches some residues of MR1c**

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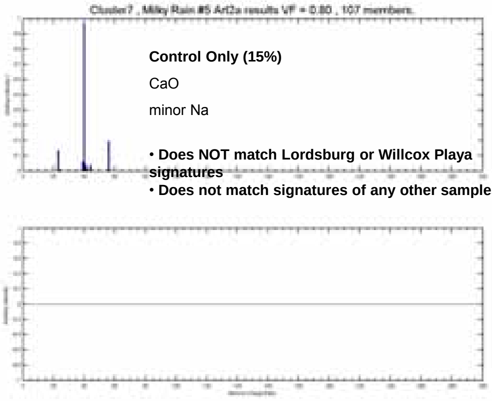

Control Only (15%)

CaO

minor Na

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Does not match signatures of any other samples**

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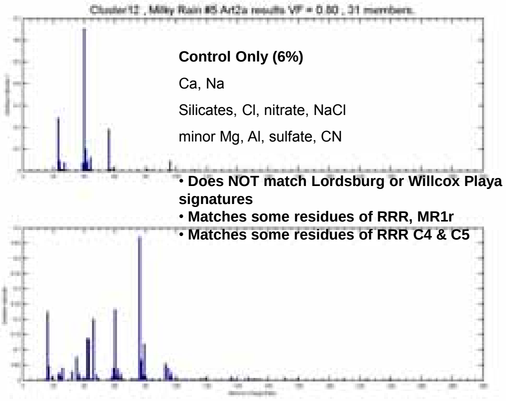

Control Only (6%)

Ca, Na

Silicates, Cl, nitrate, NaCl

minor Mg, Al, sulfate, CN

- **Does NOT match Lordsburg or Willcox Playa signatures**
- **Matches some residues of RRR, MR1r**
- **Matches some residues of RRR C4 & C5**

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MR5r vs. MR5c – Positive Ions

- Enhanced in Milky Rain
  - Significant peaks: Li, Na, Mg, Al, Si, Ca, AlO, Ti, CaO, CaOH, TiO, CaCl, Na_2Cl,
  - Minor peaks: C, C_3, C_3H, K_2Cl, Ba
- Enhanced in Control Rainwater
  - Significant peaks: none
  - Minor peaks: none

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MR5r vs. MR5c – Negative Ions

- Enhanced in Milky Rain
  - Significant peaks: many carbonaceous, O, OH, F, CN, Cl, CNO, AlO/CH_3COH, SiO, CHOO/HCO_2, nitrate (-46, -62), NaCl, SiO_2, Si_2O, SiO_3, Si_2O_2, $NaCl_2$, $AlSiO_4$, Si_2O_5, HSi_2O_5, Si_3O_4, $AlSi_2O_6$
  - Minor peaks: $AlSiO_3$, Si_2O_3
- Enhanced in Control Rainwater
  - Significant peaks: none
  - Minor peaks: none

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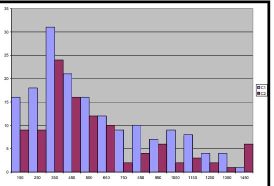
Comparison with Playa Samples from Tom Gill

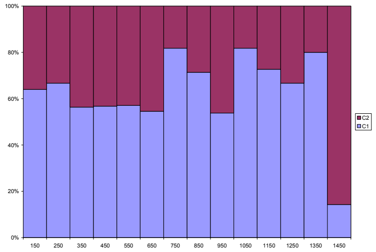
Descriptions:

- Lordsburg Sample #2:
  - Lordsburg Playa (usually dry lake bed of Pleistocene Lake Animas), western New Mexico, Joel Gilbert's site WP18, northwest of Lordsburg, New Mexico: surface material from 2nd playa north of Interstate 10. Known dust source area. Possible but unlikely source area of the "Milky Rain" of January 2008.
- Lordsburg Sample #8:
  - Lordsburg Playa (usually dry lake bed of Pleistocene Lake Animas), western New Mexico, Joel Gilbert's site 4145, northwest of Lordsburg, New Mexico: surface material collected from south playa just north of Interstate 10. North 32.280 latitude by West 108.885 longitude. Known dust source area. Possible but unlikely source area of the "Milky Rain" of January 2008.
- Willcox Playa
  - Surface sediment from the Willcox Playa (Pleistocene Lake Cochise, now a usually-dry lake), Cochise County, Arizona. Known dust source area. Collected in May 2008. Potential source of the "Milky Rain" of January 2008.

Lordsburg Playa #2

- Top 2 clusters each contribute >5% of total counts each
- Each have similar size range





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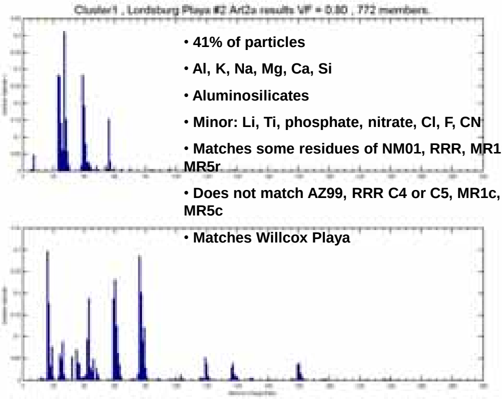

- 41% of particles
- Al, K, Na, Mg, Ca, Si
- Aluminosilicates
- Minor: Li, Ti, phosphate, nitrate, Cl, F, CN
- Matches some residues of NM01, RRR, MR1r, MR5r
- Does not match AZ99, RRR C4 or C5, MR1c, MR5c
- Matches Willcox Playa

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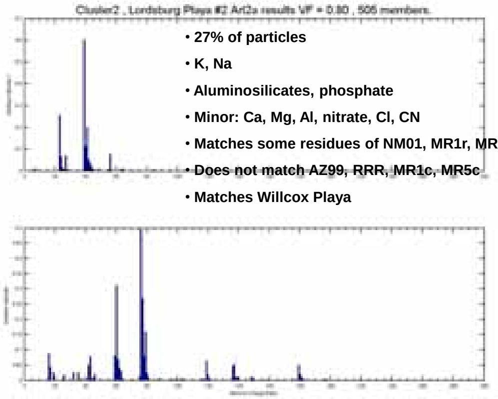

- 27% of particles
- K, Na
- Aluminosilicates, phosphate
- Minor: Ca, Mg, Al, nitrate, Cl, CN
- Matches some residues of NM01, MR1r, MR5r
- Does not match AZ99, RRR, MR1c, MR5c
- Matches Willcox Playa

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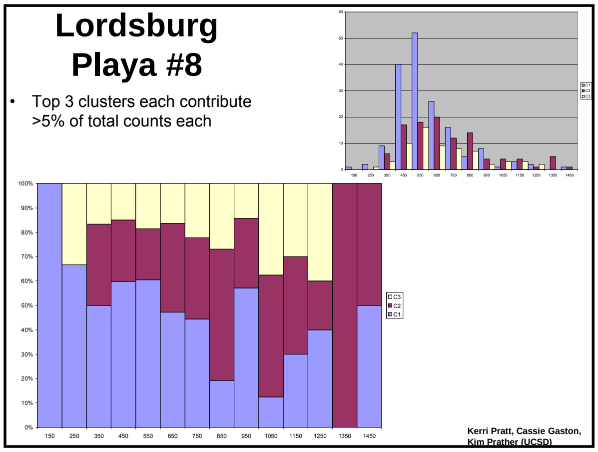

Lordsburg Playa #8

- Top 3 clusters each contribute >5% of total counts each

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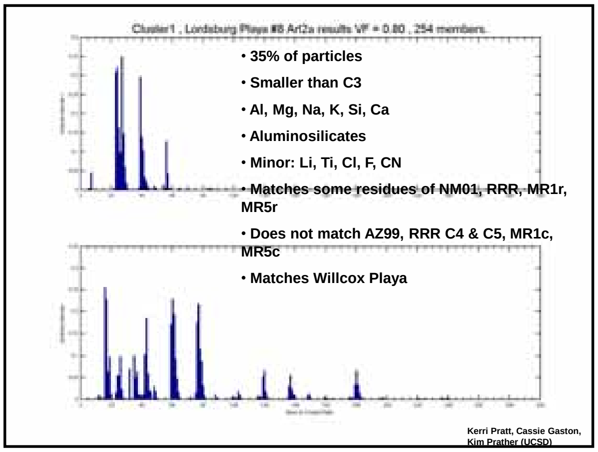

Cluster1 , Lordsburg Playa #8 Art2a results VF = 0.80 , 254 members.

- 35% of particles
- Smaller than C3
- Al, Mg, Na, K, Si, Ca
- Aluminosilicates
- Minor: Li, Ti, Cl, F, CN
- Matches some residues of NM01, RRR, MR1r, MR5r
- Does not match AZ99, RRR C4 & C5, MR1c, MR5c
- Matches Willcox Playa

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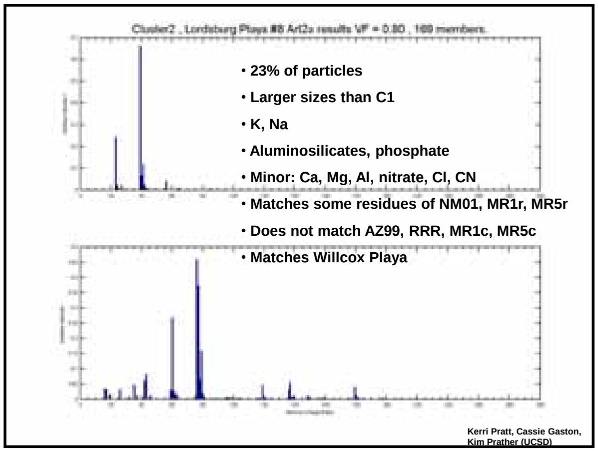
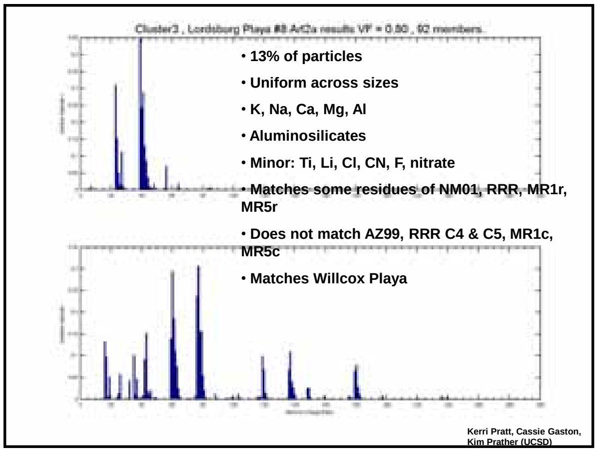


Cluster2 , Lordsburg Playa #8 Art2a results VF = 0.80 , 169 members.

- 23% of particles
- Larger sizes than C1
- K, Na
- Aluminosilicates, phosphate
- Minor: Ca, Mg, Al, nitrate, Cl, CN
- Matches some residues of NM01, MR1r, MR5r
- Does not match AZ99, RRR, MR1c, MR5c
- Matches Willcox Playa

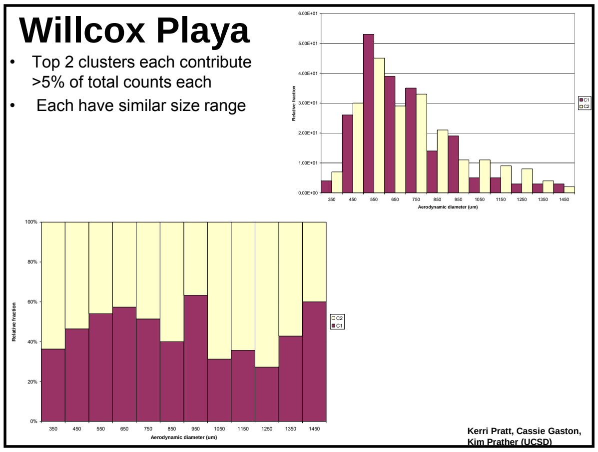
Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)



Cluster3 , Lordsburg Playa #8 Art2a results VF = 0.80 , 92 members.

- 13% of particles
- Uniform across sizes
- K, Na, Ca, Mg, Al
- Aluminosilicates
- Minor: Ti, Li, Cl, CN, F, nitrate
- Matches some residues of NM01, RRR, MR1r, MR5r
- Does not match AZ99, RRR C4 & C5, MR1c, MR5c
- Matches Willcox Playa

Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)



Willcox Playa

- Top 2 clusters each contribute >5% of total counts each
- Each have similar size range

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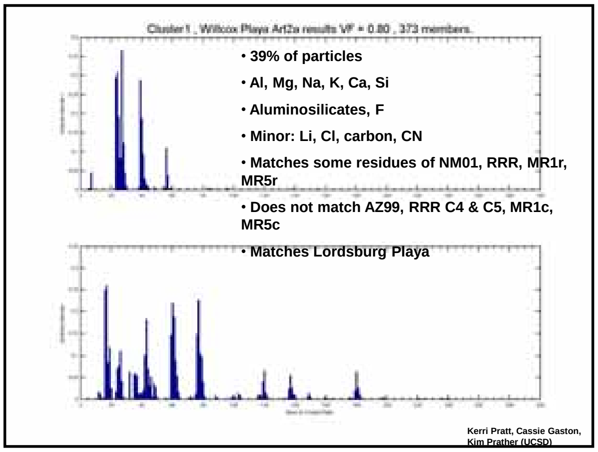
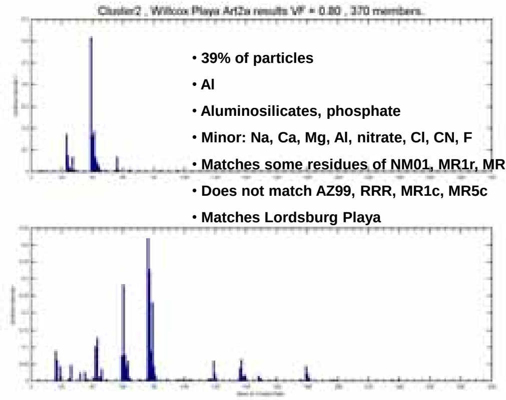


Cluster1 , Willcox Playa Art2a results VF = 0.80 , 373 members.

- 39% of particles
- Al, Mg, Na, K, Ca, Si
- Aluminosilicates, F
- Minor: Li, Cl, carbon, CN
- Matches some residues of NM01, RRR, MR1r, MR5r
- Does not match AZ99, RRR C4 & C5, MR1c, MR5c
- Matches Lordsburg Playa

Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)



- **39% of particles**
- **Al**
- **Aluminosilicates, phosphate**
- **Minor: Na, Ca, Mg, Al, nitrate, Cl, CN, F**
- **Matches some residues of NM01, MR1r, MR5r**
- **Does not match AZ99, RRR, MR1c, MR5c**
- **Matches Lordsburg Playa**

Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)

CCN activation of playa samples following Petters & Kreidenweis 2007

- More CCN-active = higher κ (NaCl = ~1.2)
- Dust generally assumed to be κ = 0
- However, some playa salts can be CCN-active (up to κ ~0.95) (Koehler et al 2007; Pratt et al, in prep.)

- Lordsburg & Willcox playa samples were found to be fairly CCN in-active:
  - Lordsburg Playa #2: κ = 0.0023 (0.0020-0.0027)
  - Lordsburg Playa #8: κ = 0.0035 (0.0034-0.0036)
  - Willcox Playa: κ = 0.0016 (0.0014-0.0017)

Kerri Pratt, Cassie Gaston, Kim Prather (UCSD)

Appendix B

Precipitation Contribution of Alkalinity and Acidity to STSIU Soils

Appendix B: Precipitation Contribution of Alkalinity and Acidity to STSIU Soils

This appendix details the chemistry of rainfall, both the white rain and typical acidic rains, and its possible chemical interactions with STSIU soils that produced the results observed in this report. The "passivation" of sulfide minerals in the soil, which is the ability of alkaline minerals to form protective iron oxyhydroxide (FeOOH) coatings on the sulfides when sulfide and alkaline minerals come in contact and react, is also discussed. The coatings decrease reactivity of the sulfides and resulting acid generation, thereby facilitating persistence of pH increases.

"White Rain" Contribution

To assess whether the white rain carried enough calcium carbonate to achieve observed pH increases of 1 or 2 S.U. in the soil, the following "ballpark" calculations were performed.

Question: How much calcium carbonate ($CaCO_3$) solids would be needed in rainfall to increase alkalinity and thus, the pH of a saturated paste of a soil sample (paste pH) from pH 3.5 to 5.5?

Assumptions:

1. 1 cm rainfall, which is the amount of 2008 white rain precipitation (i.e., 10 liters [L] of rainfall on a 1 square meter [m^2] plot of soil].

2. 6 inch (15 cm) soil depth (based on depth sampled for soil chemistry).

3. Soil paste prepared by mixing 20 mL of water with 20 grams (g) of soil (or 0.01 L/0.01 kg), which could mimic some soil water.

4. 240 kilograms (kg) soil in a 1-m^2 plot of soil that is 15 cm deep (assumes a soil bulk density of 1.6 g per cubic centimeter [g/cm^3]).

5. Increasing pH by 2 S.U. effectively neutralizes all the acidity as protons (H^+) (i.e., 99% of H^+ neutralized).

Calculations:

240 kg soil x ($10^{-3.5}$ moles H^+/L soil paste water) x (0.01 L soil paste water/0.01 kg soil) = $7.59x10^{-2}$ moles H^+

$7.59x10^{-2}$ moles H^+ x (1 mole CO_3^{2-}/2 moles H^+) = $3.79x10^{-2}$ moles carbonate ($CO_3^{2-)}$

$3.79x10^{-2}$ moles CO_3^{2-} x (1 mole $CaCO_3$/1 mole CO_3^{2-}) x (40.08 g Ca^{2+}/1 mole $CaCO_3$) = 1.52 g calcium ions (Ca^{2+})

1.52 g Ca^{2+}/10 L of rain = 0.152 g Ca/L rain = 152 mg Ca^{2+}/L of rain

152 mg Ca^{2+}/L of rain x (100 mg $CaCO_3$/40 mg Ca^{2+}) = 380 mg $CaCO_3$/L of rain

Answer: In order to raise the pH of a saturated paste from 3.5 to 5.5, 1 L of rain requires 380 mg of calcium carbonate (or 152 mg Ca^{2+}).

Interpretation:

To neutralize a 6-inch deep, 1-m^2 volume of soil, with a paste pH of 3.5 up to a pH of 5.5, a 1-cm rainfall would require 152 mg Ca^{2+}/L, assuming all the Ca^{2+} is from $CaCO_3$. If dissolved in the rainwater or soil water, that would mean its alkalinity and hardness would be 380 mg/L as $CaCO_3$ -- which would be a hard-water, alkaline rain.

However, that soil-paste pH increase might be transitory, because only active acidity would be neutralized. Acid-generating components and minerals in the soil might gradually produce additional H^+ that may need more $CaCO_3$ to avoid a subsequent pH decrease. Therefore, likely the rain carried much more calcium carbonate residue to maintain a longer-term elevated soil paste pH.

Though sampling produces variable results, Figure B-1 shows total calcium concentrations increased in the soil (0-6" depth) for some of the amendment study locations after the white rain. The magnitude of the increase probably was lower than the natural variability produced from sampling error, explaining why some plots do not show an increase. Nonetheless, assume the soils increased in Ca^{2+} concentration by at least 50 mg/kg (and thus calcium carbonate increased by 125 mg/L), which is much lower than natural variability and the magnitude of increases seen in the Northeast and North plots in Figure B-1. This amount should offset the active acidity as discussed below.

Question: How much total calcium (Ca, dissolved and particulate) would the rainwater have to carry to increase total calcium concentration in the soil by 50 mg/kg?

Calculations:

Using assumptions above:

50 mg Ca/kg soil = 0.05 g Ca/kg soil

If 10 L of water percolates into 240 kg of soil, 240 kg soil/10 L of rain = 24 kg soil/L of rain

0.05 g Ca/kg soil x 24 kg soil/L of rain = 1.2 g Ca/L of rain

Assuming all the Ca was present as $CaCO_3$ particles, and dried $CaCO_3$ has a bulk density of 1.09 g/cm^3 (the bulk density of limestone dust, http://www.engineeringtoolbox.com/density-materials-d_1652.html), the 10 L of rain falling on 1 m^2 would have left an approximately 0.028-mm-thick layer of $CaCO_3$ dust after the rain dried, based on the following calculation:

1.2 g Ca/L x 10 L rain/m^2 x 2.5 g $CaCO_3$/g Ca = 30 g $CaCO_3$/m^2

30 g $CaCO_3$/m^2 x 1 cm^3 $CaCO_3$ dust/1.09 g $CaCO_3$ x 1 m^2/10^4 cm^2 x 10 mm/cm = 0.028 mm $CaCO_3$ dust

Answer:

To add an additional 0.05 g of calcium to 1 kg of soil (equivalent to 50 mg Ca/kg soil), 1.2 g Ca/L of rain is required (i.e., 1,200 mg of calcium per liter of rainwater).

Interpretation:

1,200 mg Ca/L in rain is high but not an inconceivable suspended solids load, considering the rain was described by locals as leaving residue like a thin film of liquid white paper on cars. That observation is consistent with the calculated thin layer of $CaCO_3$ (approximately 0.028 mm) that would have been left on surfaces after the rain dried. For comparison, suspended solids concentrations in urban rainstorm runoff have ranged from 500 to 3,000 mg/L (Field et al. 2000), which is turbid to muddy water. Other particles were in the "white" rainwater in addition to calcium (see Appendix A identifying the other dissolved constituents, most of which would have originated from dissolution of particles), but calcium content in undissolved particles probably was still greater than the 152 mg Ca/L that might be needed to neutralize the active acidity in the soil water/paste. The calculations above suggest that the rainwater could carry much more than 152 mg/L and had enough particles dissolve in the soil to neutralize the potential acidity released over time. In conclusion, there could be enough calcium carbonate in suspended solids of the white rain to consume active acidity in the soil water as well as the potential acidity produced by the more oxidizing soil sulfide minerals to raise the pH by 1 or 2 S.U. and then sustain the increased pH.

Dissolved Alkalinity in the "White Rain"

Question: What is the tons/acre of dissolved alkalinity delivered by the white rain (referred to in Section 1.1 of the main text of this report), and its effect on soil pH?

Based on Table A-1 in Appendix A, average dissolved bicarbonate concentration is (36+43)/2 = 39.5 mg HCO_3^-/L, which is converted to alkalinity as 39.5/1.22 = 32.4 mg/L as
$CaCO_3$.

Assumptions:

0.4 inches of precipitation (0.0333 ft)

Alkalinity in white rain of 32.4 mg/L as $CaCO_3$

Rain falls on 0.25 acre amendment study plot = 10,890 ft^2

Liters of total rainwater per plot = 10,890 ft^2 x 0.0333 ft precipitation = 362.64 ft^3 = 10,269 L

Calculations:

mg $CaCO_3$/acre = (32.4 mg $CaCO_3$/L x 10,269 L) / 0.25 acre = 1.33x 10^6 mg/acre

Tons $CaCO_3$/acre = 1.33x10^6 mg x (1 short ton/ 9.072x10^8 mg) = 0.00147 T/acre

Answer: Tons as $Ca(OH)_2$ = 0.00147/1.35 = 0.00109 T/acre ($Ca(OH)_2$ has 135% $CaCO_3$ equivalent)

Interpretation: This dissolved bicarbonate concentration would increase the pH of the saturated paste water from 3.50 to 3.54, because it is only 8.5 percent of the alkalinity needed to increase pH by 2 units from 3.5 to 5.5 (see above). However, the control rain samples had only slightly lower dissolved bicarbonate concentrations (average = 35 mg/L). Therefore, the dissolved bicarbonate increase due to white rain above the control concentration would be 4.5 mg/L instead of 39.5 mg/L, thus decreasing this small effect further to practically no effect. Moreover, at 25ºC and a CO_2 partial pressure of 0.00038 atmospheres (current average at sea level), the theoretical dissolved bicarbonate concentration would be 5.5 mg/L (calculated with Equation 8a on page 160 in Stumm and Morgan 1996). In the elevation range at the STSIU (approximately 1,800-2,000 m), the atmospheric and CO_2 partial pressures would be approximately 80% of the sea-level pressures, thus making the theoretical dissolved bicarbonate concentration approximately 4.4 mg/L. That concentration is much lower than the estimates in Table A-1 and makes the dissolved bicarbonate concentrations of the two white rain and control samples at Tyrone and Hurley suspect. Unfortunately, bicarbonate concentrations were not reported for the more reliable National Acid Deposition Program (NADP) NM01 sample in Table A-1. In conclusion, even with the elevated bicarbonate concentration estimates, the dissolved alkalinity contribution is very small, suggesting the suspended solid load is the driver that is affecting pH changes.

Typical "Acidic" Rains

Another important question is whether over time the acidity of the rainfall will reduce the benefit from the white rain.

Question: Can the pool of H^+ ions and ions contributing to alkalinity in annual loading of rainwater to the soils reduce the soil pH elevated by white rain?

Calculations:

To answer this question requires looking at local precipitation data and the ABA results for the soils. Precipitation data from the NADP monitoring site at Gila Cliff Dwellings National Monument (NADP Site NM01; http://nadp.sws.uiuc.edu/data/sites/siteDetails.aspx?net=NTN&id=NM01) include the annual precipitation amounts and precipitation-volume-weighted average H^+ concentrations in the rainfall (Tables B-1 and B-2). These values and the calculated precipitation-volume-weighted average pH of the rainfall for calendar years 2006 through 2012 are listed in Table B-3. From the annual precipitation amounts and volume-weighted average H^+ concentrations in the rainfall, the annual loading of H^+ per acre can be estimated. These values are only estimates, because pH was not measured in all rainfall events; thus, the annual volume-weighted average H^+ concentrations in the rainfall might be biased slightly upward or downward, depending on the pH of the unmeasured rainfall.

From the weekly precipitation-volume-weighted average concentrations of Ca, Mg, Na, K, Cl, NO_3, and SO_4 reported by NADP, the weekly precipitation-volume-weighted average alkalinity of the rainfall can be calculated using Equation 14 on page 165 in Stumm and Morgan (1996); and from those weekly values and the NADP-reported weekly precipitation amounts, the annual loading of alkalinity per acre can be estimated. For these calculations, only weeks that had positive alkalinity values were included, thus reflecting addition of alkalinity that could neutralize acid. These annual alkalinity loadings are underestimates of the actual alkalinity loadings because Ca, Mg, Na, K, Cl, NO_3, and SO_4 were not measured in all rainfall events, thus precluding inclusion of those individual alkalinity loadings in the annual estimates. The annual alkalinity loading estimates are listed in Table B-3, and shown in Figure B-2. Note that a rain can be considered alkaline when pH > 6.5 (Figure B-2), which is not common. The white rain had a very high pH of 7.2.

The net H^+ loading ranged from 3 to 18 equivalents per acre per year and the net alkalinity loading ranged from 0.5 to 16 equivalents per acre per year. For comparison, the average net neutralizing potential (NNP) of soils measured at sites in the vicinity of the STSIU ranged from -298,000 to 3,704,000 equivalents per acre, with most values in the positive or negative 10,000-100,000 equivalents per acre range (Table B-4). Therefore, the annual H^+ and alkalinity loadings from rainfall are very small percentages of the NNP in all of the soils, even if added up over 100 years. The addition of H^+ in rainfall will not change the potential acidity of the soils because acidity likely is driven mainly by weathering of sulfide minerals, which overwhelms the contribution from the rain.

Answer: It is unlikely the rainwater annually falling on the STSIU will reduce the pH of the soil because the soil's potential acidity from sulfide minerals is orders of magnitude larger than the contribution from the rainwater.

"White Rain" Passivating Sulfide Minerals: The Chemistry of a Permanent pH Change

In addition to direct neutralization of hydrogen ions produced by the sulfide minerals, the white rain may be decreasing the reactivity of the sulfide minerals through "passivation", reducing acid production in the soil. The chemical explanation is as follows.

The oxidation of iron and copper sulfide minerals occurs at the mineral surface, with the release of acid (i.e., H^+ ions) and oxidized forms of sulfur into the soil solution. Other oxidation products also accumulate at the surface of the iron and copper sulfide minerals and affect the reactivity of the minerals. The oxidation products have been studied at pH 2 to 10 using analytical methods sensitive enough to probe the atoms present at the pyrite and chalcopyrite surface (Todd et al., 2003a, 2003b). At low pH (<4), ferric (hydroxyl)sulfate is the predominant oxidation product; however, at higher pH, ferric (oxy)hydroxide (FeOOH) forms. These products accumulate at the surface of the metal sulfide and affect the reactivity of the metal sulfide. The alkaline minerals in the white rain were comprised of a range of particle sizes including submicron particles; due to their high surface area, these would have reacted rapidly in the soil but the larger particles would have reacted more slowly. Oxidation of the metal sulfides in soil in the presence of the alkaline minerals likely resulted in the accumulation of ferric iron minerals at the metal sulfide mineral surfaces. In the neutral-pH soil environment (and likely alkaline micro-environment) conferred by the white rain particles, the oxidation products such as goethite (α-FeOOH) and hematite (Fe_2O_3) can passivate the metal sulfide surface resulting in decreased reactivity of the metal sulfides. The formation of these oxidation products results in acid-generating reactions being slowed significantly due to the surface "coating" on the metal sulfides created by the oxidation products (Nicholson et al., 1990). This passive coating that forms at circumneutral pH has been shown in pure systems using chalcopyrite and electrochemical methods (Yin et al., 1995). The reaction between metal sulfides and alkaline minerals and the accumulation of oxidation products at the surface of the sulfides occurs at a microscopic scale. At the field scale, oxidation products have been observed in sulfidic tailings, and include metal hydroxides, gypsum, siderite and other mineral phases (Lindsay et al., 2015). FeOOH are very abundant in STSIU soils (see Appendix D) and are sorbed onto copper sulfides (John Drexler, personal communication). Therefore, alkaline minerals deposited into the soil by the white rain can limit realization of acid generating potential and result in sustained maintenance of elevated soil pH.

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Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

			Ca	Mg	K	Na	NH4	NO3	Cl	SO4	pH			Conductivity			Sample Vol.	Precip	sub_ppt					Calc. Ca	Calc. Mg	Calc. K	Calc. Na	Calc. NH4	Calc. NO3
Site ID	Date On	Date Off	mg/L								Lab	Field	FV	Lab	Field	FV	ml	mm	mm	Lab Type	Val Code	Inval code	Notes	(mN)	(mN)	(mN)	(mN)	(mN)	(mN)
NM01	12/27/05	01/03/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/03/06	01/11/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/11/06	01/18/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/18/06	01/24/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/24/06	01/31/06	0.09	0.006	0.007	0.023	0.069	0.503	0.053	0.346	5.04	--	-	7	--	-	733	10.67	10.668	w	w			0.004491242	0.000493726	0.000179037	0.001000435	0.003833333	0.008112249
NM01	01/31/06	02/07/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	02/07/06	02/14/06	0.749	0.074	0.074	0.072	< 0.007	< 0.029	0.148	1.346	5.82	--	-	7.1	--	-	32.5	0.51	0.508	wd	wd			0.037377115	0.006089282	0.00189268	0.003131796	0.000194444	0.000233852
NM01	02/14/06	02/21/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	3.4	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	02/21/06	02/28/06	0.091	0.008	0.024	0.023	0.211	0.587	0.057	0.649	5	--	-	7.6	--	-	287.8	4.32	4.318	w	w			0.004541145	0.000658301	0.000613842	0.001000435	0.011722222	0.009466978
NM01	02/28/06	03/07/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/07/06	03/14/06	1.076	0.119	0.143	0.577	0.142	0.571	1.029	1.138	6.52	--	-	12.6	--	-	491	7.11	7.112	w	w			0.053695294	0.009792224	0.003657476	0.025097869	0.007888889	0.009208935
NM01	03/14/06	03/21/06	0.66	0.105	0.099	0.644	0.583	1.775	1.063	2.025	5.75	--	-	16.2	--	-	51.7	0.76	0.762	w	w			0.032935775	0.008640197	0.002532099	0.028012179	0.032388889	0.028626724
NM01	03/21/06	03/28/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1.9	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	03/28/06	04/04/06	0.065	0.008	0.003	0.014	0.004	0.161	0.054	0.161	5.16	--	-	4.3	--	-	70.4	1.02	1.016	w	w			0.003243675	0.000658301	7.67303E-05	0.00060896	0.000222222	0.002596565
NM01	04/04/06	04/11/06	1.499	0.097	0.11	0.087	0.039	2.982	0.325	2.07	4.94	--	-	18.3	--	-	169.1	2.54	2.54	w	w			0.074804132	0.007981897	0.002813443	0.003784254	0.002166667	0.048092896
NM01	04/11/06	04/18/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/18/06	04/25/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/25/06	05/02/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	-7	0.127	d	t			NA	NA	NA	NA	NA	NA
NM01	05/02/06	05/08/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/08/06	05/16/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	219	3.05	3.048	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	05/16/06	05/23/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/23/06	05/30/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/30/06	06/06/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1.8	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	06/06/06	06/13/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	82.1	1.27	1.27	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	06/13/06	06/20/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/20/06	06/27/06	0.849	0.058	0.069	0.068	0.849	2.436	0.117	1.487	6.1	--	-	14.2	--	-	355	5.08	5.08	w	w			0.042367384	0.004772681	0.001764796	0.002957808	0.047166667	0.039287154
NM01	06/27/06	07/03/06	--	--	--	--	--	--	--	--	6.14	--	-	29.2	--	-	16.1	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	07/03/06	07/11/06	0.067	0.005	0.009	0.007	0.377	0.88	0.025	0.6	5.14	--	-	6.8	--	-	2546.6	37.59	37.592	w	w			0.00334348	0.000411438	0.000230191	0.00030448	0.020944444	0.014192404
NM01	07/11/06	07/19/06	0.687	0.072	0.043	0.26	3.156	4.053	0.298	1.919	6.62	--	-	29	--	-	49.8	0.76	0.762	w	w			0.034283148	0.005924707	0.001099801	0.011309265	0.175333333	0.065365696
NM01	07/19/06	07/25/06	0.38	0.02	0.012	0.044	0.296	1.339	0.075	0.671	5.3	--	-	7.9	--	-	542.2	7.87	7.874	w	w			0.018963022	0.001645752	0.000306921	0.001913876	0.016444444	0.021595033
NM01	07/25/06	08/01/06	0.04	0.005	0.009	0.017	0.171	0.918	0.041	0.33	4.93	--	-	7.4	--	-	2137.2	31.5	31.496	w	w			0.001996108	0.000411438	0.000230191	0.000739452	0.0095	0.014805258
NM01	08/01/06	08/09/06	0.073	0.007	0.009	0.031	0.208	0.997	0.074	0.471	4.89	--	-	8.2	--	-	1762.4	25.91	25.908	w	w			0.003642896	0.000576013	0.000230191	0.001348412	0.011555556	0.016079348
NM01	08/09/06	08/15/06	0.036	0.004	0.007	0.01	0.078	0.928	0.038	0.331	4.77	--	-	8.6	--	-	1803.5	26.16	26.162	w	w			0.001796497	0.00032915	0.000179037	0.000434972	0.004333333	0.014966535
NM01	08/15/06	08/23/06	0.043	0.003	0.006	0.015	0.075	0.953	0.043	0.337	4.79	--	-	8.8	--	-	1924	28.19	28.194	w	w			0.002145816	0.000246863	0.000153461	0.000652458	0.004166667	0.015369728
NM01	08/23/06	08/29/06	0.157	0.018	0.024	0.059	0.273	1.66	0.115	0.862	4.61	--	-	14	--	-	423.4	6.1	6.096	w	w			0.007834722	0.001481177	0.000613842	0.002566333	0.015166667	0.026772035
NM01	08/29/06	09/12/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	3862	56.9	56.896	w		e		NA	NA	NA	NA	NA	NA
NM01	09/12/06	09/21/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	2072.5	29.21	29.21	w		e		NA	NA	NA	NA	NA	NA
NM01	09/21/06	09/26/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	6.5	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	09/26/06	10/03/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	0	0	q	d			NA	NA	NA	NA	NA	NA
NM01	10/03/06	10/10/06	0.222	0.012	0.015	0.064	0.186	0.475	0.076	0.534	5.61	--	-	4.4	--	-	1575.9	36.83	36.83	w	w			0.011078397	0.000987451	0.000383651	0.002783819	0.010333333	0.007660673
NM01	10/10/06	10/17/06	0.103	0.01	0.008	0.033	0.239	0.56	0.074	0.499	5.37	--	-	5.5	--	-	132.6	1.78	1.778	w	w			0.005139977	0.000822876	0.000204614	0.001435407	0.013277778	0.00903153
NM01	10/17/06	10/24/06	0.064	0.008	0.025	0.071	0.131	0.265	0.108	0.344	5.53	--	-	3.7	--	-	185.5	2.54	2.54	w	w			0.003193772	0.000658301	0.000639419	0.003088299	0.007277778	0.004273849
NM01	10/24/06	10/30/06	0.05	0.003	0.003	0.003	0.161	0.386	0.018	0.194	5.51	--	-	3.3	--	-	474.3	6.86	6.858	w	w			0.002495134	0.000246863	7.67303E-05	0.000130492	0.008944444	0.006225304
NM01	10/30/06	11/07/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/07/06	11/14/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/14/06	11/21/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/21/06	11/29/06	0.436	0.094	0.09	0.664	0.345	1.317	1.103	1.584	5.33	--	-	14	--	-	63.4	2.03	2.032	w	w			0.021757573	0.007735034	0.002301908	0.028882123	0.019166667	0.021240223
NM01	11/29/06	12/05/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	2.3	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	12/05/06	12/12/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	12/12/06	12/19/06	0.179	0.037	0.03	0.262	0.228	0.817	0.346	1.398	4.83	--	-	12	--	-	581.3	8.38	8.382	w	w			0.008932581	0.003044641	0.000767303	0.011396259	0.012666667	0.013176357
NM01	12/19/06	12/26/06	--	--	--	--	--	--	--	--	--	--	-	--	--	-	5.8	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	12/26/06	01/02/07	0.187	0.019	0.034	0.062	0.148	0.69	0.101	0.271	5.71	--	-	4.1	--	-	130.4	1.78	1.778	w	w			0.009331803	0.001563464	0.00086961	0.002696825	0.008222222	0.011128135
NM01	01/02/07	01/09/07	0.073	0.007	0.046	0.041	0.036	0.521	0.082	0.283	5.02	--	-	5.6	--	-	129.6	1.78	1.778	w	w			0.003642896	0.000576013	0.001176531	0.001783384	0.002	0.008402548
NM01	01/09/07	01/16/07	0.511	0.059	0.086	0.386	0.534	1.093	0.395	1.258	6.23	--	-	10.4	--	-	111.6	1.52	1.524	w	w			0.025500274	0.004854968	0.002199601	0.016789909	0.029666667	0.017627611
NM01	01/16/07	01/25/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1777	24.89	24.892	w		e		NA	NA	NA	NA	NA	NA
NM01	01/25/07	01/30/07	0.033	0.002	0.004	0.005	0.061	0.25	0.017	0.199	5.16	--	-	3.8	--	-	206.3	3.05	3.048	w	w			0.001646789	0.000164575	0.000102307	0.000217486	0.003388889	0.004031933
NM01	01/30/07	02/06/07	0.035	0.003	0.006	0.021	0.079	0.321	0.045	0.319	5.14	--	-	4.4	--	-	504.7	7.37	7.366	w	w			0.001746594	0.000246863	0.000153461	0.000913441	0.004388889	0.005177002
NM01	02/06/07	02/13/07	0.078	0.01	0.011	0.056	0.263	0.66	0.081	0.747	4.86	--	-	9.5	--	-	557	8.13	8.128	w	w			0.00389241	0.000822876	0.000281344	0.002435842	0.014611111	0.010644303
NM01	02/13/07	02/19/07	0.128	0.016	0.016	0.088	0.271	0.963	0.155	0.882	4.99	--	-	8.8	--	-	94.2	1.27	1.27	w	w			0.006387544	0.001316602	0.000409228	0.003827751	0.015055556	0.015531006
NM01	02/19/07	02/27/07	0.748	0.097	0.06	0.556	0.281	1.681	0.638	1.33	6.03	--	-	11.7	--	-	114.3	1.52	1.524	w	w			0.037327212	0.007981897	0.001534605	0.024184428	0.015611111	0.027110717
NM01	02/27/07	03/05/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1.7	0	0	t	d			NA	NA	NA	NA	NA	NA
NM01	03/05/07	03/13/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/13/07	03/20/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	0	0	q	d			NA	NA	NA	NA	NA	NA
NM01	03/20/07	03/27/07	0.176	0.016	0.025	0.036	0.083	1.009	0.105	0.399	4.88	--	-	7.8	--	-	1130.8	16.51	16.51	w	w			0.008782873	0.001316602	0.000639419	0.001565898	0.004611111	0.016272881
NM01	03/27/07	04/03/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	9.6	0.25	0.254	t		v		NA	NA	NA	NA	NA	NA
NM01	04/03/07	04/10/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/10/07	04/17/07	0.563	0.074	0.044	0.313	0.05	0.606	0.501	0.682	6.04	--	-	6.9	--	-	276.4	4.06	4.064	w	w			0.028095214	0.006089282	0.001125377	0.013614615	0.002777778	0.009773405
NM01	04/17/07	04/23/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	2.5	0	0	t	d			NA	NA	NA	NA	NA	NA

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

			Ca	Mg	K	Na	NH4	NO3	Cl	SO4	pH			Conductivity			Sample Vol.	Precip	sub_ppt					Calc. Ca	Calc. Mg	Calc. K	Calc. Na	Calc. NH4	Calc. NO3
Site ID	Date On	Date Off	mg/L								Lab	Field	FV	Lab	Field	FV	ml	mm	mm	Lab Type	Val Code	Inval code	Notes	(mN)	(mN)	(mN)	(mN)	(mN)	(mN)
NM01	04/23/07	05/01/07	0.268	0.028	0.03	0.052	0.193	0.819	0.068	0.822	5.1	--	-	7.5	--	-	1042.2	15.24	15.24	w	w			0.013373921	0.002304053	0.000767303	0.002261853	0.010722222	0.013208612
NM01	05/01/07	05/08/07	--	--	--	--	--	--	--	--	4.45	--	-	44.4	--	-	10.7	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	05/08/07	05/15/07	0.626	0.053	0.109	0.077	0.412	1.989	0.168	1.385	4.88	--	-	14.3	--	-	174	2.54	2.54	w	w			0.031239084	0.004361243	0.002787866	0.003349282	0.022888889	0.032078058
NM01	05/15/07	05/23/07	0.218	0.022	0.029	0.046	0.279	0.914	0.086	0.733	5.1	--	-	7.5	--	-	1874.9	27.43	27.432	w	w			0.010878786	0.001810327	0.000741726	0.00200087	0.0155	0.014740747
NM01	05/23/07	05/29/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	45.5	0.51	0.508	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	05/29/07	06/05/07	--	--	--	--	--	--	--	--	4.53	--	-	51.9	--	-	6.5	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	06/05/07	06/12/07	0.12	0.012	0.021	0.045	0.156	0.455	0.077	0.605	5.1	--	-	5.9	--	-	541.3	7.87	7.874	w	w			0.005988323	0.000987451	0.000537112	0.001957373	0.008666667	0.007338118
NM01	06/12/07	06/19/07	0.179	0.026	0.034	0.084	0.005	0.674	0.124	0.589	4.79	--	-	8.8	--	-	944.1	13.72	13.716	w	w			0.008932581	0.002139477	0.00086961	0.003653763	0.000277778	0.010870091
NM01	06/19/07	06/26/07	1.315	0.098	0.084	0.152	0.168	2.011	0.205	1.509	5.76	--	-	12.3	--	-	492.1	7.11	7.112	w	w			0.065622037	0.008064184	0.002148447	0.00661157	0.009333333	0.032432868
NM01	06/26/07	07/10/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1915	26.92	26.924	w		e		NA	NA	NA	NA	NA	NA
NM01	07/10/07	07/17/07	0.556	0.061	0.068	0.084	0.699	3.062	0.193	1.546	4.68	--	-	19.5	--	-	285.5	4.06	4.064	w	w			0.027745896	0.005019543	0.001739219	0.003653763	0.038833333	0.049383114
NM01	07/17/07	07/24/07	0.506	0.028	0.073	0.102	0.392	1.158	0.086	0.955	5.58	--	-	8.1	--	-	359.3	5.08	5.08	w	w			0.025250761	0.002304053	0.001867103	0.004436712	0.021777778	0.018675913
NM01	07/24/07	07/31/07	0.158	0.01	0.047	0.028	0.426	0.964	0.058	0.469	5.73	--	-	5.5	--	-	1116.3	14.48	14.478	w	w			0.007884625	0.000822876	0.001202108	0.001217921	0.023666667	0.015547133
NM01	07/31/07	08/07/07	0.098	0.006	0.013	0.019	0.166	0.813	0.056	0.375	4.99	--	-	6.4	--	-	759.8	7.62	7.62	w	w			0.004890464	0.000493726	0.000332498	0.000826446	0.009222222	0.013111846
NM01	08/07/07	08/14/07	0.623	0.04	0.068	0.125	2.718	5.215	0.272	1.772	5.77	--	-	28.2	--	-	17.9	0.25	0.254	wd	wd			0.031089376	0.003291504	0.001739219	0.005437147	0.151	0.08410612
NM01	08/14/07	08/20/07	0.445	0.028	0.036	0.037	0.662	1.718	0.081	2.285	4.63	--	-	18.8	--	-	319.1	4.57	4.572	w	w			0.022206697	0.002304053	0.000920763	0.001609395	0.036777778	0.027707443
NM01	08/20/07	08/28/07	0.172	0.028	0.014	0.059	0.181	1.263	0.09	0.725	4.82	--	-	10	--	-	1537.9	22.35	22.352	w	w			0.008583263	0.002304053	0.000358075	0.002566333	0.010055556	0.020369325
NM01	08/28/07	09/04/07	0.251	0.014	0.01	0.029	0.231	1.134	0.074	0.697	4.91	--	-	9	--	-	703.7	7.87	7.874	w	w			0.012525575	0.001152026	0.000255768	0.001261418	0.012833333	0.018288848
NM01	09/04/07	09/11/07	0.167	0.019	0.015	0.051	0.183	1.185	0.079	0.57	4.83	--	-	9	--	-	1089.6	16	16.002	w	w			0.008333749	0.001563464	0.000383651	0.002218356	0.010166667	0.019111362
NM01	09/11/07	09/18/07	0.44	0.06	0.069	0.189	0.713	2.979	0.338	1.362	4.71	--	-	18.9	--	-	79.8	1.02	1.016	w	w			0.021957183	0.004937256	0.001764796	0.008220966	0.039611111	0.048044513
NM01	09/18/07	09/25/07	0.081	0.007	0.012	0.031	0.257	0.527	0.057	0.636	5.29	--	-	5.4	--	-	1221.3	16.76	16.764	w	w			0.004042118	0.000576013	0.000306921	0.001348412	0.014277778	0.008499315
NM01	09/25/07	10/02/07	0.431	0.03	0.037	0.076	0.592	1.469	0.147	1.595	5.23	--	-	12.1	--	-	31.7	0.51	0.508	wd	wd			0.021508059	0.002468628	0.00094634	0.003305785	0.032888889	0.023691638
NM01	10/02/07	10/16/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	160.9	2.29	2.286	w		e		NA	NA	NA	NA	NA	NA
NM01	10/16/07	10/23/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	10/23/07	10/30/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	10/30/07	11/06/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/06/07	11/13/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/13/07	11/20/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/20/07	11/27/07	0.081	0.004	0.014	0.018	0.055	0.414	0.04	0.212	5.19	--	-	4	--	-	371.2	5.33	5.334	w	w			0.004042118	0.00032915	0.000358075	0.000782949	0.003055556	0.006676881
NM01	11/27/07	12/04/07	0.011	0.001	0.004	0.005	0.015	0.048	0.012	0.032	5.51	--	-	1.6	--	-	3114.4	46.74	46.736	w	w			0.00054893	8.22876E-05	0.000102307	0.000217486	0.000833333	0.000774131
NM01	12/04/07	12/12/07	0.024	0.01	0.153	0.034	0.018	0.036	0.06	0.126	5.52	--	-	2.6	--	-	1568.8	23.11	23.114	w	w			0.001197665	0.000822876	0.003913244	0.001478904	0.001	0.000580598
NM01	12/12/07	12/18/07	0.329	0.018	0.018	0.039	0.279	1.795	0.074	0.502	4.93	--	-	10.7	--	-	22.9	0.25	0.254	wd	wd			0.016417985	0.001481177	0.000460382	0.00169639	0.0155	0.028949278
NM01	12/18/07	12/24/07	0.104	0.007	0.017	0.022	0.082	0.736	0.045	0.457	4.96	--	-	6.8	--	-	71.9	1.02	1.016	w	w			0.00518988	0.000576013	0.000434805	0.000956938	0.004555556	0.01187001
NM01	12/24/07	12/31/07	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	12/31/07	01/08/08	5.842	0.37	0.201	3.41	< 0.004	0.05	2.32	2.087	7.2	--	-	46.5	--	-	790.1	10.16	10.16	w	w			0.291531514	0.03044641	0.005140928	0.148325359	0.000111111	0.000806387
NM01	01/08/08	01/16/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/16/08	01/22/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	--	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/22/08	02/05/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1893.6	26.67	26.67	w		e		NA	NA	NA	NA	NA	NA
NM01	02/05/08	02/12/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	0	0	q	d			NA	NA	NA	NA	NA	NA
NM01	02/12/08	02/19/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	451.2	5.84	5.842	w		u	ns	NA	NA	NA	NA	NA	NA
NM01	02/19/08	02/26/08	0.314	0.031	0.018	0.132	0.172	1.245	0.146	0.627	4.73	--	-	13.8	--	-	34.8	0.51	0.508	wd	wd			0.015669445	0.002550915	0.000460382	0.005741627	0.009555556	0.020079026
NM01	02/26/08	03/04/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/04/08	03/11/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0.3	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	03/11/08	03/18/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/18/08	03/25/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/25/08	04/01/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/01/08	04/08/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/08/08	04/15/08	0.575	0.088	0.024	0.27	0.07	0.995	0.427	1.253	4.97	--	-	12.1	--	-	120	1.78	1.778	w	w			0.028694047	0.007241308	0.000613842	0.011744237	0.003888889	0.016047093
NM01	04/15/08	04/22/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/22/08	04/29/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/29/08	05/06/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/06/08	05/13/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/13/08	05/20/08	0.371	0.047	0.034	0.054	0.007	0.763	0.159	0.879	4.81	--	-	9.8	--	-	144.6	2.03	2.032	w	w			0.018513898	0.003867517	0.00086961	0.002348847	0.000388889	0.012305459
NM01	05/20/08	05/27/08	0.674	0.107	0.088	0.656	0.077	0.616	1.131	0.974	6.07	--	-	10.3	--	-	898.9	12.95	12.954	w	w			0.033634413	0.008804773	0.002250755	0.028534145	0.004277778	0.009934683
NM01	05/27/08	06/03/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/03/08	06/10/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/10/08	06/17/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0.7	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	06/17/08	06/24/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	106.6	1.52	1.524	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	06/24/08	07/01/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	07/01/08	07/08/08	0.331	0.027	0.038	0.047	0.483	1.578	0.082	1.05	5.18	--	-	9.7	--	-	683.1	11.18	11.176	w	w			0.01651779	0.002221765	0.000971917	0.002044367	0.026833333	0.025449561
NM01	07/08/08	07/15/08	0.042	0.004	0.009	0.016	0.124	0.602	0.033	0.287	5.05	--	-	5.5	--	-	2397.2	35.31	35.306	w	w			0.002095913	0.00032915	0.000230191	0.000695955	0.006888889	0.009708894
NM01	07/15/08	07/22/08	0.115	0.013	0.033	0.02	0.073	0.664	0.044	0.339	5	--	-	6.3	--	-	2096	30.73	30.734	w	w			0.005738809	0.001069739	0.000844033	0.000869943	0.004055556	0.010708814
NM01	07/22/08	07/29/08	0.157	0.017	0.014	0.049	0.14	0.761	0.072	0.484	5.06	--	-	6.2	--	-	3039.5	56.39	56.388	w	w			0.007834722	0.001398889	0.000358075	0.002131361	0.007777778	0.012273204
NM01	07/29/08	08/05/08	0.765	0.078	0.054	0.045	0.606	2.113	0.182	1.342	5.48	--	-	12.3	--	-	78.2	1.02	1.016	w	w			0.038175558	0.006418432	0.001381145	0.001957373	0.033666667	0.034077897
NM01	08/05/08	08/12/08	0.082	0.008	0.009	0.02	0.145	0.913	0.048	0.492	4.78	--	-	8.6	--	-	3289.5	48.26	48.26	w	w			0.004092021	0.000658301	0.000230191	0.000869943	0.008055556	0.014724619
NM01	08/12/08	08/18/08	0.148	0.015	0.011	0.03	0.174	1.106	0.064	0.483	4.87	--	-	8.5	--	-	2690.2	37.59	37.592	w	w			0.007385598	0.001234314	0.000281344	0.001304915	0.009666667	0.017837271
NM01	08/18/08	09/02/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	2070.6	28.45	28.448	w		e		NA	NA	NA	NA	NA	NA
NM01	09/02/08	09/08/08	0.151	0.013	0.011	0.013	0.119	0.689	0.048	0.444	5.09	--	-	5.9	--	-	711.5	10.41	10.414	w	w			0.007535306	0.001069739	0.000281344	0.000565463	0.006611111	0.011112007
NM01	09/08/08	09/16/08	0.041	0.003	0.006	0.007	0.083	0.35	0.026	0.248	5.13	--	-	4.2	--	-	1201.9	17.78	17.78	w	w			0.00204601	0.000246863	0.000153461	0.00030448	0.004611111	0.005644706

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

			Ca	Mg	K	Na	NH4	NO3	Cl	SO4	pH			Conductivity			Sample Vol.	Precip	sub_ppt					Calc. Ca	Calc. Mg	Calc. K	Calc. Na	Calc. NH4	Calc. NO3
Site ID	Date On	Date Off	mg/L								Lab	Field	FV	Lab	Field	FV	ml	mm	mm	Lab Type	Val Code	Inval code	Notes	(mN)	(mN)	(mN)	(mN)	(mN)	(mN)
NM01	09/16/08	09/29/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	178.1	2.54	2.54	w		e		NA	NA	NA	NA	NA	NA
NM01	09/29/08	10/14/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	3450.4	50.8	50.8	w		e		NA	NA	NA	NA	NA	NA
NM01	10/14/08	10/28/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	--	0	d	d			NA	NA	NA	NA	NA	NA
NM01	10/28/08	11/03/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/03/08	11/12/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	83.6	2.29	2.286	w		e		NA	NA	NA	NA	NA	NA
NM01	11/12/08	11/19/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/19/08	11/25/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/25/08	12/03/08	0.044	0.003	0.005	0.012	0.071	0.145	0.027	0.245	5.4	--	-	2.9	--	-	1090	16	16.002	w	w			0.002195718	0.000246863	0.000127884	0.000521966	0.003944444	0.002338521
NM01	12/03/08	12/10/08	0.042	0.006	0.003	0.018	0.144	0.9	0.055	0.278	4.97	--	-	6.5	--	-	415.3	--	6.117	w	w			0.002095913	0.000493726	7.67303E-05	0.000782949	0.008	0.014514958
NM01	12/10/08	12/15/08	0.423	0.087	0.072	0.662	0.286	1.036	0.847	1.063	6.31	--	-	9.9	--	-	207.7	3.05	3.048	w	w			0.021108838	0.007159021	0.001841526	0.028795128	0.015888889	0.01670833
NM01	12/15/08	12/30/08	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1952.3	28.7	28.702	w		e		NA	NA	NA	NA	NA	NA
NM01	12/30/08	01/06/09	0.158	0.01	0.007	0.026	0.075	0.37	0.046	0.258	5.43	--	-	3.5	--	-	83.4	1.27	1.27	w	w			0.007884625	0.000822876	0.000179037	0.001130926	0.004166667	0.005967261
NM01	01/06/09	01/14/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/14/09	01/20/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/20/09	01/27/09	0.064	0.006	0.038	0.007	0.022	0.355	0.037	0.152	5.25	--	-	4	--	-	192.8	2.79	2.794	w	w			0.003193772	0.000493726	0.000971917	0.00030448	0.001222222	0.005725345
NM01	01/27/09	02/03/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	0	0	q	d			NA	NA	NA	NA	NA	NA
NM01	02/03/09	02/11/09	0.073	0.01	0.018	0.061	0.048	0.213	0.094	0.243	5.37	--	-	3.5	--	-	72.9	1.02	1.016	w	w			0.003642896	0.000822876	0.000460382	0.002653328	0.002666667	0.003435207
NM01	02/11/09	02/17/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	02/17/09	02/24/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	02/24/09	03/03/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/03/09	03/10/09	0.041	0.003	0.006	0.009	0.024	0.171	0.021	0.137	5.33	--	-	3	--	-	320.2	4.57	4.572	w	w			0.00204601	0.000246863	0.000153461	0.000391475	0.001333333	0.002757842
NM01	03/10/09	03/17/09	0.219	0.023	0.035	0.094	0.44	0.987	0.117	1.066	5.31	--	-	8.1	--	-	782.1	8.89	8.89	w	w			0.010928689	0.001892615	0.000895186	0.004088734	0.024444444	0.015918071
NM01	03/17/09	03/25/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/25/09	03/31/09	2.659	0.174	0.124	0.388	< 0.03	2.311	0.422	1.153	6.69	--	-	20.3	--	-	21.3	0.25	0.254	wd	wd			0.132691252	0.014318042	0.003171518	0.016876903	0.000833333	0.037271188
NM01	03/31/09	04/08/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/08/09	04/14/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	81.8	1.02	1.016	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	04/14/09	04/28/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/28/09	05/05/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/05/09	05/12/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/12/09	05/19/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/19/09	05/26/09	0.222	0.02	0.019	0.032	0.228	0.93	0.066	0.545	5.29	--	-	6.1	--	-	669.6	9.91	9.906	w	w			0.011078397	0.001645752	0.000485958	0.00139191	0.012666667	0.01499879
NM01	05/26/09	06/02/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	7.87	7.874	d		vf	ns	NA	NA	NA	NA	NA	NA
NM01	06/02/09	06/09/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/09/09	06/16/09	0.088	0.011	0.055	0.034	0.489	0.872	0.092	0.954	5.29	--	-	7.8	--	-	918.1	13.21	13.208	w	w			0.004391437	0.000905164	0.001406722	0.001478904	0.027166667	0.014063382
NM01	06/16/09	06/23/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/23/09	06/30/09	0.414	0.034	0.04	0.109	0.527	1.833	0.152	0.843	5.65	--	-	9.1	--	-	758.9	11.43	11.43	w	w			0.020659714	0.002797778	0.00102307	0.004741192	0.029277778	0.029562132
NM01	06/30/09	07/07/09	0.174	0.018	0.068	0.048	0.452	1.337	0.082	0.747	5.19	--	-	8.2	--	-	702.7	10.16	10.16	w	w			0.008683068	0.001481177	0.001739219	0.002087864	0.025111111	0.021562777
NM01	07/07/09	07/14/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	23.5	0.25	0.254	t		v		NA	NA	NA	NA	NA	NA
NM01	07/14/09	07/22/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	112.7	1.52	1.524	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	07/22/09	07/28/09	0.108	0.013	0.01	0.036	0.157	0.965	0.053	0.418	5.05	--	-	7.3	--	-	2198	30.73	30.734	w	w			0.00538949	0.001069739	0.000255768	0.001565898	0.008722222	0.015563261
NM01	07/28/09	08/05/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	22.9	0.25	0.254	t		v		NA	NA	NA	NA	NA	NA
NM01	08/05/09	08/11/09	0.187	0.02	0.015	0.039	0.162	1.258	0.068	0.485	4.86	--	-	9.1	--	-	260.3	3.81	3.81	w	w			0.009331803	0.001645752	0.000383651	0.00169639	0.009	0.020288686
NM01	08/11/09	08/18/09	0.103	0.008	0.006	0.018	0.143	0.736	0.034	0.363	5.08	--	-	5.8	--	-	972	13.97	13.97	w	w			0.005139977	0.000658301	0.000153461	0.000782949	0.007944444	0.01187001
NM01	08/18/09	08/25/09	0.158	0.01	0.01	0.026	0.169	0.492	0.038	0.405	5.49	--	-	4	--	-	2091.1	30.73	30.734	w	w			0.007884625	0.000822876	0.000255768	0.001130926	0.009388889	0.007934844
NM01	08/25/09	09/01/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1.2	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	09/01/09	09/08/09	0.354	0.026	0.062	0.022	0.618	1.492	0.076	1.172	5.35	--	-	10.1	--	-	544.5	7.87	7.874	w	w			0.017665552	0.002139477	0.001585759	0.000956938	0.034333333	0.024062576
NM01	09/08/09	09/16/09	0.186	0.016	0.017	0.016	0.187	1.656	0.086	0.749	4.63	--	-	14.8	--	-	117.2	1.52	1.524	w	w			0.0092819	0.001316602	0.000434805	0.000695955	0.010388889	0.026707524
NM01	09/16/09	09/22/09	0.22	0.017	0.012	0.053	0.422	1.148	0.078	0.978	5.16	--	-	8.3	--	-	1187.9	17.53	17.526	w	w			0.010978592	0.001398889	0.000306921	0.00230535	0.023444444	0.018514636
NM01	09/22/09	09/29/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	09/29/09	10/07/09	0.395	0.079	0.031	0.401	0.425	1.558	0.61	1.189	5.18	--	-	12.3	--	-	71.4	1.02	1.016	w	w			0.019711562	0.00650072	0.000792879	0.017442366	0.023611111	0.025127006
NM01	10/07/09	10/13/09	0.848	0.077	0.032	0.407	0.191	1.207	0.567	1.684	5.94	--	-	11.3	--	-	140.2	2.03	2.032	w	w			0.042317481	0.006336145	0.000818456	0.017703349	0.010611111	0.019466172
NM01	10/13/09	10/20/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	10/20/09	10/27/09	0.402	0.038	0.023	0.137	0.241	0.94	0.219	0.958	5.49	--	-	7.9	--	-	249.2	--	3.67	w	w			0.020060881	0.003126929	0.000588265	0.005959113	0.013388889	0.015160068
NM01	10/27/09	11/02/09	2.663	0.337	0.142	0.86	0.07	1.305	1.116	1.188	7.07	--	-	22	--	-	314.6	4.57	4.572	w	w			0.132890863	0.02773092	0.003631899	0.037407569	0.003888889	0.02104669
NM01	11/02/09	11/10/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/10/09	11/17/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/17/09	11/24/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/24/09	12/02/09	0.222	0.024	0.031	0.118	0.338	0.882	0.185	0.938	5.16	--	-	8.8	--	-	1424.6	20.83	20.828	w	w			0.011078397	0.001974902	0.000792879	0.005132666	0.018777778	0.014224659
NM01	12/02/09	12/09/09	0.263	0.023	0.031	0.09	0.157	0.247	0.124	0.386	6.15	--	-	3.9	--	-	2163.6	31.75	31.75	w	w			0.013124407	0.001892615	0.000792879	0.003914746	0.008722222	0.00398355
NM01	12/09/09	12/15/09	0.022	0.002	0.001	0.007	0.017	0.177	0.023	0.089	5.18	--	-	3.3	--	-	154.9	2.29	2.286	w	w			0.001097859	0.000164575	2.55768E-05	0.00030448	0.000944444	0.002854608
NM01	12/15/09	12/21/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	12/21/09	12/30/09	--	--	--	--	--	--	--	--	--	--	-	--	--	-	270	3.81	3.81	w		e		NA	NA	NA	NA	NA	NA
NM01	12/30/09	01/05/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/05/10	01/12/10	0.086	0.005	0.003	0.009	0.049	0.806	0.028	0.092	4.97	--	-	6.8	--	-	148.2	2.03	2.032	w	w			0.004291631	0.000411438	7.67303E-05	0.000391475	0.002722222	0.012998952
NM01	01/12/10	01/19/10	0.163	0.011	0.013	0.025	0.129	1.077	0.087	0.439	4.88	--	-	8.6	--	-	251.4	3.56	3.556	w	w			0.008134138	0.000905164	0.000332498	0.001087429	0.007166667	0.017369567
NM01	01/19/10	01/26/10	0.104	0.011	0.014	0.047	0.06	0.114	0.077	0.123	5.88	--	-	2.5	--	-	4642.4	68.33	68.326	w	w			0.00518988	0.000905164	0.000358075	0.002044367	0.003333333	0.001838561
NM01	01/26/10	02/02/10	0.011	0.003	0.003	0.023	0.066	0.138	0.04	0.195	5.3	--	-	3.5	--	-	1461.4	20.83	20.828	w	w			0.00054893	0.000246863	7.67303E-05	0.001000435	0.003666667	0.002225627
NM01	02/02/10	02/09/10	0.027	0.002	0.003	0.012	0.104	0.35	0.021	0.172	5.16	--	-	3.6	--	-	728.7	10.67	10.668	w	w			0.001347373	0.000164575	7.67303E-05	0.000521966	0.005777778	0.005644706
NM01	02/09/10	02/16/10	0.278	0.049	0.029	0.318	0.55	1.539	0.398	2.016	4.72	--	-	17.8	--	-	66.6	0.76	0.762	w	w			0.013872948	0.004032092	0.000741726	0.013832101	0.030555556	0.024820579

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

			Ca	Mg	K	Na	NH4	NO3	Cl	SO4	pH			Conductivity			Sample Vol.	Precip	sub_ppt					Calc. Ca	Calc. Mg	Calc. K	Calc. Na	Calc. NH4	Calc. NO3
Site ID	Date On	Date Off	mg/L								Lab	Field	FV	Lab	Field	FV	ml	mm	mm	Lab Type	Val Code	Inval code	Notes	(mN)	(mN)	(mN)	(mN)	(mN)	(mN)
NM01	02/16/10	02/23/10	0.021	0.002	0.002	0.008	0.023	0.106	0.013	0.07	5.19	--	-	2.5	--	-	465.2	6.86	6.858	w	w			0.001047956	0.000164575	5.11535E-05	0.000347977	0.001277778	0.00170954
NM01	02/23/10	03/02/10	0.132	0.018	0.008	0.105	0.047	0.654	0.201	0.315	5.3	--	-	5.8	--	-	141.7	2.03	2.032	w	w			0.006587155	0.001481177	0.000204614	0.004567203	0.002611111	0.010547536
NM01	03/02/10	03/09/10	0.299	0.046	0.036	0.31	0.148	0.525	0.388	0.671	5.73	--	-	6.2	--	-	189.4	2.54	2.54	w	w			0.014920904	0.003785229	0.000920763	0.013484124	0.008222222	0.008467059
NM01	03/09/10	03/16/10	4.378	0.221	0.148	2.458	0.118	0.983	1.321	2.363	6.54	--	-	40.9	--	-	25.9	0.25	0.254	wd	wd			0.218473976	0.018185559	0.00378536	0.10691605	0.006555556	0.01585356
NM01	03/16/10	03/23/10	0.147	0.014	0.008	0.026	0.202	0.937	0.052	0.539	5.01	--	-	7.9	--	-	147.9	--	2.178	w	w			0.007335695	0.001152026	0.000204614	0.001130926	0.011222222	0.015111685
NM01	03/23/10	03/30/10	0.234	0.025	0.004	0.036	< 0.01	0.481	0.057	0.426	5.29	--	-	4.8	--	-	140.9	2.03	2.032	w	w			0.011677229	0.00205719	0.000102307	0.001565898	0.000277778	0.007757439
NM01	03/30/10	04/06/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	--	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/06/10	04/13/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/13/10	04/20/10	0.341	0.05	0.018	0.061	0.205	0.784	0.093	0.598	5.86	--	-	5.6	--	-	2031	--	29.916	w	w			0.017016817	0.00411438	0.000460382	0.002653328	0.011388889	0.012644142
NM01	04/20/10	04/27/10	0.191	0.028	0.009	0.101	0.024	0.348	0.169	0.42	5.29	--	-	4.8	--	-	413.7	--	6.093	w	w			0.009531414	0.002304053	0.000230191	0.004393214	0.001333333	0.005612451
NM01	04/27/10	05/10/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	246.8	--	3.635	w		ec	ns	NA	NA	NA	NA	NA	NA
NM01	05/10/10	05/11/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	--	--			np	nn	NA	NA	NA	NA	NA	NA
NM01	05/11/10	05/18/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/18/10	05/25/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/25/10	06/01/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/01/10	06/08/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/08/10	06/15/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/15/10	06/22/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/22/10	06/29/10	0.38	0.03	0.033	0.044	0.261	1.405	0.12	0.92	4.93	--	-	10.8	--	-	999.5	15.24	15.24	w	w			0.018963022	0.002468628	0.000844033	0.001913876	0.0145	0.022659463
NM01	06/29/10	07/06/10	0.123	0.012	0.006	0.009	0.368	0.937	0.059	0.568	5.11	--	-	7.5	--	-	659.8	--	9.718	w	w			0.006138031	0.000987451	0.000153461	0.000391475	0.020444444	0.015111685
NM01	07/06/10	07/12/10	0.488	0.046	0.035	0.131	0.282	1.599	0.235	0.785	5.18	--	-	10	--	-	408.8	6.1	6.096	w	w			0.024352513	0.003785229	0.000895186	0.00569813	0.015666667	0.025788243
NM01	07/12/10	07/20/10	0.24	0.025	0.031	0.06	0.305	1.527	0.112	0.754	4.85	--	-	10.8	--	-	483.1	7.11	7.112	w	w			0.011976646	0.00205719	0.000792879	0.00260983	0.016944444	0.024627046
NM01	07/20/10	07/27/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	1962	--	28.899	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	07/27/10	08/03/10	0.07	0.014	0.065	0.03	0.238	0.867	0.088	0.383	5.19	--	-	5.9	--	-	1425.7	--	21	w	w			0.003493188	0.001152026	0.001662489	0.001304915	0.013222222	0.013982743
NM01	08/03/10	08/10/10	0.625	0.039	0.052	0.044	0.742	1.882	0.107	0.928	6.47	--	-	11.5	--	-	149.9	--	2.207	wd	wd			0.031189181	0.003209216	0.001329991	0.001913876	0.041222222	0.030352391
NM01	08/10/10	08/17/10	0.192	0.012	0.013	0.033	0.257	0.903	0.058	0.891	4.94	--	-	9	--	-	2161.3	34.04	34.036	w	w			0.009581316	0.000987451	0.000332498	0.001435407	0.014277778	0.014563342
NM01	08/17/10	08/24/10	0.104	0.01	0.012	0.014	0.111	1.438	0.073	0.405	4.57	--	-	12.2	--	-	195.7	--	2.882	w	w			0.00518988	0.000822876	0.000306921	0.00060896	0.006166667	0.023191678
NM01	08/24/10	08/31/10	0.105	0.013	0.023	0.05	0.339	1.671	0.114	0.791	4.67	--	-	13.7	--	-	248.8	3.56	3.556	w	w			0.005239782	0.001069739	0.000588265	0.002174859	0.018833333	0.02694944
NM01	08/31/10	09/07/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	09/07/10	09/15/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	227.1	3.3	3.302	w		e		NA	NA	NA	NA	NA	NA
NM01	09/15/10	09/22/10	0.13	0.012	0.012	0.016	0.161	0.577	0.041	0.449	5.17	--	-	5.6	--	-	1073.6	15.75	15.748	w	w			0.00648735	0.000987451	0.000306921	0.000695955	0.008944444	0.009305701
NM01	09/22/10	09/28/10	0.014	0.001	0.006	0.008	< 0.01	0.098	0.023	0.052	5.33	--	-	2.3	--	-	641.8	9.4	9.398	w	w			0.000698638	8.22876E-05	0.000153461	0.000347977	0.000277778	0.001580518
NM01	09/28/10	10/05/10	0.312	0.02	0.018	0.015	0.406	1.231	0.077	1.198	4.95	--	-	10.6	--	-	83.8	1.02	1.016	w	w			0.015569639	0.001645752	0.000460382	0.000652458	0.022555556	0.019853238
NM01	10/05/10	10/12/10	0.227	0.025	0.024	0.027	0.395	0.82	0.062	0.796	5.58	--	-	6.4	--	-	183.7	2.54	2.54	w	w			0.011327911	0.00205719	0.000613842	0.001174424	0.021944444	0.01322474
NM01	10/12/10	10/19/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	10/19/10	10/26/10	0.033	0.006	0.019	0.03	0.055	0.19	0.054	0.116	5.42	--	-	2.6	--	-	186.8	2.54	2.54	w	w			0.001646789	0.000493726	0.000485958	0.001304915	0.003055556	0.003064269
NM01	10/26/10	11/02/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/02/10	11/09/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/09/10	11/16/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	-7	0.127	d	t			NA	NA	NA	NA	NA	NA
NM01	11/16/10	11/23/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/23/10	11/30/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/30/10	12/07/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	12/07/10	12/14/10	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	12/14/10	12/21/10	0.072	0.006	0.011	0.021	0.1	0.429	0.043	0.25	5.28	--	-	4	--	-	330.4	4.83	4.826	w	w			0.003592994	0.000493726	0.000281344	0.000913441	0.005555556	0.006918797
NM01	12/21/10	12/28/10	0.129	0.015	0.014	0.037	0.313	0.644	0.101	0.845	5.06	--	-	8.4	--	-	29.3	0.25	0.254	wd	wd			0.006437447	0.001234314	0.000358075	0.001609395	0.017388889	0.010386259
NM01	12/28/10	01/04/11	0.053	0.005	0.011	0.023	0.039	0.16	0.032	0.134	5.53	--	-	2.6	--	-	1081.4	17.02	17.018	w	w			0.002644843	0.000411438	0.000281344	0.001000435	0.002166667	0.002580437
NM01	01/04/11	01/11/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/11/11	01/18/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	0	0	q	d			NA	NA	NA	NA	NA	NA
NM01	01/18/11	01/25/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/25/11	02/01/11	0.072	0.01	0.011	0.045	0.184	0.521	0.054	0.448	5.08	--	-	6	--	-	61.1	0.76	0.762	w	w			0.003592994	0.000822876	0.000281344	0.001957373	0.010222222	0.008402548
NM01	02/01/11	02/09/11	1.168	0.088	0.077	0.099	0.04	0.971	0.094	0.365	6.63	--	-	8.4	--	-	85.9	--	1.265	w	w			0.058286342	0.007241308	0.00196941	0.00430622	0.002222222	0.015660027
NM01	02/09/11	02/16/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	2	-7	0.127	t	t			NA	NA	NA	NA	NA	NA
NM01	02/16/11	02/22/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	02/22/11	03/01/11	0.562	0.065	0.077	0.335	0.084	0.717	0.52	0.537	6.16	--	-	7.3	--	-	141.1	2.03	2.032	w	w			0.028045312	0.005348694	0.00196941	0.014571553	0.004666667	0.011563584
NM01	03/01/11	03/09/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/09/11	03/15/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/15/11	03/22/11	0.671	0.088	0.125	0.119	0.013	0.375	0.181	0.499	6.24	--	-	6.5	--	-	97.1	1.52	1.524	w	w			0.033484705	0.007241308	0.003197094	0.005176164	0.000722222	0.006047899
NM01	03/22/11	03/28/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/28/11	04/05/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/05/11	04/12/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	84	1.02	1.016	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	04/12/11	04/19/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/19/11	04/26/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/26/11	05/03/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/03/11	05/18/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/18/11	05/24/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/24/11	05/31/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/31/11	06/07/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	63	0.76	0.762	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	06/07/11	06/21/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/21/11	06/28/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

			Ca	Mg	K	Na	NH4	NO3	Cl	SO4	pH			Conductivity			Sample Vol.	Precip	sub_ppt					Calc. Ca	Calc. Mg	Calc. K	Calc. Na	Calc. NH4	Calc. NO3
Site ID	Date On	Date Off	mg/L								Lab	Field	FV	Lab	Field	FV	ml	mm	mm	Lab Type	Val Code	Inval code	Notes	(mN)	(mN)	(mN)	(mN)	(mN)	(mN)
NM01	06/28/11	07/05/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	160.3	2.29	2.286	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	07/05/11	07/12/11	0.762	0.041	0.05	0.069	0.788	2.523	0.136	1.368	5.94	--	-	12.9	--	-	449.9	6.6	6.604	w	w			0.03802585	0.003373791	0.001278838	0.003001305	0.043777778	0.040690267
NM01	07/12/11	07/19/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	235.5	3.3	3.302	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	07/19/11	07/26/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	3.81	3.81	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	07/26/11	08/02/11	0.242	0.016	0.014	0.054	0.511	1.609	0.078	0.614	5.72	--	-	7.3	--	-	2274.6	33.02	33.02	w	w			0.012076451	0.001316602	0.000358075	0.002348847	0.028388889	0.02594952
NM01	08/02/11	08/09/11	0.213	0.021	0.023	0.042	0.491	3.275	0.101	0.821	4.5	--	-	20.8	--	-	342.6	--	5.046	w	w			0.010629273	0.001728039	0.000588265	0.001826881	0.027277778	0.052818321
NM01	08/09/11	08/16/11	0.11	0.024	0.024	0.049	0.291	1.188	0.128	0.396	5.08	--	-	7.5	--	-	3332	--	49.079	w	w			0.005489296	0.001974902	0.000613842	0.002131361	0.016166667	0.019159745
NM01	08/16/11	08/23/11	0.134	0.01	0.017	0.02	0.353	1.947	0.061	0.574	4.7	--	-	13.1	--	-	380.4	--	5.603	w	w			0.00668696	0.000822876	0.000434805	0.000869943	0.019611111	0.031400693
NM01	08/23/11	08/30/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	599.6	--	8.831	w		f	ns	NA	NA	NA	NA	NA	NA
NM01	08/30/11	09/06/11	1.271	0.072	0.052	0.064	0.669	2.092	0.121	1.809	6.41	--	-	14.5	--	-	994.1	--	14.642	w	w			0.063426319	0.005924707	0.001329991	0.002783819	0.037166667	0.033739215
NM01	09/06/11	09/13/11	0.322	0.02	0.021	0.023	0.427	1.149	0.059	0.859	5.57	--	-	7.3	--	-	1001.5	14.99	14.986	w	w			0.016068666	0.001645752	0.000537112	0.001000435	0.023722222	0.018530764
NM01	09/13/11	09/20/11	0.139	0.018	0.022	0.078	0.377	1.542	0.177	1.185	4.61	--	-	14.9	--	-	152.4	2.03	2.032	w	w			0.006936474	0.001481177	0.000562689	0.003392779	0.020944444	0.024868962
NM01	09/20/11	09/27/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	09/27/11	10/11/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	830.4	12.19	12.192	w		e		NA	NA	NA	NA	NA	NA
NM01	10/11/11	10/18/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	10/18/11	10/25/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	10/25/11	11/01/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	11/01/11	11/08/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	175.9	--	2.59	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	11/08/11	11/15/11	0.094	0.01	0.107	0.343	0.106	0.226	0.504	0.238	5.82	--	-	4.8	--	-	71.4	1.02	1.016	w	w			0.004690853	0.000822876	0.002736713	0.01491953	0.005888889	0.003644867
NM01	11/15/11	11/22/11	0.048	0.015	0.014	0.118	0.221	0.959	0.185	0.486	5.02	--	-	8.1	--	-	96.8	1.27	1.27	w	w			0.002395329	0.001234314	0.000358075	0.005132666	0.012277778	0.015466495
NM01	11/22/11	11/30/11	0.017	0.006	0.019	0.041	0.012	0.136	0.07	0.1	5.37	--	-	2.7	--	-	391.3	--	5.763	w	w			0.000848346	0.000493726	0.000485958	0.001783384	0.000666667	0.002193372
NM01	11/30/11	12/13/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	2958.8	--	43.582	w		e		NA	NA	NA	NA	NA	NA
NM01	12/13/11	12/27/11	--	--	--	--	--	--	--	--	--	--	-	--	--	-	911.7	13.21	13.208	w		e		NA	NA	NA	NA	NA	NA
NM01	12/27/11	01/03/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/03/12	01/10/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/10/12	01/17/12	0.018	0.004	0.009	0.02	0.049	0.132	0.038	0.098	5.34	--	-	3	--	-	352.7	5.08	5.08	w	w			0.000898248	0.00032915	0.000230191	0.000869943	0.002722222	0.002128861
NM01	01/17/12	01/24/12	0.182	0.013	0.015	0.034	0.105	0.578	0.056	0.261	5.57	--	-	3.8	--	-	148.6	2.03	2.032	w	w			0.00908229	0.001069739	0.000383651	0.001478904	0.005833333	0.009321829
NM01	01/24/12	01/31/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	01/31/12	02/07/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	02/07/12	02/14/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	91	1.27	1.27	t		v		NA	NA	NA	NA	NA	NA
NM01	02/14/12	02/22/12	0.514	0.041	0.032	0.195	0.454	1.244	0.185	0.844	6	--	-	8.2	--	-	454.3	6.6	6.604	w	w			0.025649983	0.003373791	0.000818456	0.008481949	0.025222222	0.020062898
NM01	02/22/12	02/28/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	02/28/12	03/07/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/07/12	03/13/12	1.171	0.072	0.072	0.19	0.198	0.754	0.215	1.115	6.61	--	-	10.6	--	-	170	2.54	2.54	w	w			0.05843605	0.005924707	0.001841526	0.008264463	0.011	0.01216031
NM01	03/13/12	03/20/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	29.3	0.25	0.254	t		v		NA	NA	NA	NA	NA	NA
NM01	03/20/12	03/27/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	03/27/12	04/10/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	--	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/10/12	04/16/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	8.1	--	0.119	t	t			NA	NA	NA	NA	NA	NA
NM01	04/16/12	04/24/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	--	0	d	d			NA	NA	NA	NA	NA	NA
NM01	04/24/12	05/08/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	61.5	--	0.906	w		e		NA	NA	NA	NA	NA	NA
NM01	05/08/12	05/15/12	0.108	0.011	0.013	0.013	0.458	0.696	0.032	0.56	5.95	--	-	5.1	--	-	509.4	7.37	7.366	w	w			0.00538949	0.000905164	0.000332498	0.000565463	0.025444444	0.011224901
NM01	05/15/12	05/25/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/25/12	05/29/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	05/29/12	06/05/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0.1	0	0	t	d			NA	NA	NA	NA	NA	NA
NM01	06/05/12	06/12/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	0	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	06/12/12	06/18/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	143.9	2.03	2.032	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	06/18/12	06/26/12	2.202	0.128	0.096	0.195	< 0.009	1.638	0.236	1.466	6.68	--	-	15.6	--	-	184.9	--	2.724	w	w			0.109885723	0.010532812	0.002455369	0.008481949	0.00025	0.026417224
NM01	06/26/12	07/03/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	43.7	--	0.644	wd		c	ns	NA	NA	NA	NA	NA	NA
NM01	07/03/12	07/11/12	0.125	0.032	0.14	0.038	0.856	1.191	0.08	0.483	6.34	--	-	8.1	--	-	2778.2	--	40.922	w	w			0.006237836	0.002633203	0.003580746	0.001652893	0.047555556	0.019208128
NM01	07/11/12	07/17/12	0.132	0.013	0.023	0.021	0.391	1.825	0.083	0.525	4.75	--	-	10.4	--	-	409	6.1	6.096	w	w			0.006587155	0.001069739	0.000588265	0.000913441	0.021722222	0.02943311
NM01	07/17/12	07/24/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	562.2	--	8.281	w		c	ns	NA	NA	NA	NA	NA	NA
NM01	07/24/12	07/31/12	0.3	0.025	0.021	0.058	0.405	1.423	0.096	0.717	5.47	--	-	7.5	--	-	998.9	--	14.713	w	w			0.014970807	0.00205719	0.000537112	0.002522836	0.0225	0.022949762
NM01	07/31/12	08/06/12	0.228	0.027	0.022	0.068	0.382	1.837	0.097	1.143	4.68	--	-	14.7	--	-	252.7	3.81	3.81	w	w			0.011377813	0.002221765	0.000562689	0.002957808	0.021222222	0.029626643
NM01	08/06/12	08/13/12	0.445	0.033	0.017	0.101	0.208	1.052	0.144	0.74	5.64	--	-	6.6	--	-	465	6.86	6.858	w	w			0.022206697	0.002715491	0.000434805	0.004393214	0.011555556	0.016966374
NM01	08/13/12	08/21/12	0.376	0.029	0.075	0.043	0.798	2.108	0.103	0.881	5.72	--	-	10.4	--	-	1216.9	--	17.925	w	w			0.018763411	0.00238634	0.001918257	0.001870378	0.044333333	0.033997258
NM01	08/21/12	08/28/12	0.099	0.007	0.019	0.011	0.232	0.807	0.041	0.352	5.22	--	-	5.5	--	-	2048.6	31.75	31.75	w	w			0.004940366	0.000576013	0.000485958	0.000478469	0.012888889	0.013015079
NM01	08/28/12	09/04/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	0	0	d	d			NA	NA	NA	NA	NA	NA
NM01	09/04/12	09/11/12	0.755	0.034	0.107	0.127	0.522	2.012	0.204	1.272	5.95	--	-	10.8	--	-	608.1	8.89	8.89	w	w			0.037676531	0.002797778	0.002736713	0.005524141	0.029	0.032448996
NM01	09/11/12	09/17/12	0.13	0.011	0.016	0.032	0.249	0.924	0.066	0.841	4.92	--	-	9.5	--	-	548.6	6.86	6.858	w	w			0.00648735	0.000905164	0.000409228	0.00139191	0.013833333	0.014902024
NM01	09/17/12	09/25/12	--	--	--	--	--	--	--	--	--	--	-	--	--	-	--	0	0	d	d			NA	NA	NA	NA	NA	NA

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Site ID	Date On	Date Off	Calc. Cl (mN)	Calc. SO4 (mN)	Calc. alkal. (meq/L)	pH (lab)	Calc. H+ (meq/L)	H+ load per event (eq/acre)	H+ load per year (eq/acre)	Precip x H+	Calc precip (mm)	SCalc precip (mm)	Annual ave H+ (meq/L)	NADP annual ave H+ (meq/L)	Alkal. load per event (eq/acre)	Net alkal. load per year (eq/acre)	Pos. alkal. load per event (eq/acre)	Pos. alkal. load per year (eq/acre)	Plot alk. (meq/L)	Plot pH (lab)
NM01	12/27/05	01/03/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/03/06	01/11/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/11/06	01/18/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/18/06	01/24/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/24/06	01/31/06	0.001494937	0.007203981	-0.0106	5.04	0.0091	0.394		0.097	10.668				-0.460		NA		-0.0106	5.04
NM01	01/31/06	02/07/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/07/06	02/14/06	0.004174541	0.028024735	0.0161	5.82	0.0015	0.003		0.001	0.508				0.033		0.033		0.0161	5.82
NM01	02/14/06	02/21/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/21/06	02/28/06	0.001607762	0.013512669	-0.0178	5.00	0.0100	0.175		0.043	4.318				-0.311		NA		-0.0178	5.00
NM01	02/28/06	03/07/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/07/06	03/14/06	0.029024342	0.023694018	0.0303	6.52	0.0003	0.009		0.002	7.112				0.873		0.873		0.0303	6.52
NM01	03/14/06	03/21/06	0.029983358	0.042162027	-0.0287	5.75	0.0018	0.005		0.001	0.762				-0.088		NA		-0.0287	5.75
NM01	03/21/06	03/28/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/28/06	04/04/06	0.001523143	0.003352141	-0.0029	5.16	0.0069	0.028		0.007	1.016				-0.012		NA		-0.0029	5.16
NM01	04/04/06	04/11/06	0.009167066	0.043098961	-0.0110	4.94	0.0115	0.118		0.029	2.54				-0.113		NA		-0.0110	4.94
NM01	04/11/06	04/18/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/18/06	04/25/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/25/06	05/02/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/02/06	05/08/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/08/06	05/16/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/16/06	05/23/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/23/06	05/30/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/30/06	06/06/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/06/06	06/13/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/13/06	06/20/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/20/06	06/27/06	0.003300144	0.030960461	-0.0217	6.10	0.0008	0.016		0.004	5.08				-0.446		NA		-0.0217	6.10
NM01	06/27/06	07/03/06	NA	NA	NA	6.14	0.0007	0.000		0.000	0.127				NA		NA			6.14
NM01	07/03/06	07/11/06	0.000705159	0.012492452	-0.0231	5.14	0.0072	1.102		0.272	37.592				-3.514		NA		-0.0231	5.14
NM01	07/11/06	07/19/06	0.008405495	0.039955027	-0.0611	6.62	0.0002	0.001		0.000	0.762				-0.188		NA		-0.0611	6.62
NM01	07/19/06	07/25/06	0.002115477	0.013970726	-0.0149	5.30	0.0050	0.160		0.039	7.874				-0.473		NA		-0.0149	5.30
NM01	07/25/06	08/01/06	0.001156461	0.006870849	-0.0195	4.93	0.0117	1.498		0.370	31.496				-2.480		NA		-0.0195	4.93
NM01	08/01/06	08/09/06	0.00208727	0.009806575	-0.0222	4.89	0.0129	1.351		0.334	25.908				-2.325		NA		-0.0222	4.89
NM01	08/09/06	08/15/06	0.001071842	0.00689167	-0.0202	4.77	0.0170	1.798		0.444	26.162				-2.138		NA		-0.0202	4.77
NM01	08/15/06	08/23/06	0.001212873	0.007016594	-0.0204	4.79	0.0162	1.850		0.457	28.194				-2.328		NA		-0.0204	4.79
NM01	08/23/06	08/29/06	0.003243731	0.01794749	-0.0355	4.61	0.0245	0.606		0.150	6.096				-0.875		NA		-0.0355	4.61
NM01	08/29/06	09/12/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/12/06	09/21/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/21/06	09/26/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/26/06	10/03/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/03/06	10/10/06	0.002143683	0.011118283	-0.0057	5.61	0.0025	0.366		0.090	36.83				-0.848		NA		-0.0057	5.61
NM01	10/10/06	10/17/06	0.00208727	0.010389556	-0.0139	5.37	0.0043	0.031		0.008	1.778				-0.100		NA		-0.0139	5.37
NM01	10/17/06	10/24/06	0.003046287	0.007162339	-0.0069	5.53	0.0030	0.030		0.007	2.54				-0.071		NA		-0.0069	5.53
NM01	10/24/06	10/30/06	0.000507714	0.004039226	-0.0078	5.51	0.0031	0.086		0.021	6.858				-0.217		NA		-0.0078	5.51
NM01	10/30/06	11/07/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/07/06	11/14/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/14/06	11/21/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/21/06	11/29/06	0.031111613	0.032980075	-0.0247	5.33	0.0047	0.038		0.010	2.032				-0.203		NA		-0.0247	5.33
NM01	11/29/06	12/05/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	12/05/06	12/12/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	12/12/06	12/19/06	0.0097594	0.029107414	-0.0279	4.83	0.0148	0.502		0.124	8.382				-0.946		NA		-0.0279	4.83
NM01	12/19/06	12/26/06	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	12/26/06	01/02/07	0.002848842	0.005642424	-0.0052	5.71	0.0019	0.014	10.18	0.003	1.778	256.413	9.811	9.818	-0.037	-17.27	NA	0.91	-0.0052	5.71
NM01	01/02/07	01/09/07	0.002312921	0.005892273	-0.0094	5.02	0.0095	0.069		0.017	1.778				-0.068		NA		-0.0094	5.02
NM01	01/09/07	01/16/07	0.011141511	0.026192509	-0.0056	6.23	0.0006	0.004		0.001	1.524				-0.035		NA		-0.0056	6.23
NM01	01/16/07	01/25/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/25/07	01/30/07	0.000479508	0.00414333	-0.0065	5.16	0.0069	0.085		0.021	3.048				-0.080		NA		-0.0065	5.16
NM01	01/30/07	02/06/07	0.001269286	0.006641821	-0.0100	5.14	0.0072	0.216		0.053	7.366				-0.299		NA		-0.0100	5.14
NM01	02/06/07	02/13/07	0.002284715	0.015553103	-0.0210	4.86	0.0138	0.454		0.112	8.128				-0.692		NA		-0.0210	4.86
NM01	02/13/07	02/19/07	0.004371985	0.018363905	-0.0263	4.99	0.0102	0.053		0.013	1.27				-0.135		NA		-0.0263	4.99
NM01	02/19/07	02/27/07	0.017995656	0.027691603	-0.0018	6.03	0.0009	0.006		0.001	1.524				-0.011		NA		-0.0018	6.03
NM01	02/27/07	03/05/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/05/07	03/13/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/13/07	03/20/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/20/07	03/27/07	0.002961668	0.008307481	-0.0152	4.88	0.0132	0.881		0.218	16.51				-1.018		NA		-0.0152	4.88
NM01	03/27/07	04/03/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/03/07	04/10/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/10/07	04/17/07	0.014131385	0.014199754	0.0108	6.04	0.0009	0.015		0.004	4.064				0.178		0.178		0.0108	6.04
NM01	04/17/07	04/23/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Site ID	Date On	Date Off	Calc. Cl (mN)	Calc. SO4 (mN)	Calc. alkal. (meq/L)	pH (lab)	Calc. H+ (meq/L)	H+ load per event (eq/acre)	H+ load per year (eq/acre)	Precip x H+	Calc precip (mm)	SCalc precip (mm)	Annual ave H+ (meq/L)	NADP annual ave H+ (meq/L)	Alkal. load per event (eq/acre)	Net alkal. load per year (eq/acre)	Pos. alkal. load per event (eq/acre)	Pos. alkal. load per year (eq/acre)	Plot alk. (meq/L)	Plot pH (lab)
NM01	04/23/07	05/01/07	0.001918032	0.01711466	-0.0135	5.10	0.0079	0.490		0.121	15.24				-0.835		NA		-0.0135	5.10
NM01	05/01/07	05/08/07	NA	NA	NA	4.45	0.0355	0.018		0.005	0.127				NA		NA			4.45
NM01	05/08/07	05/15/07	0.004738668	0.028836744	-0.0239	4.88	0.0132	0.136		0.033	2.54				-0.246		NA		-0.0239	4.88
NM01	05/15/07	05/23/07	0.002425747	0.015261613	-0.0170	5.10	0.0079	0.882		0.218	27.432				-1.887		NA		-0.0170	5.10
NM01	05/23/07	05/29/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/29/07	06/05/07	NA	NA	NA	4.53	0.0295	0.015		0.004	0.127				NA		NA			4.53
NM01	06/05/07	06/12/07	0.00217189	0.012596556	-0.0126	5.10	0.0079	0.253		0.063	7.874				-0.403		NA		-0.0126	5.10
NM01	06/12/07	06/19/07	0.003497588	0.012263424	-0.0110	4.79	0.0162	0.900		0.222	13.716				-0.613		NA		-0.0110	4.79
NM01	06/19/07	06/26/07	0.005782303	0.031418518	0.0128	5.76	0.0017	0.050		0.012	7.112				0.369		0.369		0.0128	5.76
NM01	06/26/07	07/10/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/10/07	07/17/07	0.005443827	0.032188886	-0.0489	4.68	0.0209	0.344		0.085	4.064				-0.804		NA		-0.0489	4.68
NM01	07/17/07	07/24/07	0.002425747	0.01988382	-0.0071	5.58	0.0026	0.054		0.013	5.08				-0.147		NA		-0.0071	5.58
NM01	07/24/07	07/31/07	0.001635969	0.009764934	-0.0158	5.73	0.0019	0.109		0.027	14.478				-0.927		NA		-0.0158	5.73
NM01	07/31/07	08/07/07	0.001579556	0.007807783	-0.0160	4.99	0.0102	0.316		0.078	7.62				-0.492		NA		-0.0160	4.99
NM01	08/07/07	08/14/07	0.007672129	0.036894376	-0.0871	5.77	0.0017	0.002		0.000	0.254				-0.090		NA		-0.0871	5.77
NM01	08/14/07	08/20/07	0.002284715	0.047575423	-0.0505	4.63	0.0234	0.434		0.107	4.572				-0.935		NA		-0.0505	4.63
NM01	08/20/07	08/28/07	0.002538572	0.015095047	-0.0242	4.82	0.0151	1.369		0.338	22.352				-2.188		NA		-0.0242	4.82
NM01	08/28/07	09/04/07	0.00208727	0.014512066	-0.0197	4.91	0.0123	0.392		0.097	7.874				-0.628		NA		-0.0197	4.91
NM01	09/04/07	09/11/07	0.002228302	0.01186783	-0.0207	4.83	0.0148	0.958		0.237	16.002				-1.341		NA		-0.0207	4.83
NM01	09/11/07	09/18/07	0.009533749	0.028357867	-0.0491	4.71	0.0195	0.080		0.020	1.016				-0.202		NA		-0.0491	4.71
NM01	09/18/07	09/25/07	0.001607762	0.013242	-0.0171	5.29	0.0051	0.348		0.086	16.764				-1.158		NA		-0.0171	5.29
NM01	09/25/07	10/02/07	0.004146335	0.033209103	-0.0328	5.23	0.0059	0.012		0.003	0.508				-0.067		NA		-0.0328	5.23
NM01	10/02/07	10/16/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/16/07	10/23/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/23/07	10/30/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/30/07	11/06/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/06/07	11/13/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/13/07	11/20/07	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/20/07	11/27/07	0.001128254	0.004414	-0.0067	5.19	0.0065	0.139		0.034	5.334				-0.145		NA		-0.0067	5.19
NM01	11/27/07	12/04/07	0.000338476	0.000666264	-0.0008	5.51	0.0031	0.584		0.144	46.736				-0.157		NA		-0.0008	5.51
NM01	12/04/07	12/12/07	0.001692381	0.002623415	0.0025	5.52	0.0030	0.282		0.070	23.114				0.235		0.235		0.0025	5.52
NM01	12/12/07	12/18/07	0.00208727	0.010452019	-0.0214	4.93	0.0117	0.012		0.003	0.254				-0.022		NA		-0.0214	4.93
NM01	12/18/07	12/24/07	0.001269286	0.009515085	-0.0155	4.96	0.0110	0.045		0.011	1.016				-0.064		NA		-0.0155	4.96
NM01	12/24/07	12/31/07	NA	NA	NA	NA	NA	NA	10.01	NA	NA	296.418	8.342	8.318	NA	-14.90	NA	0.78		
NM01	12/31/07	01/08/08	0.06543875	0.043452914	0.3657	7.20	0.0001	0.003		0.001	10.16				15.038		15.038		0.3657	7.20
NM01	01/08/08	01/16/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/16/08	01/22/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/22/08	02/05/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/05/08	02/12/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/12/08	02/19/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/19/08	02/26/08	0.004118128	0.013054613	-0.0128	4.73	0.0186	0.038		0.009	0.508				-0.026		NA		-0.0128	4.73
NM01	02/26/08	03/04/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/04/08	03/11/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/11/08	03/18/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/18/08	03/25/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/25/08	04/01/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/01/08	04/08/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/08/08	04/15/08	0.012044115	0.026088405	-0.0059	4.97	0.0107	0.077		0.019	1.778				-0.042		NA		-0.0059	4.97
NM01	04/15/08	04/22/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/22/08	04/29/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/29/08	05/06/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/06/08	05/13/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/13/08	05/20/08	0.004484811	0.018301443	-0.0095	4.81	0.0155	0.127		0.031	2.032				-0.078		NA		-0.0095	4.81
NM01	05/20/08	05/27/08	0.031901391	0.020279415	0.0111	6.07	0.0009	0.045		0.011	12.954				0.582		0.582		0.0111	6.07
NM01	05/27/08	06/03/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/03/08	06/10/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/10/08	06/17/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/17/08	06/24/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/24/08	07/01/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/01/08	07/08/08	0.002312921	0.021861792	-0.0279	5.18	0.0066	0.299		0.074	11.176				-1.260		NA		-0.0279	5.18
NM01	07/08/08	07/15/08	0.00093081	0.005975556	-0.0133	5.05	0.0089	1.273		0.315	35.306				-1.895		NA		-0.0133	5.05
NM01	07/15/08	07/22/08	0.00124108	0.007058236	-0.0105	5.00	0.0100	1.244		0.307	30.734				-1.304		NA		-0.0105	5.00
NM01	07/22/08	07/29/08	0.002030858	0.010077245	-0.0127	5.06	0.0087	1.987		0.491	56.388				-2.889		NA		-0.0127	5.06
NM01	07/29/08	08/05/08	0.005133557	0.027941452	-0.0192	5.48	0.0033	0.014		0.003	1.016				-0.079		NA		-0.0192	5.48
NM01	08/05/08	08/12/08	0.001353905	0.010243811	-0.0205	4.78	0.0166	3.241		0.801	48.26				-3.998		NA		-0.0205	4.78
NM01	08/12/08	08/18/08	0.001805207	0.010056424	-0.0195	4.87	0.0135	2.052		0.507	37.592				-2.965		NA		-0.0195	4.87
NM01	08/18/08	09/02/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/02/08	09/08/08	0.001353905	0.009244415	-0.0123	5.09	0.0081	0.343		0.085	10.414				-0.517		NA		-0.0123	5.09
NM01	09/08/08	09/16/08	0.000733365	0.005163547	-0.0088	5.13	0.0074	0.533		0.132	17.78				-0.633		NA		-0.0088	5.13

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Site ID	Date On	Date Off	Calc. Cl (mN)	Calc. SO4 (mN)	Calc. alkal. (meq/L)	pH (lab)	Calc. H+ (meq/L)	H+ load per event (eq/acre)	H+ load per year (eq/acre)	Precip x H+	Calc precip (mm)	SCalc precip (mm)	Annual ave H+ (meq/L)	NADP annual ave H+ (meq/L)	Alkal. load per event (eq/acre)	Net alkal. load per year (eq/acre)	Pos. alkal. load per event (eq/acre)	Pos. alkal. load per year (eq/acre)	Plot alk. (meq/L)	Plot pH (lab)
NM01	09/16/08	09/29/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/29/08	10/14/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/14/08	10/28/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/28/08	11/03/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/03/08	11/12/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/12/08	11/19/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/19/08	11/25/08	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/25/08	12/03/08	0.000761572	0.005101085	-0.0051	5.40	0.0040	0.258		0.064	16.002				-0.331		NA		-0.0051	5.40
NM01	12/03/08	12/10/08	0.00155135	0.00578817	-0.0184	4.97	0.0107	0.265		0.066	6.117				-0.456		NA		-0.0184	4.97
NM01	12/10/08	12/15/08	0.023890785	0.022132462	-0.0038	6.31	0.0005	0.006		0.001	3.048				-0.047		NA		-0.0038	6.31
NM01	12/15/08	12/30/08	NA	NA	NA	NA	NA	NA	11.81	NA	NA	301.265	9.683	9.683	NA	-0.90	NA	15.62		
NM01	12/30/08	01/06/09	0.001297492	0.005371755	-0.0026	5.43	0.0037	0.019		0.005	1.27				-0.013		NA		-0.0026	5.43
NM01	01/06/09	01/14/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/14/09	01/20/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/20/09	01/27/09	0.001043635	0.003164755	-0.0050	5.25	0.0056	0.064		0.016	2.794				-0.056		NA		-0.0050	5.25
NM01	01/27/09	02/03/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/03/09	02/11/09	0.002651398	0.005059443	-0.0036	5.37	0.0043	0.018		0.004	1.016				-0.015		NA		-0.0036	5.37
NM01	02/11/09	02/17/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/17/09	02/24/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/24/09	03/03/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/03/09	03/10/09	0.000592334	0.002852443	-0.0034	5.33	0.0047	0.087		0.021	4.572				-0.062		NA		-0.0034	5.33
NM01	03/10/09	03/17/09	0.003300144	0.022194924	-0.0236	5.31	0.0049	0.176		0.044	8.89				-0.849		NA		-0.0236	5.31
NM01	03/17/09	03/25/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/25/09	03/31/09	0.011903083	0.02400633	0.0939	6.69	0.0002	0.000		0.000	0.254				0.096		0.096		0.0939	6.69
NM01	03/31/09	04/08/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/08/09	04/14/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/14/09	04/28/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/28/09	05/05/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/05/09	05/12/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/12/09	05/19/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/19/09	05/26/09	0.00186162	0.011347311	-0.0136	5.29	0.0051	0.206		0.051	9.906				-0.545		NA		-0.0136	5.29
NM01	05/26/09	06/02/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/02/09	06/09/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/09/09	06/16/09	0.002594985	0.019862999	-0.0283	5.29	0.0051	0.274		0.068	13.208				-1.515		NA		-0.0283	5.29
NM01	06/16/09	06/23/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/23/09	06/30/09	0.004287366	0.017551896	-0.0222	5.65	0.0022	0.104		0.026	11.43				-1.026		NA		-0.0222	5.65
NM01	06/30/09	07/07/09	0.002312921	0.015553103	-0.0254	5.19	0.0065	0.265		0.066	10.16				-1.046		NA		-0.0254	5.19
NM01	07/07/09	07/14/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/14/09	07/22/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/22/09	07/28/09	0.001494937	0.008703075	-0.0175	5.05	0.0089	1.109		0.274	30.734				-2.174		NA		-0.0175	5.05
NM01	07/28/09	08/05/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	08/05/09	08/11/09	0.001918032	0.010098066	-0.0192	4.86	0.0138	0.213		0.053	3.81				-0.297		NA		-0.0192	4.86
NM01	08/11/09	08/18/09	0.000959016	0.007557934	-0.0137	5.08	0.0083	0.470		0.116	13.97				-0.772		NA		-0.0137	5.08
NM01	08/18/09	08/25/09	0.001071842	0.008432405	-0.0073	5.49	0.0032	0.402		0.099	30.734				-0.914		NA		-0.0073	5.49
NM01	08/25/09	09/01/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/01/09	09/08/09	0.002143683	0.024401924	-0.0283	5.35	0.0045	0.142		0.035	7.874				-0.901		NA		-0.0283	5.35
NM01	09/08/09	09/16/09	0.002425747	0.015594745	-0.0330	4.63	0.0234	0.145		0.036	1.524				-0.204		NA		-0.0330	4.63
NM01	09/16/09	09/22/09	0.002200096	0.020362698	-0.0261	5.16	0.0069	0.491		0.121	17.526				-1.850		NA		-0.0261	5.16
NM01	09/22/09	09/29/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/29/09	10/07/09	0.017205878	0.024755877	-0.0226	5.18	0.0066	0.027		0.007	1.016				-0.093		NA		-0.0226	5.18
NM01	10/07/09	10/13/09	0.015993005	0.03506215	-0.0033	5.94	0.0011	0.009		0.002	2.032				-0.028		NA		-0.0033	5.94
NM01	10/13/09	10/20/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/20/09	10/27/09	0.006177192	0.019946282	-0.0115	5.49	0.0032	0.048		0.012	3.67				-0.172		NA		-0.0115	5.49
NM01	10/27/09	11/02/09	0.031478295	0.024735056	0.1244	7.07	0.0001	0.002		0.000	4.572				2.302		2.302		0.1244	7.07
NM01	11/02/09	11/10/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/10/09	11/17/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/17/09	11/24/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/24/09	12/02/09	0.005218176	0.019529867	-0.0200	5.16	0.0069	0.583		0.144	20.828				-1.685		NA		-0.0200	5.16
NM01	12/02/09	12/09/09	0.003497588	0.008036811	0.0042	6.15	0.0007	0.091		0.022	31.75				0.541		0.541		0.0042	6.15
NM01	12/09/09	12/15/09	0.000648746	0.001853047	-0.0038	5.18	0.0066	0.061		0.015	2.286				-0.035		NA		-0.0038	5.18
NM01	12/15/09	12/21/09	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	12/21/09	12/30/09	NA	NA	NA	NA	NA	NA	5.01	NA	NA	235.826	5.244	5.248	NA	-11.31	NA	2.94		
NM01	12/30/09	01/05/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/05/10	01/12/10	0.000789778	0.001915509	-0.0105	4.97	0.0107	0.088		0.022	2.032				-0.087		NA		-0.0105	4.97
NM01	01/12/10	01/19/10	0.002453953	0.009140311	-0.0185	4.88	0.0132	0.190		0.047	3.556				-0.266		NA		-0.0185	4.88
NM01	01/19/10	01/26/10	0.00217189	0.002560953	0.0019	5.88	0.0013	0.365		0.090	68.326				0.533		0.533		0.0019	5.88
NM01	01/26/10	02/02/10	0.001128254	0.004060047	-0.0055	5.30	0.0050	0.422		0.104	20.828				-0.467		NA		-0.0055	5.30
NM01	02/02/10	02/09/10	0.000592334	0.00358117	-0.0077	5.16	0.0069	0.299		0.074	10.668				-0.333		NA		-0.0077	5.16
NM01	02/09/10	02/16/10	0.01122613	0.04197464	-0.0455	4.72	0.0191	0.059		0.015	0.762				-0.140		NA		-0.0455	4.72

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Site ID	Date On	Date Off	Calc. Cl (mN)	Calc. SO4 (mN)	Calc. alkal. (meq/L)	pH (lab)	Calc. H+ (meq/L)	H+ load per event (eq/acre)	H+ load per year (eq/acre)	Precip x H+	Calc precip (mm)	SCalc precip (mm)	Annual ave H+ (meq/L)	NADP annual ave H+ (meq/L)	Alkal. load per event (eq/acre)	Net alkal. load per year (eq/acre)	Pos. alkal. load per event (eq/acre)	Pos. alkal. load per year (eq/acre)	Plot alk. (meq/L)	Plot pH (lab)
NM01	02/16/10	02/23/10	0.000366683	0.001457453	-0.0019	5.19	0.0065	0.179		0.044	6.858				-0.053		NA		-0.0019	5.19
NM01	02/23/10	03/02/10	0.005669478	0.006558538	-0.0099	5.30	0.0050	0.041		0.010	2.032				-0.082		NA		-0.0099	5.30
NM01	03/02/10	03/09/10	0.010944067	0.013970726	-0.0003	5.73	0.0019	0.019		0.005	2.54				-0.003		NA		-0.0003	5.73
NM01	03/09/10	03/16/10	0.037260599	0.049199442	0.2450	6.54	0.0003	0.000		0.000	0.254				0.252		0.252		0.2450	6.54
NM01	03/16/10	03/23/10	0.001466731	0.011222386	-0.0180	5.01	0.0098	0.086		0.021	2.178				-0.158		NA		-0.0180	5.01
NM01	03/23/10	03/30/10	0.001607762	0.008869641	-0.0028	5.29	0.0051	0.042		0.010	2.032				-0.023		NA		-0.0028	5.29
NM01	03/30/10	04/06/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/06/10	04/13/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/13/10	04/20/10	0.002623191	0.012450811	-0.0035	5.86	0.0014	0.167		0.041	29.916				-0.420		NA		-0.0035	5.86
NM01	04/20/10	04/27/10	0.004766874	0.008744717	-0.0027	5.29	0.0051	0.126		0.031	6.093				-0.066		NA		-0.0027	5.29
NM01	04/27/10	05/10/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/10/10	05/11/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/11/10	05/18/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/18/10	05/25/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/25/10	06/01/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/01/10	06/08/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/08/10	06/15/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/15/10	06/22/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/22/10	06/29/10	0.003384763	0.019155094	-0.0210	4.93	0.0117	0.725		0.179	15.24				-1.296		NA		-0.0210	4.93
NM01	06/29/10	07/06/10	0.001664175	0.011826188	-0.0209	5.11	0.0078	0.305		0.075	9.718				-0.823		NA		-0.0209	5.11
NM01	07/06/10	07/12/10	0.006628494	0.016344292	-0.0140	5.18	0.0066	0.163		0.040	6.096				-0.346		NA		-0.0140	5.18
NM01	07/12/10	07/20/10	0.003159112	0.015698849	-0.0260	4.85	0.0141	0.407		0.100	7.112				-0.750		NA		-0.0260	4.85
NM01	07/20/10	07/27/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/27/10	08/03/10	0.002482159	0.007974349	-0.0168	5.19	0.0065	0.549		0.136	21				-1.430		NA		-0.0168	5.19
NM01	08/03/10	08/10/10	0.00301808	0.01932166	-0.0150	6.47	0.0003	0.003		0.001	2.207				-0.134		NA		-0.0150	6.47
NM01	08/10/10	08/17/10	0.001635969	0.018551292	-0.0224	4.94	0.0115	1.581		0.391	34.036				-3.087		NA		-0.0224	4.94
NM01	08/17/10	08/24/10	0.002059064	0.008432405	-0.0268	4.57	0.0269	0.314		0.078	2.882				-0.312		NA		-0.0268	4.57
NM01	08/24/10	08/31/10	0.003215525	0.016469217	-0.0376	4.67	0.0214	0.308		0.076	3.556				-0.541		NA		-0.0376	4.67
NM01	08/31/10	09/07/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/07/10	09/15/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/15/10	09/22/10	0.001156461	0.009348519	-0.0113	5.17	0.0068	0.431		0.106	15.748				-0.722		NA		-0.0113	5.17
NM01	09/22/10	09/28/10	0.000648746	0.001082679	-0.0020	5.33	0.0047	0.178		0.044	9.398				-0.077		NA		-0.0020	5.33
NM01	09/28/10	10/05/10	0.00217189	0.024943263	-0.0286	4.95	0.0112	0.046		0.011	1.016				-0.118		NA		-0.0286	4.95
NM01	10/05/10	10/12/10	0.001748794	0.01657332	-0.0164	5.58	0.0026	0.027		0.007	2.54				-0.168		NA		-0.0164	5.58
NM01	10/12/10	10/19/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/19/10	10/26/10	0.001523143	0.002415207	-0.0031	5.42	0.0038	0.039		0.010	2.54				-0.032		NA		-0.0031	5.42
NM01	10/26/10	11/02/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/02/10	11/09/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/09/10	11/16/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/16/10	11/23/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/23/10	11/30/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/30/10	12/07/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	12/07/10	12/14/10	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	12/14/10	12/21/10	0.001212873	0.005205189	-0.0081	5.28	0.0052	0.102		0.025	4.826				-0.157		NA		-0.0081	5.28
NM01	12/21/10	12/28/10	0.002848842	0.017593537	-0.0212	5.06	0.0087	0.009	7.27	0.002	0.254	296.244	6.065	6.067	-0.022	-11.33	NA	0.78	-0.0212	5.06
NM01	12/28/10	01/04/11	0.000902603	0.002789981	-0.0019	5.53	0.0030	0.203		0.050	17.018				-0.133		NA		-0.0019	5.53
NM01	01/04/11	01/11/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/11/11	01/18/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/18/11	01/25/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/25/11	02/01/11	0.001523143	0.009327698	-0.0126	5.08	0.0083	0.026		0.006	0.762				-0.039		NA		-0.0126	5.08
NM01	02/01/11	02/09/11	0.002651398	0.007599575	0.0459	6.63	0.0002	0.001		0.000	1.265				0.235		0.235		0.0459	6.63
NM01	02/09/11	02/16/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/16/11	02/22/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/22/11	03/01/11	0.014667306	0.011180745	0.0125	6.16	0.0007	0.006		0.001	2.032				0.103		0.103		0.0125	6.16
NM01	03/01/11	03/09/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/09/11	03/15/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/15/11	03/22/11	0.005105351	0.010389556	0.0276	6.24	0.0006	0.004		0.001	1.524				0.170		0.170		0.0276	6.24
NM01	03/22/11	03/28/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/28/11	04/05/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/05/11	04/12/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/12/11	04/19/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/19/11	04/26/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/26/11	05/03/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/03/11	05/18/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/18/11	05/24/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/24/11	05/31/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/31/11	06/07/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/07/11	06/21/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/21/11	06/28/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			

Table B-1
Rainwater Chemistry at Gila Cliffs Dwelling National Monument, Station NM01

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Site ID	Date On	Date Off	Calc. Cl (mN)	Calc. SO4 (mN)	Calc. alkal. (meq/L)	pH (lab)	Calc. H+ (meq/L)	H+ load per event (eq/acre)	H+ load per year (eq/acre)	Precip x H+	Calc precip (mm)	SCalc precip (mm)	Annual ave H+ (meq/L)	NADP annual ave H+ (meq/L)	Alkal. load per event (eq/acre)	Net alkal. load per year (eq/acre)	Pos. alkal. load per event (eq/acre)	Pos. alkal. load per year (eq/acre)	Plot alk. (meq/L)	Plot pH (lab)
NM01	06/28/11	07/05/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/05/11	07/12/11	0.003836065	0.028482792	-0.0273	5.94	0.0011	0.031		0.008	6.604				-0.730		NA		-0.0273	5.94
NM01	07/12/11	07/19/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/19/11	07/26/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/26/11	08/02/11	0.002200096	0.012783943	-0.0248	5.72	0.0019	0.255		0.063	33.02				-3.318		NA		-0.0248	5.72
NM01	08/02/11	08/09/11	0.002848842	0.017093839	-0.0580	4.50	0.0316	0.646		0.160	5.046				-1.184		NA		-0.0580	4.50
NM01	08/09/11	08/16/11	0.003610414	0.008245019	-0.0208	5.08	0.0083	1.652		0.408	49.079				-4.132		NA		-0.0208	5.08
NM01	08/16/11	08/23/11	0.001720588	0.011951113	-0.0363	4.70	0.0200	0.452		0.112	5.603				-0.822		NA		-0.0363	4.70
NM01	08/23/11	08/30/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	08/30/11	09/06/11	0.003412969	0.037664744	-0.0014	6.41	0.0004	0.023		0.006	14.642				-0.080		NA		-0.0014	6.41
NM01	09/06/11	09/13/11	0.001664175	0.017885028	-0.0188	5.57	0.0027	0.163		0.040	14.986				-1.142		NA		-0.0188	5.57
NM01	09/13/11	09/20/11	0.004992525	0.024672594	-0.0422	4.61	0.0245	0.202		0.050	2.032				-0.347		NA		-0.0422	4.61
NM01	09/20/11	09/27/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/27/11	10/11/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/11/11	10/18/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/18/11	10/25/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	10/25/11	11/01/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/01/11	11/08/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	11/08/11	11/15/11	0.014216004	0.004955339	0.0004	5.82	0.0015	0.006		0.002	1.016				0.001		0.001		0.0004	5.82
NM01	11/15/11	11/22/11	0.005218176	0.010118887	-0.0217	5.02	0.0095	0.049		0.012	1.27				-0.111		NA		-0.0217	5.02
NM01	11/22/11	11/30/11	0.001974445	0.002082075	-0.0026	5.37	0.0043	0.099		0.025	5.763				-0.062		NA		-0.0026	5.37
NM01	11/30/11	12/13/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	12/13/11	12/27/11	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	12/27/11	01/03/12	NA	NA	NA	NA	NA	NA	3.82	NA	NA	161.662	5.836	5.835	NA	-11.59	NA	0.51		
NM01	01/03/12	01/10/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/10/12	01/17/12	0.001071842	0.002040434	-0.0029	5.34	0.0046	0.094		0.023	5.08				-0.060		NA		-0.0029	5.34
NM01	01/17/12	01/24/12	0.001579556	0.005434217	-0.0043	5.57	0.0027	0.022		0.005	2.032				-0.036		NA		-0.0043	5.57
NM01	01/24/12	01/31/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	01/31/12	02/07/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/07/12	02/14/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/14/12	02/22/12	0.005218176	0.017572716	-0.0045	6.00	0.0010	0.027		0.007	6.604				-0.121		NA		-0.0045	6.00
NM01	02/22/12	02/28/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	02/28/12	03/07/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/07/12	03/13/12	0.006064367	0.023215141	0.0330	6.61	0.0002	0.003		0.001	2.54				0.339		0.339		0.0330	6.61
NM01	03/13/12	03/20/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/20/12	03/27/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	03/27/12	04/10/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/10/12	04/16/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/16/12	04/24/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	04/24/12	05/08/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/08/12	05/15/12	0.000902603	0.011659622	-0.0166	5.95	0.0011	0.033		0.008	7.366				-0.495		NA		-0.0166	5.95
NM01	05/15/12	05/25/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/25/12	05/29/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	05/29/12	06/05/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/05/12	06/12/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/12/12	06/18/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	06/18/12	06/26/12	0.0066567	0.030523226	0.0678	6.68	0.0002	0.002		0.001	2.724				0.747		0.747		0.0678	6.68
NM01	06/26/12	07/03/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/03/12	07/11/12	0.002256509	0.010056424	-0.0174	6.34	0.0005	0.076		0.019	40.922				-2.884		NA		-0.0174	6.34
NM01	07/11/12	07/17/12	0.002341128	0.010930896	-0.0335	4.75	0.0178	0.439		0.108	6.096				-0.828		NA		-0.0335	4.75
NM01	07/17/12	07/24/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	07/24/12	07/31/12	0.00270781	0.014928481	-0.0205	5.47	0.0034	0.202		0.050	14.713				-1.220		NA		-0.0205	5.47
NM01	07/31/12	08/06/12	0.002736017	0.023798122	-0.0390	4.68	0.0209	0.322		0.080	3.81				-0.602		NA		-0.0390	4.68
NM01	08/06/12	08/13/12	0.004061716	0.015407358	-0.0067	5.64	0.0023	0.064		0.016	6.858				-0.186		NA		-0.0067	5.64
NM01	08/13/12	08/21/12	0.002905255	0.018343084	-0.0303	5.72	0.0019	0.138		0.034	17.925				-2.198		NA		-0.0303	5.72
NM01	08/21/12	08/28/12	0.001156461	0.007328905	-0.0150	5.22	0.0060	0.774		0.191	31.75				-1.930		NA		-0.0150	5.22
NM01	08/28/12	09/04/12	NA	NA	NA	NA	NA	NA		NA	NA				NA		NA			
NM01	09/04/12	09/11/12	0.005754097	0.026483999	-0.0160	5.95	0.0011	0.040		0.010	8.89				-0.574		NA		-0.0160	5.95
NM01	09/11/12	09/17/12	0.00186162	0.017510254	-0.0251	4.92	0.0120	0.334		0.082	6.858				-0.696		NA		-0.0251	4.92
NM01	09/17/12	09/25/12	NA	NA	NA	NA	NA	NA	2.57	NA	NA	164.168	3.868	3.864	NA	-10.74	NA	1.09		

Table B-2
Calculation of H+ and Alkalinity Loads in Rainwater at Gila Cliff Dwelling National Monument

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Site ID	Period	Year	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Ca	Mg	K	Na	NH4	NO3	Cl	SO4	Lab H+	Lab Cond.	Field H+	Field Cond.	Cation/ Anion Ratio	Sample Volume	Precip	Precipitation Represented by Field Chemistry %	Valid Samples		Days	Date On	Date Off
			%				ueq/L									uS/cm	ueq/L	uS/cm		ml	cm		Lab	Field			
NM01	Annual	1985	39	43	97	85	5.19	2.55	2.352	2.132	1.719	6.581	2.99	23.538	16.8655	10.39	--	--	0.93	16032.9	28.59	0	16	0	155	7/29/1985	12/31/1985
NM01	Annual	1986	81	100	88	96	6.188	1.974	0.614	2.654	3.493	9.597	7.194	20.58	20.7014	12.13	0.7079	6.5	0.95	29956.1	52.51	2	26	1	364	12/31/1985	12/30/1986
NM01	Annual	1987	41	100	6	69	19.361	4.607	1.841	14.312	4.047	13.904	9.225	34.203	6.5464	11.75	--	--	0.88	1093.3	35.9	0	5	0	364	12/30/1986	12/29/1987
NM01	Annual	1988	87	100	90	101	7.435	1.316	0.409	2.871	3.437	12.323	2.652	23.892	19.1426	11.38	17.2982	12.2	0.89	30669.2	49.78	44	30	13	371	12/29/1987	1/3/1989
NM01	Annual	1989	93	100	90	100	9.381	1.727	0.793	3.785	6.431	13.001	3.554	22.746	14.7911	10.95	18.197	10.9	0.94	16176.3	26.64	32	23	11	364	1/3/1989	1/2/1990
NM01	Annual	1990	86	100	84	96	11.627	1.81	0.665	3.611	9.979	12.888	3.978	21.288	11.1686	10.09	16.3305	11.7	1.02	20364.5	36.92	69	32	22	365	1/2/1990	1/2/1991
NM01	Annual	1991	95	100	96	95	4.94	0.905	1.074	2.262	4.324	9.275	3.329	15.581	12.1899	7.95	15.9221	9.5	0.91	27869.4	44.64	94	32	27	363	1/2/1991	12/31/1991
NM01	Annual	1992	88	100	85	99	5.639	1.152	0.46	2.306	7.928	9.855	2.031	19.039	10.617	8.14	15.7398	10.5	0.91	26702.2	46.67	81	32	25	365	12/31/1991	12/30/1992
NM01	Annual	1993	93	100	94	100	7.335	1.316	0.384	2.697	7.263	11.21	2.116	20.518	11.695	8.61	13.3045	9.9	0.91	29779.3	46.91	94	26	24	370	12/30/1992	1/4/1994
NM01	Annual	1994	92	100	93	100	8.084	1.727	0.563	4.263	7.041	12.162	3.696	18.351	14.6893	8.83	13.8676	9.7	1.06	24292.3	38.46	80	27	21	364	1/4/1994	1/3/1995
NM01	Annual	1995	92	100	98	101	5.489	0.905	0.332	2.001	9.369	11.823	1.777	16.768	17.2584	10.09	20.9894	11.7	1.16	20315.9	30.38	97	23	21	364	1/3/1995	1/2/1996
NM01	Annual	1996	98	100	99	100	9.331	1.645	0.588	4.437	11.31	14.243	4.147	18.101	12.6474	9.75	13.4276	9.1	1.1	24752	36.83	95	25	21	363	1/2/1996	12/30/1996
NM01	Annual	1997	82	100	79	99	13.523	1.81	1.253	3.306	8.205	13.501	3.385	22.767	14.5881	10.6	13.3352	10.1	1.08	22541.9	42.52	79	29	26	365	12/30/1996	12/30/1997
NM01	Annual	1998	88	100	89	99	7.635	1.152	0.384	1.74	6.819	12.614	2.172	17.685	15.7398	9.92	18.1552	10.5	1.03	17319.1	28.73	89	31	28	364	12/30/1997	12/29/1998
NM01	Annual	1999	96	100	98	101	11.677	1.563	0.793	1.523	9.092	17.114	2.257	19.33	17.8238	12.24	18.6209	11.8	1.1	19518.4	29.25	90	23	17	364	12/29/1998	12/28/1999
NM01	Annual	2000	76	98	61	100	10.379	1.398	0.409	2.871	8.482	12.694	2.426	15.227	9.9312	8.46	10.2802	9	1.1	12974.1	31.35	60	17	14	371	12/28/1999	1/2/2001
NM01	Annual	2001	88	100	93	100	14.77	1.727	1.253	2.871	13.361	19.13	3.413	23.1	13.0617	11.18	15.1008	9.8	1.03	17486.9	27.83	74	28	22	364	1/2/2001	1/1/2002
NM01	Annual	2002	90	100	92	108	16.717	1.892	0.665	2.219	17.242	21.211	2.454	18.31	7.9616	9.78	9.5719	9.8	1.11	16816.3	24.94	89	24	18	364	1/1/2002	12/31/2002
NM01	Annual	2003	84	100	79	100	20.409	2.057	0.588	2.088	18.184	19.291	2.398	17.685	4.5499	8.74	6.9024	8.5	1.22	15190.3	28.13	78	21	17	364	12/31/2002	12/30/2003
NM01	Annual	2004	82	100	70	101	9.78	1.316	0.486	2.61	10.423	13.275	2.482	13.06	7.3961	7.22	9.6828	8.3	1.11	17715	36.86	69	27	22	365	12/30/2003	12/29/2004
NM01	Annual	2005	89	100	95	99	6.537	0.905	1.151	1.784	9.314	9.791	2.144	12.79	7.6033	6.91	--	--	1.1	22251.3	34.79	0	26	0	370	12/29/2004	1/3/2006
NM01	Annual	2006	90	100	74	95	8.184	1.152	0.46	2.567	11.809	14.388	2.962	11.644	9.8175	7.88	--	--	1.17	16560.8	34.77	0	23	0	364	1/3/2006	1/2/2007
NM01	Annual	2007	88	100	84	104	9.281	1.563	0.869	2.175	9.702	12.339	2.341	11.623	8.3176	6.77	--	--	1.21	20895.6	35.13	0	32	0	363	1/2/2007	12/31/2007
NM01	Annual	2008	74	100	67	97	16.966	2.386	0.614	7.656	7.54	12.146	5.247	10.977	9.6828	8.3	--	--	1.58	19889.5	44.83	0	17	0	365	12/31/2007	12/30/2008
NM01	Annual	2009	92	100	94	103	12.525	2.057	0.716	3.306	14.747	13.775	3.244	13.415	5.2481	7	--	--	1.27	16459.1	25.07	0	24	0	365	12/30/2008	12/30/2009
NM01	Annual	2010	92	100	89	100	8.134	1.398	0.46	1.914	8.981	10.001	2.257	9.144	6.0674	5.73	--	--	1.26	20116.4	33.22	0	30	0	363	12/30/2009	12/28/2010
NM01	Annual	2011	76	100	64	100	15.07	2.057	0.665	2.306	20.346	21.469	2.934	13.435	5.8345	8.29	--	--	1.22	10955.6	25.34	0	16	0	371	12/28/2010	1/3/2012
NM01	Annual	2012	62	73	93	100	13.772	2.057	1.585	2.262	27.554	20.066	2.567	13.269	3.8637	8	--	--	1.42	11183.4	17.77	0	15	0	362	1/3/2012	9/25/2012

Note:

Rainwater chemistry at Gila Cliffs Dwelling National Monument, station NM01, averaged by year and calculated microequivalents to obtain alkalinity, following Stumm and Morgan (1996).

Table B-3
Precipitation Data from the NADP Monitoring Site at Gila Cliff Dwellings National Monument, Volume-Weighted Average pH and Annual H+ Loading

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
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Year	NADP-reported annual precipitation (cm)	NADP-reported annual volume-weighted average H^+ conc. (meq/L)	Calculated annual volume-weighted average pH	Estimated annual H^+ loading	Estimated annual alkalinity loading
				(eq H^+/acre)	(eq alk/acre)
2006	34.77	9.8175	5.008	13.81	0.91
2007	35.13	8.3176	5.08	11.82	0.78
2008	44.83	9.6828	5.014	17.57	15.62
2009	25.07	5.2481	5.28	5.32	2.94
2010	33.22	6.0674	5.217	8.16	0.78
2011	25.34	5.8345	5.234	5.98	0.51
2012	17.77	3.8637	5.413	2.78	1.09

Note:
Data from NADP Site NM01

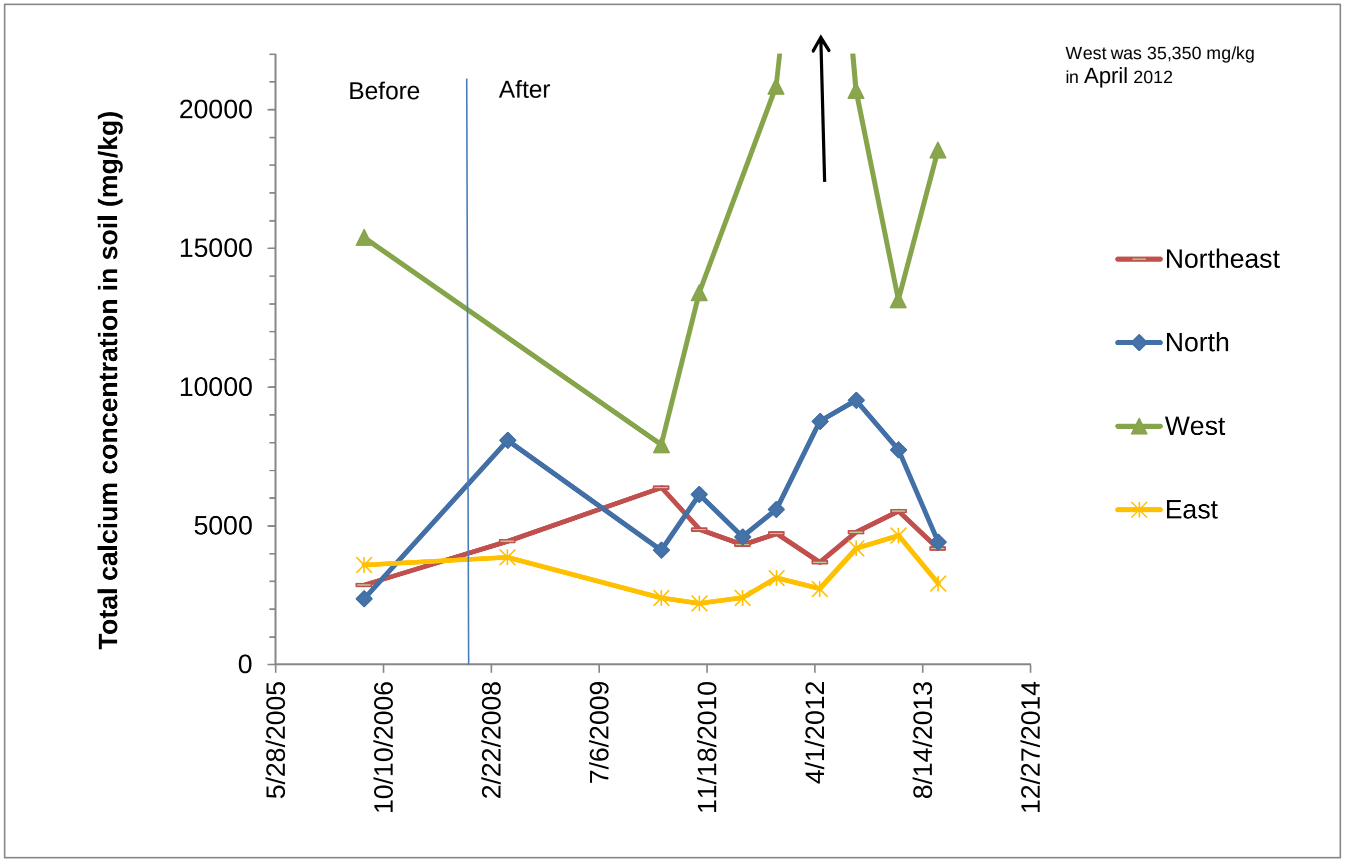
Table B-4
Average Net Neutralization Potential (NNP) converted to equivalents (eq) per acre.

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

NNP (tCaCO3/k5)						
Year					Average	Average
2010	2011	2012	2013	2014	(t CaCO3/kt)	(eq/acre)
31.75	-0.9375	7.375	0.0625	1.0625	7.86	242,165
-9.6875	7.875	1.75	10.75	-1.5	1.84	56,595
1.0625	2.8125	-0.5625	-1.4375	1.8125	0.74	22,715
-2.75	-5.3125	1.375	-1.5625	0.5	-1.55	-47,740
-0.6875	-0.3	-1.25	-4.0625	-1.5625	-1.57	-48,433
-11.5625	-3.875	-12.5	--	--	-9.31	-286,825
14.625	-3.4375	-1.8125	-1.5625	0.125	1.59	48,895
5.9375	9.75	2.8125	8.5625	6.5	6.71	206,745
-2.1875	--	--	--	--	-2.19	-67,375
131.6875	32.5	62.4375	84.6875	39.4375	70.15	2,160,620
-0.625	0.0625	-0.3125	1.375	1.375	0.38	11,550
18.125	--	--	--	--	18.13	558,250
-5.9375	-2.0625	-1.875	-4.375	-2.1875	-3.29	-101,255
-13.4375	-15.625	23	-4.25	-5.625	-3.19	-98,175
1.0625	--	--	--	--	1.06	32,725
-9.6875	--	--	--	--	-9.69	-298,375
-3.4375	6.4375	3.75	-0.5	-1.5625	0.94	28,875
-0.9375	-0.625	12.375	1.0625	-0.625	2.25	69,300
--	--	-2.1875	16.4375	3.125	5.79	178,383
--	--	11.4375	-0.75	2.1875	4.29	132,183
--	--	7.0625	4.375	3.375	4.94	152,075
--	--	-0.3125	1.4375	-0.3	0.28	8,470
--	--	18.375	5.0625	-0.625	7.60	234,208
237.7	100.0625	60.0625	165.375	57.7	124.18	3,824,744
3.3	10.7	5.7	4.375	4.375	5.69	175,252
6.975	10.8125	2.0625	8.5	-1.5625	5.36	165,011
-0.6375	-4.375	6.125	-1.6875	1.5	0.19	5,698

Note:

Average net neutralizing potential (acid neutralizing potential minus acid generating potential) in soils in the vicinity of the STSIU. Averages were calculated for 2010 through 2014, but not all sample locations were analyzed in each year. Per-acre values were calculated for a 6-inch-deep soil having a density of 2.5 g/cm^3.



Note:
West plot is influenced by Gila Conglomerate Formation and thus has patchy calcium, resulting in high variability.
This graph assumes adjacent plots have similar calcium concentrations (2006 and 2008 is for plot to be treated, and 2010 to 2014 for adjacent reference plots). Data are from Table 1 and ARCADIS (2014a).

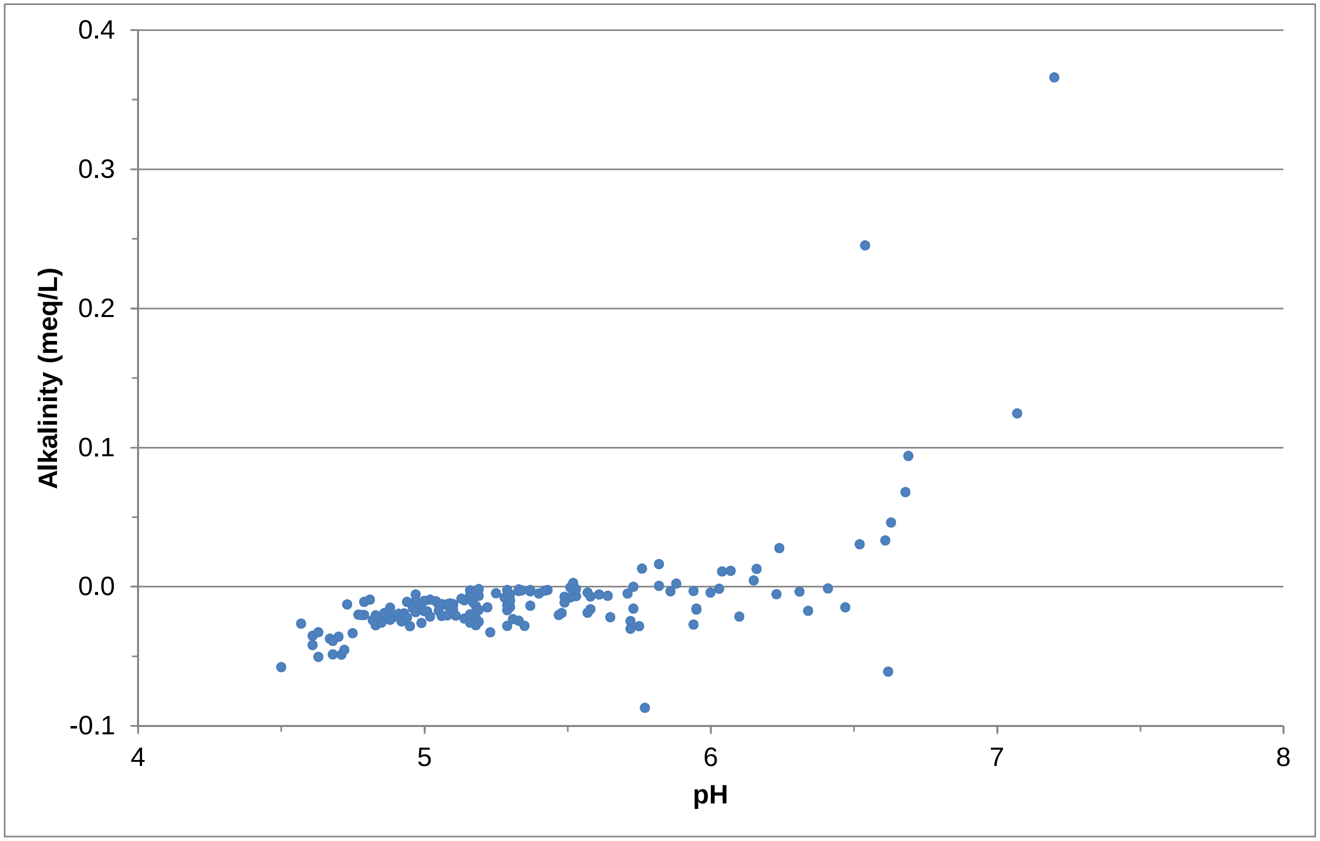
FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

YEAR 5 REPORT - PH MONITORING

Change in Soil Calcium Concentration after White Rain in Amendment Study Plots

ARCADIS

FIGURE
B-1



Note:
Alkalinity is fairly constant from pH of 4.5 to 6.5. Rainwater becomes high in alkalinity at pH > 6.5.

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Relationship of Alkalinity to pH in Rainwater at NM01 Station

ARCADIS

FIGURE

B-2

Appendix C

Early Post-White Rain Results in 2008 and 2009 and Long-term Trends

Table C-1
Data Collected in 2009 to Evaluate Effect of White Rain

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Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Soil Sample Location	Sieved field pH (0-6") S.U. 0 m on transect	Sieved field pH (0-6") S.U. 25 m on transect	Sieved field pH (0-6") S.U. 50 m on transect	Average Field Soil Sieved pH (0-6") S.U.[1,2]	Lab Sieved pH (0-6") S.U. 25 m on transect[2]	Soil Cu (0-6") mg/kg (unsieved) 25 m on transect	Soil Cu (0-6") mg/kg (sieved) 25 m on transect[3]	Average Sieved Calculated pCu (0-6")	Total Sulfur (0-6") (%)[4]	Pyritic/Sulfide Sulfur (0-6") (%)[5]	AGP (0-6") (tCaCO$_3$/kt)[6] (calculated)	ANP (0-6") (tCaCO$_3$/kt)[4]	NNP (0-6") (tCaCO$_3$/kt)[6] (calculated)	NPR (0-6") (ANP/AGP)[6] (calculated)
FID 0	7.2	6.8	7.4	7.1	6.6	329	566	6.68	0.03	0.018	0.56	11	10.4	19.6
FID 1	7.2	7.0	6.9	7.0	6.2	143	377	7.05	0.02	0.012	0.38	62	61.6	165.3
FID 2	7.1	6.3	6.9	6.8	5.6	405	643	6.18	0.02	0.012	0.38	57	56.6	152.0
FID 3	7.6	8.0	8.3	8.0	7.6	236	471	7.66	0.17	0.102	3.19	164	160.8	51.5
FID 4	6.1	8.1	8.1	7.4	6.0	599	839	6.50	< 0.01	0.006	0.19	12	11.8	64.0
FID 6*	6.1	7.0	6.7	6.6	6.4	182	561	6.20	0.02	0.012	0.38	7	6.6	18.7
FID 7	7.8	6.0	6.9	6.9	5.2	242	478	6.66	0.01	0.006	0.19	34	33.8	181.3
FID 8*	3.8	5.9	6.8	5.5	6.1	430	450	5.40	0.14	0.084	2.63	23	20.4	8.8
FID 10*	6.5	6.2	6.3	6.4	6.0	1020	1137	5.16	0.05	0.030	0.94	11	10.1	11.7
FID 12*	7.5	7.8	6.6	7.3	7.5	4260	4757	4.41	1.02	0.612	19.13	35	15.9	1.8
FID 13	5.6	7.8	8.1	7.1	7.4	1970	2228	5.12	0.34	0.204	6.38	25	18.6	3.9
FID 15	6.4	6.9	7.4	6.9	8.0	1360	1610	5.27	0.55	0.330	10.31	22	11.7	2.1
FID 16	5.7	4.9	5.1	5.2	4.3	512	751	4.60	< 0.01	0.006	0.19	0	-0.2	0.0
FID 17*	6.3	6.5	5.8	6.2	6.6	4680	7262	2.87	0.64	0.384	12.00	26	14.0	2.2
FID 18*	4.6	5.0	5.0	4.9	4.3	326	367	5.06	0.04	0.024	0.75	0	-0.8	0.0
FID 20*	7.7	5.5	4.8	6.0	4.9	790	860	5.13	0.09	0.054	1.69	5	3.3	3.0
FID 21*	6.8	7.4	7.8	7.3	6.3	131	139	8.49	0.03	0.018	0.56	3	2.4	5.3
FID 22	7.0	5.7	4.6	5.8	5.1	285	521	5.52	0.07	0.042	1.31	7	5.7	5.3
FID 23	4.2	4.4	4.5	4.4	3.7	252	488	4.28	0.16	0.096	3.00	0	-3.0	0.0
FID 24	8.1	8.1	8.0	8.0	7.7	121	355	8.07	< 0.01	0.006	0.19	31	31	165.3
FID 25	8.2	8.4	7.9	8.2	7.8	66	299	8.38	0.01	0.006	0.19	115	114.8	613.3
FID 26*	8.2	8.2	7.7	8.0	7.9	75	70	9.91	< 0.01	0.006	0.19	10	9.8	53.3
FID 27*	6.5	7.4	7.4	7.1	6.2	206	347	7.23	< 0.01	0.006	0.19	19	18.8	101.3
FID 28	7.4	5.3	7.7	6.8	5.4	348	585	6.34	0.04	0.024	0.75	6	5.3	8.0
FID 30	7.9	8.5	7.9	8.1	7.7	90	324	8.23	0.01	0.006	0.19	190	189.8	1013.3
FID 31	6.3	6.5	6.9	6.6	6.1	187	422	6.50	0.01	0.006	0.19	14	13.8	74.7
FID 32	6.6	6.3	5.8	6.2	5.7	2120	2380	4.21	0.02	0.012	0.38	7	6.6	18.7
FID 33	8.2	7.9	3.7	6.6	7.5	308	544	6.24	0.19	0.114	3.56	52	48.4	14.6
FID 34*	7.8	7.6	6.7	7.4	7.0	209	371	7.40	< 0.01	0.006	0.19	24	23.8	128.00
FID 35	7.4	8.0	7.6	7.7	7.8	210	445	7.45	0.04	0.024	0.75	97	96.3	129.33
FID 37[7]	5.4	5.3	5.4	5.4	-	373	610	4.98	--	--	--	--	--	--
FID 39	6.4	7.1	7.9	7.1	5.5	414	652	6.53	< 0.01	0.006	0.19	14	13.8	74.67
FID 43	5.2	4.0	3.9	4.4	4.2	466	704	3.86	0.93	0.558	17.44	0	-17.4	0.00

Notes:

*Also sampled for mineralogical analysis, which reported sieved copper concentrations < 2 mm.

[1] Average of 3 soil samples on 50-m transect and analyzed using the soil paste method for pH in the field.

[2] Field samples were sieved to 2 mm for pH, and lab pH samples were sieved to 0.25 mm.

[3] Samples for copper analysis were adjusted to being sieved using regressions in main report, unless sampled in mineralogical analysis, where sieved <2 mm estimates were available (shown with asterisk).

[4] Sulfur and ABA results for data throughout this report were always sieved to < 0.25 mm.

[5] Pyritic Sulfide Sulfur was calculated as 60% of Total Sulfur, based on 2010-2014 data. Pyritic Sulfide Sulfur was calculated using the detection limit when Total Sulfur was less than 0.1%.

[6] AGP is calculated from Pyritic Sulfide Sulfur where S(%)*31.25 = AGP. NNP = ANP - AGP, NPR = ANP/AGP

[7] FID 37 was not sampled in the 0-6" depth (too shallow); therefore was estimated from the 0-1" range. The 0-6" pH has been found to be the same as the 0-1" pH, and the 0-6" Cu is calculated as follows: [0-1" Cu]*0.7.

0-6" = zero to six inch, mm = millimeters

AGP = acid generation potential

ANP = acid neutralization potential

mg/kg - milligram per kilogram

NNP = Net Neutralization Potential

NPR = Neutralization Potential Ratio

S.U. = standard units

-- = not applicable

Table C-2

Comparison of Lab Estimates of Copper, pH, Calculated pCu, and Acid Base Accounting Results in 2009 (ACZ) and 2010 (SVL)[1] Soil Samples

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Soil Sample ID	Lab Soil pH (0-6") SU (2009 adj unsieved, 2010 unsieved)		Unsieved Soil Cu (0-6") mg/kg		Unsieved Soil pCu (0-6") calculated		Total Sulfur (%)		Pyritic/Sulfide Sulfur (%)[2]		AGP (tCaCO3/kt) (calculated)		ANP (tCaCO3/kt)		NNP (tCaCO3/kt) (calculated)		NPR (ANP/AGP) (calculated)	
	2009	**2010**	**2009**	**2010**	**2009**	**2010**	**2009**	**2010**	**2009**	**2010**	**2009**	**2010**	**2009**	**2010**	**2009**	**2010**	**2009**	**2010**
FID 7	5.69	5.86	242	503	6.32	5.64	0.01	0.03	0.006	0.02	0.2	0.7	34	12.30	33.8	11.7	181.3	18.9
FID 8	6.45	7.00	430	470	6.36	6.77	0.14	0.28	0.084	0.08	3	2.3	23	17.94	20	15.6	8.8	7.6
FID 10	6.36	5.26	1020	1776	5.29	3.63	0.05	0.04	0.030	0.02	1	0.6	11	15.09	10	14.5	11.7	23.5
FID 15	8.04	5.62	1360	1442	6.52	4.20	0.55	0.06	0.330	0.02	10	0.6	22	2.57	12	1.9	2.1	4.0
FID 16	4.94	5.56	512	2603	4.76	3.47	< 0.01	0.11	0.006	0.05	0.2	1.6	0	4.03	0	2.4	0.0	2.5
FID 17	6.87	5.95	4680	5119	4.01	3.05	0.64	0.28	0.384	0.18	12	5.5	26	10.16	14	4.7	2.2	1.8
FID 18	4.94	4.47	326	445	5.28	4.48	0.04	0.17	0.024	0.04	1	1.3	0	2.96	-1	1.7	0.0	2.3
FID 22	5.61	7.20	285	388	6.05	7.18	0.07	0.12	0.042	0.05	1	1.6	7	14.95	6	13.3	5.3	9.1
FID 23	4.43	4.88	252	199	5.10	5.79	0.16	0.07	0.096	0.02	3	0.6	0	4.03	-3	3.4	0.0	6.2
FID 28	5.86	8.01	348	338	6.06	8.09	0.04	0.06	0.024	0.03	1	1.0	6	100.63	5	99.6	8.0	102.0
FID 37	--	5.23	373	810	--	4.50	--	0.03	--	0.01	--	0.3	--	2.56	--	2.2	--	8.0
FID 43	4.85	6.86	466	489	4.79	6.60	0.93	0.39	0.558	0.11	17	3.3	0	28.07	-17	24.8	0.0	8.5
FID 101	--	4.78	--	282	--	5.30	--	0.14	--	0.04	--	1.3	--	2.04	--	0.8	--	1.6
FID 102	--	4.64	--	280	--	5.17	--	0.28	--	0.07	--	2.2	--	1.03	--	-1.2	--	0.5
FID 103	--	4.84	--	323	--	5.20	--	0.05	--	0.00	--	0.0	--	7.22	--	7.2	--	--
FID 104	--	4.07	--	461	--	4.07	--	0.74	--	0.24	--	7.4	--	< 0.3	--	-7.1	--	0.0
FID 105	--	6.08	--	1255	--	4.79	--	0.09	--	0.04	--	1.3	--	9.89	--	8.6	--	7.4
FID 106	--	5.86	--	441	--	5.79	--	0.03	--	0.01	--	0.3	--	9.25	--	8.9	--	28.2
Reference #1 (West)	--	7.84	--	1857	--	5.98	--	0.03	--	< 0.01	--	0.3	--	246.89	--	246.6	--	823.0
Reference #2 (North)	--	6.72	--	672	--	6.10	--	0.02	--	< 0.01	--	0.3	--	3.85	--	3.6	--	12.8
Reference #3 (North East)	--	5.78	--	2457	--	3.74	--	0.08	--	0.02	--	0.7	--	8.26	--	7.6	--	12.2
Reference #4 (East)	--	5.76	--	1418	--	4.35	--	0.15	--	0.03	--	1.0	--	< 0.3	--	-0.7	--	0.3

Notes:

[1] SVL 2010 data not used in analysis in this report because not sieved for pH and Cu. ACZ samples were sieved to < 2mm and were used. However, SVL data shown here to compare to 2009 unsieved samples. 2009 samples were at one location (25 m on 50 m transect); 2010 samples were a composite of 5 locations in 50 m x 50 m plot

[2] See footnotes of Table C-1 to describe ABA and sulfur calculations.

0-6" = zero to six inch

ABA - Acid base accounting (note all soils were sieved to <0.25 mm for ABA in all years)

AGP - Acid generating potential

ANP - Acid neutralizing potential

NNP = Net Neutralization Potential

NPR = Neutralization Potential Ratio

SU - Standard units

mg/kg - milligram per kilogram

-- = not applicable

Cu = copper

Bolded = influenced by Gila Conglomerate Formation (providing high buffering capacity)

🟦 highlighted in blue means 2010 value is higher than 2009 value, and shows no consistent pattern except an increase in copper and NPR in 2010.

Table C-3
Sieved Soil pH, Copper, and pCu Data used in Figure C-1

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Soil Sample Location	Soil pH (0 to 6 inches) [1] (S.U.)							Soil Cu (0 to 6 inches) [1] (mg/kg)							Soil pCu (0 to 6 inches) (calculated)						
	2008	2009	2010	2011	2012	2013	2014	2008	2009	2010	2011	2012	2013	2014	2008	2009	2010	2011	2012	2013	2014
FID 7	--	6.89	5.40	4.80	4.70	5.40	5.10	--	478	550	494	514	375	491	--	6.66	5.11	4.67	4.53	5.55	4.96
FID 8	--	5.47	6.50	6.40	5.50	6.50	4.60	--	668	545	332	252	358	473	--	4.95	6.14	6.62	6.10	6.62	4.54
FID 10	--	6.35	4.80	4.80	5.00	5.00	4.70	--	1137	2060	2140	2210	1780	2550	--	5.16	3.03	2.99	3.13	3.38	2.69
FID 15	--	6.91	4.90	4.80	4.60	5.20	5.60	--	1610	2520	2260	1030	1950	1850	--	5.27	2.89	2.92	3.64	3.46	3.90
FID 16	--	5.24	4.80	4.50	4.30	4.70	4.80	--	751	3550	2020	1450	1290	1440	--	4.60	2.40	2.77	2.97	3.47	3.44
FID 17*	--	6.18	5.10	6.00	4.90	--	--	--	7262	4550	4220	5150	--	--	--	2.87	2.40	3.32	2.07	--	--
FID 18	--	4.85	3.90	4.30	4.40	4.30	4.20	--	367	559	254	192	141	310	--	5.06	3.69	4.97	5.39	5.65	4.65
FID 22	--	5.78	6.50	6.20	6.40	6.30	6.90	--	521	488	430	308	296	378	--	5.52	6.27	6.13	6.70	6.66	6.93
FID 23*	--	4.36	4.40	--	--	--	--	--	488	202	--	--	--	--	--	4.28	5.33	--	--	--	--
FID 28	--	6.81	7.70	6.90	6.70	6.80	7.30	--	585	527	400	271	318	423	--	6.34	7.29	6.87	7.13	7.04	7.17
FID 37	--	5.40	4.80	4.60	4.50	5.30	4.70	--	610	1210	654	765	432	708	--	4.98	3.64	4.16	3.89	5.29	4.16
FID 43*	--	4.37	6.50	--	--	--	--	--	704	636	--	--	--	--	--	3.86	5.96	--	--	--	--
Reference #2 (North)	6.6	--	6.43	6.00	5.80	6.00	6.20	1946	--	913	687	1170	578	760	4.77	--	5.48	5.41	4.61	5.61	5.48
Reference #3 (Northeast)	5.9	--	5.31	5.60	5.10	6.70	5.40	2714	--	2721	1950	2250	1090	1540	3.76	--	3.18	3.84	3.21	5.53	3.92
Reference #4 (East)	5.7	--	5.28	5.40	4.80	6.00	4.90	1099	--	1669	1130	1210	923	1020	4.57	--	3.72	4.28	3.64	5.07	3.93

Notes:

[1] 2008 reference samples and 2009 samples were tested using unsieved soil and were adjusted to sieved values using equation in main report when necessary (see sieve adjusted values in Table C-1 for 2009).

2011 to 2014 data are from the "permanence monitoring" dataset

mg/kg = milligrams per kilogram

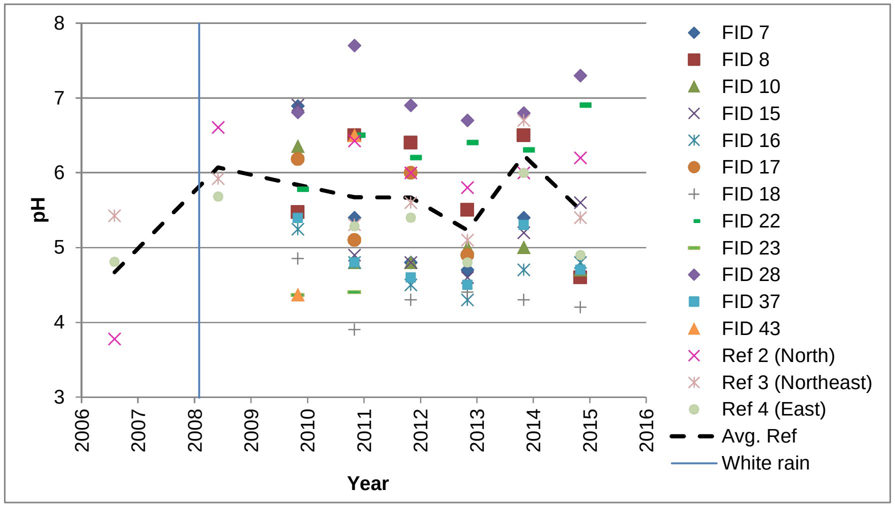
pCu = -log (cupric ion activity)

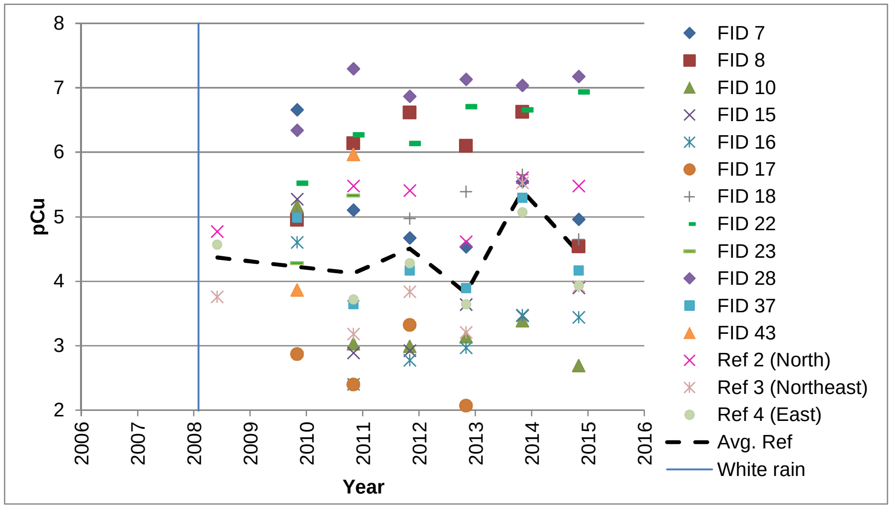
S.U. = standard units

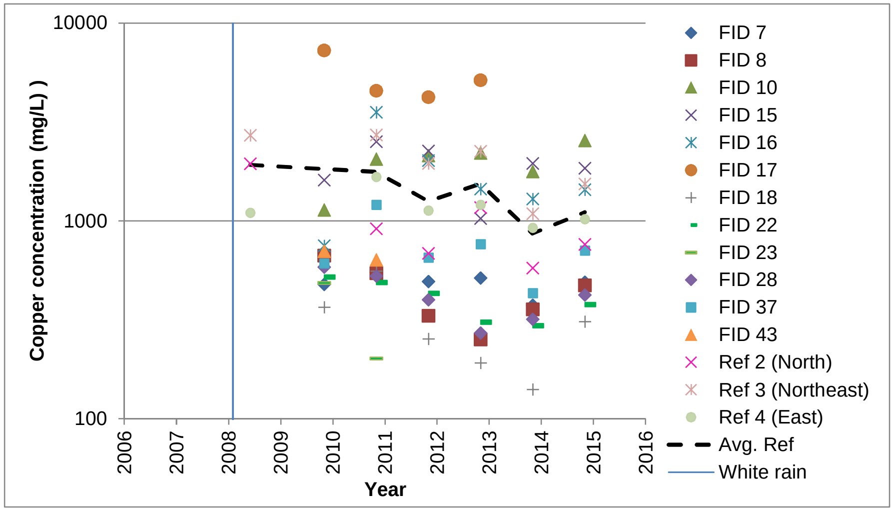
-- = not applicable

*Locations FID 17, FID 23, and FID 43 were excavated and not sampled in later years.

🟦 highlighted in blue means 2010 value is higher than 2009 value (or than 2008 value for reference locations) and shows no consistent pattern of increase or decrease (compare to Table C-2 unsieved dataset)







Note:
All data were from soils sieved to < 2 mm or adjusted as if sieved. Includes 2006, 2008 and 2009 unsieved data (adjusted as if sieved). 2006 pH data are from amendment plot adjacent to reference plot. Year tick mark shown on plot represents January (e.g., 2014 data sampled in fall are closer to Jan. 2015 than Jan. 2014 on graph).

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

YEAR 5 REPORT - PH MONITORING

Long-Term (>5 years) Change in pH, Copper, and pCu

ARCADIS

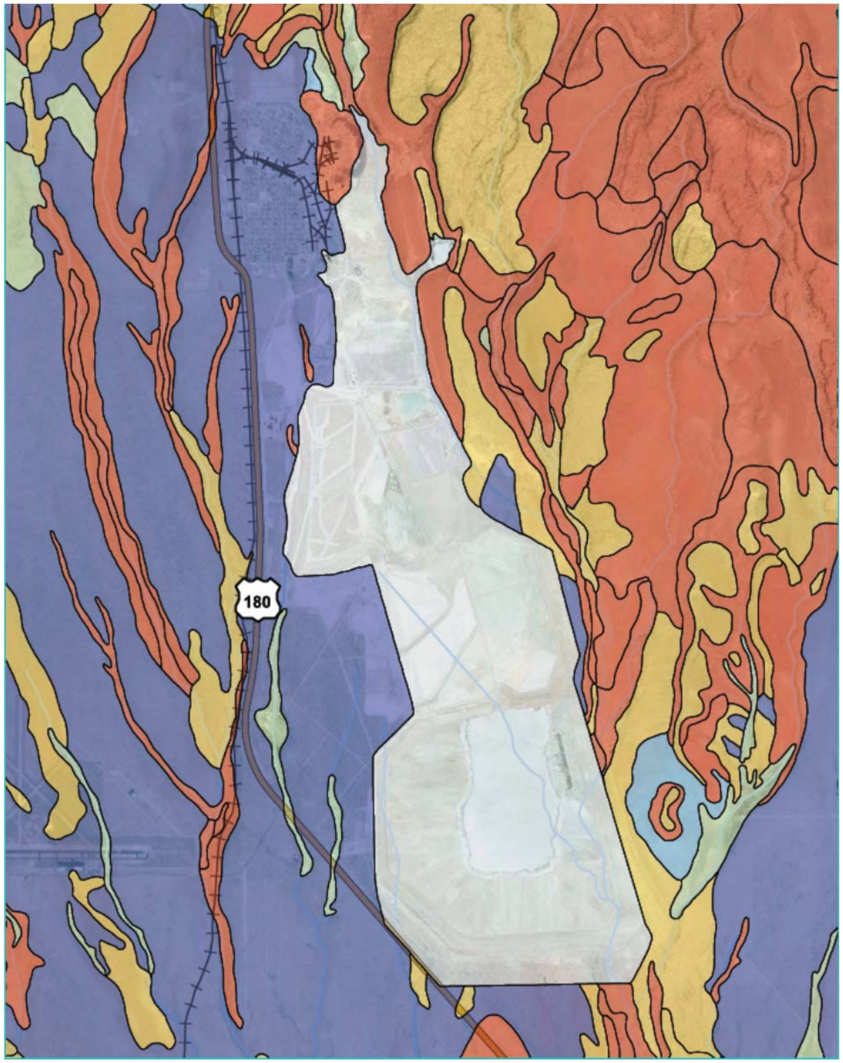
FIGURE

C-1

ARCADIS

Appendix D

Mineralogical Analysis



Soil Rating Polygons

- 🟥 <= 1
- 🟨 > 1 and <= 3
- 🟩 > 3 and <= 5
- 🟦 > 5 and <= 13
- 🟪 > 13 and <= 25
- ⬜ Not rated or not available

Note: concentrations in percent (kg/kg)
NRCS = Natural Resources Conservation Service.

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

YEAR 5 REPORT - PH MONITORING

NRCS Calcium Carbonate Concentrations in Chino Surface (0-6") Soil

ARCADIS

FIGURE
D-1

Table D-1
Summary of Speciation Test Results from Drexler's Laboratory on 2009 FID Samples

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Sample	Soil Cu sieved to < 2mm ppm	Soil pH sieved to < 2 mm (field)	Cu (mg/kg)	CuNi[2]	Cu-FeO	CuM[3]	Cubanite ($CuFe_2S_3$)[4]	Chalcopyrite ($CuFeS_2$)	Covellite (CuS)	Cuprite (Cu2O)	Bornite (Cu_5FeS_4)	CuMO	Slag[5]	FeOOH[6]	FeSO4	SnMO	MnOOH	Brass	CuSO4	Calculated Soil pCu
FID 34	371	7.38	682	0	34.75	0	25.12	0	0	0	0	0	0	39.32	0.81	0	0	0	0	7.40
FID 26	70	8.02	75	0	10.51	0	0	29.31	0	10.08	0	0	0	37.48	12.62	0	0	0	0	9.92
FID 8	450	5.47	430	22.75	3.11	2.26	0	0	0	0	0	0	0	11.09	0	0.05	0	60.74	0	5.40
FID 6	561	6.6	650	0	20.42	30.4	10.35	0	0	0	0	0	0.73	38.11	0	0	0	0	0	6.20
FID 27	347	7.11	322	1.24	50.32	0	6.71	0	0	0	0	0	0.19	31.2	0	0	0	10.35	0	7.23
FID 20	860	5.98	755	0	8.09	0	4.5	0	0	0	15.98	0	0.75	68.13	0	0	2.56	0	0	5.13
FID 12	4757	7.32	5580	0	4.6	3.08	35.1	7.96	0	11.76	19.01	0	0	8.84	0.39	0.03	0	0	9.24	4.41
FID 10	1137	6.35	1050	0	13.99	28.9	35.67	4.61	6.77	0.87	0	0	0.69	6.61	1.6	0.3	0	0	0	5.15
FID 17	7262	6.18	9150	0	4.84	0	35.03	6.2	0	0	41.64	0	0.34	9.2	2.57	0	0.18	0	0	2.86
FID 21	139	7.34	131	0	55.55	0	14.41	0	0	0	0	0	0	30.05	0	0	0	0	0	8.49
FID 37	606	5.4	533	0	35.6	0	20.87	5.75	0	0	0	0	0.42	37.36	0	0	0	0	0	4.99
FID 18	367	4.85	215	0	0	0	0	0	0	0	0	38.61	0.92	58.91	1.56	0	0	0	0	5.06

Notes:

[1] Details on Bioavailability test methods for birds and speciation of copper-containing minerals are in LEGS (2009) in Appendix G.

[2] Mineral results are in relative mass percentage for phase.

[3] CuM is tectogenic (M = unknown metal)

[4] Most sulfides are geogenic (survived smelting unaltered or from tailings; not converted to H_2SO4).

[5] Slag may contain CaO, MgO,SiO, Fe_2SiO_4, $Al_2$03, glass-like substances (globules are technogenic)

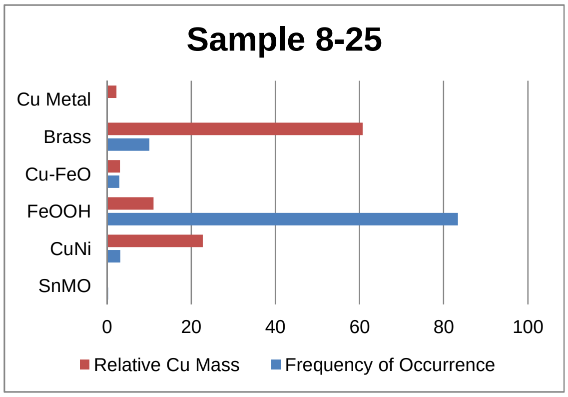
[6] FeOOH contains 2.6% copper--adsorbed onto surface

FID 8 Laboratory Output

Form	Association	Size (microns)
snmo	Liberated	3
cuni	Liberated	5
cuni	Liberated	2
Fe	Cemented	7
Fe	Liberated	15
cuni	Liberated	7
cuni	Liberated	7
cuni	Liberated	6
Fe	Liberated	32
Fe	Liberated	40
cuFe	Liberated	22
Fe	Cemented	32
Fe	Liberated	17
Fe	Rimming	16
Fe	Liberated	20
Fe	Liberated	31
cufe	Liberated	8
Fe	Cemented	42
Fe	Liberated	10
Fe	Liberated	13
Fe	Liberated	60
Fe	Liberated	32
cuni	Liberated	1
cuni	Liberated	1
Fe	Liberated	80
brass	Rimming	9
Fe	Liberated	24
Fe	Liberated	10
Fe	Liberated	28
cuni	Cemented	3
Fe	Liberated	11
Fe	Liberated	9
Fe	Cemented	4
Fe	Liberated	11
Fe	Liberated	32
Fe	Liberated	10
Fe	Liberated	42
Fe	Liberated	9
Fe	Liberated	28
Fe	Liberated	28
brass	Liberated	7
Fe	Liberated	3
cu	Liberated	2
Fe	Liberated	21
Fe	Liberated	23
Fe	Liberated	9
Fe	Liberated	5
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Liberated	5
brass	Liberated	3
Fe	Rimming	8
Fe	Liberated	31
brass	Cemented	13
Fe	Liberated	8
brass	Liberated	5
brass	Liberated	3
brass	Liberated	62
Fe	Liberated	9

Form	Number	Mean	Std-Dev	Range low	Range high
total	65	15.63	16.14	1	80
SnMO	1	3	ND	3	3
CuNi	8	4	2.56	1	7
FeOOH	46	18.41	16.35	3	80
Cu-FeO	2	21	ND	8	22
Brass	7	14.57	21.21	3	62
Cu Metal	1	2	ND	2	2

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
SnMO	0.3	0.05	1.32
CuNi	3.15	22.75	4.25
FeOOH	83.37	11.09	9.05
Cu-FeO	2.96	3.11	3.54
Brass	10.04	60.74	7.31
Cu Metal	0.2	2.26	1.08

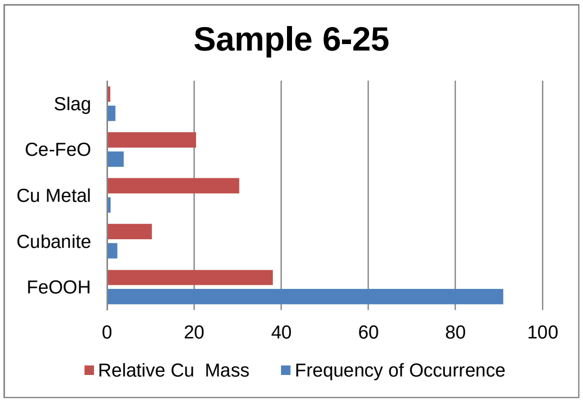


FID 6 Laboratory Output

Form	Association	Size (microns)
Fe	Liberated	12
Fe	Liberated	3
Fe	Cemented	9
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Rimming	10
Fe	Liberated	4
Fe	Liberated	12
Fe	Cemented	7
cub	Liberated	6
Fe	Cemented	5
Fe	Liberated	6
Fe	Liberated	5
Fe	Cemented	4
Fe	Cemented	4
Fe	Liberated	12
Fe	Liberated	8
Fe	Liberated	9
Fe	Cemented	15
Fe	Cemented	12
Fe	Cemented	110
Fe	Liberated	7
Fe	Rimming	100
Fe	Cemented	8
Fe	Liberated	8
cub	Liberated	8
cu	Liberated	9
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
cufe	Liberated	42
Fe	Liberated	15
Fe	Liberated	21
Fe	Liberated	55
Fe	Rimming	8
Slag	Liberated	21
Fe	Cemented	5
Fe	Cemented	5
Fe	Cemented	5
Fe	Cemented	5
Fe	Rimming	6
Fe	Rimming	14
Fe	Rimming	14
Fe	Cemented	11
Fe	Cemented	7
Fe	Cemented	12
Fe	Cemented	13
Fe	Liberated	48
Fe	Liberated	13
cub	Inclusion	6
cub	Inclusion	3
cub	Inclusion	1
cub	Inclusion	1
cub	Inclusion	1
Fe	Liberated	30
Fe	Cemented	8
Fe	Liberated	3
Fe	Liberated	10
Fe	Liberated	10
Fe	Liberated	10
Fe	Liberated	10
Fe	Cemented	6
Fe	Cemented	6
Fe	Cemented	6
Fe	Cemented	6
Fe	Cemented	6
Fe	Cemented	4

Form	Number	Mean	Std-Dev	Range low	Range high
total	103	10.54	15.95	1	110
FeOOH	93	10.62	16.31	2	110
Cubanite (CuFe2S	7	3.71	2.93	1	8
Cu Metal	1	9	ND	9	9
Ce-FeO	1	42	ND	42	42
Slag	1	21	ND	21	21

Form	(linear) freq	Rm Cu	Error-95%	
%	%	%		
FeOOH	90.98	38.11	5.53	
Cubanite	2.39	10.35	2.95	74.22360248
Cu Metal	0.83	30.4	1.75	25.77639752
Ce-FeO	3.87	20.42	3.72	
Slag	1.93	0.73	2.66	



FID 6 Laboratory Output

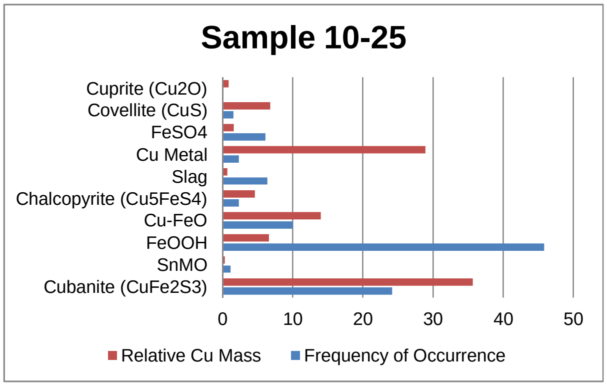
Form	Association	Size (microns)
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Liberated	11
Fe	Liberated	3
Fe	Cemented	7
Fe	Liberated	9
Fe	Liberated	12
Fe	Liberated	6
Fe	Liberated	25
Fe	Liberated	8
Fe	Liberated	9
Fe	Liberated	13
Fe	Cemented	8
Fe	Cemented	6
Fe	Liberated	4
Fe	Cemented	7
Fe	Rimming	22
Fe	Liberated	14
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Liberated	8
Fe	Liberated	5
Fe	Rimming	7
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2

FID 10 Laboratory Output

Form	Association	Size (microns)
cub	Liberated	11
snmo	Liberated	11
cub	Liberated	23
cub	Liberated	4
Fe	Cemented	7
cub	Liberated	7
snmo	Liberated	9
cub	Liberated	21
cufe	Liberated	12
cub	Liberated	16
cp	Liberated	20
Fe	Rimming	27
Fe	Liberated	9
Slag	Liberated	90
cub	Liberated	11
Fe	Liberated	12
Fe	Liberated	13
cub	Cemented	8
cu	Liberated	28
Fe	Liberated	19
Fe	Liberated	15
Fe	Liberated	14
cub	Liberated	19
Fe	Liberated	8
Fe	Rimming	29
cub	Liberated	8
Fe	Rimming	32
Fe	Liberated	11
cub	Liberated	35
cufe	Liberated	50
Slag	Liberated	21
Fe	Liberated	14
cub	Liberated	14
Fe	Liberated	22
cub	Liberated	22
cub	Liberated	15
cufe	Liberated	40
Fe	Liberated	5
cufe	Liberated	8
cufe	Liberated	9
cub	Liberated	14
Fe	Liberated	15
Fe	Liberated	15
Fe	Liberated	34
cu	Liberated	12
Sulf	Cemented	35
Fe	Rimming	35
cub	Liberated	10
cufe	Liberated	28
cub	Liberated	11
Fe	Liberated	19
Sulf	Liberated	12
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Sulf	Rimming	9
Fe	Rimming	13
Fe	Liberated	12
cub	Liberated	11
Fe	Liberated	31
Fe	Liberated	20
Fe	Rimming	36
Fe	Liberated	4
cub	Liberated	33
Fe	Rimming	12
Fe	Liberated	9
cub	Liberated	11
cus	Liberated	13
Fe	Cemented	11
Fe	Liberated	9
Fe	Liberated	7
Fe	Liberated	7

Form	Number	Mean	Std-Dev	Range low	Range high
total	116	14.95	12.57	1	90
Cubanite	33	12.7	8.6	1	35
SnMO	2	10	1.41	9	11
FeOOH	50	15.9	10.94	4	45
Cu-FeO	10	17.4	16.19	3	50
Chalcopyrite	4	10	8.91	2	20
Slag	2	55.5	48.79	21	90
Cu Metal	2	20	11.31	12	28
FeSO4	8	13.25	8.83	9	35
Covellite	4	6.75	4.5	3	13
Cuprite	1	2	ND	2	2

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
Cubanite (CuFe2S3)	24.16	35.67	7.79
SnMO	1.15	0.3	1.94
FeOOH	45.85	6.61	9.07
Cu-FeO	10.03	13.99	5.47
Chalcopyrite (Cu5FeS4	2.31	4.61	2.73
Slag	6.4	0.69	4.45
Cu Metal	2.31	28.9	2.73
FeSO4	6.11	1.6	4.36
Covellite (CuS)	1.56	6.77	2.25
Cuprite (Cu2O)	0.12	0.87	0.62
		100.01	



FID 10 Laboratory Output

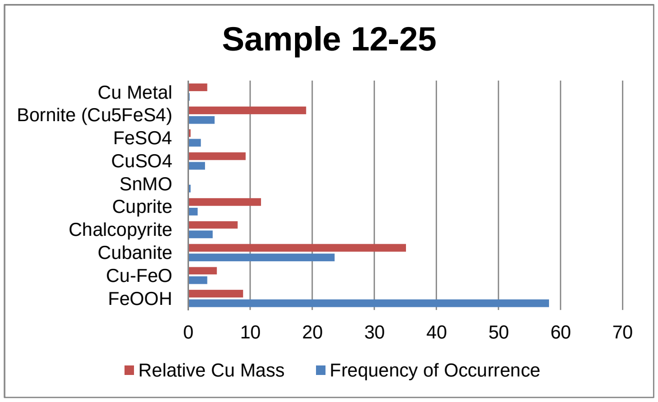
Form	Association	Size (microns)
Fe	Liberated	12
cuo	Cemented	2
Fe	Liberated	9
Fe	Liberated	40
Fe	Liberated	45
Fe	Liberated	4
Fe	Liberated	29
Sulf	Liberated	10
Sulf	Liberated	10
Sulf	Liberated	10
Sulf	Liberated	10
Sulf	Liberated	10
cub	Liberated	13
Fe	Cemented	10
cub	Cemented	4
cub	Cemented	7
cufe	Liberated	11
cus	Rimming	4
cub	Rimming	1
cub	Liberated	32
cp	Cemented	3
cub	Liberated	3
cufe	Liberated	6
cp	Liberated	2
cub	Cemented	4
Fe	Liberated	7
cus	Liberated	7
cus	Liberated	3
Fe	Liberated	8
Fe	Liberated	8
Fe	Liberated	32
cub	Liberated	11
cub	Liberated	13
cub	Liberated	7
cub	Liberated	6
Fe	Liberated	13
cufe	Liberated	3
cub	Liberated	3
cub	Liberated	11
cp	Liberated	15
Fe	Cemented	28
cufe	Liberated	7
Fe	Liberated	8

FID 12 Laboratory Output

Form	**Association**	**Size (microns)**
Fe	Liberated	13
Fe	Cemented	220
Fe	Liberated	14
cufe	Liberated	8
cub	Liberated	16
cufe	Liberated	6
Fe	Liberated	60
Fe	Liberated	45
Fe	Liberated	90
Fe	Rimming	22
cub	Liberated	8
cub	Liberated	58
Fe	Liberated	32
cp	Rimming	28
Fe	Liberated	11
Fe	Cemented	46
Fe	Liberated	23
cub	Liberated	17
Fe	Liberated	7
Fe	Liberated	13
Fe	Liberated	9
cub	Liberated	8
cp	Liberated	20
cuo	Liberated	19
Fe	Rimming	29
Fe	Cemented	35
cub	Liberated	42
cub	Liberated	6
Fe	Cemented	44
cub	Liberated	13
cub	Liberated	7
Fe	Rimming	48
Fe	Liberated	35
Fe	Liberated	25
Fe	Rimming	17
Fe	Liberated	40
cp	Liberated	20
Fe	Rimming	23
cub	Liberated	25
Fe	Liberated	14
snmo	Liberated	15
Fe	Liberated	35
Fe	Liberated	80
cufe	Liberated	21
Fe	Liberated	25
Fe	Cemented	23
cuo	Liberated	7
Fe	Liberated	8
cub	Liberated	10
cub	Liberated	19
Fe	Cemented	13
cub	Liberated	26
Fe	Liberated	15
cufe	Liberated	14
Fe	Liberated	11
cub	Liberated	8
cuo	Rimming	10
cufe	Rimming	15
cub	Liberated	9
cub	Liberated	44
Fe	Liberated	22
cub	Liberated	15
cub	Liberated	8
cp	Liberated	23
Fe	Liberated	8
cub	Liberated	24
Fe	Cemented	65
cub	Liberated	42
Fe	Liberated	15

Form	**Number**	**Mean**	**Std-Dev**	**Range low**	**Range high**
total	112	32.97	33.24	5	220
FeOOH	54	39.76	41.88	5	220
Cu-FeO	7	16.29	11.59	6	40
Cubanite	34	25.62	16.9	6	62
Chalcopyrite	5	29.2	14.79	20	55
Cuprite	5	11.4	5.5	6	19
SnMO	1	15	ND	15	15
CuSO4	2	50.5	41.72	21	80
FeSO4	1	76	ND	76	76
Bornite	2	78.5	23.33	62	95
Cu Metal	1	9	ND	9	9

Form	**(linear) freq**	**Rm Cu**		**Error-95%**
%	%	%		
FeOOH	58.14	8.84	x	9.14
Cu-FeO	3.09	4.6		3.2
Cubanite	23.59	35.1	x	7.86
Chalcopyrite	3.95	7.96	x	3.61
Cuprite	1.54	11.76	x	2.28
SnMO	0.41	0.03	x	1.18
CuSO4	2.73	9.24	x	3.02
FeSO4	2.06	0.39	x	2.63
Bornite (Cu5FeS4)	4.25	19.01	x	3.74
Cu Metal	0.24	3.08	x	0.91
		100.01		



FID 12 Laboratory Output

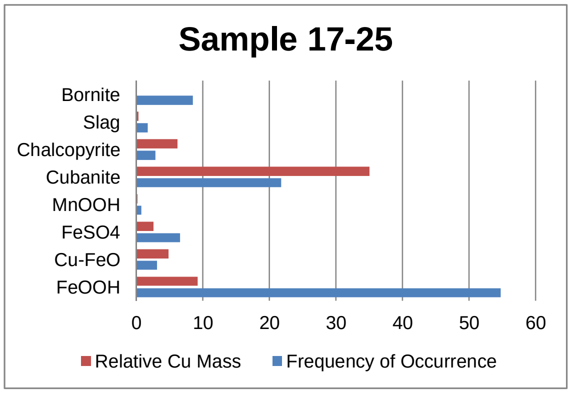
Form	Association	Size (microns)
Fe	Liberated	5
cub	Liberated	35
Fe	Cemented	22
Fe	Cemented	15
Fe	Rimming	22
Fe	Rimming	45
cufe	Liberated	10
Fe	Liberated	36
cub	Liberated	28
cub	Liberated	15
Fe	Liberated	55
cub	Liberated	22
cub	Liberated	37
Fe	Liberated	15
Fe	Liberated	8
cub	Liberated	17
cub	Rimming	35
cuso4	Liberated	21
Fe	Liberated	16
Fe	Liberated	11
cub	Liberated	22
Fe	Cemented	75
cub	Liberated	10
cub	Liberated	23
Sulf	Liberated	76
Fe	Liberated	42
cuo	Liberated	15
cuo	Liberated	6
cuso4	Liberated	80
cufe	Liberated	40
Fe	Cemented	100
Fe	Cemented	100
Fe	Cemented	100
cub	Liberated	60
Fe	Cemented	195
cub	Liberated	45
cub	Liberated	62
born	Liberated	62
cp	Liberated	55
cu	Inclusion	9
cub	Liberated	55
born	Liberated	95
Fe	Liberated	50

FID 17 Laboratory Output

Form	Association	Size (microns)
Fe	Liberated	18
cufe	Liberated	6
Sulf	Liberated	48
Fe	Liberated	10
Sulf	Rimming	14
Fe	Liberated	6
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Sulf	Cemented	3
Mn	Liberated	23
Fe	Liberated	6
Fe	Liberated	14
cufe	Liberated	23
Fe	Liberated	11
cub	Cemented	29
cp	Liberated	13
Fe	Liberated	14
Fe	Liberated	14
cufe	Liberated	23
Fe	Liberated	10
cufe	Liberated	29
Fe	Liberated	5
Fe	Cemented	4
Fe	Liberated	13
Fe	Cemented	4
Fe	Liberated	25
Fe	Liberated	15
cub	Liberated	6
Fe	Rimming	50
Fe	Liberated	9
Fe	Rimming	35
Fe	Liberated	8
Fe	Liberated	11
Fe	Liberated	42
Fe	Liberated	4
cub	Cemented	5
cub	Inclusion	3
Fe	Liberated	28
Fe	Rimming	16
Fe	Rimming	85
cub	Liberated	12
cub	Liberated	17
Fe	Rimming	36
Fe	Cemented	22
Fe	Liberated	19
Fe	Liberated	11
Fe	Rimming	28
cp	Liberated	9
cp	Liberated	16
Fe	Liberated	14
Fe	Liberated	23
cub	Liberated	5
Fe	Liberated	29
cub	Liberated	25
Fe	Liberated	20
Fe	Rimming	24
Fe	Rimming	27
Fe	Liberated	65
cub	Liberated	24
Fe	Rimming	15
Fe	Rimming	15
cub	Liberated	22
cufe	Liberated	3
Fe	Liberated	19
Fe	Liberated	14
Fe	Cemented	86

Form	Number	Mean	Std-Dev	Range low	Range high
total	118	25.88	30.92	2	210
FeOOH	68	24.57	29.51	2	210
Cu-FeO	6	15.83	10.59	3	29
FeSO4	4	50	59.82	3	135
MnOOH	1	23	ND	23	23
Cubanite	27	24.63	19.41	2	80
Chalcopyrite	5	17.4	10.16	9	35
Slag	3	17.67	9.61	9	28
Bornite	4	65	85.76	9	190

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
FeOOH	54.72	9.2	8.98
Cu-FeO	3.11	4.84	3.13
FeSO4	6.55	2.57	4.46
MnOOH	0.75	0.18	1.56
Cubanite	21.77	35.03	7.45
Chalcopyrite	2.85	6.2	3
Slag	1.74	0.34	2.36
Bornite	8.51	41.64	5.04



FID 17 Laboratory Output

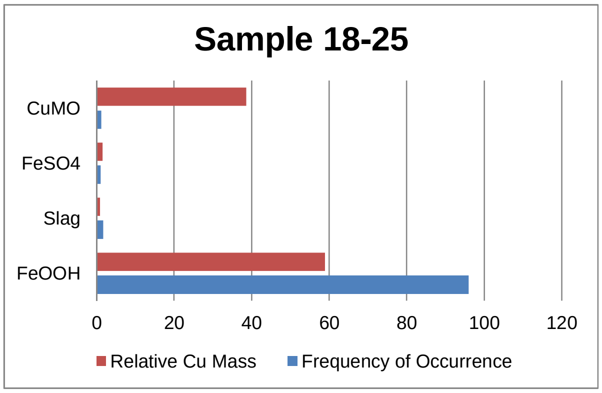
Form	Association	Size (microns)
Fe	Liberated	44
Fe	Liberated	30
cub	Liberated	22
Fe	Liberated	9
Slag	Liberated	9
Fe	Liberated	4
Fe	Liberated	26
Fe	Liberated	11
cub	Liberated	42
cp	Liberated	35
Slag	Liberated	16
Fe	Liberated	17
Fe	Rimming	32
cub	Liberated	24
cub	Liberated	12
Fe	Liberated	9
Fe	Liberated	10
cub	Liberated	32
born	Liberated	52
born	Liberated	9
born	Liberated	9
cp	Liberated	14
Fe	Liberated	23
Fe	Liberated	50
cub	Cemented	22
Fe	Liberated	70
born	Liberated	190
cub	Liberated	11
Fe	Liberated	16
Fe	Rimming	10
cub	Liberated	30
Fe	Liberated	23
Slag	Liberated	28
Fe	Rimming	55
cub	Liberated	17
Fe	Liberated	21
cufe	Liberated	11
cub	Liberated	31
cub	Liberated	30
cub	Liberated	80
cub	Liberated	14
cub	Liberated	2
cub	Liberated	25
cub	Liberated	43
Fe	Liberated	43
Fe	Liberated	24
Sulf	Liberated	135
cub	Liberated	80
Fe	Liberated	210

FID 18 Laboratory Output

Form	Association	Size (microns)
Fe	Liberated	7
Fe	Liberated	4
Fe	Liberated	7
Fe	Liberated	13
Fe	Liberated	15
Fe	Liberated	7
Fe	Liberated	4
Fe	Cemented	7
Fe	Liberated	4
Fe	Liberated	22
Fe	Rimming	4
Fe	Liberated	7
Fe	Liberated	40
Fe	Liberated	12
Fe	Liberated	28
Fe	Liberated	29
Fe	Liberated	6
Fe	Liberated	60
Slag	Liberated	29
Fe	Liberated	26
Fe	Liberated	25
Fe	Liberated	32
Fe	Liberated	5
Fe	Cemented	3
Fe	Liberated	20
Fe	Liberated	23
Fe	Liberated	30
Fe	Liberated	9
Fe	Rimming	9
Fe	Liberated	9
Fe	Liberated	8
Fe	Liberated	13
Fe	Liberated	13
Fe	Liberated	7
Fe	Liberated	4
Sulf	Liberated	18
Fe	Liberated	7
Fe	Rimming	23
Fe	Liberated	6
Fe	Liberated	4
Fe	Liberated	14
Fe	Liberated	7
Fe	Liberated	42
Fe	Liberated	15
Fe	Liberated	23
Fe	Liberated	4
Fe	Rimming	31
Fe	Liberated	7
Fe	Liberated	3
Fe	Liberated	20
Fe	Liberated	4
Fe	Rimming	75
Fe	Liberated	19
Fe	Liberated	8
Fe	Liberated	21
Fe	Liberated	21
Fe	Liberated	3
Fe	Liberated	9
Fe	Liberated	2
Fe	Liberated	145
Fe	Liberated	5
Fe	Liberated	6
Fe	Liberated	4
Fe	Liberated	20
Fe	Cemented	9
cumo	Liberated	20
Fe	Liberated	7
Fe	Cemented	35
Fe	Liberated	13

Form	Number	Mean	Std-Dev	Range low	Range high
total	100	16.91	20.57	1	145
FeOOH	96	16.91	20.9	2	145
Slag	1	29	ND	29	29
FeSO4	1	18	ND	18	18
CuMO	2	10.5	13.44	1	20

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
FeOOH	95.98	58.91	3.85
Slag	1.71	0.92	2.54
FeSO4	1.06	1.56	2.01
CuMO	1.24	38.61	2.17



FID 18 Laboratory Output

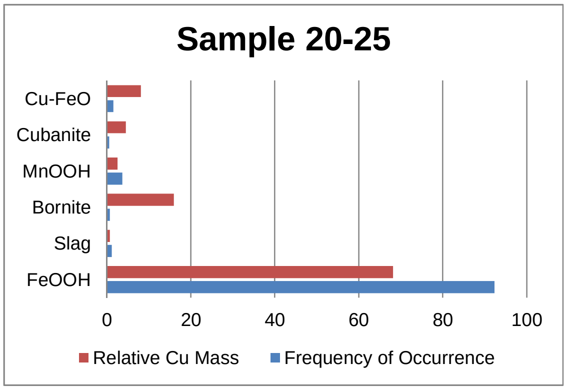
Form	Association	Size (microns)
Fe	Liberated	12
Fe	Liberated	27
Fe	Liberated	48
Fe	Liberated	33
Fe	Liberated	4
Fe	Liberated	6
Fe	Liberated	18
Fe	Liberated	42
Fe	Liberated	23
Fe	Liberated	7
Fe	Cemented	14
Fe	Liberated	32
Fe	Liberated	13
Fe	Liberated	4
Fe	Liberated	13
Fe	Cemented	5
Fe	Cemented	2
Fe	Rimming	8
Fe	Cemented	3
Fe	Liberated	5
Fe	Liberated	10
Fe	Liberated	105
Fe	Liberated	7
Fe	Liberated	6
Fe	Cemented	5
Fe	Cemented	4
Fe	Cemented	3
cumo	Cemented	1
Fe	Cemented	4
Fe	Liberated	5
Fe	Liberated	31

FID 20 Laboratory Output

Form	Association	Size (microns)
Fe	Liberated	35
Fe	Liberated	6
Fe	Liberated	31
Fe	Liberated	40
Fe	Liberated	55
Fe	Liberated	38
Fe	Liberated	26
Fe	Liberated	32
Fe	Liberated	9
Fe	Liberated	16
Fe	Rimming	14
Fe	Cemented	7
Fe	Liberated	23
Fe	Liberated	8
Fe	Liberated	16
Fe	Liberated	21
Fe	Liberated	7
Fe	Cemented	8
Fe	Liberated	30
Fe	Cemented	16
Fe	Rimming	30
Fe	Cemented	22
Slag	Liberated	6
Slag	Liberated	15
Fe	Rimming	30
Fe	Cemented	7
Fe	Cemented	9
Fe	Rimming	14
Fe	Cemented	4
Fe	Rimming	10
Fe	Liberated	7
Fe	Liberated	15
Fe	Rimming	14
Fe	Rimming	19
Fe	Liberated	14
Fe	Liberated	12
Fe	Liberated	19
Fe	Liberated	58
Fe	Cemented	7
Fe	Cemented	7
Fe	Cemented	7
Fe	Cemented	7
Fe	Cemented	7
Fe	Liberated	10
Fe	Liberated	15
born	Cemented	13
Fe	Liberated	23
Fe	Cemented	33
Fe	Liberated	12
Fe	Liberated	8
Fe	Liberated	32
Fe	Liberated	13
Fe	Liberated	15
Mn	Liberated	36
Fe	Rimming	45
Fe	Liberated	9
cub	Cemented	11
Fe	Rimming	19
Fe	Cemented	14
Fe	Rimming	14
Fe	Cemented	7
Fe	Cemented	4
Fe	Liberated	9
Mn	Liberated	4
Mn	Liberated	11
Fe	Liberated	25
Fe	Liberated	32
Fe	Liberated	7
Fe	Liberated	10
Fe	Rimming	12

Form	Number	Mean	Std-Dev	Range low	Range high
total	100	18.28	13.03	4	70
FeOOH	90	18.74	13.34	4	70
Slag	2	10.5	6.36	6	15
Bornite	1	13	ND	13	13
MnOOH	4	17	13.74	4	36
Cubanite	1	11	ND	11	11
Cu-FeO	2	14	9.9	7	21

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
FeOOH	92.29	68.13	5.23
Slag	1.15	0.75	2.09
Bornite	0.71	15.98	1.65
MnOOH	3.72	2.56	3.71
Cubanite	0.6	4.5	1.52
Cu-FeO	1.53	8.09	2.41



FID 20 Laboratory Output

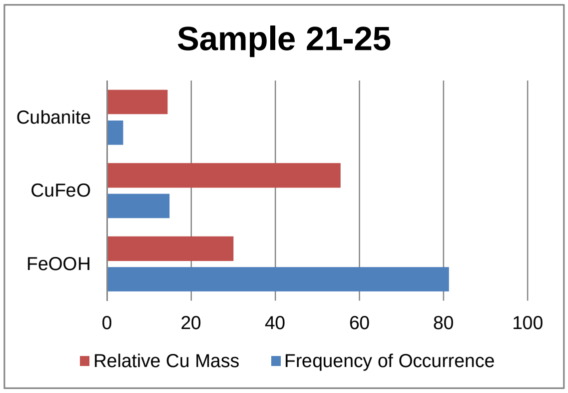
Form	**Association**	**Size (microns)**
Fe	Liberated	11
Fe	Cemented	9
Fe	Cemented	10
Fe	Liberated	42
Fe	Liberated	7
Fe	Liberated	8
Fe	Liberated	18
Fe	Liberated	11
Fe	Liberated	32
cufe	Liberated	21
Fe	Liberated	14
Fe	Liberated	20
Fe	Liberated	22
Fe	Liberated	8
Fe	Cemented	13
Fe	Liberated	11
cufe	Cemented	7
Fe	Liberated	32
Mn	Liberated	17
Fe	Liberated	5
Fe	Liberated	12
Fe	Liberated	12
Fe	Rimming	42
Fe	Cemented	47
Fe	Liberated	18
Fe	Liberated	28
Fe	Liberated	25
Fe	Rimming	30
Fe	Liberated	5
Fe	Liberated	70

FID 21 Laboratory Output

Form	Association	Size (microns)
Fe	Liberated	7
Fe	Liberated	8
Fe	Liberated	18
Fe	Liberated	13
cufe	Liberated	23
Fe	Liberated	11
Fe	Liberated	7
Fe	Liberated	3
Fe	Liberated	3
Fe	Liberated	8
Fe	Liberated	8
Fe	Liberated	13
Fe	Rimming	12
Fe	Liberated	22
Fe	Liberated	8
Fe	Liberated	10
Fe	Liberated	11
Fe	Liberated	5
Fe	Liberated	6
Fe	Cemented	4
Fe	Cemented	3
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Liberated	25
Fe	Rimming	12
Fe	Rimming	27
Fe	Liberated	13
Fe	Cemented	4
cufe	Liberated	23
cufe	Liberated	24
Fe	Liberated	20
Fe	Liberated	18
Fe	Rimming	10
Fe	Rimming	21
Fe	Rimming	5
Fe	Rimming	9
Fe	Liberated	5
Fe	Rimming	27
cufe	Liberated	8
Fe	Liberated	7
cub	Liberated	20
Fe	Liberated	16
Fe	Liberated	22

Form	Number	Mean	Std-Dev	Range low	Range high
total	46	11.39	7.92	1	27
FeOOH	41	10.39	7.53	1	27
CuFeO	4	19.5	7.68	8	24
Cunanite	1	20	ND	20	20

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
FeOOH	81.3	30.05	11.27
CuFeO	14.89	55.55	10.29
Cubanite	3.82	14.41	5.54

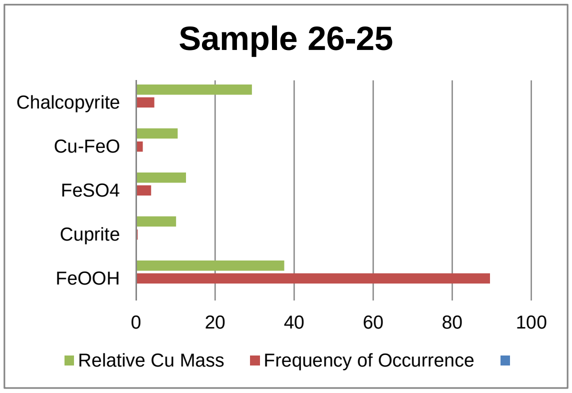


FID 26 Laboratory Output

Form	**Association**	**Size (microns)**
Fe	Liberated	7
cuo	Liberated	1
Fe	Rimming	14
Fe	Liberated	4
Fe	Liberated	5
Fe	Liberated	11
Fe	Liberated	7
Fe	Liberated	7
Fe	Liberated	7
Fe	Liberated	7
Fe	Liberated	7
Fe	Rimming	14
Fe	Liberated	4
Sulf	Liberated	9
Fe	Liberated	4
Fe	Liberated	10
Fe	Rimming	6
Fe	Liberated	4
Fe	Liberated	8
Fe	Liberated	11
Fe	Liberated	14
Fe	Liberated	5
Fe	Liberated	6
Cufe	Liberated	4
Fe	Liberated	4
Fe	Rimming	7
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Liberated	6
Fe	Liberated	9
Fe	Liberated	4
cp	Liberated	11
Fe	Liberated	13

Form	**Number**	**Mean**	**Std-Dev**	**Range low**	**Range high**
total	35	6.8	3.67	1	14
FeOOH	31	6.87	3.62	2	14
Cuprite	1	1	-1.#J	1	1
FeSO4	1	9	-1.#J	9	9
Cu-FeO	1	4	-1.#J	4	4
Chalcopyrite	1	11	-1.#J	11	11

Form	**(linear) freq**	**Rm Cu**	**Error-95%**
%	%	%	
FeOOH	89.5	37.48	10.16
Cuprite	0.42	10.08	2.14
FeSO4	3.78	12.62	6.32
Cu-FeO	1.68	10.51	4.26
Chalcopyrite	4.62	29.31	6.96

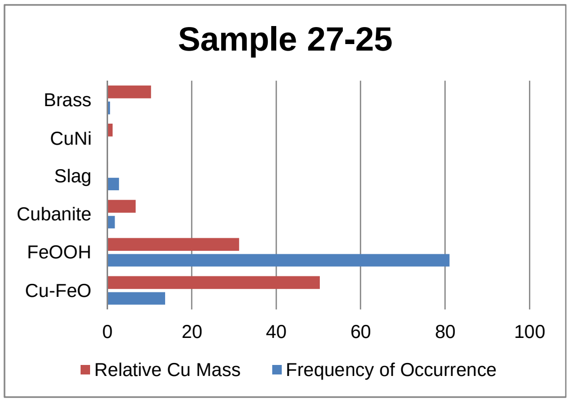


FID 27 Laboratory Output

Form	Association	Size (microns)
cufe	Liberated	13
Fe	Liberated	13
Fe	Rimming	21
Fe	Cemented	65
cub	Liberated	3
cufe	Liberated	12
Fe	Liberated	13
Fe	Liberated	9
cufe	Liberated	10
Fe	Liberated	22
cub	Inclusion	10
Slag	Liberated	45
cub	Inclusion	1
Fe	Liberated	7
cub	Liberated	9
Fe	Liberated	48
Fe	Liberated	28
Fe	Liberated	40
Fe	Liberated	12
Fe	Liberated	30
Fe	Liberated	25
Fe	Liberated	8
Fe	Liberated	41
cufe	Liberated	42
Fe	Rimming	24
Fe	Liberated	10
Fe	Liberated	15
Fe	Liberated	12
Fe	Liberated	23
Fe	Liberated	22
cufe	Liberated	11
cufe	Liberated	10
Fe	Liberated	13
Fe	Liberated	13
Fe	Liberated	11
Fe	Cemented	20
Fe	Liberated	6
Fe	Liberated	40
cub	Liberated	6
cufe	Cemented	22
Fe	Liberated	23
cufe	Liberated	8
cufe	Liberated	10
cuni	Liberated	1
Fe	Liberated	4
Fe	Cemented	8
Fe	Liberated	23
Fe	Liberated	10
cufe	Liberated	32
Fe	Liberated	33
Fe	Cemented	9
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	4
Fe	Cemented	14
Fe	Cemented	25
Fe	Rimming	8
Fe	Cemented	4
Fe	Liberated	24
Fe	Liberated	4
Fe	Liberated	9
Fe	Cemented	11
Fe	Cemented	7
Fe	Rimming	21
Fe	Liberated	13
Fe	Cemented	2
Fe	Cemented	2

Form	Number	Mean	Std-Dev	Range low	Range high
total	103	15.64	13.03	1	65
Cu-FeO	12	18.33	13.02	8	42
FeOOH	83	15.73	12.93	2	65
Cubanite	5	5.8	3.83	1	10
Slag	1	45	ND	45	45
CuNi	1	1	ND	1	1
Brass	1	10	ND	10	10

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
Cu-FeO	13.66	50.32	6.63
FeOOH	81.07	31.2	7.57
Cubanite	1.8	6.71	2.57
Slag	2.79	0.19	3.18
CuNi	0.06	1.24	0.48
Brass	0.62	10.35	1.52



FID 27 Laboratory Output

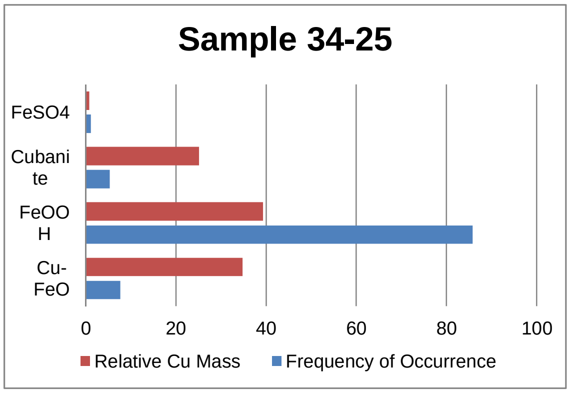
Form	**Association**	**Size (microns)**
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Liberated	33
Fe	Liberated	6
Fe	Liberated	5
Fe	Rimming	11
Fe	Cemented	3
Fe	Cemented	3
Fe	Cemented	3
Fe	Cemented	3
Fe	Liberated	27
Fe	Liberated	25
Fe	Cemented	10
Fe	Cemented	4
Fe	Cemented	17
Fe	Inclusion	14
Fe	Liberated	9
cufe	Liberated	42
cufe	Liberated	8
Fe	Cemented	10
Fe	Cemented	10
Fe	Cemented	16
Fe	Cemented	55
Fe	Liberated	21
Fe	Liberated	9
Fe	Liberated	8
Fe	Rimming	23
Fe	Cemented	14
Fe	Cemented	32
Fe	Liberated	41
Fe	Liberated	8
brass	Rimming	10
Fe	Liberated	15

FID 34 Laboratory Output

Form	Association	Size (microns)
cufe	Liberated	7
Fe	Cemented	12
Fe	Liberated	7
Fe	Liberated	13
Fe	Liberated	14
Fe	Rimming	7
Fe	Cemented	25
Fe	Cemented	6
Fe	Cemented	13
cufe	Liberated	10
Fe	Liberated	35
Fe	Cemented	7
Fe	Rimming	3
Fe	Liberated	16
Fe	Cemented	6
Fe	Cemented	10
Fe	Liberated	8
Fe	Liberated	6
cub	Liberated	60
Fe	Liberated	28
cufe	Liberated	5
Fe	Cemented	11
Fe	Liberated	13
cufe	Liberated	9
Fe	Liberated	40
Fe	Liberated	7
Fe	Liberated	13
Fe	Cemented	4
Fe	Cemented	9
Fe	Liberated	100
Fe	Liberated	11
Fe	Cemented	10
Fe	Cemented	7
Fe	Liberated	9
Fe	Liberated	9
Fe	Liberated	7
cufe	Liberated	9
Fe	Liberated	8
Fe	Liberated	15
Fe	Liberated	7
Fe	Cemented	25
Fe	Cemented	6
Fe	Liberated	12
Fe	Liberated	32
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	2
Fe	Cemented	7
Fe	Cemented	36
Fe	Liberated	48
Fe	Liberated	4
Fe	Liberated	5
Fe	Liberated	42
Fe	Liberated	9
cufe	Liberated	30
Fe	Cemented	12
cufe	Liberated	7
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1

Form	Number	Mean	Std-Dev	Range low	Range high
total	100	11.21	13.92	1	100
Cu-FeO	8	10.75	7.94	5	30
FeOOH	89	10.81	13.61	1	100
Cubanite	1	60	ND	60	60
FeSO4	2	6.5	3.54	4	9

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
Cu-FeO	7.67	34.75	5.22
FeOOH	85.82	39.32	6.84
Cubanite	5.35	25.12	4.41
FeSO4	1.16	0.81	2.1



FID 34 Laboratory Output

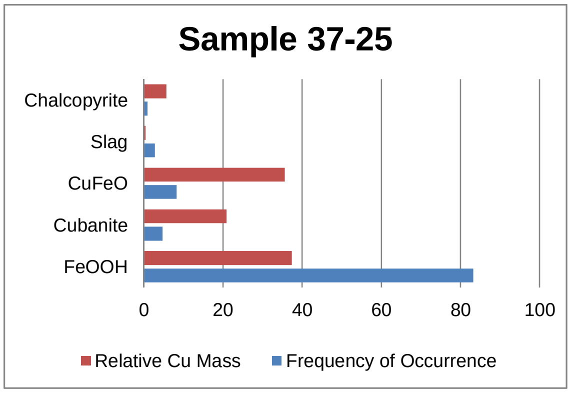
Form	Association	Size (microns)
Fe	Cemented	1
Fe	Cemented	1
Fe	Cemented	1
Fe	Liberated	7
Fe	Cemented	5
Fe	Liberated	8
Fe	Liberated	7
Fe	Cemented	19
Fe	Liberated	3
Fe	Liberated	12
Fe	Cemented	13
Fe	Liberated	11
Fe	Cemented	10
cufe	Liberated	9
Fe	Liberated	15
Fe	Liberated	7
Fe	Cemented	9
Fe	Cemented	13
Sulf	Liberated	9
Fe	Cemented	1
Fe	Cemented	4
Fe	Rimming	13
Sulf	Cemented	4
Fe	Rimming	5
Fe	Liberated	3
Fe	Cemented	2
Fe	Liberated	9
Fe	Cemented	9
Fe	Cemented	4
Fe	Rimming	5
Fe	Cemented	9

FID 37 Laboratory Output

Form	Association	Size (microns)
Fe	Liberated	10
Fe	Liberated	6
Fe	Rimming	25
cub	Liberated	1
Fe	Rimming	13
Fe	Cemented	5
Fe	Liberated	9
Fe	Liberated	12
Fe	Liberated	10
Fe	Liberated	15
Fe	Liberated	5
Fe	Cemented	1
cufe	Liberated	4
cub	Liberated	8
Fe	Liberated	8
Fe	Liberated	9
Fe	Liberated	20
cufe	Cemented	6
Fe	Cemented	11
Slag	Liberated	24
Fe	Liberated	4
Fe	Liberated	14
Fe	Cemented	9
cufe	Liberated	15
Fe	Liberated	9
Fe	Liberated	8
Fe	Liberated	3
Fe	Cemented	16
cufe	Cemented	6
Fe	Cemented	7
Fe	Liberated	21
Fe	Liberated	7
Fe	Rimming	5
Fe	Liberated	9
Fe	Cemented	22
Fe	Liberated	14
Fe	Liberated	18
cub	Liberated	5
cub	Liberated	3
cub	Rimming	4
cufe	Liberated	6
Fe	Liberated	5
Fe	Liberated	9
Fe	Liberated	11
Fe	Liberated	12
Fe	Liberated	11
Fe	Liberated	12
Fe	Rimming	10
Fe	Liberated	14
Fe	Liberated	30
Fe	Cemented	7
Fe	Cemented	5
Fe	Cemented	5
Fe	Cemented	5
Fe	Cemented	5
Fe	Liberated	7
Fe	Liberated	4
Fe	Liberated	5
Fe	Liberated	9
cufe	Liberated	20
Fe	Liberated	25
Fe	Cemented	5
cufe	Cemented	6
cufe	Liberated	7
Fe	Liberated	13
Fe	Liberated	22
Fe	Cemented	7
Fe	Liberated	8
cufe	Liberated	17

Form	Number	Mean	Std-Dev	Range low	Range high
total	101	11.32	7.22	1	40
FeOOH	81	11.74	7.33	1	40
Cubanite	7	7.71	7.39	1	23
CuFeO	10	9.5	5.62	4	20
Slag	2	16	11.31	8	24
Chalcopyrite	1	11	ND	11	11

Form	(linear) freq	Rm Cu	Error-95%
%	%	%	
FeOOH	83.2	37.36	7.29
Cubanite	4.72	20.87	4.14
CuFeO	8.31	35.6	5.38
Slag	2.8	0.42	3.22
Chalcopyrite	0.96	5.75	1.9



FID 37 Laboratory Output

Form	Association	Size (microns)
Fe	Liberated	6
Fe	Cemented	10
Fe	Liberated	14
Fe	Liberated	12
Fe	Rimming	13
Fe	Liberated	40
cp	Cemented	11
Fe	Liberated	24
Fe	Liberated	22
Fe	Liberated	15
Fe	Liberated	10
Fe	Liberated	13
Fe	Liberated	7
Fe	Liberated	14
Fe	Liberated	19
Fe	Liberated	15
Fe	Liberated	9
Fe	Cemented	7
Fe	Liberated	16
Slag	Liberated	8
cufe	Liberated	8
Fe	Liberated	32
Fe	Liberated	7
Fe	Liberated	10
Fe	Liberated	5
Fe	Liberated	4
Fe	Liberated	5
Fe	Liberated	7
Fe	Rimming	28
cub	Liberated	23
cub	Liberated	10
Fe	Liberated	16

Appendix E

Geographic Coordinates and pH
and pCu of Sample Locations

Table E-1
2010 to 2014 Long-Term Sample Locations

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Soil Sample Location	Latitude	Longitude
FID 7	32.67855053	-108.0674777
FID 8	32.66682	-108.092
FID 10	32.7056407	-108.1135094
FID 15	32.69782613	-108.1068607
FID 16	32.69603826	-108.1070997
FID 18	32.67401869	-108.0918219
FID 22	32.66688318	-108.0779728
FID 28	32.66998379	-108.0510906
FID 37	32.70642178	-108.0953737
FID 43	32.65894	-108.08845
FID 101	32.67318231	-108.090994
FID 102	32.66236805	-108.088698
FID 103	32.65527085	-108.0873456
FID 104	32.6645904	-108.0942524
FID 105	32.68730007	-108.1033105
FID 106	32.67276866	-108.0629348
ERA 2	32.68901327	-108.1063857
ERA 3	32.68504508	-108.1047095
ERA 4	32.68905991	-108.0921652
ERA 10	32.68372263	-108.0666094
ERA 13	32.68252837	-108.0489154
Reference Plot #1 (West)	32.70648237	-108.1382839
Reference Plot #2 (North)	32.71301138	-108.1296714
Reference Plot #3 (Northeast)	32.70383081	-108.1111335
Reference Plot #4 (East)	32.68969036	-108.1039554

Notes:
Coordinate System: NAD 1983 State Plane New Mexico West

Table E-2
Coordinates of Sample Locations Included in Interpolations and Maps

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

									Pre-White Rain (pre-2008)				2009	2010		2014	
Location ID	**Alternate ID**	**Source**	**Year Collected**	**Original Soil depth (if not 0-6" were converted to 0-6")[1]**	**Sieving Status**	**"Yes" if inside WB tailings**	**Latitude**	**Longitude**	**Original Cu value**	**Final Adjusted Cu**	**pH**	**pCu**	**pH**	**pH**	**pCu**	**pH**	**pCu**
U04-1131	S96	SRK, 2008	2004	0-6"	2 mm sieve	No	32.66540229	-108.055882	237	237	7.61	8.13					
U04-1132	SS97	SRK, 2008	2006	0-1"	.25 sieve	No	32.75191978	-108.1471355	412	288	5.97	6.38					
U04-1133	SS98	SRK, 2008	2006	0-1"	.25 sieve	No	32.74742739	-108.1249598	475	333	5.97	6.21					
U04-1138	SS103	SRK, 2008	2006	0-1"	.25 sieve	No	32.74429383	-108.1389187	497	348	4.52	4.81					
U04-1139	SS104	SRK, 2008	2006	0-1"	.25 sieve	No	32.75110133	-108.1129991	407	285	5.70	6.14					
U04-1140	SS105	SRK, 2008	2006	0-1"	.25 sieve	No	32.73268075	-108.1381274	226	158	5.49	6.62					
U04-1141	SS106	SRK, 2008	2006	0-1"	.25 sieve	No	32.73144587	-108.124364	531	372	5.50	5.65					
U04-1142	SS107	SRK, 2008	2006	0-1"	.25 sieve	No	32.73323295	-108.0753661	194	136	5.53	6.84					
U04-1144	SS109	SRK, 2008	2006	0-1"	.25 sieve	No	32.72196351	-108.1378727	597	418	6.77	6.70					
U04-1146	SS111	SRK, 2008	2006	0-1"	.25 sieve	No	32.72214363	-108.1025637	551	386	4.80	4.96					
U04-1147	SS112	SRK, 2008	2006	0-1"	.25 sieve	No	32.71713174	-108.0870592	558	391	5.62	5.70					
U04-1150	SS115	SRK, 2008	2006	0-1"	.25 sieve	No	32.7112231	-108.1401569	3800	2660	7.78	5.51					
U04-1151	SS116	SRK, 2008	2006	0-1"	.25 sieve	No	32.71105615	-108.1198787	1460	1022	7.09	5.96					
U04-1152	SS117	SRK, 2008	2006	0-1"	.25 sieve	No	32.70334288	-108.1110735	4450	3115	4.87	2.62					
U04-1154	SS118D	SRK, 2008	2006	0-6"	.25 sieve	No	32.70237095	-108.0936065	259	259	4.99	5.59					
U04-1158	SS121	SRK, 2008	2006	0-1"	.25 sieve	No	32.69413949	-108.0884663	896	627	4.62	4.23					
U04-1159	SS122	SRK, 2008	2006	0-1"	.25 sieve	No	32.69847542	-108.0676521	119	83	5.78	7.63					
U04-1160	SS123	SRK, 2008	2006	0-1"	.25 sieve	No	32.69948724	-108.0381803	449	314	5.74	6.07					
U04-1162	SS124D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.68527714	-108.0920925	523	523	7.56	7.17					
U04-1164	SS125D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.68882207	-108.0809109	166	166	5.22	6.32					
U04-1166	SS127	SRK, 2008	2006	0-1"	.25 sieve	Yes	32.68067489	-108.1055569	1020	1530	6.97	5.39					
U04-1167	SS128	SRK, 2008	2006	0-1"	.25 sieve	No	32.67729767	-108.0909229	454	318	3.97	4.41					
U04-1169	SS129D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.677299	-108.0805078	337	337	4.07	4.43					
U04-1170	SS130	SRK, 2008	2006	0-1"	.25 sieve	No	32.67623991	-108.0749139	227	159	4.81	5.98					
U04-1172	SS131D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.67349226	-108.0622866	444	444	4.76	4.76					
U04-1173	SS132	SRK, 2008	2006	0-1"	.25 sieve	No	32.67638362	-108.0506471	740	518	4.85	4.66					
U04-1175	SS134	SRK, 2008	2006	0-1"	.25 sieve	No	32.67028508	-108.0980149	334	234	3.83	4.63					
U04-1176	SS135	SRK, 2008	2006	0-1"	.25 sieve	No	32.67014008	-108.0828301	325	228	4.10	4.91					
U04-1178	SS137	SRK, 2008	2006	0-1"	.25 sieve	No	32.6623217	-108.083937	309	216	3.62	4.52					
U04-1179	SS138	SRK, 2008	2006	0-1"	.25 sieve	No	32.66069495	-108.0752254	297	208	5.05	5.90					
U04-1180	SS139	SRK, 2008	2006	0-1"	.25 sieve	No	32.66013963	-108.0553804	696	487	4.57	4.47					
U04-1182	SS141	SRK, 2008	2006	0-1"	.25 sieve	Yes	32.65009382	-108.0846326	320	480	3.56	3.55					
U04-1183	SS142	SRK, 2008	2006	0-1"	.25 sieve	No	32.64934479	-108.0746562	392	274	3.69	4.31					
U04-1184	SS143	SRK, 2008	2006	0-1"	.25 sieve	No	32.64831161	-108.0600417	738	517	8.16	7.74					
U04-1186	SS145	SRK, 2008	2006	0-1"	.25 sieve	No	32.63583166	-108.0866406	413	289	2.92	3.54					
U04-1187	SS146	SRK, 2008	2006	0-1"	.25 sieve	No	32.63982697	-108.0812578	710	497	5.58	5.39					
U04-1189	SS148	SRK, 2008	2006	0-1"	.25 sieve	No	32.62556509	-108.0813376	632	442	3.96	4.02					
U04-1197	SS156	SRK, 2008	2006	0-1"	.25 sieve	No	32.59932169	-108.0860226	196	137	5.06	6.39					
U04-1200	ERA159D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.70756028	-108.1384823	809	809	7.59	6.70					
U04-1201	ERA160D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.69849133	-108.1381535	34	34	7.60	10.35					
U04-1202	ERA161D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.6897467	-108.1382089	556	556	7.85	7.37					
U04-1203	ERA162	SRK, 2008	2006	0-1"	.25 sieve	No	32.76541334	-108.1026024	218	153	6.49	7.59					
U04-1204	ERA163	SRK, 2008	2006	0-1"	.25 sieve	No	32.76906989	-108.1082783	208	146	6.95	8.08					
U04-1205	ERA164	SRK, 2008	2006	0-1"	.25 sieve	No	32.74354342	-108.0095505	136	95	5.62	7.33					
U04-1206	ERA165	SRK, 2008	2006	0-1"	.25 sieve	No	32.74909591	-108.0257729	177	124	6.90	8.21					
U05-4001	HR-01	Chino, 1995	1995	0-1"	not sieved	No	32.76440757	-108.1714475	318	286	5.51	5.96					
U05-4004	HR-02	Chino, 1995	1995	0-1"	not sieved	No	32.75980088	-108.1823783	216	194	5.07	5.99					

Notes:

[1] All sieved 0-6" soils were sieved to < 2 mm. All sieved 0-1" soils were sieved to < 0.25 mm. Ratio used to convert Cu concentration of 0-1" sieved at <0.25 mm soils to 0-6" sieved at < 2 mm soils is from Appendix A (median ratio of SS samples) of ARCADIS (2011)(note: no conversion needed for pH since median ratio and slope = 1.0). Multiplied Cu concentration by 0.7 if outside windblown tailings and by 1.5 if inside windblown tailings. If unsieved, multiplied by 0.9 if outside windblown tailings and by 1.3 if inside windblown tailings. The 0.9 and 1.3 are from median ratios of unsieved 0-1" soil in 2009 lab reports (at 25 m on transect) compared to sieved 0-6" co-located soil in Drexler lab report in Appendix D for soils in and outside of windblown tailings, respectively (FID 8, 18, 20 in tailings). If have pH from unsieved soil, multiply by 1.06 to convert from 0 to 1" to 0 to 6" unsieved soils (using Hurley data in Chino 1995), and then used equation in Figure 6 to adjust unsieved 0-6" to 2 mm sieved fraction of 0-6" soil: Sieved = 1.19*unsieved - 1.5781.

Darker shaded 0-1" depths were inside windblown tailings.

References

ARCADIS. 2010. AOC Terrestrial Invertebrate Copper Bioaccumulation and Bioavailability Study. Smelter/Tailing Soils Investigation Unit. Prepared for Freeport-McMoRan Chino Mines Company, Vanadium, New Mexico. (composite of 15 samples in 100-m radius plot).

Chino, 1995. Administrative Order on Consent, Investigation Area, Remedial Investigation Background Report, Chino Mines Investigation Area. Prepared by Chino Mines Company, Hurley, New Mexico. Department received 28 October 1995. (one grab sample).

Newfields. 2005. Chino Mines Administrative Order on Consent Site-wide Ecological Risk Assessment. Prepared for Chino Mines Company. November. (average of 3 samples on 50-m transect).

SRK, Inc. 2008. "Chino Mines Company, Hurley, New Mexico Administrative Order on Consent,Revised Remedial Investigation Report, Smelter/Tailing Soils Investigation Unit." Revision 2. February 6. (method was composite of 6 random subsamples in 100' x 100' area)

Table E-2
Coordinates of Sample Locations Included in Interpolations and Maps

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

									Pre-White Rain (pre-2008)				2009	2010		2014	
Location ID	Alternate ID	Source	Year Collected	Original Soil depth (if not 0-6" were converted to 0-6")[1]	Sieving Status	"Yes" if inside WB tailings	Latitude	Longitude	Original Cu value	Final Adjusted Cu	pH	pCu	pH	pH	pCu	pH	pCu
2001	U01-2001	Chino 1995	1995	0-1"	not sieved	No	32.80008016	-108.0435679	170	153	6.10	7.23					
2002	U01-2002	Chino 1995	1995	0-1"	not sieved	No	32.80119161	-108.0298614	186	167	8.95	9.78					
2003	U01-2003	Chino 1995	1995	0-1"	not sieved	No	32.79586031	-108.0268491	294	265	4.87	5.45					
2004	U01-2004	Chino 1995	1995	0-1"	not sieved	No	32.79775953	-108.0290338	172	155	4.74	5.95					
2005	U01-2005	Chino 1995	1995	0-1"	not sieved	No	32.79125757	-108.0264252	152	137	8.61	9.69					
2006	U01-2006	Chino 1995	1995	0-1"	not sieved	No	32.78816381	-108.0257992	150	135	4.12	5.53					
2007	U01-2007	Chino 1995	1995	0-1"	not sieved	No	32.78334987	-108.0259998	88	79	6.85	8.68					
2008	U01-2008	Chino 1995	1995	0-1"	not sieved	No	32.78334146	-108.0260041	214	193	5.69	6.58					
2009	U01-2009	Chino 1995	1995	0-1"	not sieved	No	32.78001897	-108.0443108	204	184	6.67	7.55					
2010	U01-2010	Chino 1995	1995	0-1"	not sieved	No	32.79412138	-108.0249325	199	179	4.72	5.76					
2011	U01-2011	Chino 1995	1995	0-1"	not sieved	No	32.7907745	-108.0233733	146	131	5.18	6.55					
2012	U01-2012	Chino 1995	1995	0-1"	not sieved	No	32.79980341	-108.0243482	69	62	7.30	9.38					
ERA01		Newfields 2005	2005	0-6"	2 mm sieve	No	32.69852048	-108.114054	3517	3517	4.47	2.10					
ERA02		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)/this report (2014)	1999, 2010, 2014	0-6"	2 mm sieve	Yes	32.68901327	-108.1063857	811	811	4.80	4.10				6.00	4.98
ERA03		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)/this report (2014)	1999, 2010, 2014	0-6"	2 mm sieve	Yes	32.68504508	-108.1047095	709	709	4.97	4.41		6.50	6.00	5.90	5.37
ERA04		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)/this report (2014)	1999, 2010, 2014	0-6"	2 mm sieve	Yes	32.68905991	-108.0921652	541	541	4.83	4.60		6.30	6.03	5.40	5.08
ERA05		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	No	32.68915546	-108.0911448	421	421	6.54	6.48		6.40	7.00		
ERA06		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	No	32.69904658	-108.0957667	499	499	6.67	6.40		6.30	5.80		
ERA07		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	Yes	32.67583102	-108.0998132	789	789	5.47	4.75		6.70	5.90		
ERA08		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	Yes	32.67493886	-108.1031287	710	710	6.97	6.27		7.00	6.40		
ERA09		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	No	32.68635775	-108.0728992	562	562	4.35	4.10		4.60	5.10		
ERA10		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)/this report (2014)	1999, 2010, 2014	0-6"	2 mm sieve	No	32.68372263	-108.0666094	485	485	4.53	4.45		5.40	6.30	5.30	5.67
ERA11		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	No	32.65669417	-108.0609862	276	276	7.73	8.07		7.00	7.40		
ERA12		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	No	32.64590072	-108.0636424	204	204	7.77	8.44		7.80	8.40		
ERA13		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)/this report (2014)	1999, 2010, 2014	0-6"	2 mm sieve	No	32.68252837	-108.0489154	126	126	4.78	6.22		6.30	7.20	5.50	5.97
ERA14		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	No	32.64297845	-108.1187113	109	109	7.73	9.14		7.50	8.70		
ERA15		Newfields 2005 (pre 2008)/ARCADIS 2010 (2010)	1999, 2010	0-6"	2 mm sieve	No	32.7061957	-108.1406131	712	712	7.73	6.98		7.80	7.40		
ERA16		Newfields 2005	1999	0-6"	2 mm sieve	No	32.61082558	-108.1969186	77	77	6.10	8.02					
ERA17		Newfields 2005	1999	0-6"	2 mm sieve	No	32.61311818	-108.1920758	57	57	5.63	7.93					
ERA18		Newfields 2005	1999	0-6"	2 mm sieve	No	32.61412551	-108.1867633	73	73	6.07	8.04					
ERA19		Newfields 2005	1999	0-6"	2 mm sieve	No	32.60926575	-108.1838475	62	62	6.68	8.80					
ERA20		Newfields 2005	1999	0-6"	2 mm sieve	No	32.60891223	-108.1854341	45	45	7.73	10.15					
ERA21		Newfields 2005	1999	0-6"	2 mm sieve	No	32.60798024	-108.1874537	48	48	6.20	8.65					
ERA22		Newfields 2005	1999	0-6"	2 mm sieve	No	32.71254866	-108.1217547	1120	1120	7.50	6.24					
ERA23		Newfields 2005	1999	0-6"	2 mm sieve	Yes	32.68665743	-108.1001054	973	973	5.27	4.33					
ERA24		Newfields 2005	1999	0-6"	2 mm sieve	No	32.68975703	-108.0660367	63	63	5.33	7.54					
ERA25		Newfields 2005	1999	0-6"	2 mm sieve	No	32.6728881	-108.0460747	70	70	7.73	9.64					
ERA26		Newfields 2005	1999	0-6"	2 mm sieve	Yes	32.67710086	-108.0985397	535	535	4.23	4.05					
ERA27		Newfields 2005	1999	0-6"	2 mm sieve	No	32.61827975	-108.0861412	328	328	5.77	6.04					
ERA28		Newfields 2005	1999	0-6"	2 mm sieve	No	32.74719308	-108.1298187	1060	1060	7.53	6.34					
ERA29		Newfields 2005	1999	0-6"	2 mm sieve	No	32.79689403	-108.100408	460	460	7.43	7.20					
ERA30		Newfields 2005	1999	0-6"	2 mm sieve	No	32.7793464	-108.0220581	102	102	7.53	9.02					
ERA31		Newfields 2005	1999	0-6"	2 mm sieve	No	32.57969114	-108.0457504	78	78	7.73	9.53					
ERA32		Newfields 2005	1999	0-6"	2 mm sieve	No	32.77698681	-108.1075358	419	419	7.60	7.46					
ERA33		Newfields 2005	1999	0-6"	2 mm sieve	No	32.76545661	-108.1160531	176	176	6.60	7.53					
ERA34		Newfields 2005	1999	0-6"	2 mm sieve	No	32.77744919	-108.0296384	57	57	6.20	8.46					
FID 0		this report	2009	0-6"	2 mm sieve		32.6953	-108.14707					7.12				
FID 1		this report	2009	0-6"	2 mm sieve		32.71892	-108.02474					7.02				
FID 10		this report	2009	0-6"	2 mm sieve		32.7056407	-108.1135094					6.35	4.8	3.03	4.70	2.69
FID 101		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.67318231	-108.090994						4.2	4.34	3.90	4.47
FID 102		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.66236805	-108.088698						3.8	4.11	3.50	4.11
FID 103		this report	2009, 2010	0-6"	2 mm sieve		32.65527085	-108.0873456						4	4.05		
FID 104		this report	2009, 2010	0-6"	2 mm sieve		32.6645904	-108.0942524						3.8	3.83		
FID 105		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.68730007	-108.1033105						5.6	4.23	4.50	3.79
FID 106		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.67276866	-108.0629348						5	4.95	4.40	4.25
FID 12		this report	2009	0-6"	2 mm sieve		32.69557	-108.11226					7.32				
FID 13		this report	2009	0-6"	2 mm sieve		32.69598	-108.11115					7.14				

Table E-2
Coordinates of Sample Locations Included in Interpolations and Maps

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

									Pre-White Rain (pre-2008)				2009	2010		2014	
Location ID	Alternate ID	Source	Year Collected	Original Soil depth (if not 0-6" were converted to 0-6")[1]	Sieving Status	"Yes" if inside WB tailings	Latitude	Longitude	Original Cu value	Final Adjusted Cu	pH	pCu	pH	pH	pCu	pH	pCu
FID 15		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.69782613	-108.1068607					6.91	4.9	2.89	5.60	3.90
FID 16		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.69603826	-108.1070997					5.24	4.8	2.40	4.80	3.44
FID 17		this report	2009	0-6"	2 mm sieve		32.6978	-108.11351					6.18				
FID 18		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.67401869	-108.0918219					4.85	3.9	3.69	4.20	4.65
FID 2		this report	2009	0-6"	2 mm sieve		32.700015	-108.04933					6.75				
FID 20		this report	2009	0-6"	2 mm sieve		32.68451	-108.10315					5.98				
FID 21		this report	2009	0-6"	2 mm sieve		32.686856	-108.07329					7.34				
FID 22		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.66688318	-108.0779728					5.78	6.5	6.27	6.90	6.93
FID 23		this report	2009	0-6"	2 mm sieve		32.6568	-108.08405					4.36				
FID 24		this report	2009	0-6"	2 mm sieve		32.59025	-108.04998					8.05				
FID 25		this report	2009	0-6"	2 mm sieve		32.59951	-108.06337					8.17				
FID 26		this report	2009	0-6"	2 mm sieve		32.58858	-108.0474					8.02				
FID 27		this report	2009	0-6"	2 mm sieve		32.73268	-108.132					7.11				
FID 28		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.66998379	-108.0510906					6.81	7.7	7.29	7.30	7.17
FID 3		this report	2009	0-6"	2 mm sieve		32.64739	-108.11628					7.96				
FID 30		this report	2009	0-6"	2 mm sieve		32.68964	-108.14886					8.11				
FID 31		this report	2009	0-6"	2 mm sieve		32.61116	-108.06492					6.57				
FID 32		this report	2009	0-6"	2 mm sieve		32.71212	-108.14642					6.24				
FID 33		this report	2009	0-6"	2 mm sieve		32.64202	-108.07249					6.61				
FID 34		this report	2009	0-6"	2 mm sieve		32.7047	-108.15557					7.38				
FID 35		this report	2009	0-6"	2 mm sieve		32.69806	-108.03871					7.66				
FID 37		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.70642178	-108.0953737					5.40	4.8	3.64	4.70	4.16
FID 39		this report	2009	0-6"	2 mm sieve		32.72701	-108.12251					7.14				
FID 4		this report	2009	0-6"	2 mm sieve		32.73449	-108.12495					7.42				
FID 43		this report	2009, 2010	0-6"	2 mm sieve		32.65894	-108.08845					4.37	6.5	5.96		
FID 6		this report	2009	0-6"	2 mm sieve		32.70373	-108.14667					6.60				
FID 7		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.67855053	-108.0674777					6.89	5.4	5.11	5.10	4.96
FID 8		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.66682	-108.092					5.47	6.5	6.14	4.60	4.54
R-01	U06-3016	Chino, 1995	1995	0-1"	not sieved	No	32.65301589	-108.2049927	79	71	5.95	7.97					
R-03	U06-3026	Chino, 1995	1995	0-1"	not sieved	No	32.68638036	-108.1923896	170	153	8.30	9.27					
R-05	U06-3015	Chino, 1995	1995	0-1"	not sieved	No	32.66953229	-108.2051172	186	167	6.56	7.55					
R-07	U06-3024	Chino, 1995	1995	0-1"	not sieved	No	32.66477181	-108.1606266	207	186	8.51	9.25					
R-08	U06-3028	Chino, 1995	1995	0-1"	not sieved	No	32.65742282	-108.1905159	114	103	6.81	8.35					
R-12	U06-3030	Chino, 1995	1995	0-1"	not sieved	No	32.6330853	-108.1786698	73	66	7.72	9.71					
R-14	U06-3037	Chino, 1995	1995	0-1"	not sieved	No	32.62964588	-108.1538365	43	39	7.96	10.54					
Reference Plot #1		this report	2009, 2010, 2014	0-6"	2 mm sieve		32.70648237	-108.1382839					7.61	7.76	5.75	8.00	6.98
Reference Plot #2		this report	2010, 2014	0-6"	2 mm sieve		32.71301138	-108.1296714						6.43	5.48	6.20	5.48
Reference Plot #3		this report	2010, 2014	0-6"	2 mm sieve		32.70383081	-108.1111335						5.31	3.18	5.40	3.92
Reference Plot #4		this report	2010, 2014	0-6"	2 mm sieve		32.68969036	-108.1039554						5.28	3.72	4.90	3.93
S78	U04-1113	SRK 2008	2004	0-6"	2 mm sieve	No	32.62222938	-108.1270725	207	207	7.79	8.45					
S79	U04-1114	SRK 2008	2004	0-6"	2 mm sieve	No	32.62209147	-108.1108193	157	157	7.95	8.92					
SS100	U04-1135	SRK 2008	2006	0-1"	.25 sieve	No	32.76321419	-108.0650925	234	164	6.17	7.21					
SS101	U04-1136	SRK 2008	2006	0-1"	.25 sieve	No	32.76084825	-108.0469138	206	144	6.95	8.09					
SS102	U04-1137	SRK 2008	2006	0-1"	.25 sieve	No	32.7708121	-108.0241219	201	141	5.76	7.01					
SS108	U04-1143	SRK 2008	2006	0-1"	.25 sieve	No	32.73496501	-108.0302108	252	176	6.62	7.55					
SS110	U04-1145	SRK 2008	2006	0-1"	.25 sieve	No	32.72500445	-108.1269495	692	484	7.39	7.10					
SS113	U04-1148	SRK 2008	2006	0-1"	.25 sieve	No	32.73708481	-108.0612137	209	146	6.93	8.05					
SS114	U04-1149	SRK 2008	2006	0-1"	.25 sieve	No	32.72776321	-108.0339913	119	83	6.92	8.69					
SS119D	U04-1148	SRK 2008	2006	0-6"	2 mm sieve	No	32.72237092	-108.0570041	125	125	6.10	7.46					
SS120	U04-1149	SRK 2008	2006	0-1"	.25 sieve	No	32.70660545	-108.0349796	119	83	7.18	8.93					
SS149	U04-1190	SRK 2008	2006	0-1"	.25 sieve	No	32.62478889	-108.0724029	628	440	8.16	7.93					
SS150	U04-1191	SRK 2008	2006	0-1"	.25 sieve	No	32.62480828	-108.0589678	605	424	8.06	7.88					
SS151	U04-1192	SRK 2008	2006	0-1"	.25 sieve	No	32.61697541	-108.1193069	259	181	7.97	8.77					
SS152	U04-1193	SRK 2008	2006	0-1"	.25 sieve	No	32.61314892	-108.1027049	237	166	8.24	9.13					
SS153	U04-1194	SRK 2008	2006	0-1"	.25 sieve	No	32.61154015	-108.0861817	438	307	6.78	7.06					
SS154	U04-1195	SRK 2008	2006	0-1"	.25 sieve	No	32.61334764	-108.073191	372	260	7.75	8.15					
SS155	U04-1196	SRK 2008	2006	0-1"	.25 sieve	No	32.61358271	-108.0593351	387	271	8.10	8.43					
SS157	U04-1198	SRK 2008	2006	0-1"	.25 sieve	No	32.59897344	-108.0725214	141	99	8.09	9.58					

Table E-2
Coordinates of Sample Locations Included in Interpolations and Maps

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

									Pre-White Rain (pre-2008)				2009	2010		2014	
Location ID	Alternate ID	Source	Year Collected	Original Soil depth (if not 0-6" were converted to 0-6")[1]	Sieving Status	"Yes" if inside WB tailings	Latitude	Longitude	Original Cu value	Final Adjusted Cu	pH	pCu	pH	pH	pCu	pH	pCu
SS158	U04-1199	SRK 2008	2006	0-1"	.25 sieve	No	32.59929209	-108.0581835	247	173	7.98	8.84					
SS99	U04-1134	SRK 2008	2006	0-1"	.25 sieve	No	32.75855967	-108.092432	93	65	5.77	7.91					
STS-SS-2010-016		this report	2010	0-6"	2 mm sieve		32.706988	-108.112068						4.90	3.80		
STS-SS-2010-017		this report	2010	0-6"	2 mm sieve		32.697138	-108.108012						6.00	4.10		
STS-SS-2010-018		this report	2010	0-6"	2 mm sieve		32.703877	-108.10829						6.00	4.90		
T-01	U06-3007	Chino, 1995	1995	0-1"	not sieved	Yes	32.68030028	-108.104904	1330	1729	5.90	4.26					
T-03	U06-3022	Chino, 1995	1995	0-1"	not sieved	No	32.6424394	-108.0839285	554	499	5.84	5.63					
T-04	U06-3008	Chino, 1995	1995	0-1"	not sieved	Yes	32.66282815	-108.093958	549	714	2.31	1.93					
T-05	U06-3018	Chino, 1995	1995	0-1"	not sieved	No	32.65977257	-108.0840418	543	489	3.47	3.44					
T-08	U06-3012	Chino, 1995	1995	0-1"	not sieved	No	32.63507853	-108.0852333	647	582	6.73	6.28					
T-09	U06-3013	Chino, 1995	1995	0-1"	not sieved	No	32.62830215	-108.0801244	645	581	7.14	6.66					
T-12	U06-3003	Chino, 1995	1995	0-1"	not sieved	No	32.60805227	-108.0947345	216	194	7.78	8.52					
T-15	U06-3001	Chino, 1995	1995	0-1"	not sieved	No	32.65513424	-108.1251809	773	696	7.92	7.18					
U04-1001		Chino, 1995	1995	0-1"	not sieved	No	32.70333294	-108.111166	3560	3204	5.28	2.97					
U04-1002		Chino, 1995	1995	0-1"	not sieved	No	32.69477762	-108.1099717	5240	4716	4.75	2.03					
U04-1003		Chino, 1995	1995	0-1"	not sieved	Yes	32.68838883	-108.1093604	1880	2444	7.38	5.23					
U04-1004		Chino, 1995	1995	0-1"	not sieved	No	32.69391643	-108.1023049	1140	1140	5.12	4.01					
U04-1007		Chino, 1995	1995	0-1"	not sieved	No	32.7046106	-108.0926108	845	761	3.69	3.15					
U04-1008		Chino, 1995	1995	0-1"	not sieved	No	32.70130525	-108.1008324	644	580	4.40	4.12					
U04-1009		Chino, 1995	1995	0-1"	not sieved	No	32.69730516	-108.0936941	803	723	3.75	3.25					
U04-1010		Chino, 1995	1995	0-1"	not sieved	No	32.68911098	-108.0918883	1230	1107	5.31	4.22					
U04-1011		Chino, 1995	1995	0-1"	not sieved	No	32.68824992	-108.1002775	990	891	3.40	2.69					
U04-1012		Chino, 1995	1995	0-1"	not sieved	No	32.69574066	-108.0661595	309	278	6.23	6.66					
U04-1013		Chino, 1995	1995	0-1"	not sieved	No	32.69708305	-108.0746109	521	469	4.49	4.44					
U04-1014		Chino, 1995	1995	0-1"	not sieved	No	32.7046385	-108.0741387	504	454	4.53	4.52					
U04-1015		Chino, 1995	1995	0-1"	not sieved	No	32.69051559	-108.057494	330	297	5.85	6.23					
U04-1016		Chino, 1995	1995	0-1"	not sieved	No	32.6878586	-108.0740262	922	830	4.04	3.36					
U04-1017		Chino, 1995	1995	0-1"	not sieved	No	32.70256947	-108.0531671	216	194	6.05	6.91					
U04-1018		Chino, 1995	1995	0-1"	not sieved	No	32.77809698	-108.1069584	175	158	5.31	6.46					
U04-1019		Chino, 1995	1995	0-1"	not sieved	No	32.69572173	-108.0365271	245	221	5.94	6.66					
U04-1020		Chino, 1995	1995	0-1"	not sieved	No	32.69772166	-108.0456939	436	392	4.63	4.78					
U04-1021		Chino, 1995	1995	0-1"	not sieved	No	32.68863839	-108.0381111	280	252	5.76	6.34					
U04-1022		Chino, 1995	1995	0-1"	not sieved	No	32.72119372	-108.1184431	1790	1611	5.20	3.68					
U04-1023		Chino, 1995	1995	0-1"	not sieved	No	32.71041593	-108.1254436	3410	3069	8.25	5.78					
U04-1024		Chino, 1995	1995	0-1"	not sieved	No	32.70486094	-108.1386937	2040	1836	7.87	6.02					
U04-1025		Chino, 1995	1995	0-1"	not sieved	No	32.69891646	-108.1375552	2490	2241	7.19	5.15					
U04-1028		Chino, 1995	1995	0-1"	not sieved	No	32.68936124	-108.1391106	1340	1206	6.66	5.37					
U04-1029		Chino, 1995	1995	0-1"	not sieved	No	32.68866687	-108.1446941	372	335	8.64	8.69					
U04-1030		Chino, 1995	1995	0-1"	not sieved	No	32.69616692	-108.1475271	837	753	8.27	7.42					
U04-1031		Chino, 1995	1995	0-1"	not sieved	No	32.70513876	-108.1473049	1740	1566	6.99	5.38					
U04-1032		Chino, 1995	1995	0-1"	not sieved	No	32.70483316	-108.1561661	1040	936	7.92	6.84					
U04-1033		Chino, 1995	1995	0-1"	not sieved	No	32.69758348	-108.1559994	562	506	8.78	8.34					
U04-1034		Chino, 1995	1995	0-1"	not sieved	No	32.68923044	-108.1566113	424	382	8.65	8.55					
U04-1035	S1	SRK, 2008	2004	0-1"	.25 sieve	No	32.71733691	-108.1269036	1240	868	4.65	3.88					
U04-1036	S2	SRK, 2008	2004	0-1"	.25 sieve	No	32.71663325	-108.1236833	625	438	6.03	5.95					
U04-1037	S3	SRK, 2008	2004	0-1"	.25 sieve	No	32.71386667	-108.1301655	2110	1477	4.89	3.50					
U04-1038	S4	SRK, 2008	2004	0-1"	.25 sieve	No	32.71387737	-108.1269181	7990	5593	5.36	2.40					
U04-1039	S5	SRK, 2008	2004	0-1"	.25 sieve	No	32.71388795	-108.1236708	1140	798	4.22	3.58					
U04-1040	S6	SRK, 2008	2004	0-1"	.25 sieve	No	32.71109975	-108.1366473	3670	2569	6.72	4.56					
U04-1041	S7	SRK, 2008	2004	0-1"	.25 sieve	No	32.71111059	-108.1334001	4760	3332	7.83	5.29					
U04-1042	S8	SRK, 2008	2004	0-1"	.25 sieve	No	32.71112137	-108.1301528	6100	4270	7.30	4.52					
U04-1043	S9	SRK, 2008	2004	0-1"	.25 sieve	No	32.71113206	-108.1269055	4950	3465	7.57	5.01					
U04-1044	S10	SRK, 2008	2004	0-1"	.25 sieve	No	32.71114267	-108.1236583	6090	4263	7.30	4.52					
U04-1045	S11	SRK, 2008	2004	0-1"	.25 sieve	No	32.70834351	-108.1398816	3880	2716	7.92	5.61					
U04-1046	S12	SRK, 2008	2004	0-1"	.25 sieve	No	32.70835445	-108.1366344	3160	2212	7.84	5.77					
U04-1047	S13	SRK, 2008	2004	0-1"	.25 sieve	No	32.70908851	-108.1332847	5920	4144	7.73	4.95					
U04-1048	S14	SRK, 2008	2004	0-1"	.25 sieve	No	32.7085135	-108.1301406	8030	5621	7.87	4.73					

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Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

									Pre-White Rain (pre-2008)				2009	2010		2014	
Location ID	Alternate ID	Source	Year Collected	Original Soil depth (if not 0-6" were converted to 0-6")[1]	Sieving Status	"Yes" if inside WB tailings	Latitude	Longitude	Original Cu value	Final Adjusted Cu	pH	pCu	pH	pH	pCu	pH	pCu
U04-1049	S15	SRK, 2008	2004	0-1"	.25 sieve	No	32.70852419	-108.1268934	12100	8470	7.94	4.32					
U04-1050	S16	SRK, 2008	2004	0-1"	.25 sieve	No	32.70839737	-108.1236458	8310	5817	7.08	3.96					
U04-1051	S17	SRK, 2008	2004	0-1"	.25 sieve	No	32.70559821	-108.1398686	4650	3255	7.84	5.33					
U04-1052	S18	SRK, 2008	2004	0-1"	.25 sieve	No	32.70560915	-108.1366215	3670	2569	7.92	5.68					
U04-1053	S19	SRK, 2008	2004	0-1"	.25 sieve	No	32.70561885	-108.1338621	5660	3962	7.72	4.99					
U04-1054	S20	SRK, 2008	2004	0-1"	.25 sieve	No	32.70285291	-108.1398556	4240	2968	7.89	5.48					
U04-1055	S21	SRK, 2008	2004	0-1"	.25 sieve	No	32.70286385	-108.1366086	6670	4669	7.92	4.99					
U04-1056	S22	SRK, 2008	2004	0-1"	.25 sieve	No	32.70287354	-108.1338493	5210	3647	7.68	5.05					
U04-1057	S23	SRK, 2008	2004	0-1"	.25 sieve	No	32.70010763	-108.1398426	3030	2121	7.08	5.12					
U04-1058	S24	SRK, 2008	2004	0-1"	.25 sieve	No	32.70011855	-108.1365958	3910	2737	6.87	4.63					
U04-1059	S25	SRK, 2008	2004	0-1"	.25 sieve	No	32.70012761	-108.1340966	4630	3241	7.84	5.34					
U04-1060	S26	SRK, 2008	2004	0-1"	.25 sieve	No	32.69736233	-108.1398296	2600	1820	6.59	4.84					
U04-1061	S27	SRK, 2008	2004	0-1"	.25 sieve	No	32.69737327	-108.1365829	3150	2205	7.29	5.27					
U04-1062	S28	SRK, 2008	2004	0-1"	.25 sieve	No	32.69778781	-108.1337556	5840	4088	7.99	5.21					
U04-1063	S29	SRK, 2008	2004	0-1"	.25 sieve	No	32.69461702	-108.1398167	1690	1183	7.34	6.03					
U04-1064	S30	SRK, 2008	2004	0-1"	.25 sieve	No	32.69462796	-108.13657	2350	1645	7.87	6.14					
U04-1065	S31	SRK, 2008	2004	0-1"	.25 sieve	No	32.69463988	-108.1328682	3120	2184	7.94	5.88					
U04-1066	S32	SRK, 2008	2004	0-1"	.25 sieve	No	32.68959262	-108.13104	2440	1708	7.97	6.19					
U04-1067	S33	SRK, 2008	2004	0-6"	2 mm sieve	No	32.68982493	-108.1274216	2570	1799	7.94	6.10					
U04-1068	S34	SRK, 2008	2004	0-1"	.25 sieve	No	32.68928766	-108.1242792	4340	3038	8.02	5.58					
U04-1069	S35	SRK, 2008	2004	0-1"	.25 sieve	No	32.70387193	-108.1129101	3270	2289	4.47	2.60					
U04-1070	S36	SRK, 2008	2004	0-1"	.25 sieve	No	32.70437429	-108.1101669	3970	2779	5.29	3.14					
U04-1071	S37	SRK, 2008	2004	0-1"	.25 sieve	No	32.70177084	-108.1134075	1900	1330	7.67	6.20					
U04-1072	S38	SRK, 2008	2004	0-1"	.25 sieve	No	32.70167006	-108.1099717	4280	2996	4.70	2.51					
U04-1073	S39	SRK, 2008	2004	0-1"	.25 sieve	No	32.70195507	-108.1067256	2470	1729	4.46	2.91					
U04-1074	S40	SRK, 2008	2004	0-1"	.25 sieve	No	32.70163255	-108.1035219	3610	2527	4.50	2.51					
U04-1075	S41	SRK, 2008	2004	0-1"	.25 sieve	No	32.69891449	-108.1132064	8170	5719	4.58	1.65					
U04-1076	S42	SRK, 2008	2004	0-1"	.25 sieve	No	32.69892675	-108.1090494	5780	4046	4.61	2.08					
U04-1077	S43	SRK, 2008	2004	0-1"	.25 sieve	No	32.69893492	-108.1067128	2230	1561	4.42	2.99					
U04-1078	S44	SRK, 2008	2004	0-1"	.25 sieve	No	32.69894497	-108.103466	908	636	5.17	4.73					
U04-1080	S45	SRK, 2008	2004	0-1"	.25 sieve	No	32.69618733	-108.1138419	8270	5789	4.91	1.94					
U04-1081	S56	SRK, 2008	2004	0-1"	.25 sieve	No	32.69070905	-108.1034304	1490	1043	5.70	4.65					
U04-1082	S46	SRK, 2008	2004	0-1"	.25 sieve	No	32.6960246	-108.1116732	9000	6300	5.89	2.76					
U04-1083	S47	SRK, 2008	2004	0-1"	.25 sieve	No	32.6959845	-108.1073659	7990	5593	4.85	1.93					
U04-1084	S48	SRK, 2008	2004	0-1"	.25 sieve	No	32.69619966	-108.1034541	2520	1764	4.40	2.84					
U04-1085	S49	SRK, 2008	2004	0-1"	.25 sieve	No	32.69342387	-108.1131821	5430	3801	6.56	3.96					
U04-1086	S50	SRK, 2008	2004	0-1"	.25 sieve	No	32.69458855	-108.1099391	272	190	7.38	8.17					
U04-1087	S51	SRK, 2008	2004	0-1"	.25 sieve	No	32.69363315	-108.1066761	3790	2653	4.92	2.85					
U04-1088	S52	SRK, 2008	2004	0-1"	.25 sieve	No	32.69375562	-108.1034324	1540	1078	4.69	3.67					
U04-1089	S53	SRK, 2008	2004	0-1"	.25 sieve	No	32.69110526	-108.1125128	7880	5516	7.36	4.28					
U04-1090	S54	SRK, 2008	2004	0-1"	.25 sieve	No	32.69069946	-108.1095763	2220	1554	5.60	4.10					
U04-1091	S55	SRK, 2008	2004	0-1"	.25 sieve	Yes	32.68974483	-108.1061962	1740	2610	5.69	3.58					
U04-1092	S57	SRK, 2008	2004	0-1"	.25 sieve	Yes	32.68794351	-108.1099113	1300	1950	5.20	3.46					
U04-1093	S58	SRK, 2008	2004	0-1"	.25 sieve	Yes	32.68795224	-108.107315	1590	2385	5.04	3.08					
U04-1094	S59	SRK, 2008	2004	0-1"	.25 sieve	No	32.70316191	-108.1242624	14100	9870	7.33	3.58					
U04-1095	S60	SRK, 2008	2004	0-1"	.25 sieve	No	32.70215863	-108.1246637	18300	12810	7.36	3.31					
U04-1096	S61	SRK, 2008	2004	0-1"	.25 sieve	No	32.69884392	-108.1242907	30500	21350	7.53	2.88					
U04-1097	S62	SRK, 2008	2004	0-1"	.25 sieve	No	32.69792003	-108.1237389	20100	14070	7.64	3.46					
U04-1098	S63	SRK, 2008	2004	0-1"	.25 sieve	No	32.69667772	-108.1238164	10500	7350	7.59	4.16					
U04-1099	S64	SRK, 2008	2004	0-1"	.25 sieve	No	32.74940305	-108.1322771	689	482	7.49	7.20					
U04-1100	S65	SRK, 2008	2004	0-1"	.25 sieve	No	32.74369462	-108.1310412	660	462	4.78	4.73					
U04-1101	S66	SRK, 2008	2004	0-1"	.25 sieve	No	32.73870439	-108.131451	789	552	6.61	6.23					
U04-1102	S67	SRK, 2008	2004	0-1"	.25 sieve	No	32.73292465	-108.1308801	899	629	4.74	4.34					
U04-1103	S68	SRK, 2008	2004	0-1"	.25 sieve	No	32.72817366	-108.1334221	846	592	5.83	5.42					
U04-1104	S69	SRK, 2008	2004	0-1"	.25 sieve	No	32.72267541	-108.1339438	710	497	4.95	4.80					
U04-1105	S70	SRK, 2008	2004	0-1"	.25 sieve	No	32.71626544	-108.1356252	2280	1596	7.38	5.72					
U04-1106	S71	SRK, 2008	2004	0-1"	.25 sieve	No	32.70960523	-108.1344573	5350	3745	7.21	4.58					

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Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

									Pre-White Rain (pre-2008)				2009	2010		2014	
Location ID	Alternate ID	Source	Year Collected	Original Soil depth (if not 0-6" were converted to 0-6")[1]	Sieving Status	"Yes" if inside WB tailings	Latitude	Longitude	Original Cu value	Final Adjusted Cu	pH	pCu	pH	pH	pCu	pH	pCu
U04-1107	S72	SRK, 2008	2004	0-6"	2 mm sieve	No	32.68180304	-108.1289454	1160	1160	7.85	6.53					
U04-1108	S73	SRK, 2008	2004	0-6"	2 mm sieve	No	32.67078256	-108.1281301	1290	1290	7.72	6.28					
U04-1109	S74	SRK, 2008	2004	0-6"	2 mm sieve	No	32.66028472	-108.1286239	529	529	7.71	7.30					
U04-1110	S75	SRK, 2008	2004	0-6"	2 mm sieve	No	32.6498925	-108.1182743	940	940	7.75	6.67					
U04-1111	S76	SRK, 2008	2004	0-6"	2 mm sieve	No	32.64490744	-108.1293188	278	278	7.78	8.10					
U04-1112	S77	SRK, 2008	2004	0-6"	2 mm sieve	No	32.63482403	-108.1222914	267	267	7.86	8.22					
U04-1115	S80	SRK, 2008	2004	0-6"	2 mm sieve	Yes	32.68114702	-108.1055324	1440	1440	6.69	5.20					
U04-1116	S81	SRK, 2008	2004	0-6"	2 mm sieve	Yes	32.6811605	-108.0992466	875	875	6.80	5.87					
U04-1117	S82	SRK, 2008	2004	0-6"	2 mm sieve	No	32.68117784	-108.0909384	455	455	3.93	3.96					
U04-1118	S83	SRK, 2008	2004	0-6"	2 mm sieve	No	32.68119748	-108.0811834	358	358	3.96	4.26					
U04-1119	S84	SRK, 2008	2004	0-6"	2 mm sieve	Yes	32.67407385	-108.104917	362	362	7.30	7.35					
U04-1120	S85	SRK, 2008	2004	0-6"	2 mm sieve	Yes	32.6740384	-108.0992255	451	451	3.88	3.92					
U04-1121	S86	SRK, 2008	2004	0-6"	2 mm sieve	Yes	32.67401869	-108.0918219	513	513	3.79	3.69					
U04-1122	S87	SRK, 2008	2004	0-6"	2 mm sieve	No	32.67315474	-108.0815894	309	309	4.33	4.77					
U04-1123	S88	SRK, 2008	2004	0-6"	2 mm sieve	No	32.67389726	-108.0719324	484	484	7.70	7.39					
U04-1124	S89	SRK, 2008	2004	0-6"	2 mm sieve	No	32.67375257	-108.0632721	399	399	4.48	4.62					
U04-1125	S90	SRK, 2008	2004	0-6"	2 mm sieve	No	32.67681553	-108.0558675	255	255	7.86	8.28					
U04-1126	S91	SRK, 2008	2004	0-6"	2 mm sieve	Yes	32.66741787	-108.0986987	926	926	7.05	6.04					
U04-1127	S92	SRK, 2008	2004	0-6"	2 mm sieve	Yes	32.66682079	-108.0920031	581	581	3.78	3.54					
U04-1128	S93	SRK, 2008	2004	0-6"	2 mm sieve	No	32.6659985	-108.0810463	308	308	4.22	4.67					
U04-1129	S94	SRK, 2008	2004	0-6"	2 mm sieve	No	32.66564599	-108.0728144	313	313	4.28	4.71					
U04-1130	S95	SRK, 2008	2004	0-6"	2 mm sieve	No	32.66538892	-108.0632983	494	494	5.96	5.75					
U04-1131	S96	SRK, 2008	2004	0-6"	2 mm sieve	No	32.66540229	-108.055882	237	237	7.61	8.13					
U04-1132	SS97	SRK, 2008	2006	0-1"	.25 sieve	No	32.75191978	-108.1471355	412	288	5.97	6.38					
U04-1133	SS98	SRK, 2008	2006	0-1"	.25 sieve	No	32.74742739	-108.1249598	475	333	5.97	6.21					
U04-1138	SS103	SRK, 2008	2006	0-1"	.25 sieve	No	32.74429383	-108.1389187	497	348	4.52	4.81					
U04-1139	SS104	SRK, 2008	2006	0-1"	.25 sieve	No	32.75110133	-108.1129991	407	285	5.70	6.14					
U04-1140	SS105	SRK, 2008	2006	0-1"	.25 sieve	No	32.73268075	-108.1381274	226	158	5.49	6.62					
U04-1141	SS106	SRK, 2008	2006	0-1"	.25 sieve	No	32.73144587	-108.124364	531	372	5.50	5.65					
U04-1142	SS107	SRK, 2008	2006	0-1"	.25 sieve	No	32.73323295	-108.0753661	194	136	5.53	6.84					
U04-1144	SS109	SRK, 2008	2006	0-1"	.25 sieve	No	32.72196351	-108.1378727	597	418	6.77	6.70					
U04-1146	SS111	SRK, 2008	2006	0-1"	.25 sieve	No	32.72214363	-108.1025637	551	386	4.80	4.96					

Table E-2
Coordinates of Sample Locations Included in Interpolations and Maps

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

									Pre-White Rain (pre-2008)				2009	2010		2014	
Location ID	Alternate ID	Source	Year Collected	Original Soil depth (if not 0-6" were converted to 0-6")^1	Sieving Status	"Yes" if inside WB tailings	Latitude	Longitude	Original Cu value	Final Adjusted Cu	pH	pCu	pH	pH	pCu	pH	pCu
U04-1147	SS112	SRK, 2008	2006	0-1"	.25 sieve	No	32.71713174	-108.0870592	558	391	5.62	5.70					
U04-1150	SS115	SRK, 2008	2006	0-1"	.25 sieve	No	32.7112231	-108.1401569	3800	2660	7.78	5.51					
U04-1151	SS116	SRK, 2008	2006	0-1"	.25 sieve	No	32.71105615	-108.1198787	1460	1022	7.09	5.96					
U04-1152	SS117	SRK, 2008	2006	0-1"	.25 sieve	No	32.70334288	-108.1110735	4450	3115	4.87	2.62					
U04-1154	SS118D	SRK, 2008	2006	0-6"	.25 sieve	No	32.70237095	-108.0936065	259	259	4.99	5.59					
U04-1158	SS121	SRK, 2008	2006	0-1"	.25 sieve	No	32.69413949	-108.0884663	896	627	4.62	4.23					
U04-1159	SS122	SRK, 2008	2006	0-1"	.25 sieve	No	32.69847542	-108.0676521	119	83	5.78	7.63					
U04-1160	SS123	SRK, 2008	2006	0-1"	.25 sieve	No	32.69948724	-108.0381803	449	314	5.74	6.07					
U04-1162	SS124D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.68527714	-108.0920925	523	523	7.56	7.17					
U04-1164	SS125D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.68882207	-108.0809109	166	166	5.22	6.32					
U04-1166	SS127	SRK, 2008	2006	0-1"	.25 sieve	Yes	32.68067489	-108.1055569	1020	1530	6.97	5.39					
U04-1167	SS128	SRK, 2008	2006	0-1"	.25 sieve	No	32.67729767	-108.0909229	454	318	3.97	4.41					
U04-1169	SS129D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.677299	-108.0805078	337	337	4.07	4.43					
U04-1170	SS130	SRK, 2008	2006	0-1"	.25 sieve	No	32.67623991	-108.0749139	227	159	4.81	5.98					
U04-1172	SS131D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.67349226	-108.0622866	444	444	4.76	4.76					
U04-1173	SS132	SRK, 2008	2006	0-1"	.25 sieve	No	32.67638362	-108.0506471	740	518	4.85	4.66					
U04-1175	SS134	SRK, 2008	2006	0-1"	.25 sieve	No	32.67028508	-108.0980149	334	234	3.83	4.63					
U04-1176	SS135	SRK, 2008	2006	0-1"	.25 sieve	No	32.67014008	-108.0828301	325	228	4.10	4.91					
U04-1178	SS137	SRK, 2008	2006	0-1"	.25 sieve	No	32.6623217	-108.083937	309	216	3.62	4.52					
U04-1179	SS138	SRK, 2008	2006	0-1"	.25 sieve	No	32.66069495	-108.0752254	297	208	5.05	5.90					
U04-1180	SS139	SRK, 2008	2006	0-1"	.25 sieve	No	32.66013963	-108.0553804	696	487	4.57	4.47					
U04-1182	SS141	SRK, 2008	2006	0-1"	.25 sieve	Yes	32.65009382	-108.0846326	320	480	3.56	3.55					
U04-1183	SS142	SRK, 2008	2006	0-1"	.25 sieve	No	32.64934479	-108.0746562	392	274	3.69	4.31					
U04-1184	SS143	SRK, 2008	2006	0-1"	.25 sieve	No	32.64831161	-108.0600417	738	517	8.16	7.74					
U04-1186	SS145	SRK, 2008	2006	0-1"	.25 sieve	No	32.63583166	-108.0866406	413	289	2.92	3.54					
U04-1187	SS146	SRK, 2008	2006	0-1"	.25 sieve	No	32.63982697	-108.0812578	710	497	5.58	5.39					
U04-1189	SS148	SRK, 2008	2006	0-1"	.25 sieve	No	32.62556509	-108.0813376	632	442	3.96	4.02					
U04-1197	SS156	SRK, 2008	2006	0-1"	.25 sieve	No	32.59932169	-108.0860226	196	137	5.06	6.39					
U04-1200	ERA159D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.70756028	-108.1384823	809	809	7.59	6.70					
U04-1201	ERA160D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.69849133	-108.1381535	34	34	7.60	10.35					
U04-1202	ERA161D	SRK, 2008	2006	0-6"	2 mm sieve	No	32.6897467	-108.1382089	556	556	7.85	7.37					
U04-1203	ERA162	SRK, 2008	2006	0-1"	.25 sieve	No	32.76541334	-108.1026024	218	153	6.49	7.59					
U04-1204	ERA163	SRK, 2008	2006	0-1"	.25 sieve	No	32.76906989	-108.1082783	208	146	6.95	8.08					
U04-1205	ERA164	SRK, 2008	2006	0-1"	.25 sieve	No	32.74354342	-108.0095505	136	95	5.62	7.33					
U04-1206	ERA165	SRK, 2008	2006	0-1"	.25 sieve	No	32.74909591	-108.0257729	177	124	6.90	8.21					
U05-4001	HR-01	Chino, 1995	1995	0-1"	not sieved	No	32.76440757	-108.1714475	318	286	5.51	5.96					
U05-4004	HR-02	Chino, 1995	1995	0-1"	not sieved	No	32.75980088	-108.1823783	216	194	5.07	5.99					

Notes:

[1] All sieved 0-6" soils were sieved to < 2 mm. All sieved 0-1" soils were sieved to < 0.25 mm. Ratio used to convert Cu concentration of 0-1" sieved at <0.25 mm soils to 0-6" sieved at < 2 mm soils is from Appendix A (median ratio of SS samples) of ARCADIS (2011)(note: no conversion needed for pH since median ratio and slope = 1.0). Multiplied Cu concentration by 0.7 if outside windblown tailings and by 1.5 if inside windblown tailings. If unsieved, multiplied by 0.9 if outside windblown tailings and by 1.3 if inside windblown tailings. The 0.9 and 1.3 are from median ratios of unsieved 0-1" soil in 2009 lab reports (at 25 m on transect) compared to sieved 0-6" co-located soil in Drexler lab report in Appendix D for soils in and outside of windblown tailings, respectively (FID 8, 18, 20 in tailings). If have pH from unsieved soil, multiply by 1.06 to convert from 0 to 1" to 0 to 6" unsieved soils (using Hurley data in Chino 1995), and then used equation in Figure 6 to adjust unsieved 0-6" to 2 mm sieved fraction of 0-6" soil: Sieved = 1.19*unsieved - 1.5781.

Darker shaded 0-1" depths were inside windblown tailings.

References

ARCADIS. 2010. AOC Terrestrial Invertebrate Copper Bioaccumulation and Bioavailability Study. Smelter/Tailing Soils Investigation Unit. Prepared for Freeport-McMoRan Chino Mines Company, Vanadium, New Mexico. (composite of 15 samples in 100-m radius plot).

Chino, 1995. Administrative Order on Consent, Investigation Area, Remedial Investigation Background Report, Chino Mines Investigation Area. Prepared by Chino Mines Company, Hurley, New Mexico. Department received 28 October 1995. (one grab sample).

Newfields. 2005. Chino Mines Administrative Order on Consent Site-wide Ecological Risk Assessment. Prepared for Chino Mines Company. November. (average of 3 samples on 50-m transect).

SRK, Inc. 2008. "Chino Mines Company, Hurley, New Mexico Administrative Order on Consent,Revised Remedial Investigation Report, Smelter/Tailing Soils Investigation Unit." Revision 2. February 6. (method was composite of 6 random subsamples in 100' x 100' area)

Appendix F

Statistical ANOVA Output Tables and
Subsets Data Figure

Table F-1

Comparison of pH, Copper, and pCu before (1999) and after (2010, 2012-2014) the White Rain using "Subset of White Rain Effects" Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Year	pH	Copper	pCu
Subset of primary white rain effects dataset (n = 5. all have pH $\leq$ 5.5)			
1999	4.78^{a}	541^{ac}	4.70^{a}
2010	6.14^{b}	475^{ab}	6.17^{b}
2012	6.18^{b}	538^{ac}	5.98^{b}
2013	6.04^{bc}	353^{ac}	6.5^{bc}
2014	5.62^{c}	561^{c}	5.41^{c}
Subset of validation-plus white rain effects dataset (n = 9)			
1999	4.93^{a}	--	--
2010	6.34^{b}	--	--
2012	6.02^{bc}	--	--
2013	6.27^{bc}	--	--
2014	5.84^{c}	--	--
Subset of validation-plus white rain effects dataset with pH $\leq$ 5.5, (n = 8)			
1999	4.74^{a}	--	--
2010	6.11^{b}	--	--
2012	5.83^{bc}	--	--
2013	6.11^{b}	--	--
2014	5.58^{c}	--	--

[1] Similarly suprerscripted values are not significantly different (see pairwise results of Tables F-2 to F-4.

Table F-2
Repeated Measures ANOVA and Post-hoc Comparisons Test for pH on Subset of White Rain Effects Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA): pH (subset of primary white rain effects dataset)
All 5 datapoints are pH $\leq$ 5.5

N of Cases Processed: 5

Dependent Variable Means

PH_PREWR1999	I_POSTWR2010	PH_2012	PH_2013	PH_2014
4.78	6.14	6.18	6.04	5.62

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5
Year	1	2	3	4	5

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	6.8944	4	1.7236	16.4387	<0.0001	0.0022	0.0001
Error	1.6776	16	0.1049				

Greenhouse-Geisser Epsilon	0.4566
Huynh-Feldt Epsilon	0.8204

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	6.8944	1.8264	3.774857643	16.4387	0.0048	0.0022	0.0001
Error	1.6776	7.3056	0.229632063				

Table F-2
Repeated Measures ANOVA and Post-hoc Comparisons Test for pH on Subset of White Rain Effects Dataset
Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.0151	4	1	16.3346	0.1832
Pillai Trace	0.9849	4	1	16.3346	0.1832
Hotelling-Lawley Trace	65.3384	4	1	16.3346	0.1832

▼Hypothesis Tests

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		Mean Difference	Stdandard Error	p-Value	95% Confidence Interval	
Comparing Levels		Between Levels	of Difference		Lower	Upper
1	2	-1.36	0.1166	0.0003	-1.6838	-1.0362
1	3	-1.4	0.1414	0.0006	-1.7926	-1.0074
1	4	-1.26	0.2821	0.0111	-2.0433	-0.4767
1	5	-0.84	0.103	0.0012	-1.1259	-0.5541
2	3	-0.04	0.1536	0.8074	-0.4665	0.3865
2	4	0.1	0.2627	0.7228	-0.6293	0.8293
2	5	0.52	0.1594	0.031	0.0775	0.9625
3	4	0.14	0.3187	0.6832	-0.745	1.025
3	5	0.56	0.1364	0.0148	0.1813	0.9387
4	5	0.42	0.2396	0.1545	-0.2452	1.0852

*No correction applied for multiple comparisons.

Table F-2
Repeated Measures ANOVA and Post-hoc Comparisons Test for pH on Subset of White Rain Effects Dataset
Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA): pH (subset of validation plus white rain effects dataset)

N of Cases Processed: 9

Dependent Variable Means

PH_PREWR	PH_POSTWR	PH_2012	PH_2013	PH_2014
4.9293	6.3403	6.0222	6.2667	5.8444

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5
Year	1	2	3	4	5

Residuals have been saved.

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	11.5808	4	2.8952	14.3097	0	0.0001	0
Error	6.4744	32	0.2023				

Greenhouse-Geisser Epsilon	0.5966
Huynh-Feldt Epsilon	0.8675

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	11.5808	2.3864	4.852832719	14.3097	0.0001619	0.0001	0
Error	6.4744	19.0912	0.33913007				

Table F-2
Repeated Measures ANOVA and Post-hoc Comparisons Test for pH on Subset of White Rain Effects Dataset
Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis (pH: Subset of Validation Plus Dataset)

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.0763	4	5	15.1353	0.0053
Pillai Trace	0.9237	4	5	15.1353	0.0053
Hotelling-Lawley Trace	12.1082	4	5	15.1353	0.0053

▼Hypothesis Tests

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		lean Difference	Stdandard Error	p-Value	95% Confidence Interval	
Comparing Levels		3etween Levels	of Difference		Lower	Upper
1	2	-1.411	0.2206	0.0002	-1.9197	-0.9023
1	3	-1.093	0.2626	0.0032	-1.6985	-0.4875
1	4	-1.3374	0.1871	0.0001	-1.7688	-0.906
1	5	-0.9152	0.2493	0.0063	-1.4901	-0.3402
2	3	0.318	0.1657	0.0911	-0.064	0.7
2	4	0.0736	0.2001	0.7226	-0.3879	0.5351
2	5	0.4958	0.0997	0.0011	0.2659	0.7258
3	4	-0.2444	0.2799	0.408	-0.89	0.4011
3	5	0.1778	0.1698	0.3257	-0.2137	0.5693
4	5	0.4222	0.2241	0.0963	-0.0945	0.939

Table F-2
Repeated Measures ANOVA and Post-hoc Comparisons Test for pH on Subset of White Rain Effects Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA): pH (subset of validation plus white rain effects, pH$\leq$5.5)

N of Cases Processed: 8

Dependent Variable Means

PH_PREWR	PH_POSTWR	PH_2012	PH_2013	PH_2014
4.7385	6.1133	5.825	6.1125	5.575

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5
Year	1	2	3	4	5

Residuals have been saved.

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	10.344	4	2.586	12.1935	0	0.0005	0
Error	5.9382	28	0.2121				

Greenhouse-Geisser Epsilon	0.5634
Huynh-Feldt Epsilon	0.8443

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	10.344	2.2536	4.58998935	12.1935	0.000717	0.0005	0
Error	5.9382	15.7752	0.376426289				

Table F-2
Repeated Measures ANOVA and Post-hoc Comparisons Test for pH on Subset of White Rain Effects Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis (pH: subset of validation plus dataset, pH≤5.5)

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.0608	4	4	15.4466	0.0106
Pillai Trace	0.9392	4	4	15.4466	0.0106
Hotelling-Lawley Trace	15.4466	4	4	15.4466	0.0106

▼Hypothesis Tests

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		lean Difference	Stdandard Error	p-Value	95% Confidence Interval	
Comparing Levels		3etween Levels	of Difference		Lower	Upper
1	2	-1.3748	0.2467	0.0008	-1.9582	-0.7913
1	3	-1.0865	0.2976	0.0082	-1.7903	-0.3827
1	4	-1.374	0.208	0.0003	-1.8659	-0.8821
1	5	-0.8365	0.2683	0.0169	-1.4708	-0.2022
2	3	0.2883	0.1848	0.1627	-0.1486	0.7252
2	4	0.0008	0.2114	0.9971	-0.499	0.5006
2	5	0.5383	0.1023	0.0012	0.2964	0.7802
3	4	-0.2875	0.3136	0.3898	-1.0291	0.4541
3	5	0.25	0.1742	0.1945	-0.162	0.662
4	5	0.5375	0.2179	0.043	0.0223	1.0527

*No correction applied for multiple comparisons.

Table F-3
Repeated Measures ANOVA and Post-hoc Comparisons Test for pCu on Subset of White Rain Effects Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA): pCu (subset of primary white rain effects dataset) All are pH $\leq$ 5.5

N of Cases Processed: 5

Dependent Variable Means

PCU_PREWR1999	CU_POSTWR2010	PCU_2012	PCU_2013	PCU_2014
4.69713	6.16535	5.97522	6.50298	5.41411

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5
Year	1	2	3	4	5

Residuals have been saved.

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	10.05794	4	2.51448	11.85393	0.00011	0.01323	0
Error	3.39396	16	0.21212				

Greenhouse-Geisser Epsilon	0.34003
Huynh-Feldt Epsilon	0.45462

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	10.05794	1.36012	7.394891627	11.85393	0.01838	0.01323	0
Error	3.39396	5.44048	0.623834662				

Table F-3
Repeated Measures ANOVA and Post-hoc Comparisons Test for pCu on Subset of White Rain Effects Dataset
Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.00236	4	1	105.50116	0.07287
Pillai Trace	0.99764	4	1	105.50116	0.07287
Hotelling-Lawley Trace	422.00466	4	1	105.50116	0.07287

▼Hypothesis Tests

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor Comparing Levels		Mean Difference Between Levels	Stdandard Error of Difference	p-Value	95% Confidence Interval	
					Lower	Upper
1	2	-1.46823	0.11859	0.00024	-1.79749	-1.13896
1	3	-1.2781	0.1328	0.00065	-1.6468	-0.9094
1	4	-1.80586	0.37807	0.0088	-2.85554	-0.75618
1	5	-0.71698	0.21381	0.02848	-1.31061	-0.12336
2	3	0.19013	0.08884	0.09906	-0.05652	0.43678
2	4	-0.33763	0.43616	0.48208	-1.5486	0.87334
2	5	0.75124	0.15101	0.00763	0.33197	1.17052
3	4	-0.52776	0.44512	0.30138	-1.76362	0.7081
3	5	0.56111	0.10711	0.00635	0.26372	0.85851
4	5	1.08887	0.44453	0.07048	-0.14533	2.32307

*No correction applied for multiple comparisons.

Table F-4
Repeated Measures ANOVA and Post-hoc Comparisons Test for Copper on Subset of White Rain Effects Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA): Copper (subset of primary white rain effects dataset All 5 dataspoints are pH ≤ 5.5

Dependent Variable Means

U_PREWR1999	POSTWR2010	CU_2012	CU_2013	CU_2014
541.328	475.2	537.8	353	561.2

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5
Year	1	2	3	4	5

Residuals have been saved.

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	lean Squares	F-Ratio	p-Value	G-G	H-F
Year	144,541.13	4	36,135.28	2.28951	0.1047	0.18907	0.2
Error	252,527.63	16	15,782.98				

Greenhouse-Ge	0.34149
Huynh-Feldt Ep	0.45841

Within Subjects - Corrected

Source	SS	df	lean Squares	F-Ratio	p-Value	G-G	H-F
year	144,541.13	1.36596	105,816.52	2.28951	0.1907	0.18907	0.2
Error	252,527.63	5.46384	46,217.98				

Table F-4
Repeated Measures ANOVA and Post-hoc Comparisons Test for Copper on Subset of White Rain Effects Dataset
Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.05408	4	1	4.37235	0.34255
Pillai Trace	0.94592	4	1	4.37235	0.34255
Hotelling-Lawle	17.48942	4	1	4.37235	0.34255

▼Hypothesis Tests

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		Mean Difference	tandard Error	p-Value	95% Confidence Interval	
Comparing Levels		Between Levels	of Difference		Lower	Upper
1	2	66.128	60.01838	0.33239	-100.5097	232.76574
1	3	3.528	63.92226	0.95863	-173.9486	181.00464
1	4	188.328	89.54741	0.10329	-60.29547	436.95147
1	5	-19.872	64.24458	0.77252	-198.2436	158.49955
2	3	-62.6	24.57967	0.06352	-130.8441	5.64409
2	4	122.2	111.39093	0.33423	-187.0708	431.47081
2	5	-86	20.3101	0.01332	-142.3899	-29.61013
3	4	184.8	120.1301	0.19879	-148.7346	518.33462
3	5	-23.4	10.41921	0.08805	-52.32837	5.52837
4	5	-208.2	123.82706	0.16798	-551.999	135.59903

*No correction applied for multiple comparisons.

Table F-5
Repeated Measures ANOVA and Post-Hoc Comparisons for pH on Long-Term (>5 Years) Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA): pH for 2009 to 2014
(Using 9 samples from Figure C-1 in Appendix C sampled every year from 2009 to 2014)

N of Cases Processed: 9

Dependent Variable Means

PH_2009	PH_2010	PH_2011	PH_2012	PH_2013	PH_2014
5.96667	5.47778	5.25556	5.12222	5.5	5.32222

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5	6
Year	2009	2010	2011	2012	2013	2014

Residuals have been saved.

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	3.88148	5	0.7763	2.85146	0.02707	0.08195	0.05904
Error	10.88981	40	0.27225				

Greenhouse-Geisser Epsilon	0.43117
Huynh-Feldt Epsilon	0.59556

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	3.88148	2.15585	1.800440661	2.85146	0.08553	0.08195	0.05904
Error	10.88981	17.2468	0.631410465				

Table F-5
Repeated Measures ANOVA and Post-Hoc Comparisons for pH on Long-Term (>5 Years) Dataset Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.3805	5	4	1.30252	0.41058
Pillai Trace	0.6195	5	4	1.30252	0.41058
Hotelling-Lawley Trace	1.62815	5	4	1.30252	0.41058

▼Hypothesis Tests

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		Mean Difference	Stdandard Error	p-Value	95% Confidence Interval	
Comparing Levels		Between Levels	of Difference		Lower	Upper
2009	2010	0.48889	0.37912	0.23324	-0.38537	1.36315
2009	2011	0.71111	0.35781	0.08211	-0.11401	1.53623
2009	2012	0.84444	0.33003	0.03372	0.0834	1.60549
2009	2013	0.46667	0.31067	0.17147	-0.24975	1.18308
2009	2014	0.64444	0.31823	0.07745	-0.0894	1.37829
2010	2011	0.22222	0.1152	0.08986	-0.04344	0.48788
2010	2012	0.35556	0.17006	0.06993	-0.0366	0.74771
2010	2013	-0.02222	0.13922	0.87714	-0.34327	0.29882
2010	2014	0.15556	0.24727	0.54683	-0.41465	0.72576
2011	2012	0.13333	0.11055	0.26225	-0.12161	0.38827
2011	2013	-0.24444	0.08992	0.02632	-0.45181	-0.03708
2011	2014	-0.06667	0.2555	0.80074	-0.65584	0.52251
2012	2013	-0.37778	0.13922	0.02651	-0.69882	-0.05673
2012	2014	-0.2	0.19149	0.3268	-0.64157	0.24157
2013	2014	0.17778	0.25428	0.50429	-0.4086	0.76416

*No correction applied for multiple comparisons.

Table F-6
Repeated Measures ANOVA and Post-Hoc Comparisons for Copper on Long-Term (>5 Years) Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA): Copper for 2009 to 2014
(Using 9 samples from Figure C-1 in Appendix C sampled every year from 2009 to 2014)

N of Cases Processed: 9

Box-Cox Transformed Copper, lambda = -0.5

Dependent Variable Means

BC_CU_2009	BC_CU_2010	BC_CU_2011	BC_CU_2012	BC_CU_2013	C_CU_2014
0.03928	0.03379	0.04054	0.04576	0.04725	0.03944

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5	6
Year	2009	2010	2011	2012	2013	2014

Residuals have been saved.

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	0.00107	5	0.00021	5.80683	0.0004	0.0115	0
Error	0.00148	40	0.00004				

Greenhouse-Geisser Epsilon	0.41684
Huynh-Feldt Epsilon	0.56654

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	0.00107	2.0842	0.000513386	5.80683	0.0127048	0.0115	0
Error	0.00148	16.6736	8.87631E-05				

Table F-6
Repeated Measures ANOVA and Post-Hoc Comparisons for Copper on Long-Term (>5 Years) Dataset Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.21454	5	4	2.92893	0.15996
Pillai Trace	0.78546	5	4	2.92893	0.15996
Hotelling-Lawley Trace	3.66117	5	4	2.92893	0.15996

▼Hypothesis Tests

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		Mean Difference	Stdandard Error	p-Value	95% Confidence Interval	
Comparing Levels		Between Levels	of Difference		Lower	Upper
2009	2010	0.00549	0.00256	0.06458	-0.00042	0.01141
2009	2011	-0.00126	0.0032	0.70475	-0.00865	0.00613
2009	2012	-0.00648	0.00441	0.17962	-0.01664	0.00368
2009	2013	-0.00797	0.00422	0.09579	-0.0177	0.00177
2009	2014	-0.00016	0.00235	0.94795	-0.00558	0.00526
2010	2011	-0.00675	0.0022	0.01525	-0.01182	-0.00169
2010	2012	-0.01197	0.00315	0.00524	-0.01924	-0.00471
2010	2013	-0.01346	0.00398	0.00956	-0.02263	-0.00429
2010	2014	-0.00565	0.00162	0.00813	-0.00938	-0.00192
2011	2012	-0.00522	0.00179	0.01916	-0.00934	-0.0011
2011	2013	-0.00671	0.00223	0.01695	-0.01185	-0.00156
2011	2014	0.0011	0.00141	0.45802	-0.00215	0.00435
2012	2013	-0.00149	0.00272	0.59966	-0.00775	0.00478
2012	2014	0.00632	0.00239	0.02954	0.00081	0.01184
2013	2014	0.00781	0.00269	0.0199	0.0016	0.01402

*No correction applied for multiple comparisons.

Table F-7
Repeated Measures ANOVA and Post-Hoc Comparisons for pCu on Long-Term (>5 Years) Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA): pCu for 2009 to 2014
(Using 9 samples from Figure C-1 in Appendix C sampled every year from 2009 to 2014)

N of Cases Processed: 9

Dependent Variable Means

PCU_2009	PCU_2010	PCU_2011	PCU_2012	PCU_2013	PCU_2014
5.39447	4.49551	4.6778	4.83073	5.23563	4.71551

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5	6
Year	2009	2010	2011	2012	2013	2014

Residuals have been saved.

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	5.47695	5	1.09539	2.37465	0.05607	0.12231	0.09986
Error	18.45142	40	0.46129				

Greenhouse-Geisser Epsilon	0.41602
Huynh-Feldt Epsilon	0.56491

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	5.47695	2.0801	2.633022451	2.37465	0.12501	0.12231	0.09986
Error	18.45142	16.6408	1.108806067				

Table F-7
Repeated Measures ANOVA and Post-Hoc Comparisons for pCu on Long-Term (>5 Years) Dataset Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.0466	5	4	16.36613	0.00906
Pillai Trace	0.9534	5	4	16.36613	0.00906
Hotelling-Lawley Trace	20.45766	5	4	16.36613	0.00906

▼Hypothesis Tests

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		Mean Difference	Stdandard Error	p-Value	95% Confidence Interval	
Comparing Levels		Between Levels	of Difference		Lower	Upper
2009	2010	0.89896	0.48219	0.09927	-0.21296	2.01089
2009	2011	0.71667	0.48629	0.17877	-0.4047	1.83805
2009	2012	0.56374	0.46746	0.26228	-0.51422	1.64171
2009	2013	0.15884	0.43619	0.72518	-0.84701	1.1647
2009	2014	0.67896	0.40448	0.13175	-0.25377	1.6117
2010	2011	-0.18229	0.18124	0.34395	-0.60023	0.23564
2010	2012	-0.33522	0.21602	0.15932	-0.83337	0.16293
2010	2013	-0.74012	0.23163	0.0127	-1.27426	-0.20598
2010	2014	-0.22	0.28893	0.46825	-0.88628	0.44628
2011	2012	-0.15293	0.13408	0.28703	-0.46211	0.15625
2011	2013	-0.55783	0.11435	0.00123	-0.82152	-0.29414
2011	2014	-0.03771	0.30549	0.90481	-0.74217	0.66676
2012	2013	-0.4049	0.17562	0.05004	-0.80988	0.00008
2012	2014	0.11522	0.22539	0.62301	-0.40453	0.63497
2013	2014	0.52012	0.27127	0.09149	-0.10542	1.14567

*No correction applied for multiple comparisons.

Table F-8
Repeated Measures ANOVA and Post-Hoc Comparisons for pH on "Permanance Monitoring" Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA) : pH

Permanence Monitoring Dataset

N of Cases Processed: 17

Natural log-transformed pH

Dependent Variable Means

LN_PH_2010	LN_PH_2011	LN_PH_2012	LN_PH_2013	LN_PH_2014
1.67482	1.63749	1.64384	1.68031	1.62796

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5
Year	2010	2011	2012	2013	2014

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	0.03694	4	0.00923	1.52679	0.20499	0.22596	0.21862
Error	0.38708	64	0.00605				

Greenhouse-Geisser Epsilon	0.63612
Huynh-Feldt Epsilon	0.76652

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	0.03694	2.54448	0.014517701	1.52679	0.2296	0.22596	0.21862
Error	0.38708	40.71168	0.009507837				

Table F-8
Repeated Measures ANOVA and Post-Hoc Comparisons for pH on "Permanance Monitoring" Dataset Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.4524	4	13	3.93391	0.02629
Pillai Trace	0.5476	4	13	3.93391	0.02629
Hotelling-Lawley Trace	1.21043	4	13	3.93391	0.02629

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor Comparing Levels		Mean Difference Between Levels	Stdandard Error of Difference	p-Value	95% Confidence Interval	
					Lower	Upper
2010	2011	0.03732	0.01493	0.02371	0.00567	0.06898
2010	2012	0.03097	0.02375	0.21069	-0.01938	0.08133
2010	2013	-0.00549	0.02393	0.82142	-0.05622	0.04524
2010	2014	0.04685	0.02716	0.10379	-0.01073	0.10444
2011	2012	-0.00635	0.02513	0.80376	-0.05962	0.04692
2011	2013	-0.04281	0.01673	0.02104	-0.07829	-0.00734
2011	2014	0.00953	0.02686	0.72729	-0.04741	0.06648
2012	2013	-0.03646	0.03649	0.33248	-0.11381	0.04088
2012	2014	0.01588	0.03531	0.65886	-0.05896	0.09073
2013	2014	0.05235	0.02841	0.08399	-0.00788	0.11257

*No correction applied for multiple comparisons.

Table F-9
Repeated Measures ANOVA and Post-Hoc Comparisons for Copper on "Permanence Monitoring" Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance : Copper
Permanence Monitoring Dataset

N of Cases Processed: 17

Box-Cox Transformed Copper, lambda = -0.16

Dependent Variable Means

BC_CU_2010	BC_CU_2011	BC_CU_2012	BC_CU_2013	BC_CU_2014
0	1	2	3	4
0.33429	0.35778	0.35925	0.37214	0.35296

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5
Year	2010	2011	2012	2013	2014

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	0.01279	4	0.0032	20.05364	< 0.0001	0	0
Error	0.01021	64	0.00016				

Greenhouse-Geisser Epsilon	0.82935
Huynh-Feldt Epsilon	1

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	0.01279	4	0.0031975	20.05364	< 0.0001	0	0
Error	0.01021	64	0.000159531				

Table F-9
Repeated Measures ANOVA and Post-Hoc Comparisons for Copper on "Permanence Monitoring" Dataset Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

Test of: Year

Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.20302	4	13	12.75812	0.0002
Pillai Trace	0.79698	4	13	12.75812	0.0002
Hotelling-Lawley Trace	3.92558	4	13	12.75812	0.0002

Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		Mean Difference	Stdandard Error	p-Value	95% Confidence Interval	
Comparing Levels		Between Levels	of Difference		Lower	Upper
2010	2011	-0.0235	0.00424	0.00004	-0.03248	-0.01451
2010	2012	-0.02496	0.00497	0.00013	-0.03551	-0.01442
2010	2013	-0.03785	0.00488	< 0.00001	-0.0482	-0.02751
2010	2014	-0.01867	0.00368	0.00011	-0.02647	-0.01088
2011	2012	-0.00147	0.00506	0.77532	-0.01219	0.00925
2011	2013	-0.01436	0.00346	0.00075	-0.02169	-0.00703
2011	2014	0.00482	0.00362	0.20149	-0.00285	0.0125
2012	2013	-0.01289	0.00498	0.01987	-0.02346	-0.00233
2012	2014	0.00629	0.00441	0.17271	-0.00305	0.01564
2013	2014	0.01918	0.00356	0.00006	0.01164	0.02673

*No correction applied for multiple comparisons.

Table F-10
Repeated Measures ANOVA and Post-Hoc Comparisons for pCu on "Permanence Monitoring" Dataset

Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Repeated Measures Analysis of Variance (ANOVA) : pCu
Permanence Monitoring Dataset

N of Cases Processed: 17

Dependent Variable Means

PCU_2010	PCU_2011	PCU_2012	PCU_2013	PCU_2014
4.48346	4.77468	4.8259	5.26245	4.66834

Repeated Measures Factors and Levels of Dependent Variables

Within Factor	1	2	3	4	5
Year	2010	2011	2012	2013	2014

Univariate and Multivariate Repeated Measures Analysis

Within Subjects

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
Year	5.65526	4	1.41382	5.73631	0.00052	0.00213	0.00081
Error	15.77393	64	0.24647				

Greenhouse-Geisser Epsilon	0.73282
Huynh-Feldt Epsilon	0.91501

Within Subjects - Corrected

Source	SS	df	Mean Squares	F-Ratio	p-Value	G-G	H-F
year	5.65526	2.93128	1.929280041	5.73631	0.00597	0.00213	0.00081
Error	15.77393	46.90048	0.336327688				

Table F-10
Repeated Measures ANOVA and Post-Hoc Comparisons for pCu on "Permanence Monitoring" Dataset Continued
Year 5 pH Monitoring Report
Freeport-McMoRan Chino Mines Company
Vanadium, New Mexico

Multivariate Repeated Measures Analysis

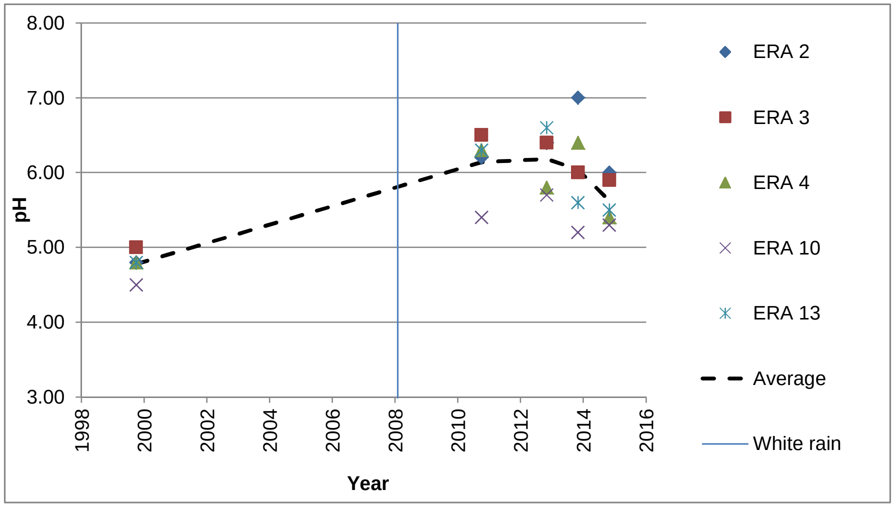
Test of: Year

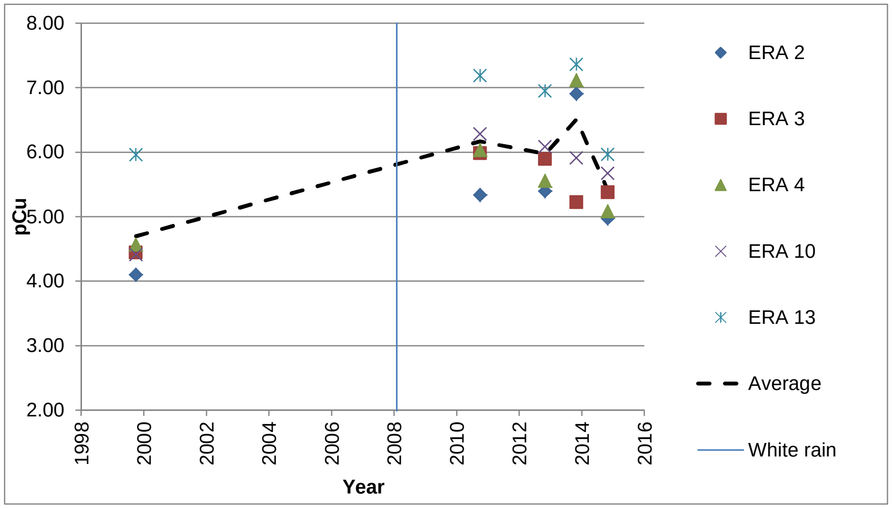
Statistic	Value	Hypothesis df	Error df	F-Ratio	p-Value
Wilks's Lambda	0.32526	4	13	6.74196	0.00364
Pillai Trace	0.67474	4	13	6.74196	0.00364
Hotelling-Lawley Trace	2.07445	4	13	6.74196	0.00364

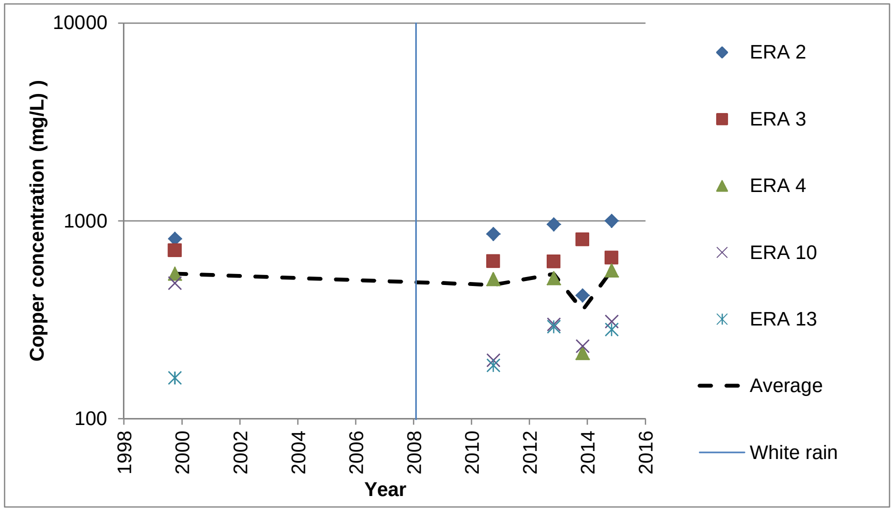
Pairwise comparisons between levels of within-subjects factor: Year

Within Subjects Factor		Mean Difference	Stdandard Error	p-Value	95% Confidence Interval	
Comparing Levels		Between Levels	of Difference		Lower	Upper
2010	2011	-0.29123	0.12019	0.02763	-0.54603	-0.03642
2010	2012	-0.34244	0.15867	0.04645	-0.6788	-0.00608
2010	2013	-0.779	0.17654	0.00044	-1.15324	-0.40475
2010	2014	-0.18489	0.17856	0.31587	-0.56342	0.19365
2011	2012	-0.05122	0.14163	0.72237	-0.35145	0.24902
2011	2013	-0.48777	0.12791	0.00153	-0.75893	-0.21661
2011	2014	0.10634	0.18143	0.56598	-0.27828	0.49095
2012	2013	-0.43655	0.21758	0.06202	-0.8978	0.02469
2012	2014	0.15755	0.20618	0.4559	-0.27953	0.59464
2013	2014	0.59411	0.16764	0.0027	0.23873	0.94949

*No correction applied for multiple comparisons.







Note:
Year tick mark shown on plot represents January (e.g., 2014 data sampled in fall are closer to Jan. 2015 than Jan. 2014 on graph).

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

YEAR 5 REPORT - PH MONITORING

Subset of Primary White Rain effects Dataset Change in pH, Copper, and pCu

ARCADIS

FIGURE

F-1

Appendix G

2009 to 2014 Laboratory Reports

L78388-01

LABID	CLIENTID	PROJECTID	DEPTNAME	COLLECTDATE	RECEIVEDATE	ANALYTE	MATRIX	METHOD	RESULT	TEXTRESULT	QUAL	UNITS	MDL	PQL	ANALYZEDATE	ANALYST	CAS
L78388-01	FID 20-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	790	790		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-01	FID 20-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	3	3	B	t CaCO3/K	1	5	10/21/2009	calc	
L78388-01	FID 20-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	5	5		t CaCO3/K	1	5	10/21/2009	calc	
L78388-01	FID 20-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	2	2		t CaCO3/K	1	5	10/21/2009	calc	
L78388-01	FID 20-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	0.5	0.5		%	0.1	0.5	10/13/2009	itk	
L78388-01	FID 20-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	4.9	4.9		units	0.1	0.1	10/9/2009	itk	
L78388-01	FID 20-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	94.4	94.4		%	0.1	0.5	10/15/2009	brd	
L78388-01	FID 20-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.09	0.09	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-02	FID 21-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	131	131		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-02	FID 21-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-02	FID 21-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	3	3		t CaCO3/K	1	5	10/21/2009	calc	
L78388-02	FID 21-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	3	3		t CaCO3/K	1	5	10/21/2009	calc	
L78388-02	FID 21-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	0.3	0.3	B	%	0.1	0.5	10/13/2009	itk	
L78388-02	FID 21-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6.3	6.3		units	0.1	0.1	10/9/2009	itk	
L78388-02	FID 21-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.6	98.6		%	0.1	0.5	10/15/2009	brd	
L78388-02	FID 21-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.03	0.03	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-03	FID 22-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	285	285		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-03	FID 22-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	2	2	B	t CaCO3/K	1	5	10/21/2009	calc	
L78388-03	FID 22-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	7	7		t CaCO3/K	1	5	10/21/2009	calc	
L78388-03	FID 22-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	5	5		t CaCO3/K	1	5	10/21/2009	calc	
L78388-03	FID 22-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	0.7	0.7		%	0.1	0.5	10/13/2009	itk	
L78388-03	FID 22-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	5.1	5.1		units	0.1	0.1	10/9/2009	itk	
L78388-03	FID 22-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.9	96.9		%	0.1	0.5	10/15/2009	brd	
L78388-03	FID 22-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.07	0.07	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-04	FID 24-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	121	121		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-04	FID 24-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-04	FID 24-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	31	31		t CaCO3/K	1	5	10/21/2009	calc	
L78388-04	FID 24-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	31	31		t CaCO3/K	1	5	10/21/2009	calc	
L78388-04	FID 24-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	3.1	3.1		%	0.1	0.5	10/13/2009	itk	
L78388-04	FID 24-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.7	7.7		units	0.1	0.1	10/9/2009	itk	
L78388-04	FID 24-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.1	96.1		%	0.1	0.5	10/15/2009	brd	
L78388-04	FID 24-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC			U	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-05	FID 25-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	66	66		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-05	FID 25-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-05	FID 25-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	115	115		t CaCO3/K	1	5	10/21/2009	calc	
L78388-05	FID 25-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	115	115		t CaCO3/K	1	5	10/21/2009	calc	
L78388-05	FID 25-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	11.5	11.5		%	0.1	0.5	10/14/2009	itk	
L78388-05	FID 25-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.8	7.8		units	0.1	0.1	10/9/2009	itk	
L78388-05	FID 25-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.8	97.8		%	0.1	0.5	10/15/2009	brd	
L78388-05	FID 25-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.01	0.01	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-06	FID 26-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	75	75		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-06	FID 26-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-06	FID 26-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	10	10		t CaCO3/K	1	5	10/21/2009	calc	
L78388-06	FID 26-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	10	10		t CaCO3/K	1	5	10/21/2009	calc	
L78388-06	FID 26-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	1	1.0		%	0.1	0.5	10/13/2009	itk	
L78388-06	FID 26-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.9	7.9		units	0.1	0.1	10/9/2009	itk	
L78388-06	FID 26-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.5	98.5		%	0.1	0.5	10/15/2009	brd	
L78388-06	FID 26-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC			U	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-07	FID 27-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	206	206		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-07	FID 27-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-07	FID 27-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	19	19		t CaCO3/K	1	5	10/21/2009	calc	
L78388-07	FID 27-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	19	19		t CaCO3/K	1	5	10/21/2009	calc	
L78388-07	FID 27-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	1.9	1.9		%	0.1	0.5	10/13/2009	itk	
L78388-07	FID 27-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6.2	6.2		units	0.1	0.1	10/9/2009	itk	
L78388-07	FID 27-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC			U	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-08	FID 28-25 0-6"	PR553454	Metals Analysis	6/22/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	348	348		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-08	FID 28-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	1	1	B	t CaCO3/K	1	5	10/21/2009	calc	
L78388-08	FID 28-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	6	6		t CaCO3/K	1	5	10/21/2009	calc	
L78388-08	FID 28-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	5	5		t CaCO3/K	1	5	10/21/2009	calc	
L78388-08	FID 28-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	0.6	0.6		%	0.1	0.5	10/13/2009	itk	
L78388-08	FID 28-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	5.4	5.4		units	0.1	0.1	10/10/2009	itk	
L78388-08	FID 28-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.04	0.04	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-09	FID 30-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	90	90		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-09	FID 30-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-09	FID 30-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	190	190		t CaCO3/K	1	5	10/21/2009	calc	
L78388-09	FID 30-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	190	190		t CaCO3/K	1	5	10/21/2009	calc	
L78388-09	FID 30-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	19	19.0		%	0.1	0.5	10/14/2009	itk	
L78388-09	FID 30-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.7	7.7		units	0.1	0.1	10/10/2009	itk	
L78388-09	FID 30-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.7	96.7		%	0.1	0.5	10/15/2009	brd	
L78388-09	FID 30-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.01	0.01	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-10	FID 31-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	187	187		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-10	FID 31-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-10	FID 31-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	14	14		t CaCO3/K	1	5	10/21/2009	calc	
L78388-10	FID 31-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	14	14		t CaCO3/K	1	5	10/21/2009	calc	
L78388-10	FID 31-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	1.4	1.4		%	0.1	0.5	10/13/2009	itk	
L78388-10	FID 31-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6.1	6.1		units	0.1	0.1	10/10/2009	itk	
L78388-10	FID 31-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.3	97.3		%	0.1	0.5	10/15/2009	brd	
L78388-10	FID 31-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.01	0.01	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-11	FID 32-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	2120	2120		mg/Kg	5	30	10/13/2009	ear	7440-50-8
L78388-11	FID 32-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-11	FID 32-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	7	7		t CaCO3/K	1	5	10/21/2009	calc	
L78388-11	FID 32-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	7	7		t CaCO3/K	1	5	10/21/2009	calc	
L78388-11	FID 32-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	0.7	0.7		%	0.1	0.5	10/14/2009	itk	
L78388-11	FID 32-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	5.7	5.7		units	0.1	0.1	10/10/2009	itk	
L78388-11	FID 32-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.5	98.5		%	0.1	0.5	10/15/2009	brd	
L78388-11	FID 32-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.02	0.02	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-12	FID 33-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	308	308		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-12	FID 33-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	6	6		t CaCO3/K	1	5	10/21/2009	calc	
L78388-12	FID 33-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	52	52		t CaCO3/K	1	5	10/21/2009	calc	
L78388-12	FID 33-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	46	46		t CaCO3/K	1	5	10/21/2009	calc	
L78388-12	FID 33-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	5.2	5.2		%	0.1	0.5	10/13/2009	itk	
L78388-12	FID 33-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.5	7.5		units	0.1	0.1	10/10/2009	itk	
L78388-12	FID 33-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96	96.0		%	0.1	0.5	10/15/2009	brd	
L78388-12	FID 33-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.19	0.19		%	0.01	0.1	10/12/2009	bsu/brd	
L78388-13	FID 34-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	209	209		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-13	FID 34-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-13	FID 34-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	24	24		t CaCO3/K	1	5	10/21/2009	calc	
L78388-13	FID 34-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	24	24		t CaCO3/K	1	5	10/21/2009	calc	
L78388-13	FID 34-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	2.4	2.4		%	0.1	0.5	10/14/2009	itk	
L78388-13	FID 34-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7	7.0		units	0.1	0.1	10/10/2009	itk	
L78388-13	FID 34-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	95	95.0		%	0.1	0.5	10/15/2009	brd	
L78388-13	FID 34-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC			U	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-14	FID 35-25 0-6"	PR553454	Metals Analysis	6/22/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	210	210		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-14	FID 35-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	1	1	B	t CaCO3/K	1	5	10/21/2009	calc	
L78388-14	FID 35-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	97	97		t CaCO3/K	1	5	10/21/2009	calc	
L78388-14	FID 35-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	96	96		t CaCO3/K	1	5	10/21/2009	calc	
L78388-14	FID 35-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	9.7	9.7		%	0.1	0.5	10/14/2009	itk	
L78388-14	FID 35-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.8	7.8		units	0.1	0.1	10/10/2009	itk	
L78388-14	FID 35-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.7	97.7		%	0.1	0.5	10/15/2009	brd	
L78388-14	FID 35-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.04	0.04	B	%	0.01	0.1	10/12/2009	bsu/brd	
L78388-15	FID 39-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	414	414		mg/Kg	1	5	10/12/2009	aeh	7440-50-8
L78388-15	FID 39-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/K	1	5	10/21/2009	calc	
L78388-15	FID 39-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	14	14		t CaCO3/K	1	5	10/21/2009	calc	
L78388-15	FID 39-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	14	14		t CaCO3/K	1	5	10/21/2009	calc	
L78388-15	FID 39-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	1.4	1.4		%	0.1	0.5	10/14/2009	itk	
L78388-15	FID 39-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	5.5	5.5		units	0.1	0.1	10/10/2009	itk	
L78388-15	FID 39-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	95.2	95.2		%	0.1	0.5	10/15/2009	brd	
L78388-15	FID 39-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC			U	%	0.01	0.1	10/12/2009	bsu/brd	

L76592-01

LABID	CLIENTID	PROJECTID	DEPTNAME	COLLECTDATE	RECEIVEDATE	ANALYTE	MATRIX	METHOD	RESULT	TEXTRESULT	QUAL	UNITS	MDL	PQL	ANALYZEDATE	ANALYST	CAS
L76592-01	FID 0-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	538	538		mg/Kg	1	5	10/21/2009	ear	7440-50-8
L76592-01	FID 0-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.2	1.2		%	0.1	0.5	10/19/2009	jjg	
L76592-01	FID 0-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.8	98.8		%	0.1	0.5	10/19/2009	jjg	
L76592-03	FID 1-25 0-1"	PR553454	Metals Analysis	6/22/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	175	175		mg/Kg	1	5	10/21/2009	ear	7440-50-8
L76592-03	FID 1-25 0-1"	PR553454	Soil Analysis	6/22/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.8	1.8		%	0.1	0.5	10/19/2009	jjg	
L76592-03	FID 1-25 0-1"	PR553454	Soil Analysis	6/22/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.2	98.2		%	0.1	0.5	10/19/2009	jjg	
L76592-05	FID 2-25 0-1"	PR553454	Metals Analysis	6/22/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	453	453		mg/Kg	1	5	10/21/2009	ear	7440-50-8
L76592-05	FID 2-25 0-1"	PR553454	Soil Analysis	6/22/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	2.3	2.3		%	0.1	0.5	10/19/2009	jjg	
L76592-05	FID 2-25 0-1"	PR553454	Soil Analysis	6/22/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.7	97.7		%	0.1	0.5	10/19/2009	jjg	
L76592-07	FID 3-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	377	377		mg/Kg	1	5	10/21/2009	ear	7440-50-8
L76592-07	FID 3-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1	1.0		%	0.1	0.5	10/20/2009	jjg	
L76592-07	FID 3-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	99	99.0		%	0.1	0.5	10/20/2009	jjg	
L76592-09	FID 4-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	676	676		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76592-09	FID 4-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	4.7	4.7		%	0.1	0.5	10/20/2009	jjg	
L76592-09	FID 4-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	95.3	95.3		%	0.1	0.5	10/20/2009	jjg	
L76592-11	FID 6-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Arsenic, total (3050)	SO	M6020 ICP-MS	6.4	6.4		mg/Kg	0.3	1	10/21/2009	scp	7440-38-2
L76592-11	FID 6-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Cadmium, total (3050)	SO	M6020 ICP-MS	1.2	1.20		mg/Kg	0.05	0.3	10/21/2009	scp	7440-43-9
L76592-11	FID 6-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	650	650		mg/Kg	10	50	10/22/2009	ear	7440-50-8
L76592-11	FID 6-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Iron, total (3050)	SO	M6010B ICP	96100	96100		mg/Kg	20	50	10/22/2009	ear	7439-89-6
L76592-11	FID 6-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.8	1.8		%	0.1	0.5	10/20/2009	jjg	
L76592-11	FID 6-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.2	98.2		%	0.1	0.5	10/20/2009	jjg	
L76592-13	FID 7-25 0-1"	PR553454	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	192	192		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76592-13	FID 7-25 0-1"	PR553454	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	4.7	4.7		%	0.1	0.5	10/20/2009	jjg	
L76592-13	FID 7-25 0-1"	PR553454	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	95.3	95.3		%	0.1	0.5	10/20/2009	jjg	

L76593-01

LABID	CLIENTID	PROJECTID	DEPTNAME	COLLECTDATE	RECEIVEDATE	ANALYTE	MATRIX	METHOD	RESULT	TEXTRESULT	QUAL	UNITS	MDL	PQL	ANALYZEDATE	ANALYST	CAS
L76593-01	FID 10-25 0-1"	PR553454	Metals Analysis	6/19/2009	6/24/2009	Arsenic, total (3050)	SO	M6020 ICP-MS	3.6	3.6		mg/Kg	0.3	1	10/26/2009	erf	7440-38-2
L76593-01	FID 10-25 0-1"	PR553454	Metals Analysis	6/19/2009	6/24/2009	Cadmium, total (3050)	SO	M6020 ICP-MS	2.07	2.07		mg/Kg	0.05	0.3	10/26/2009	erf	7440-43-9
L76593-01	FID 10-25 0-1"	PR553454	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	1050	1050		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76593-01	FID 10-25 0-1"	PR553454	Metals Analysis	6/19/2009	6/24/2009	Iron, total (3050)	SO	M6010B ICP	15300	15300		mg/Kg	2	5	10/22/2009	ear	7439-89-6
L76593-01	FID 10-25 0-1"	PR553454	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	4.7	4.7		%	0.1	0.5	7/5/2009	bjl	
L76593-01	FID 10-25 0-1"	PR553454	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	95.3	95.3		%	0.1	0.5	7/5/2009	bjl	
L76593-03	FID 12-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Arsenic, total (3050)	SO	M6020 ICP-MS	6	6.0		mg/Kg	0.3	1	10/27/2009	erf	7440-38-2
L76593-03	FID 12-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Cadmium, total (3050)	SO	M6020 ICP-MS	6.13	6.13		mg/Kg	0.05	0.3	10/27/2009	erf	7440-43-9
L76593-03	FID 12-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	5580	5580		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76593-03	FID 12-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Iron, total (3050)	SO	M6010B ICP	42500	42500		mg/Kg	2	5	10/22/2009	ear	7439-89-6
L76593-03	FID 12-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.1	1.1		%	0.1	0.5	7/5/2009	bjl	
L76593-03	FID 12-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.9	98.9		%	0.1	0.5	7/5/2009	bjl	
L76593-05	FID 13-25 0-1"	PR553454	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	1280	1280		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76593-05	FID 13-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	2.4	2.4		%	0.1	0.5	7/6/2009	bjl	
L76593-05	FID 13-25 0-1"	PR553454	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.6	97.6		%	0.1	0.5	7/6/2009	bjl	
L76593-07	FID 15-25 0-1"	PR553454	Metals Analysis	6/22/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	1530	1530		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76593-07	FID 15-25 0-1"	PR553454	Soil Analysis	6/22/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1	1.0		%	0.1	0.5	7/6/2009	bjl	
L76593-07	FID 15-25 0-1"	PR553454	Soil Analysis	6/22/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	99	99.0		%	0.1	0.5	7/6/2009	bjl	
L76593-09	FID 16-25 0-1"	PR553454	Metals Analysis	6/22/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	362	362		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76593-09	FID 16-25 0-1"	PR553454	Soil Analysis	6/22/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	0.6	0.6		%	0.1	0.5	7/2/2009	bjl	
L76593-09	FID 16-25 0-1"	PR553454	Soil Analysis	6/22/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	99.4	99.4		%	0.1	0.5	7/2/2009	bjl	
L76593-11	FID 17-25 0-1"	B0063538.000	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	9150	9150		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76593-11	FID 17-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	2.7	2.7		%	0.1	0.5	7/3/2009	bjl	
L76593-11	FID 17-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.3	97.3		%	0.1	0.5	7/3/2009	bjl	
L76593-13	FID 18-25 0-1"	B0063538.000	Metals Analysis	6/22/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	215	215		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76593-13	FID 18-25 0-1"	B0063538.000	Soil Analysis	6/22/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	0.5	0.5		%	0.1	0.5	7/3/2009	bjl	
L76593-13	FID 18-25 0-1"	B0063538.000	Soil Analysis	6/22/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	99.5	99.5		%	0.1	0.5	7/3/2009	bjl	

L76594-01

LABID	CLIENTID	PROJECTID	DEPTNAME	COLLECTDATE	RECEIVEDATE	ANALYTE	MATRIX	METHOD	RESULT	TEXTRESULT	QUAL	UNITS	MDL	PQL	ANALYZEDATE
L76594-01	FID 20-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	755	755		mg/Kg	1	5	10/22/2009
L76594-01	FID 20-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	3.4	3.4		%	0.1	0.5	7/4/2009
L76594-01	FID 20-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.6	96.6		%	0.1	0.5	7/4/2009
L76594-03	FID 21-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	153	153		mg/Kg	1	5	10/22/2009
L76594-03	FID 21-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	0.6	0.6		%	0.1	0.5	7/4/2009
L76594-03	FID 21-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	99.4	99.4		%	0.1	0.5	7/4/2009
L76594-05	FID 22-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	347	347		mg/Kg	1	5	10/22/2009
L76594-05	FID 22-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.2	1.2		%	0.1	0.5	7/4/2009
L76594-05	FID 22-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.8	98.8		%	0.1	0.5	7/4/2009
L76594-07	FID 24-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	222	222		mg/Kg	1	5	10/22/2009
L76594-07	FID 24-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	4.2	4.2		%	0.1	0.5	7/5/2009
L76594-07	FID 24-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	95.8	95.8		%	0.1	0.5	7/5/2009
L76594-09	FID 25-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	89	89		mg/Kg	1	5	10/22/2009
L76594-09	FID 25-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.5	1.5		%	0.1	0.5	7/5/2009
L76594-09	FID 25-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.5	98.5		%	0.1	0.5	7/5/2009
L76594-11	FID 26-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	134	134		mg/Kg	1	5	10/22/2009
L76594-11	FID 26-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.3	1.3		%	0.1	0.5	7/6/2009
L76594-11	FID 26-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.7	98.7		%	0.1	0.5	7/6/2009
L76594-13	FID 27-25 0-1"	B0063538.000	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	322	322		mg/Kg	1	5	10/22/2009
L76594-13	FID 27-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	3.7	3.7		%	0.1	0.5	7/6/2009
L76594-13	FID 27-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.3	96.3		%	0.1	0.5	7/6/2009
L76594-15	FID 28-25 0-1"	B0063538.000	Metals Analysis	6/22/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	426	426		mg/Kg	1	5	10/22/2009
L76594-15	FID 28-25 0-1"	B0063538.000	Soil Analysis	6/22/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	2.1	2.1		%	0.1	0.5	10/20/2009
L76594-15	FID 28-25 0-1"	B0063538.000	Soil Analysis	6/22/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.9	97.9		%	0.1	0.5	10/20/2009

L76595-01

LABID	CLIENTID	PROJECTID	DEPTNAME	COLLECTDATE	RECEIVEDATE	ANALYTE	MATRIX	METHOD	RESULT	TEXTRESULT	QUAL	UNITS	MDL	PQL	ANALYZEDATE	ANALYST	CAS
L76595-01	FID 30-25 0-1"	B0063538.000	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	291	291		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76595-01	FID 30-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	2	2.0		%	0.1	0.5	6/30/2009	itk/brd	
L76595-01	FID 30-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98	98.0		%	0.1	0.5	6/30/2009	itk/brd	
L76595-03	FID 31-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	294	294		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76595-03	FID 31-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.5	1.5		%	0.1	0.5	6/30/2009	itk/brd	
L76595-03	FID 31-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.5	98.5		%	0.1	0.5	6/30/2009	itk/brd	
L76595-05	FID 32-25 0-1"	B0063538.000	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	2250	2250		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76595-05	FID 32-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.6	1.6		%	0.1	0.5	6/30/2009	itk/brd	
L76595-05	FID 32-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.4	98.4		%	0.1	0.5	6/30/2009	itk/brd	
L76595-07	FID 33-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	785	785		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76595-07	FID 33-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.9	1.9		%	0.1	0.5	7/1/2009	itk/brd	
L76595-07	FID 33-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.2	98.2		%	0.1	0.5	7/1/2009	itk/brd	
L76595-09	FID 34-25 0-1"	B0063538.000	Metals Analysis	6/18/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	682	682		mg/Kg	1	5	10/22/2009	ear	7440-50-8
L76595-09	FID 34-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.4	1.4		%	0.1	0.5	7/1/2009	itk/brd	
L76595-09	FID 34-25 0-1"	B0063538.000	Soil Analysis	6/18/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.6	98.6		%	0.1	0.5	7/1/2009	itk/brd	
L76595-11	FID 35-25 0-1"	B0063538.000	Metals Analysis	6/22/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	219	219		mg/Kg	1	5	10/23/2009	ear	7440-50-8
L76595-11	FID 35-25 0-1"	B0063538.000	Soil Analysis	6/22/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.6	1.6		%	0.1	0.5	7/1/2009	itk/brd	
L76595-11	FID 35-25 0-1"	B0063538.000	Soil Analysis	6/22/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.4	98.4		%	0.1	0.5	7/1/2009	itk/brd	
L76595-13	FID 37-25 0-1"	B0063538.000	Metals Analysis	6/22/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	533	533		mg/Kg	1	5	10/23/2009	ear	7440-50-8
L76595-13	FID 37-25 0-1"	B0063538.000	Soil Analysis	6/22/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	1.3	1.3		%	0.1	0.5	7/1/2009	itk/brd	
L76595-13	FID 37-25 0-1"	B0063538.000	Soil Analysis	6/22/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.7	98.7		%	0.1	0.5	7/1/2009	itk/brd	
L76595-14	FID 39-25 0-1"	B0063538.000	Metals Analysis	6/19/2009	6/24/2009	Copper, total (3050)	SO	M6010B ICP	590	590		mg/Kg	1	5	10/23/2009	ear	7440-50-8
L76595-14	FID 39-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Moisture Content	SO	M209F, Gravimetric -	3.9	3.9		%	0.1	0.5	7/1/2009	itk/brd	
L76595-14	FID 39-25 0-1"	B0063538.000	Soil Analysis	6/19/2009	6/24/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.1	96.1		%	0.1	0.5	7/1/2009	itk/brd	

L78892-01

LABID	CLIENTID	PROJECTID	DEPTNAME	COLLECTDATE	RECEIVEDATE	ANALYTE	MATRIX	METHOD	RESULT	TEXTRESULT	QUAL	UNITS	MDL	PQL	ANALYZEDATE	ANALYST	CAS
L78892-01	FID 08-25 0-1"		Metals Analysis	10/7/2009	10/19/2009	Copper, total (3050)	SO	M6010B ICP	328	328		mg/Kg	1	5	40128.77111	aeh	7440-50-8
L78892-01	FID 08-25 0-1"		Soil Analysis	10/7/2009	10/19/2009	Moisture Content	SO	M209F, Gravimetric -	6.9	6.9		%	0.1	0.5	40125.79167	itk	
L78892-01	FID 08-25 0-1"		Soil Analysis	10/7/2009	10/19/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	4.4	4.4		units	0.1	0.1	40126.91667	itk	
L78892-02	FID 08-25 0-6"		Metals Analysis	10/7/2009	10/19/2009	Copper, total (3050)	SO	M6010B ICP	430	430		mg/Kg	1	5	40128.77795	aeh	7440-50-8
L78892-02	FID 08-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	4	4	B	t CaCO3/K	1	5	40129.72029	calc	
L78892-02	FID 08-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	23	23		t CaCO3/K	1	5	40129.72029	calc	
L78892-02	FID 08-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	19	19		t CaCO3/K	1	5	40129.72029	calc	
L78892-02	FID 08-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Moisture Content	SO	M209F, Gravimetric -	12.7	12.7		%	0.1	0.5	40125.875	itk	
L78892-02	FID 08-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	2.3	2.3		%	0.1	0.5	40126.62917	itk	
L78892-02	FID 08-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6.1	6.1		units	0.1	0.1	40127.08333	itk	
L78892-02	FID 08-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.14	0.14		%	0.01	0.1	40126.69444	bsu	
L78892-03	FID 23-25 0-1"		Metals Analysis	10/7/2009	10/19/2009	Copper, total (3050)	SO	M6010B ICP	168	168		mg/Kg	1	5	40128.7848	aeh	7440-50-8
L78892-03	FID 23-25 0-1"		Soil Analysis	10/7/2009	10/19/2009	Moisture Content	SO	M209F, Gravimetric -	8.1	8.1		%	0.1	0.5	40125.91667	itk	
L78892-03	FID 23-25 0-1"		Soil Analysis	10/7/2009	10/19/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	3.8	3.8		units	0.1	0.1	40127.16667	itk	
L78892-04	FID 23-25 0-6"		Metals Analysis	10/7/2009	10/19/2009	Copper, total (3050)	SO	M6010B ICP	252	252		mg/Kg	1	5	40128.78709	aeh	7440-50-8
L78892-04	FID 23-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	5	5		t CaCO3/K	1	5	40129.72042	calc	
L78892-04	FID 23-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	0	0		t CaCO3/K	1	5	40129.72042	calc	
L78892-04	FID 23-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	-5	-5		t CaCO3/K	1	5	40129.72042	calc	
L78892-04	FID 23-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Moisture Content	SO	M209F, Gravimetric -	5.5	5.5		%	0.1	0.5	40125.95833	itk	
L78892-04	FID 23-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3			U	%	0.1	0.5	40126.70417	itk	
L78892-04	FID 23-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	3.7	3.7		units	0.1	0.1	40127.25	itk	
L78892-04	FID 23-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.16	0.16		%	0.01	0.1	40126.70833	bsu	
L78892-05	FID 43-25 0-1"		Metals Analysis	10/7/2009	10/19/2009	Copper, total (3050)	SO	M6010B ICP	229	229		mg/Kg	1	5	40128.79167	aeh	7440-50-8
L78892-05	FID 43-25 0-1"		Soil Analysis	10/7/2009	10/19/2009	Moisture Content	SO	M209F, Gravimetric -	1.8	1.8		%	0.1	0.5	40126	itk	
L78892-05	FID 43-25 0-1"		Soil Analysis	10/7/2009	10/19/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	3.7	3.7		units	0.1	0.1	40127.33333	itk	
L78892-06	FID 43-25 0-6"		Metals Analysis	10/7/2009	10/19/2009	Copper, total (3050)	SO	M6010B ICP	466	466		mg/Kg	1	5	40128.79395	aeh	7440-50-8
L78892-06	FID 43-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	29	29		t CaCO3/K	1	5	40129.72054	calc	
L78892-06	FID 43-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	0	0		t CaCO3/K	1	5	40129.72054	calc	
L78892-06	FID 43-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	-29	-29		t CaCO3/K	1	5	40129.72054	calc	
L78892-06	FID 43-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Moisture Content	SO	M209F, Gravimetric -	5.9	5.9		%	0.1	0.5	40126.04167	itk	
L78892-06	FID 43-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3			U	%	0.1	0.5	40126.85417	itk	
L78892-06	FID 43-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	4.2	4.2		units	0.1	0.1	40127.41667	itk	
L78892-06	FID 43-25 0-6"		Soil Analysis	10/7/2009	10/19/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.93	0.93		%	0.01	0.1	40126.73611	bsu	

L78387

LABID	CLIENTID	PROJECTID	DEPTNAME	COLLECTDATE	RECEIVEDATE	ANALYTE	MATRIX	METHOD	RESULT	TEXTRESULT	QUAL	UNITS	MDL	PQL	ANALYZEDATE	ANALYST	CAS
L78387-09	FID 12-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	3	3		t CaCO3/Kt	1	5	40105.53543	calc	
L78387-09	FID 12-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	3.5	3.5		%	0.1	0.5	40100.5	itk	
L78387-09	FID 12-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.5	7.5		units	0.1	0.1	40096.18156	itk	
L78387-09	FID 12-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.4	98.4		%	0.1	0.5	40101	jjg	
L78387-09	FID 12-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	1.02	1.02		%	0.01	0.1	40093.60245	brd/bsu	
L78387-10	FID 13-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	1970	1970		mg/Kg	1	5	40098.5078	ear	7440-50-8
L78387-10	FID 13-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	11	11		t CaCO3/Kt	1	5	40105.53545	calc	
L78387-10	FID 13-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	25	25		t CaCO3/Kt	1	5	40105.53545	calc	
L78387-10	FID 13-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	14	14		t CaCO3/Kt	1	5	40105.53545	calc	
L78387-10	FID 13-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	2.5	2.5		%	0.1	0.5	40099.60231	itk	
L78387-10	FID 13-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.4	7.4		units	0.1	0.1	40096.26192	itk	
L78387-10	FID 13-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.6	97.6		%	0.1	0.5	40101.14167	jjg	
L78387-10	FID 13-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.34	0.34		%	0.01	0.1	40093.60903	brd/bsu	
L78387-11	FID 15-25 0-6"	PR553454	Metals Analysis	6/22/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	1360	1360		mg/Kg	1	5	40098.51008	ear	7440-50-8
L78387-11	FID 15-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	17	17		t CaCO3/Kt	1	5	40105.53547	calc	
L78387-11	FID 15-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	22	22		t CaCO3/Kt	1	5	40105.53547	calc	
L78387-11	FID 15-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	5	5		t CaCO3/Kt	1	5	40105.53547	calc	
L78387-11	FID 15-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	2.2	2.2		%	0.1	0.5	40099.62505	itk	
L78387-11	FID 15-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	8	8.0		units	0.1	0.1	40096.34228	itk	
L78387-11	FID 15-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.7	98.7		%	0.1	0.5	40101.28333	jjg	
L78387-11	FID 15-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.55	0.55		%	0.01	0.1	40093.6156	brd/bsu	
L78387-12	FID 16-25 0-6"	PR553454	Metals Analysis	6/22/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	512	512		mg/Kg	1	5	40098.51693	ear	7440-50-8
L78387-12	FID 16-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/Kt	1	5	40105.53549	calc	
L78387-12	FID 16-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	0	0		t CaCO3/Kt	1	5	40105.53549	calc	
L78387-12	FID 16-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3				t CaCO3/Kt	1	5	40105.53549	calc	
L78387-12	FID 16-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3			U	%	0.1	0.5	40099.64778	itk	
L78387-12	FID 16-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	4.3	4.3		units	0.1	0.1	40096.42264	itk	
L78387-12	FID 16-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.9	98.9		%	0.1	0.5	40101.425	jjg	
L78387-12	FID 16-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC			U	%	0.01	0.1	40093.62218	brd/bsu	
L78387-13	FID 17-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	4680	4680		mg/Kg	1	5	40098.51921	ear	7440-50-8
L78387-13	FID 17-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	20	20		t CaCO3/Kt	1	5	40105.5355	calc	
L78387-13	FID 17-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	26	26		t CaCO3/Kt	1	5	40105.5355	calc	
L78387-13	FID 17-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	6	6		t CaCO3/Kt	1	5	40105.5355	calc	
L78387-13	FID 17-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	2.6	2.6		%	0.1	0.5	40100.53472	itk	
L78387-13	FID 17-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6.6	6.6		units	0.1	0.1	40096.503	itk	
L78387-13	FID 17-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98	98.0		%	0.1	0.5	40101.56667	jjg	
L78387-13	FID 17-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.64	0.64		%	0.01	0.1	40093.62875	brd/bsu	
L78387-14	FID 18-25 0-6"	PR553454	Metals Analysis	6/22/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	326	326		mg/Kg	1	5	40098.52149	ear	7440-50-8
L78387-14	FID 18-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	1	1	B	t CaCO3/Kt	1	5	40105.53552	calc	
L78387-14	FID 18-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	0	0		t CaCO3/Kt	1	5	40105.53552	calc	
L78387-01	FID 0-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	329	329		mg/Kg	1	5	40098.47586	ear	7440-50-8
L78387-01	FID 0-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/Kt	1	5	40105.53529	calc	
L78387-01	FID 0-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	11	11		t CaCO3/Kt	1	5	40105.53529	calc	
L78387-01	FID 0-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	11	11		t CaCO3/Kt	1	5	40105.53529	calc	
L78387-01	FID 0-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	1.1	1.1		%	0.1	0.5	40099.42046	itk	
L78387-01	FID 0-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6.6	6.6		units	0.1	0.1	40095.45833	itk	
L78387-01	FID 0-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.6	97.6		%	0.1	0.5	40099.725	jjg	
L78387-01	FID 0-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.03	0.03	B	%	0.01	0.1	40093.54329	brd/bsu	
L78387-02	FID 1-25 0-6"	PR553454	Metals Analysis	6/22/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	143	143		mg/Kg	1	5	40098.48955	ear	7440-50-8
L78387-02	FID 1-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/Kt	1	5	40105.53531	calc	
L78387-02	FID 1-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	62	62		t CaCO3/Kt	1	5	40105.53531	calc	
L78387-02	FID 1-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	62	62		t CaCO3/Kt	1	5	40105.53531	calc	
L78387-02	FID 1-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	6.2	6.2		%	0.1	0.5	40099.46593	itk	
L78387-02	FID 1-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6.2	6.2		units	0.1	0.1	40095.53869	itk	
L78387-02	FID 1-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.6	96.6		%	0.1	0.5	40100.00833	jjg	
L78387-02	FID 1-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.02	0.02	B	%	0.01	0.1	40093.54986	brd/bsu	
L78387-03	FID 2-25 0-6"	PR553454	Metals Analysis	6/22/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	405	405		mg/Kg	1	5	40098.49183	ear	7440-50-8
L78387-03	FID 2-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/Kt	1	5	40105.53534	calc	
L78387-03	FID 2-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	57	57		t CaCO3/Kt	1	5	40105.53534	calc	
L78387-03	FID 2-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	57	57		t CaCO3/Kt	1	5	40105.53534	calc	
L78387-03	FID 2-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	5.7	5.7		%	0.1	0.5	40099.48866	itk	
L78387-03	FID 2-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	5.6	5.6		units	0.1	0.1	40095.61905	itk	
L78387-03	FID 2-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.8	96.8		%	0.1	0.5	40100.15	jjg	
L78387-03	FID 2-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.02	0.02	B	%	0.01	0.1	40093.55644	brd/bsu	
L78387-04	FID 3-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	236	236		mg/Kg	1	5	40098.4941	ear	7440-50-8
L78387-04	FID 3-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	5	5		t CaCO3/Kt	1	5	40105.53535	calc	
L78387-04	FID 3-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	164	164		t CaCO3/Kt	1	5	40105.53535	calc	
L78387-04	FID 3-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	159	159		t CaCO3/Kt	1	5	40105.53535	calc	
L78387-04	FID 3-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	16.4	16.4		%	0.1	0.5	40100.46528	itk	
L78387-04	FID 3-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	7.6	7.6		units	0.1	0.1	40095.69941	itk	
L78387-04	FID 3-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	98.7	98.7		%	0.1	0.5	40100.29167	jjg	
L78387-04	FID 3-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.17	0.17		%	0.01	0.1	40093.56301	brd/bsu	
L78387-05	FID 4-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	599	599		mg/Kg	1	5	40098.49638	ear	7440-50-8
L78387-05	FID 4-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/Kt	1	5	40105.53536	calc	
L78387-05	FID 4-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	12	12		t CaCO3/Kt	1	5	40105.53536	calc	
L78387-05	FID 4-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	12	12		t CaCO3/Kt	1	5	40105.53536	calc	
L78387-05	FID 4-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	1.2	1.2		%	0.1	0.5	40099.51139	itk	
L78387-05	FID 4-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6	6.0		units	0.1	0.1	40095.77977	itk	
L78387-05	FID 4-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	94.5	94.5		%	0.1	0.5	40100.43333	jjg	
L78387-05	FID 4-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC			U	%	0.01	0.1	40093.56958	brd/bsu	
L78387-06	FID 6-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	182	182		mg/Kg	1	5	40098.49866	ear	7440-50-8
L78387-06	FID 6-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/Kt	1	5	40105.53538	calc	
L78387-06	FID 6-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	7	7		t CaCO3/Kt	1	5	40105.53538	calc	
L78387-06	FID 6-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	7	7		t CaCO3/Kt	1	5	40105.53538	calc	
L78387-06	FID 6-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	0.7	0.7		%	0.1	0.5	40099.53412	itk	
L78387-06	FID 6-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6.4	6.4		units	0.1	0.1	40095.86013	itk	
L78387-06	FID 6-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	97.3	97.3		%	0.1	0.5	40100.575	jjg	
L78387-06	FID 6-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.02	0.02	B	%	0.01	0.1	40093.57616	brd/bsu	
L78387-07	FID 7-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	242	242		mg/Kg	1	5	40098.50095	ear	7440-50-8
L78387-07	FID 7-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3			U	t CaCO3/Kt	1	5	40105.53539	calc	
L78387-07	FID 7-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	34	34		t CaCO3/Kt	1	5	40105.53539	calc	
L78387-07	FID 7-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	34	34		t CaCO3/Kt	1	5	40105.53539	calc	
L78387-07	FID 7-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	3.4	3.4		%	0.1	0.5	40099.55685	itk	
L78387-07	FID 7-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	5.2	5.2		units	0.1	0.1	40096.02084	itk	
L78387-07	FID 7-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	95.8	95.8		%	0.1	0.5	40100.71667	jjg	
L78387-07	FID 7-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.01	0.01	B	%	0.01	0.1	40093.58931	brd/bsu	
L78387-08	FID 10-25 0-6"	PR553454	Metals Analysis	6/19/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	1020	1020		mg/Kg	1	5	40098.50323	ear	7440-50-8
L78387-08	FID 10-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	2	2	B	t CaCO3/Kt	1	5	40105.53542	calc	
L78387-08	FID 10-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	11	11		t CaCO3/Kt	1	5	40105.53542	calc	
L78387-08	FID 10-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	9	9		t CaCO3/Kt	1	5	40105.53542	calc	
L78387-08	FID 10-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3	1.1	1.1		%	0.1	0.5	40099.57958	itk	
L78387-08	FID 10-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	6	6.0		units	0.1	0.1	40096.1012	itk	
L78387-08	FID 10-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	96.4	96.4		%	0.1	0.5	40100.85833	jjg	
L78387-08	FID 10-25 0-6"	PR553454	Soil Analysis	6/19/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.05	0.05	B	%	0.01	0.1	40093.59588	brd/bsu	
L78387-09	FID 12-25 0-6"	PR553454	Metals Analysis	6/18/2009	9/25/2009	Copper, total (3050)	SO	M6010B ICP	4260	4260		mg/Kg	1	5	40098.50552	ear	7440-50-8
L78387-09	FID 12-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Generation Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	32	32		t CaCO3/Kt	1	5	40105.53543	calc	
L78387-09	FID 12-25 0-6"	PR553454	Soil Analysis	6/18/2009	9/25/2009	Acid Neutralization Potential (calc)	SO	M600/2-78-054 1.3	35	35		t CaCO3/Kt	1	5	40105.53543	calc	
L78387-14	FID 18-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Acid-Base Potential (calc on Sulfur total)	SO	M600/2-78-054 1.3	-1	-1		t CaCO3/Kt	1	5	40105.53552	calc	
L78387-14	FID 18-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Neutralization Potential as CaCO3	SO	M600/2-78-054 3.2.3			U	%	0.1	0.5	40099.67051	itk	
L78387-14	FID 18-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	pH, Saturated Paste	SO	USDA No. 60 (21A)	4.3	4.3		units	0.1	0.1	40096.58336	itk	
L78387-14	FID 18-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Solids, Percent	SO	CLPSOW390, PART F, D	99.1	99.1		%	0.1	0.5	40101.70833	jjg	
L78387-14	FID 18-25 0-6"	PR553454	Soil Analysis	6/22/2009	9/25/2009	Sulfur, total	SO	ASTM D-4239-85C, LEC	0.04	0.04	B	%	0.01	0.1	40093.63532	brd/bsu	

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Analytical Report

October 26, 2009

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Project ID: PR553454
ACZ Project ID: L76592

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on June 24, 2009. This project has been assigned to ACZ's project number, L76592. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 12.0. The enclosed results relate only to the samples received under L76592. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after November 26, 2009. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454
Sample ID: FID 0-25 0-1"

ACZ Sample ID: ***L76592-01***
Date Sampled: *06/18/09 10:25*
Date Received: *06/24/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	538		*	mg/Kg	1	5	10/21/09 21:05	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.2		*	%	0.1	0.5	10/19/09 14:30	jjg
Solids, Percent	CLPSOW390, PART F, D-98	98.8		*	%	0.1	0.5	10/19/09 14:30	jjg

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 8:50	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 12:00	bsu
Digestion - Hot Plate	M3050B ICP							10/19/09 18:36	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L76592-03***
Sample ID:	FID 1-25 0-1"	Date Sampled:	*06/22/09 09:38*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	175		*	mg/Kg	1	5	10/21/09 21:14	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.8		*	%	0.1	0.5	10/19/09 19:16	jjg
Solids, Percent	CLPSOW390, PART F, D-98	98.2		*	%	0.1	0.5	10/19/09 19:16	jjg

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 8:58	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 12:08	bsu
Digestion - Hot Plate	M3050B ICP							10/19/09 21:27	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L76592-05***
Project ID:	PR553454	Date Sampled:	*06/22/09 10:45*
Sample ID:	FID 2-25 0-1"	Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	453		*	mg/Kg	1	5	10/21/09 21:20	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	2.3		*	%	0.1	0.5	10/19/09 21:40	jjg
Solids, Percent	CLPSOW390, PART F, D-98	97.7		*	%	0.1	0.5	10/19/09 21:40	jjg

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 9:06	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 12:17	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 0:19	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454
Sample ID: FID 3-25 0-1"

ACZ Sample ID: ***L76592-07***
Date Sampled: *06/18/09 14:45*
Date Received: *06/24/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	377		*	mg/Kg	1	5	10/21/09 21:23	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.0		*	%	0.1	0.5	10/20/09 0:03	jjg
Solids, Percent	CLPSOW390, PART F, D-98	99.0		*	%	0.1	0.5	10/20/09 0:03	jjg

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 9:14	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 12:25	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 1:16	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L76592-09***
Sample ID:	FID 4-25 0-1"	Date Sampled:	*06/18/09 17:07*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	676		*	mg/Kg	1	5	10/22/09 12:05	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	4.7		*	%	0.1	0.5	10/20/09 2:26	jjg
Solids, Percent	CLPSOW390, PART F, D-98	95.3		*	%	0.1	0.5	10/20/09 2:26	jjg

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 9:23	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 12:34	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 2:13	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454
Sample ID:	FID 6-25 0-1"
ACZ Sample ID:	***L76592-11***
Date Sampled:	*06/18/09 09:50*
Date Received:	*06/24/09*
Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	M6020 ICP-MS	6.4			mg/Kg	0.3	1	10/21/09 19:47	scp
Cadmium, total (3050)	M6020 ICP-MS	1.20			mg/Kg	0.05	0.3	10/21/09 19:47	scp
Copper, total (3050)	M6010B ICP	650		*	mg/Kg	10	50	10/22/09 12:08	ear
Iron, total (3050)	M6010B ICP	96100		*	mg/Kg	20	50	10/22/09 12:08	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.8		*	%	0.1	0.5	10/20/09 4:50	jjg
Solids, Percent	CLPSOW390, PART F, D-98	98.2		*	%	0.1	0.5	10/20/09 4:50	jjg

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 9:31	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 12:42	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 3:10	itk
Digestion - Hot Plate	M3050B ICP-MS							10/20/09 3:10	itk

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L76592-13***
Sample ID:	FID 7-25 0-1"	Date Sampled:	*06/19/09 14:15*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	192		*	mg/Kg	1	5	10/22/09 12:11	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	4.7		*	%	0.1	0.5	10/20/09 7:13	jjg
Solids, Percent	CLPSOW390, PART F, D-98	95.3		*	%	0.1	0.5	10/20/09 7:13	jjg

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 9:39	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 12:51	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 4:07	itk

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	LCSWD	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	LFB	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	LFM	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	LFMD	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	LRB	Laboratory Reagent Blank
ICB	Initial Calibration Blank	MS	Matrix Spike
ICV	Initial Calibration Verification standard	MSD	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	PBS	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	PBW	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	PQV	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	SDL	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Arsenic, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272631													
WG272631ICV	ICV	10/21/09 18:22	MS091020-3	.05		.05096	mg/L	101.9	90	110			
WG272631ICB	ICB	10/21/09 18:28				U	mg/L		-0.0015	0.0015			
WG272468PBS	PBS	10/21/09 18:50				.33	mg/Kg		-0.9	0.9			
WG272468LCSS	LCSS	10/21/09 18:56	PCN33395	88.3		82.7	mg/Kg		69	108			
WG272468LCSSD	LCSSD	10/21/09 19:02	PCN33395	88.3		88	mg/Kg		69	108	6.2	20	
L76592-03MS	MS	10/21/09 19:24	MS090915-5	25.025	2.9	23.26	mg/Kg	81.4	75	125			
L76592-03MSD	MSD	10/21/09 19:30	MS090915-5	25.025	2.9	23.24	mg/Kg	81.3	75	125	0.09	20	

Cadmium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272631													
WG272631ICV	ICV	10/21/09 18:22	MS091020-3	.05		.05029	mg/L	100.6	90	110			
WG272631ICB	ICB	10/21/09 18:28				U	mg/L		-0.0003	0.0003			
WG272468PBS	PBS	10/21/09 18:50				U	mg/Kg		-0.15	0.15			
WG272468LCSS	LCSS	10/21/09 18:56	PCN33395	91		86.65	mg/Kg		74.1	108			
WG272468LCSSD	LCSSD	10/21/09 19:02	PCN33395	91		92.55	mg/Kg		74.1	108	6.6	20	
L76592-03MS	MS	10/21/09 19:24	MS090915-5	25	1.24	25.125	mg/Kg	95.5	75	125			
L76592-03MSD	MSD	10/21/09 19:30	MS090915-5	25	1.24	25.775	mg/Kg	98.1	75	125	2.55	20	

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272615													
WG272615ICV	ICV	10/21/09 20:41	II091007-3	2		2.014	mg/L	100.7	90	110			
WG272615ICB	ICB	10/21/09 20:44				U	mg/L		-0.03	0.03			
WG272468PBS	PBS	10/21/09 20:56				U	mg/Kg		-3	3			
WG272468LCSS	LCSS	10/21/09 20:59	PCN33395	237		209.3	mg/Kg		198	275			
WG272468LCSSD	LCSSD	10/21/09 21:02	PCN33395	237		230.3	mg/Kg		198	275	9.6	20	
L76592-01MS	MS	10/21/09 21:08	II091016-2	50	538	615.5	mg/Kg	155	75	125			M3
L76592-01MSD	MSD	10/21/09 21:11	II091016-2	50	538	610.3	mg/Kg	144.6	75	125	0.85	20	M3
WG272702													
WG272702ICV	ICV	10/22/09 11:19	II091007-3	2		1.925	mg/L	96.3	90	110			
WG272702ICB	ICB	10/22/09 11:22				U	mg/L		-0.03	0.03			
L76592-01MS	MS	10/22/09 11:51	II091016-2	50	534	597.1	mg/Kg	126.2	75	125			M3
L76592-01MSD	MSD	10/22/09 11:55	II091016-2	50	534	585.4	mg/Kg	102.8	75	125	1.98	20	

Iron, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272702													
WG272702ICV	ICV	10/22/09 11:19	II091007-3	2		1.944	mg/L	97.2	90	110			
WG272702ICB	ICB	10/22/09 11:22				U	mg/L		-0.06	0.06			
L76592-01MS	MS	10/22/09 11:51	II091016-2	100	46000	48619.3	mg/Kg	2619.3	75	125			M3
L76592-01MSD	MSD	10/22/09 11:55	II091016-2	100	46000	43723.3	mg/Kg	-2276.7	75	125	10.6	20	M3

Moisture Content M209F, Gravimetric - 105 C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272453													
L76592-01DUP	DUP	10/19/09 16:53			1.2	1.44	%				18.2	20	
WG272453PBS	PBS	10/20/09 12:00				100	%		99.9	100.1			

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272453													
L76592-01DUP	DUP	10/19/09 16:53			98.8	98.56	%				0.2	20	
WG272453PBS	PBS	10/20/09 12:00				U	%		99.9	100.1			

Inorganic Extended Qualifier Report

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L76592***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L76592-01	WG272615	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76592-03	WG272615	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76592-05	WG272615	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76592-07	WG272615	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76592-09	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76592-11	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
L76592-13	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.

Certification Qualifiers

Freeport-McMoRan - Chino Mines Company ACZ Project ID: ***L76592***

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Moisture Content	M209F, Gravimetric - 105 C
Solids, Percent	CLPSOW390, PART F, D-98

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company

B0063538.0002.00003

ACZ Project ID: L76592

Date Received: 6/24/2009

Received By:

Date Printed: 6/24/2009

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Is the trip blank for Cyanide present?			X
12) Is the trip blank for VOA present?			X
13) Are samples requiring no headspace, headspace free?			X
14) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/hr)
NA8701	18.4	13

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76592
Date Received: 6/24/2009
Received By:

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L76592-01	FID 0-25 0-1"									X		☐
L76592-02	FID 0-25 0-6"									X		☐
L76592-03	FID 1-25 0-1"									X		☐
L76592-04	FID 1-25 0-6"									X		☐
L76592-05	FID 2-25 0-1"									X		☐
L76592-06	FID 2-25 0-6"									X		☐
L76592-07	FID 3-25 0-1"									X		☐
L76592-08	FID 3-25 0-6"									X		☐
L76592-09	FID 4-25 0-1"									X		☐
L76592-10	FID 4-25 0-6"									X		☐
L76592-11	FID 6-25 0-1"									X		☐
L76592-12	FID 6-25 0-6"									X		☐
L76592-13	FID 7-25 0-1"									X		☐
L76592-14	FID 7-25 0-6"									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ____________________

ACZ Laboratories, Inc. L76592

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS

E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper	% moisture	Total Arsenic, Cadmium, Copper, Iron	Cation Exchange Capacity	Calcium	Acid-Base Accounting		
FID 0-25 0-1"	6/18/09 1025	SO	1	x	x						
FID 0-25 0-6"	6/18/09 1026	SO	1	x	x						
FID 1-25 0-1"	6/22/09 0938	SO	1	x	x						
FID 1-25 0-6"	6/22/09 0940	SO	1	x	x						
FID 2-25 0-1"	6/22/09 1045	SO	1	x	x						
FID 2-25 0-6"	6/22/09 1047	SO	1	x	x						
FID 3-25 0-1"	6/18/09 1445	SO	1	x	x						
FID 3-25 0-6"	6/18/09 1447	SO	1	x	x						
FID 4-25 0-1"	6/18/09 1707	SO	1	x	x						
FID 4-25 0-6"	6/18/09 1710	SO	1	x	x						

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454 (1) COPPER-SOIL

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Karen Thompson	6/23/09 1200		6-24-09 10:11

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

6/23/09 1200

ACZ Laboratories, Inc. L76592

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com
Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS
E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com
Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒

If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper	% moisture	Total Arsenic, Cadmium, Copper, Iron	Cation Exchange Capacity	Calcium	Acid-Base Accounting		
~~FID 5-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~						
~~FID 5-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~						
FID 6-25 0-1"	6/18/09 0950	SO	1		x	x	(2)				
FID 6-25 0-6"	6/18/09 0955	SO	1	x	x		x	x	x	(3)	
FID 7-25 0-1"	6/19/09 1415	SO	1	x	x						
FID 7-25 0-6"	6/19/09 1417	SO	1	x	x						
~~FID 8-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~		~~x~~	~~x~~					
~~FID 8-25 0-6"~~	~~NOT SAMPLED~~	SO	~~1~~	~~x~~	~~x~~		~~x~~	~~x~~	~~x~~		
~~FID 9-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~		~~x~~	~~x~~					
~~FID 9-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~		~~x~~	~~x~~	~~x~~		

L76924D

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR 553454

(2) SOIL-METALS

(3) CHINO-SOIL-ANALYSIS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Kare Thompson	6/23/09 1200		6.24.09 10:11

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive   Steamboat Springs, CO 80487   (800) 334-5493

Analytical Report

October 29, 2009

Report to:	Bill to:
Pam Pinson	Accounts Payable
Freeport-McMoRan - Chino Mines Company	Freeport-McMoRan - Chino Mines Company
210 Cortez Ave. Box 7	P.O. Box 13308
Hurley, NM 88043	Phoenix, AZ 85002-3308

cc: Rebecca Lindeman

Project ID: PR553454
ACZ Project ID: L76593

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on June 24, 2009. This project has been assigned to ACZ's project number, L76593. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 12.0. The enclosed results relate only to the samples received under L76593. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after November 29, 2009. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454
Sample ID: FID 10-25 0-1"

ACZ Sample ID: ***L76593-01***
Date Sampled: *06/19/09 09:35*
Date Received: *06/24/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	M6020 ICP-MS	3.6			mg/Kg	0.3	1	10/26/09 23:55	erf
Cadmium, total (3050)	M6020 ICP-MS	2.07			mg/Kg	0.05	0.3	10/26/09 23:55	erf
Copper, total (3050)	M6010B ICP	1050		*	mg/Kg	1	5	10/22/09 23:05	ear
Iron, total (3050)	M6010B ICP	15300		*	mg/Kg	2	5	10/22/09 23:05	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	4.7		*	%	0.1	0.5	07/05/09 4:00	bjl
Solids, Percent	CLPSOW390, PART F, D-98	95.3		*	%	0.1	0.5	07/05/09 4:00	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:00	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 12:59	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 11:30	jjg
Digestion - Hot Plate	M3050B ICP-MS							10/21/09 11:30	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454
Sample ID: FID 12-25 0-1"

ACZ Sample ID: ***L76593-03***
Date Sampled: *06/18/09 15:25*
Date Received: *06/24/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	M6020 ICP-MS	6.0			mg/Kg	0.3	1	10/27/09 0:01	erf
Cadmium, total (3050)	M6020 ICP-MS	6.13			mg/Kg	0.05	0.3	10/27/09 0:01	erf
Copper, total (3050)	M6010B ICP	5580		*	mg/Kg	1	5	10/22/09 23:17	ear
Iron, total (3050)	M6010B ICP	42500		*	mg/Kg	2	5	10/22/09 23:17	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.1		*	%	0.1	0.5	07/05/09 15:10	bjl
Solids, Percent	CLPSOW390, PART F, D-98	98.9		*	%	0.1	0.5	07/05/09 15:10	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:02	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 13:08	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 12:30	jjg
Digestion - Hot Plate	M3050B ICP-MS							10/21/09 12:30	jjg

** Please refer to Qualifier Reports for details.*

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L76593-05***
Sample ID:	FID 13-25 0-1"	Date Sampled:	*06/18/09 16:10*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1280		*	mg/Kg	1	5	10/22/09 23:26	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	2.4		*	%	0.1	0.5	07/06/09 2:20	bjl
Solids, Percent	CLPSOW390, PART F, D-98	97.6		*	%	0.1	0.5	07/06/09 2:20	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:05	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 13:17	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 13:30	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454
Sample ID:	FID 15-25 0-1"
ACZ Sample ID:	***L76593-07***
Date Sampled:	*06/22/09 15:23*
Date Received:	*06/24/09*
Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1530		*	mg/Kg	1	5	10/22/09 23:29	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.0		*	%	0.1	0.5	07/06/09 13:30	bjl
Solids, Percent	CLPSOW390, PART F, D-98	99.0		*	%	0.1	0.5	07/06/09 13:30	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:08	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 13:25	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 13:50	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L76593-09***
Sample ID:	FID 16-25 0-1"	Date Sampled:	*06/22/09 14:55*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	362		*	mg/Kg	1	5	10/22/09 23:32	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	0.6		*	%	0.1	0.5	07/02/09 23:42	bjl
Solids, Percent	CLPSOW390, PART F, D-98	99.4		*	%	0.1	0.5	07/02/09 23:42	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:11	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 13:34	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 14:10	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76593-11***
Sample ID:	FID 17-25 0-1"	Date Sampled:	*06/18/09 15:39*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	9150		*	mg/Kg	1	5	10/22/09 23:35	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	2.7		*	%	0.1	0.5	07/03/09 8:51	bjl
Solids, Percent	CLPSOW390, PART F, D-98	97.3		*	%	0.1	0.5	07/03/09 8:51	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:14	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 13:42	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 14:30	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L76593-13***
Project ID:	B0063538.0002.00003	Date Sampled:	*06/22/09 14:05*
Sample ID:	FID 18-25 0-1"	Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	215		*	mg/Kg	1	5	10/22/09 23:38	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	0.5		*	%	0.1	0.5	07/03/09 17:59	bjl
Solids, Percent	CLPSOW390, PART F, D-98	99.5		*	%	0.1	0.5	07/03/09 17:59	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:17	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 13:51	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 14:50	jjg

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	LCSWD	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	LFB	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	LFM	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	LFMD	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	LRB	Laboratory Reagent Blank
ICB	Initial Calibration Blank	MS	Matrix Spike
ICV	Initial Calibration Verification standard	MSD	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	PBS	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	PBW	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	PQV	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	SDL	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1)	EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2)	EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3)	EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5)	EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6)	Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Inorganic QC Summary

Freeport-McMoRan - Chino Mines Company
Project ID: B0063538.0002.00003

ACZ Project ID: ***L76593***

Arsenic, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272902													
WG272902ICV	ICV	10/26/09 23:13	MS091020-3	.05		.04949	mg/L	99	90	110			
WG272902ICB	ICB	10/26/09 23:18				U	mg/L		-0.0015	0.0015			
WG272605PBS	PBS	10/26/09 23:40				U	mg/Kg		-0.9	0.9			
WG272605LCSS	LCSS	10/26/09 23:45	PCN33395	88.3		89.4	mg/Kg		69	108			
WG272605LCSSD	LCSSD	10/26/09 23:50	PCN33395	88.3		88.6	mg/Kg		69	108	0.9	20	
L76593-03MS	MS	10/27/09 0:06	MS090915-5	25.27525	6	29.24	mg/Kg	91.9	75	125			
L76593-03MSD	MSD	10/27/09 0:11	MS090915-5	25.27525	6	35.47	mg/Kg	116.6	75	125	19.26	20	

Cadmium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272902													
WG272902ICV	ICV	10/26/09 23:13	MS091020-3	.05		.04739	mg/L	94.8	90	110			
WG272902ICB	ICB	10/26/09 23:18				U	mg/L		-0.0003	0.0003			
WG272605PBS	PBS	10/26/09 23:40				U	mg/Kg		-0.15	0.15			
WG272605LCSS	LCSS	10/26/09 23:45	PCN33395	91		93.4	mg/Kg		74.1	108			
WG272605LCSSD	LCSSD	10/26/09 23:50	PCN33395	91		88.5	mg/Kg		74.1	108	5.4	20	
L76593-03MS	MS	10/27/09 0:06	MS090915-5	25.25	6.13	30.058	mg/Kg	94.8	75	125			
L76593-03MSD	MSD	10/27/09 0:11	MS090915-5	25.25	6.13	33.012	mg/Kg	106.5	75	125	9.37	20	

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272720													
WG272720ICV	ICV	10/22/09 22:40	II091007-3	2		2.004	mg/L	100.2	90	110			
WG272720ICB	ICB	10/22/09 22:43				U	mg/L		-0.03	0.03			
WG272605PBS	PBS	10/22/09 22:56				U	mg/Kg		-3	3			
WG272605LCSS	LCSS	10/22/09 22:59	PCN33395	237		255.6	mg/Kg		198	275			
WG272605LCSSD	LCSSD	10/22/09 23:02	PCN33395	237		242.9	mg/Kg		198	275	5.1	20	
L76593-01MS2	MS	10/22/09 23:11	II091016-2	51.5	1050	1201.4	mg/Kg	294	75	125			M3
L76593-01MSD2	MSD	10/22/09 23:14	II091016-2	51.5	1050	1023.1	mg/Kg	-52.2	75	125	16.03	20	M3

Iron, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272720													
WG272720ICV	ICV	10/22/09 22:40	II091007-3	2		1.905	mg/L	95.3	90	110			
WG272720ICB	ICB	10/22/09 22:43				U	mg/L		-0.06	0.06			
WG272605PBS	PBS	10/22/09 22:56				2.3	mg/Kg		-6	6			
WG272605LCSS	LCSS	10/22/09 22:59	PCN33395	18900		18570.3	mg/Kg		9550	28200			
WG272605LCSSD	LCSSD	10/22/09 23:02	PCN33395	18900		18516.7	mg/Kg		9550	28200	0.3	20	
L76593-01MS2	MS	10/22/09 23:11	II091016-2	103	15300	16598.2	mg/Kg	1260.4	75	125			M3
L76593-01MSD2	MSD	10/22/09 23:14	II091016-2	103	15300	16601.4	mg/Kg	1263.5	75	125	0.02	20	M3

Freeport-McMoRan - Chino Mines Company
Project ID: B0063538.0002.00003

ACZ Project ID: ***L76593***

Moisture Content M209F, Gravimetric - 105 C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG266298													
WG266298PBS	PBS	07/02/09 9:00				100.05	%		99.9	100.1			
L76440-06DUP	DUP	07/02/09 20:10			11.4	10.99	%				3.7	20	
WG266307													
WG266307PBS	PBS	07/02/09 10:00				100	%		99.9	100.1			
L76593-08DUP	DUP	07/02/09 19:08			1.6	1.37	%				15.5	20	

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG266298													
WG266298PBS	PBS	07/02/09 9:00				U	%		99.9	100.1			
L76440-06DUP	DUP	07/02/09 20:10			88.6	89.01	%				0.5	20	
WG266307													
WG266307PBS	PBS	07/02/09 10:00				U	%		99.9	100.1			
L76593-08DUP	DUP	07/02/09 19:08			98.4	98.63	%				0.2	20	

Inorganic Extended Qualifier Report

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L76593***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L76593-01	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76593-03	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76593-05	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76593-07	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76593-09	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76593-11	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76593-13	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Moisture Content	M209F, Gravimetric - 105 C
Solids, Percent	CLPSOW390, PART F, D-98

Sample Receipt

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76593
Date Received: 6/24/2009
Received By:
Date Printed: 6/24/2009

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Is the trip blank for Cyanide present?			X
12) Is the trip blank for VOA present?			X
13) Are samples requiring no headspace, headspace free?			X
14) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/hr)
NA8701	18.4	13

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

Sample Receipt

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76593
Date Received: 6/24/2009
Received By:

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L76593-01	FID 10-25 0-1"									X		☐
L76593-02	FID 10-25 0-6"									X		☐
L76593-03	FID 12-25 0-1"									X		☐
L76593-04	FID 12-25 0-6"									X		☐
L76593-05	FID 13-25 0-1"									X		☐
L76593-06	FID 13-25 0-6"									X		☐
L76593-07	FID 15-25 0-1"									X		☐
L76593-08	FID 15-25 0-6"									X		☐
L76593-09	FID 16-25 0-1"									X		☐
L76593-10	FID 16-25 0-6"									X		☐
L76593-11	FID 17-25 0-1"									X		☐
L76593-12	FID 17-25 0-6"									X		☐
L76593-13	FID 18-25 0-1"									X		☐
L76593-14	FID 18-25 0-6"									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ______________________

ACZ Laboratories, Inc. L76593

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson	Address: 210 Cortez Avenue
Company: FMI - Chino Mine	Hurley , NM 88043
E-mail: pamela_pinson@fmi.com	Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman	E-mail: rebecca.lindeman@arcadis-us.com
Company: ARCADIS	Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson	Address: 210 Cortez Avenue
Company: FMI - Chino Mine	Hurley , NM 88043
E-mail: pamela_pinson@fmi.com	Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒

If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS

Project/PO #: B0063538.0002.00003

Reporting state for compliance testing:

Sampler's Name: K. Thompson/ARCADIS

Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper	% moisture	Total Arsenic, Cadmium, Copper, Iron	Cation Exchange Capacity	Calcium	Acid-Base Accounting		
FID 10-25 0-1"	6/19/09 0935	SO	1		x	x					
FID 10-25 0-6"	6/19/09 0938	SO	1	x	x		x	x	x		
~~FID 11-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~						
~~FID 11-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~						
FID 12-25 0-1"	6/18/09 1525	SO	1		x	x					
FID 12-25 0-6"	6/18/09 1527	SO	1	x	x		x	x	x		
FID 13-25 0-1"	6/18/09 1610	SO	1	x	x						
FID 13-25 0-6"	6/18/09 1613	SO	1	x	x						
~~FID 14-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~		~~x~~	~~x~~					
~~FID 14-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~		~~x~~	~~x~~	~~x~~		

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

6.24.09

6.24.09

REMARKS

FMI purchase requisition PR553454

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Karen Thompson	6/23/09 1200		6-24-09 10:11

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L76593

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson	Address: 210 Cortez Avenue
Company: FMI - Chino Mine	Hurley, NM 88043
E-mail: pamela_pinson@fmi.com	Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman	E-mail: rebecca.lindeman@arcadis-us.com
Company: ARCADIS	Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson	Address: 210 Cortez Avenue
Company: FMI - Chino Mine	Hurley, NM 88043
E-mail: pamela_pinson@fmi.com	Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒

If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS

Project/PO #: B0063538.0002.00003

Reporting state for compliance testing:

Sampler's Name: K. Thompson/ARCADIS

Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper	% moisture	Total Arsenic, Cadmium, Copper, Iron	Cation Exchange Capacity	Calcium	Acid-Base Accounting		
FID 15-25 0-1"	6/22/09 1523	SO	1	x	x						
FID 15-25 0-6"	6/22/09 1525	SO	1	x	x						
FID 16-25 0-1"	6/22/09 1455	SO	1	x	x						
FID 16-25 0-6"	6/22/09 1457	SO	1	x	x						
FID 17-25 0-1"	6/18/09 1539	SO	1		x	x					
FID 17-25 0-6"	6/18/09 1545	SO	1	x	x		x	x	x		
FID 18-25 0-1"	6/22/09 1405	SO	1		x	x					
FID 18-25 0-6"	6/22/09 1407	SO	1	x	x		x	x	x		
~~FID 19-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~		~~x~~	~~x~~					
~~FID 19-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~		~~x~~	~~x~~	~~x~~		

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Kare Thompson	6/23/09 1200		6.24.09 10:11

6.24.09

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive   Steamboat Springs, CO 80487   (800) 334-5493

Analytical Report

October 26, 2009

Report to:	Bill to:
Pam Pinson	Accounts Payable
Freeport-McMoRan - Chino Mines Company	Freeport-McMoRan - Chino Mines Company
210 Cortez Ave. Box 7	P.O. Box 13308
Hurley, NM 88043	Phoenix, AZ 85002-3308

cc: Rebecca Lindeman

Project ID: B0063538.0002.00003
ACZ Project ID: L76594

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on June 24, 2009. This project has been assigned to ACZ's project number, L76594. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 12.0. The enclosed results relate only to the samples received under L76594. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after November 26, 2009. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: B0063538.0002.00003
Sample ID: FID 20-25 0-1"

ACZ Sample ID: ***L76594-01***
Date Sampled: *06/19/09 10:23*
Date Received: *06/24/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	755		*	mg/Kg	1	5	10/22/09 12:14	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	3.4		*	%	0.1	0.5	07/04/09 3:08	bjl
Solids, Percent	CLPSOW390, PART F, D-98	96.6		*	%	0.1	0.5	07/04/09 3:08	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:19	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 13:59	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 5:04	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: B0063538.0002.00003
Sample ID: FID 21-25 0-1"

ACZ Sample ID: ***L76594-03***
Date Sampled: *06/19/09 14:52*
Date Received: *06/24/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	153		*	mg/Kg	1	5	10/22/09 12:18	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	0.6		*	%	0.1	0.5	07/04/09 12:17	bjl
Solids, Percent	CLPSOW390, PART F, D-98	99.4		*	%	0.1	0.5	07/04/09 12:17	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:22	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 14:08	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 6:01	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: B0063538.0002.00003
Sample ID: FID 22-25 0-1"

ACZ Sample ID: ***L76594-05***
Date Sampled: *06/19/09 15:47*
Date Received: *06/24/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	347		*	mg/Kg	1	5	10/22/09 12:21	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.2		*	%	0.1	0.5	07/04/09 21:25	bjl
Solids, Percent	CLPSOW390, PART F, D-98	98.8		*	%	0.1	0.5	07/04/09 21:25	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:25	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 14:17	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 6:58	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76594-07***
Sample ID:	FID 24-25 0-1"	Date Sampled:	*06/19/09 11:47*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	222		*	mg/Kg	1	5	10/22/09 12:24	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	4.2		*	%	0.1	0.5	07/05/09 6:34	bjl
Solids, Percent	CLPSOW390, PART F, D-98	95.8		*	%	0.1	0.5	07/05/09 6:34	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:28	brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 14:25	bsu
Digestion - Hot Plate	M3050B ICP							10/20/09 7:55	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76594-09***
Sample ID:	FID 25-25 0-1"	Date Sampled:	*06/19/09 12:05*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	89		*	mg/Kg	1	5	10/22/09 12:28	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.5		*	%	0.1	0.5	07/05/09 15:42	bjl
Solids, Percent	CLPSOW390, PART F, D-98	98.5		*	%	0.1	0.5	07/05/09 15:42	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:31	brd
Crush and Pulverize	USDA No. 1, 1972							10/19/09 8:00	itk
Digestion - Hot Plate	M3050B ICP							10/20/09 8:53	itk

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76594-11***
Sample ID:	FID 26-25 0-1"	Date Sampled:	*06/19/09 11:27*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	134		*	mg/Kg	1	5	10/22/09 12:31	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.3		*	%	0.1	0.5	07/06/09 0:51	bjl
Solids, Percent	CLPSOW390, PART F, D-98	98.7		*	%	0.1	0.5	07/06/09 0:51	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:34	brd
Crush and Pulverize	USDA No. 1, 1972							10/19/09 8:07	itk
Digestion - Hot Plate	M3050B ICP							10/20/09 9:50	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76594-13***
Sample ID:	FID 27-25 0-1"	Date Sampled:	*06/18/09 14:05*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	322		*	mg/Kg	1	5	10/22/09 12:34	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	3.7		*	%	0.1	0.5	07/06/09 9:59	bjl
Solids, Percent	CLPSOW390, PART F, D-98	96.3		*	%	0.1	0.5	07/06/09 9:59	bjl

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:37	brd
Crush and Pulverize	USDA No. 1, 1972							10/19/09 8:15	itk
Digestion - Hot Plate	M3050B ICP							10/20/09 10:47	itk

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76594-15***
Sample ID:	FID 28-25 0-1"	Date Sampled:	*06/22/09 12:05*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	426		*	mg/Kg	1	5	10/22/09 12:44	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	2.1		*	%	0.1	0.5	10/20/09 9:36	jjg
Solids, Percent	CLPSOW390, PART F, D-98	97.9		*	%	0.1	0.5	10/20/09 9:36	jjg

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/19/09 12:39	brd
Crush and Pulverize	USDA No. 1, 1972							10/19/09 8:22	itk
Digestion - Hot Plate	M3050B ICP							10/20/09 11:44	itk

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	LCSWD	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	LFB	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	LFM	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	LFMD	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	LRB	Laboratory Reagent Blank
ICB	Initial Calibration Blank	MS	Matrix Spike
ICV	Initial Calibration Verification standard	MSD	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	PBS	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	PBW	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	PQV	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	SDL	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272702													
WG272702ICV	ICV	10/22/09 11:19	II091007-3	2		1.925	mg/L	96.3	90	110			
WG272702ICB	ICB	10/22/09 11:22				U	mg/L		-0.03	0.03			
L76592-01MS	MS	10/22/09 11:51	II091016-2	50	534	597.1	mg/Kg	126.2	75	125			M3
L76592-01MSD	MSD	10/22/09 11:55	II091016-2	50	534	585.4	mg/Kg	102.8	75	125	1.98	20	

Moisture Content M209F, Gravimetric - 105 C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG266307													
WG266307PBS	PBS	07/02/09 10:00				100	%		99.9	100.1			
L76593-08DUP	DUP	07/02/09 19:08			1.6	1.37	%				15.5	20	
WG272453													
L76592-01DUP	DUP	10/19/09 16:53			1.2	1.44	%				18.2	20	
WG272453PBS	PBS	10/20/09 12:00				100	%		99.9	100.1			

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG266307													
WG266307PBS	PBS	07/02/09 10:00				U	%		99.9	100.1			
L76593-08DUP	DUP	07/02/09 19:08			98.4	98.63	%				0.2	20	
WG272453													
L76592-01DUP	DUP	10/19/09 16:53			98.8	98.56	%				0.2	20	
WG272453PBS	PBS	10/20/09 12:00				U	%		99.9	100.1			

Inorganic Extended Qualifier Report

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L76594***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L76594-01	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76594-03	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76594-05	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76594-07	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76594-09	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76594-11	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76594-13	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76594-15	WG272702	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.

Certification Qualifiers

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L76594***

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Moisture Content	M209F, Gravimetric - 105 C
Solids, Percent	CLPSOW390, PART F, D-98

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76594
Date Received: 6/24/2009
Received By:
Date Printed: 6/24/2009

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Is the trip blank for Cyanide present?			X
12) Is the trip blank for VOA present?			X
13) Are samples requiring no headspace, headspace free?			X
14) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/hr)
NA8701	18.4	13

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76594
Date Received: 6/24/2009
Received By:

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L76594-01	FID 20-25 0-1"									X		☐
L76594-02	FID 20-25 0-6"									X		☐
L76594-03	FID 21-25 0-1"									X		☐
L76594-04	FID 21-25 0-6"									X		☐
L76594-05	FID 22-25 0-1"									X		☐
L76594-06	FID 22-25 0-6"									X		☐
L76594-07	FID 24-25 0-1"									X		☐
L76594-08	FID 24-25 0-6"									X		☐
L76594-09	FID 25-25 0-1"									X		☐
L76594-10	FID 25-25 0-6"									X		☐
L76594-11	FID 26-25 0-1"									X		☐
L76594-12	FID 26-25 0-6"									X		☐
L76594-13	FID 27-25 0-1"									X		☐
L76594-14	FID 27-25 0-6"									X		☐
L76594-15	FID 28-25 0-1"									X		☐
L76594-16	FID 28-25 0-6"									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ____________________

ACZ Laboratories, Inc. L76594

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS

E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒

If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper	% moisture	Total Arsenic, Cadmium, Copper, Iron	Cation Exchange Capacity	Calcium	Acid-Base Accounting		
FID 20-25 0-1"	6/19/09 1023	SO	1		x	x					
FID 20-25 0-6"	6/19/09 1025	SO	1	x	x		x	x	x		
FID 21-25 0-1"	6/19/09 1452	SO	1		x	x					
FID 21-25 0-6"	6/19/09 1455	SO	1	x	x		x	x	x		
FID 22-25 0-1"	6/19/09 1547	SO	1	x	x						
FID 22-25 0-6"	6/19/09 1550	SO	1	x	x						
~~FID 23-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~						
~~FID 23-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~x~~	~~x~~						
FID 24-25 0-1"	6/19/09 1147	SO	1	x	x						
FID 24-25 0-6"	6/19/09 1150	SO	1	x	x						

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Kare Thompson	6/23/09 1200		6.24.09 10:11

LDO 6.24.09

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L76594

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com
Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS
E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com
Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper	% moisture	Total Arsenic, Cadmium, Copper, Iron	Cation Exchange Capacity	Calcium	Acid-Base Accounting		
FID 25-25 0-1"	6/19/09 1205	SO	1	X	X						
FID 25-25 0-6"	6/19/09 1207	SO	1	X	X						
FID 26-25 0-1"	6/19/09 1127	SO	1		X	X					
FID 26-25 0-6"	6/19/09 1130	SO	1	X	X		X	X	X		
FID 27-25 0-1"	6/18/09 1405	SO	1		X	X					
FID 27-25 0-6"	6/18/09 1408	SO	1	X	X		X	X	X		
FID 28-25 0-1"	6/22/09 1205	SO	1	X	X						
FID 28-25 0-6"	6/22/09 1208	SO	1	X	X						
~~FID 29-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~X~~	~~X~~						
~~FID 29-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~X~~	~~X~~						

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

6.24.09

REMARKS

FMI purchase requisition PR553454

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY	DATE:TIME	RECEIVED BY:	DATE:TIME
Kare Thompson	6/23/09 1200		6.24.09 10:11

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

October 26, 2009

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
210 Cortez Ave. Box 7
Hurley, NM 88043

Bill to:
Accounts Payable
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

cc: Rebecca Lindeman

Project ID: B0063538.0002.00003
ACZ Project ID: L76595

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on June 24, 2009. This project has been assigned to ACZ's project number, L76595. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 12.0. The enclosed results relate only to the samples received under L76595. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after November 26, 2009. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76595-01***
Sample ID:	FID 30-25 0-1"	Date Sampled:	*06/18/09 10:58*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	291		*	mg/Kg	1	5	10/22/09 23:41	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	2.0		*	%	0.1	0.5	06/30/09 12:11	itk/brd
Solids, Percent	CLPSOW390, PART F, D-98	98.0		*	%	0.1	0.5	06/30/09 12:11	itk/brd

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 9:47	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 14:34	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 15:10	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: B0063538.0002.00003

Sample ID: FID 31-25 0-1"

ACZ Sample ID: ***L76595-03***

Date Sampled: *06/19/09 12:27*

Date Received: *06/24/09*

Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	294		*	mg/Kg	1	5	10/22/09 23:44	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.5		*	%	0.1	0.5	06/30/09 18:01	itk/brd
Solids, Percent	CLPSOW390, PART F, D-98	98.5		*	%	0.1	0.5	06/30/09 18:01	itk/brd

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 9:55	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 14:42	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 15:30	jjg

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76595-05***
Sample ID:	FID 32-25 0-1"	Date Sampled:	*06/18/09 12:00*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	2250		*	mg/Kg	1	5	10/22/09 23:47	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.6		*	%	0.1	0.5	06/30/09 21:54	itk/brd
Solids, Percent	CLPSOW390, PART F, D-98	98.4		*	%	0.1	0.5	06/30/09 21:54	itk/brd

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 10:03	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 14:51	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 15:50	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003
Sample ID:	FID 33-25 0-1"

ACZ Sample ID:	***L76595-07***
Date Sampled:	*06/19/09 13:15*
Date Received:	*06/24/09*
Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	785		*	mg/Kg	1	5	10/22/09 23:50	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.9		*	%	0.1	0.5	07/01/09 1:47	itk/brd
Solids, Percent	CLPSOW390, PART F, D-98	98.2		*	%	0.1	0.5	07/01/09 1:47	itk/brd

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 10:12	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 14:59	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 16:10	jjg

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L76595-09***
Project ID:	B0063538.0002.00003	Date Sampled:	*06/18/09 12:28*
Sample ID:	FID 34-25 0-1"	Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	682		*	mg/Kg	1	5	10/22/09 23:53	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.4		*	%	0.1	0.5	07/01/09 5:40	itk/brd
Solids, Percent	CLPSOW390, PART F, D-98	98.6		*	%	0.1	0.5	07/01/09 5:40	itk/brd

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 10:20	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 15:08	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 16:30	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: B0063538.0002.00003
Sample ID: FID 35-25 0-1"

ACZ Sample ID: ***L76595-11***
Date Sampled: *06/22/09 10:28*
Date Received: *06/24/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	219		*	mg/Kg	1	5	10/23/09 0:02	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.6		*	%	0.1	0.5	07/01/09 9:33	itk/brd
Solids, Percent	CLPSOW390, PART F, D-98	98.4		*	%	0.1	0.5	07/01/09 9:33	itk/brd

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 10:28	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 15:17	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 16:50	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76595-13***
Sample ID:	FID 37-25 0-1"	Date Sampled:	*06/22/09 15:47*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	533		*	mg/Kg	1	5	10/23/09 0:05	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.3		*	%	0.1	0.5	07/01/09 13:26	itk/brd
Solids, Percent	CLPSOW390, PART F, D-98	98.7		*	%	0.1	0.5	07/01/09 13:26	itk/brd

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 10:36	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 15:25	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 17:10	jjg

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	B0063538.0002.00003	ACZ Sample ID:	***L76595-14***
Sample ID:	FID 39-25 0-1"	Date Sampled:	*06/19/09 08:48*
		Date Received:	*06/24/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	590		*	mg/Kg	1	5	10/23/09 0:08	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	3.9		*	%	0.1	0.5	07/01/09 15:23	itk/brd
Solids, Percent	CLPSOW390, PART F, D-98	96.1		*	%	0.1	0.5	07/01/09 15:23	itk/brd

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							06/30/09 10:40	itk/brd
Crush and Pulverize	USDA No. 1, 1972							10/15/09 15:34	bsu
Digestion - Hot Plate	M3050B ICP							10/21/09 17:30	jjg

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	LCSWD	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	LFB	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	LFM	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	LFMD	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	LRB	Laboratory Reagent Blank
ICB	Initial Calibration Blank	MS	Matrix Spike
ICV	Initial Calibration Verification standard	MSD	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	PBS	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	PBW	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	PQV	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	SDL	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Inorganic QC Summary

Freeport-McMoRan - Chino Mines Company
Project ID: B0063538.0002.00003

ACZ Project ID: ***L76595***

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272720													
WG272720ICV	ICV	10/22/09 22:40	II091007-3	2		2.004	mg/L	100.2	90	110			
WG272720ICB	ICB	10/22/09 22:43				U	mg/L		-0.03	0.03			
WG272605PBS	PBS	10/22/09 22:56				U	mg/Kg		-3	3			
WG272605LCSS	LCSS	10/22/09 22:59	PCN33395	237		255.6	mg/Kg		198	275			
WG272605LCSSD	LCSSD	10/22/09 23:02	PCN33395	237		242.9	mg/Kg		198	275	5.1	20	
L76593-01MS2	MS	10/22/09 23:11	II091016-2	51.5	1050	1201.4	mg/Kg	294	75	125			M3
L76593-01MSD2	MSD	10/22/09 23:14	II091016-2	51.5	1050	1023.1	mg/Kg	-52.2	75	125	16.03	20	M3

Moisture Content M209F, Gravimetric - 105 C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG266128													
WG266128PBS	PBS	06/30/09 10:15				100	%		99.9	100.1			
L76595-01DUP	DUP	06/30/09 14:08			2	1.75	%				13.3	20	

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG266128													
WG266128PBS	PBS	06/30/09 10:15				U	%		99.9	100.1			
L76595-01DUP	DUP	06/30/09 14:08			98	98.25	%				0.3	20	

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L76595-01	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76595-03	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76595-05	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76595-07	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76595-09	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76595-11	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76595-13	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L76595-14	WG272720	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Moisture Content	M209F, Gravimetric - 105 C
Solids, Percent	CLPSOW390, PART F, D-98

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76595
Date Received: 6/24/2009
Received By:
Date Printed: 6/24/2009

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Is the trip blank for Cyanide present?			X
12) Is the trip blank for VOA present?			X
13) Are samples requiring no headspace, headspace free?			X
14) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/hr)
NA8701	18.4	13

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

Sample Receipt

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76595
Date Received: 6/24/2009
Received By:

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L76595-01	FID 30-25 0-1"									X		☐
L76595-02	FID 30-25 0-6"									X		☐
L76595-03	FID 31-25 0-1"									X		☐
L76595-04	FID 31-25 0-6"									X		☐
L76595-05	FID 32-25 0-1"									X		☐
L76595-06	FID 32-25 0-6"									X		☐
L76595-07	FID 33-25 0-1"									X		☐
L76595-08	FID 33-25 0-6"									X		☐
L76595-09	FID 34-25 0-1"									X		☐
L76595-10	FID 34-25 0-6"									X		☐
L76595-11	FID 35-25 0-1"									X		☐
L76595-12	FID 35-25 0-6"									X		☐
L76595-13	FID 37-25 0-1"									X		☐
L76595-14	FID 39-25 0-1"									X		☐
L76595-15	FID 39-25 0-6"									X		☐

Sample Container Preservation Legend

Abbreviation	**Description**	**Container Type**	**Preservative/Limits**
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ______________________

ACZ Laboratories, Inc. L76595

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS

E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper	% moisture	Total Arsenic, Cadmium, Copper, Iron	Cation Exchange Capacity	Calcium	Acid-Base Accounting		
FID 30-25 0-1"	6/18/09 1058	SO	1	x	x						
FID 30-25 0-6"	6/18/09 1100	SO	1	x	x						
FID 31-25 0-1"	6/19/09 1227	SO	1	x	x						
FID 31-25 0-6"	6/19/09 1230	SO	1	x	x						
FID 32-25 0-1"	6/18/09 1200	SO	1	x	x						
FID 32-25 0-6"	6/18/09 1203	SO	1	x	x						
FID 33-25 0-1"	6/19/09 1315	SO	1	x	x						
FID 33-25 0-6"	6/19/09 1317	SO	1	x	x						
FID 34-25 0-1"	6/18/09 1228	SO	1		x	x					
FID 34-25 0-6"	6/18/09 1230	SO	1	x	x		x	x	x		

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Kare Thompson	6/23/09 1200		6-24-09 10:11

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS

E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mine
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper	% moisture	Total Arsenic, Cadmium, Copper, Iron	Cation Exchange Capacity	Calcium	Acid-Base Accounting		
FID 35-25 0-1"	6/22/09 1028	SO	1	X	X						
FID 35-25 0-6"	6/22/09 1030	SO	1	X	X						
~~FID 36-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~		~~X~~	~~X~~					
~~FID 36-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~X~~	~~X~~		~~X~~	~~X~~	~~X~~		
FID 37-25 0-1"	6/22/09 1547	SO	1		X	X					
~~FID 37-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~X~~	~~X~~		~~X~~	~~X~~	~~X~~		
~~FID 38-25 0-1"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~X~~	~~X~~						
~~FID 38-25 0-6"~~	~~NOT SAMPLED~~	~~SO~~	~~1~~	~~X~~	~~X~~						
FID 39-25 0-1"	6/19/09 0848	SO	1	X	X						
FID 39-25 0-6"	6/19/09 0850	SO	1	X	X						

L76.2409

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Kare Thompson	6/23/09 1200	L76	6.24.09 10:11

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Karen Thompson
Arcadis U.S., Inc.
1610 B Street Suite 100
Helena, MT 59601

Page 1 of 2
6/15/2009

Quote Number: CHINO-SOIL-ANALYSIS

Matrix: Soil Analysis of Freeport-McMoRan Chino Mine Soil Samples

Parameter	Method	Detection Limit	Cost/Sample
Metals Analysis			
Arsenic, total (3050)	M6020 ICP-MS	0.05 mg/Kg	$16.20
Cadmium, total (3050)	M6020 ICP-MS	0.01 mg/Kg	$16.20
Calcium, total (3050)	M6010B ICP	20 mg/Kg	$8.10
Cation Exchange Capacity (CEC)	USDA No. 60 (19)	0.3 meq/100g	$19.80
Copper, total (3050)	M6010B ICP	1 mg/Kg	$8.10
Iron, total (3050)	M6010B ICP	2 mg/Kg	$8.10
Misc.			
Electronic Data Deliverable			$0.00
Quality Control Summary			$0.00
Setup charge for ICP, total			$18.00
Setup Charge for ICPMS			$18.00
Sample Preparation			
Air Dry at 34 Degrees C	USDA No. 1, 1972		$6.30
Cation Exchange Capacity Extractio	USDA No. 60 (19)		$0.00
Crush and Pulverize	USDA No. 1, 1972		$9.90
Digestion - Hot Plate	M3050B ICP-MS		$13.50
Digestion - Hot Plate	M3050B ICP		$13.50
Saturated Paste Extraction	USDA No. 60 (2)		$14.40
Soil Analysis			
Acid Generation Potential (calc on S	M600/2-78-054 1.3	Calculation	$0.00
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	Calculation	$0.00
Acid-Base Potential (calc on Sulfur t	M600/2-78-054 1.3	Calculation	$0.00
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.1 %	$12.60
pH, Saturated Paste	USDA No. 60 (21A)	0.1 units	$6.30
Solids, Percent	CLPSOW390, PART F, D-98	0.1 %	$6.30
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.01 %	$15.30
		Cost/Sample:	**$210.60**

Prices are based on a standard turnaround time of 3 weeks or 15 working days and reflect a 10% discount.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Karen Thompson
Arcadis U.S., Inc.
1610 B Street Suite 100
Helena, MT 59601

Page 2 of 2
6/15/2009

Quote Number: CHINO-SOIL-ANALYSIS

Pricing includes shipment of all standard sample containers and related paperwork by UPS Ground Service. Please allow three to five days for delivery when ordering containers. ACZ must be notified prior to receiving samples of all special requests such as electronic data deliverables or special reporting reqirements. The client will be charged for special sample containers or express shipping and additional charges may apply for non-standard requests.

This quotation is valid for six months from the bid date unless specified otherwise in the bid. All bids must be signed and returned to ACZ before project(s) is received. The authorized signature represents acceptance of the pricing as well as the general terms and conditions of ACZ Laboratories, Inc. Our general terms and conditions can be downloaded from our web site at http://www.acz.com/eservices/download.html. Please note that MDL's in this quote may possibly increase due to sample matrix or samples with high TDS.
All orders that require shipping of coolers are subject to a minimum charge of $200.00. Local orders without shipping are subject to a minimum charge of $125.00. Samples may incur a $10.00/sample disposal fee for any samples deemed to be hazardous.

ACZ Representative (Authorized signature and date) ____________________

Client Representative (Authorized signature and date) Karen Thompson, ARCADIS 6/16/09

Please invoice:

Pam Pinson
FMI - Chino Mines
210 Cortez Ave
Hurley, NM 88043

Reference purchase requisition PR 553454 on invoice.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

October 19, 2009

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
210 Cortez Ave. Box 7
Hurley, NM 88043

cc: Rebecca Lindeman

Bill to:
Accounts Payable
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

Project ID: PR553454
ACZ Project ID: L78387

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 25, 2009. This project has been assigned to ACZ's project number, L78387. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 12.0. The enclosed results relate only to the samples received under L78387. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after November 19, 2009. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID: PR553454
Sample ID: FID 0-25 0-6"

ACZ Sample ID: ***L78387-01***
Date Sampled: *06/18/09 10:26*
Date Received: *09/25/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	329		*	mg/Kg	1	5	10/12/09 11:25	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	11			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	11			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.1		*	%	0.1	0.5	10/13/09 10:05	itk
pH, Saturated Paste	USDA No. 60 (21A)	6.6		*	units	0.1	0.1	10/09/09 11:00	itk
Solids, Percent	CLPSOW390, PART F, D-98	97.6		*	%	0.1	0.5	10/13/09 17:24	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.03	B	*	%	0.01	0.1	10/07/09 13:02	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:00	itk
Crush and Pulverize	USDA No. 1, 1972							10/15/09 15:42	bsu
Digestion - Hot Plate	M3050B ICP							10/09/09 12:00	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/09/09 11:00	itk
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							10/15/09 9:00	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76592-02.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L78387-02***
Sample ID:	FID 1-25 0-6"	Date Sampled:	*06/22/09 09:40*
		Date Received:	*09/25/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	143		*	mg/Kg	1	5	10/12/09 11:44	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	62			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	62			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	6.2		*	%	0.1	0.5	10/13/09 11:10	itk
pH, Saturated Paste	USDA No. 60 (21A)	6.2		*	units	0.1	0.1	10/09/09 12:55	itk
Solids, Percent	CLPSOW390, PART F, D-98	96.6		*	%	0.1	0.5	10/14/09 0:12	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.02	B	*	%	0.01	0.1	10/07/09 13:11	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:01	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 15:49	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 13:01	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/09/09 12:55	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76592-04.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454
Sample ID: FID 2-25 0-6"

ACZ Sample ID: ***L78387-03***
Date Sampled: *06/22/09 10:47*
Date Received: *09/25/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	405		*	mg/Kg	1	5	10/12/09 11:48	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	57			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	57			t CaCO3/Kt	1	5	10/19/09 12:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	5.7		*	%	0.1	0.5	10/13/09 11:43	itk
pH, Saturated Paste	USDA No. 60 (21A)	5.6		*	units	0.1	0.1	10/09/09 14:51	itk
Solids, Percent	CLPSOW390, PART F, D-98	96.8		*	%	0.1	0.5	10/14/09 3:36	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.02	B	*	%	0.01	0.1	10/07/09 13:21	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:02	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 16:38	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 13:21	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/09/09 14:51	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76592-06.

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L78387-04***
Sample ID:	FID 3-25 0-6"	Date Sampled:	*06/18/09 14:47*
		Date Received:	*09/25/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	236		*	mg/Kg	1	5	10/12/09 11:51	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	164			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	159			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	16.4		*	%	0.1	0.5	10/14/09 11:10	itk
pH, Saturated Paste	USDA No. 60 (21A)	7.6		*	units	0.1	0.1	10/09/09 16:47	itk
Solids, Percent	CLPSOW390, PART F, D-98	98.7		*	%	0.1	0.5	10/14/09 7:00	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.17		*	%	0.01	0.1	10/07/09 13:30	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:03	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 17:27	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 13:41	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/09/09 16:47	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76592-08.

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L78387-05***
Sample ID:	FID 4-25 0-6"	Date Sampled:	*06/18/09 17:10*
		Date Received:	*09/25/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	599		*	mg/Kg	1	5	10/12/09 11:54	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	12			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	12			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.2		*	%	0.1	0.5	10/13/09 12:16	itk
pH, Saturated Paste	USDA No. 60 (21A)	6.0		*	units	0.1	0.1	10/09/09 18:42	itk
Solids, Percent	CLPSOW390, PART F, D-98	94.5		*	%	0.1	0.5	10/14/09 10:24	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace		U	*	%	0.01	0.1	10/07/09 13:40	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:04	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 18:17	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 14:01	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/09/09 18:42	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76592-10.

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID: PR553454
Sample ID: FID 6-25 0-6"

ACZ Sample ID: ***L78387-06***
Date Sampled: *06/18/09 09:55*
Date Received: *09/25/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	182		*	mg/Kg	1	5	10/12/09 11:58	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	7			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	7			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.7		*	%	0.1	0.5	10/13/09 12:49	itk
pH, Saturated Paste	USDA No. 60 (21A)	6.4		*	units	0.1	0.1	10/09/09 20:38	itk
Solids, Percent	CLPSOW390, PART F, D-98	97.3		*	%	0.1	0.5	10/14/09 13:48	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.02	B	*	%	0.01	0.1	10/07/09 13:49	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:05	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 19:06	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 14:21	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/09/09 20:38	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76592-12.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L78387-07***
Sample ID:	FID 7-25 0-6"	Date Sampled:	*06/19/09 14:17*
		Date Received:	*09/25/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	242		*	mg/Kg	1	5	10/12/09 12:01	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	34			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	34			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.4		*	%	0.1	0.5	10/13/09 13:21	itk
pH, Saturated Paste	USDA No. 60 (21A)	5.2		*	units	0.1	0.1	10/10/09 0:30	itk
Solids, Percent	CLPSOW390, PART F, D-98	95.8		*	%	0.1	0.5	10/14/09 17:12	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.01	B	*	%	0.01	0.1	10/07/09 14:08	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:06	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 19:55	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 14:41	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/10/09 0:29	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76592-14.

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454
Sample ID:	FID 10-25 0-6"
ACZ Sample ID:	***L78387-08***
Date Sampled:	*06/19/09 09:38*
Date Received:	*09/25/09*
Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1020		*	mg/Kg	1	5	10/12/09 12:04	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	2	B		t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	11			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	9			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.1		*	%	0.1	0.5	10/13/09 13:54	itk
pH, Saturated Paste	USDA No. 60 (21A)	6.0		*	units	0.1	0.1	10/10/09 2:25	itk
Solids, Percent	CLPSOW390, PART F, D-98	96.4		*	%	0.1	0.5	10/14/09 20:36	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.05	B	*	%	0.01	0.1	10/07/09 14:18	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:07	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 20:44	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 15:02	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/10/09 2:25	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76593-02.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454
Sample ID: FID 12-25 0-6"

ACZ Sample ID: ***L78387-09***
Date Sampled: *06/18/09 15:27*
Date Received: *09/25/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	4260		*	mg/Kg	1	5	10/12/09 12:07	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	32			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	35			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	3			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.5		*	%	0.1	0.5	10/14/09 12:00	itk
pH, Saturated Paste	USDA No. 60 (21A)	7.5		*	units	0.1	0.1	10/10/09 4:21	itk
Solids, Percent	CLPSOW390, PART F, D-98	98.4		*	%	0.1	0.5	10/15/09 0:00	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	1.02		*	%	0.01	0.1	10/07/09 14:27	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:08	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 21:34	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 15:22	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/10/09 4:21	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76593-04.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454
Sample ID: FID 13-25 0-6"

ACZ Sample ID: ***L78387-10***
Date Sampled: *06/18/09 16:13*
Date Received: *09/25/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1970		*	mg/Kg	1	5	10/12/09 12:11	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	11			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	25			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	14			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.5		*	%	0.1	0.5	10/13/09 14:27	itk
pH, Saturated Paste	USDA No. 60 (21A)	7.4		*	units	0.1	0.1	10/10/09 6:17	itk
Solids, Percent	CLPSOW390, PART F, D-98	97.6		*	%	0.1	0.5	10/15/09 3:24	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.34		*	%	0.01	0.1	10/07/09 14:37	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:09	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 22:23	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 15:42	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/10/09 6:17	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76593-06.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L78387-11***
Project ID:	PR553454	Date Sampled:	*06/22/09 15:25*
Sample ID:	FID 15-25 0-6"	Date Received:	*09/25/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1360		*	mg/Kg	1	5	10/12/09 12:14	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	17			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	22			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.2		*	%	0.1	0.5	10/13/09 15:00	itk
pH, Saturated Paste	USDA No. 60 (21A)	8.0		*	units	0.1	0.1	10/10/09 8:12	itk
Solids, Percent	CLPSOW390, PART F, D-98	98.7		*	%	0.1	0.5	10/15/09 6:48	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.55		*	%	0.01	0.1	10/07/09 14:46	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:10	itk
Crush and Pulverize	USDA No. 1, 1972							10/06/09 23:12	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 16:02	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/10/09 8:12	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76593-08.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454
Sample ID: FID 16-25 0-6"

ACZ Sample ID: ***L78387-12***
Date Sampled: *06/22/09 14:57*
Date Received: *09/25/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	512		*	mg/Kg	1	5	10/12/09 12:24	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	10/13/09 15:32	itk
pH, Saturated Paste	USDA No. 60 (21A)	4.3		*	units	0.1	0.1	10/10/09 10:08	itk
Solids, Percent	CLPSOW390, PART F, D-98	98.9		*	%	0.1	0.5	10/15/09 10:12	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace		U	*	%	0.01	0.1	10/07/09 14:55	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:11	itk
Crush and Pulverize	USDA No. 1, 1972							10/07/09 0:02	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 16:22	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/10/09 10:08	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76593-10.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L78387-13***
Sample ID:	FID 17-25 0-6"	Date Sampled:	*06/18/09 15:45*
		Date Received:	*09/25/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	4680		*	mg/Kg	1	5	10/12/09 12:27	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	20			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	26			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.6		*	%	0.1	0.5	10/14/09 12:50	itk
pH, Saturated Paste	USDA No. 60 (21A)	6.6		*	units	0.1	0.1	10/10/09 12:04	itk
Solids, Percent	CLPSOW390, PART F, D-98	98.0		*	%	0.1	0.5	10/15/09 13:36	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.64		*	%	0.01	0.1	10/07/09 15:05	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:12	itk
Crush and Pulverize	USDA No. 1, 1972							10/07/09 0:51	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 16:42	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/10/09 12:04	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76593-12.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	PR553454	ACZ Sample ID:	***L78387-14***
Sample ID:	FID 18-25 0-6"	Date Sampled:	*06/22/09 14:07*
		Date Received:	*09/25/09*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	326		*	mg/Kg	1	5	10/12/09 12:30	ear

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	1	B		t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-1			t CaCO3/Kt	1	5	10/19/09 12:50	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	10/13/09 16:05	itk
pH, Saturated Paste	USDA No. 60 (21A)	4.3		*	units	0.1	0.1	10/10/09 14:00	itk
Solids, Percent	CLPSOW390, PART F, D-98	99.1		*	%	0.1	0.5	10/15/09 17:00	jjg
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.04	B	*	%	0.01	0.1	10/07/09 15:14	brd/bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/06/09 15:13	itk
Crush and Pulverize	USDA No. 1, 1972							10/07/09 1:40	itk
Digestion - Hot Plate	M3050B ICP							10/09/09 17:03	itk
Saturated Paste Extraction	USDA No. 60 (2)							10/10/09 13:59	itk

Note: This report is for additional analysis of the sample previously reported as ACZ project L76593-14.

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	LCSWD	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	LFB	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	LFM	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	LFMD	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	LRB	Laboratory Reagent Blank
ICB	Initial Calibration Blank	MS	Matrix Spike
ICV	Initial Calibration Verification standard	MSD	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	PBS	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	PBW	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	PQV	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	SDL	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Freeport-McMoRan - Chino Mines Company
Project ID: PR553454

ACZ Project ID: ***L78387***

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272001													
WG272001ICV	ICV	10/12/09 10:58	II091007-3	2		1.944	mg/L	97.2	90	110			
WG272001ICB	ICB	10/12/09 11:02				U	mg/L		-0.03	0.03			
WG271900PBS	PBS	10/12/09 11:15				U	mg/Kg		-3	3			
WG271900LCSS	LCSS	10/12/09 11:18	PCN33158	237		218	mg/Kg		198	275			
WG271900LCSSD	LCSSD	10/12/09 11:21	PCN33158	237		240	mg/Kg		198	275	9.6	20	
L78387-01MS	MS	10/12/09 11:31	II091001-2	50.5	329	406.6	mg/Kg	153.7	75	125			M3
L78387-01MSD	MSD	10/12/09 11:35	II091001-2	50.5	329	421.7	mg/Kg	183.6	75	125	3.65	20	M3

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272036													
WG272036PBS	PBS	10/13/09 9:00				U	%		-0.1	0.1			
WG272036LCSS	LCSS	10/13/09 9:32	PCN20880	100		96.98	%	97	80	120			
L78387-01DUP	DUP	10/13/09 10:38			1.1	1.01	%				8.5	20	
WG272037													
WG272037LCSS	LCSS	10/14/09 10:20	PCN20880	100		97.26	%	97.3	80	120			
L78415-01DUP	DUP	10/14/09 19:30			6.6	7.37	%				11	20	

pH, Saturated Paste USDA No. 60 (21A)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG271894													
L78387-06DUP	DUP	10/09/09 22:34			6.4	6.45	units				0.8	20	

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG272103													
WG272103PBS	PBS	10/13/09 14:00				U	%		99.9	100.1			
L78387-01DUP	DUP	10/13/09 20:48			97.6	97.83	%				0.2	20	

Sulfur, total ASTM D-4239-85C, LECO Furnace

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG271713													
WG271713PBS	PBS	10/07/09 12:15				U	%		-0.03	0.03			
WG271713LCSS	LCSS	10/07/09 12:24	PCN33366	4.24		4.24	%	100	80	120			
L78387-06DUP	DUP	10/07/09 13:59			.02	U	%				200	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L78387-01	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-02	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-03	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-04	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-05	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-06	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-07	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-08	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L78387-09	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-10	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-11	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-12	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-13	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78387-14	WG272001	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG271713	Sulfur, total	ASTM D-4239-85C, LECO Furnace	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3
pH, Saturated Paste	USDA No. 60 (21A)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur, total	ASTM D-4239-85C, LECO Furnace

Sample Receipt

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76592
Date Received: 6/24/2009
Received By:
Date Printed: 6/24/2009

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Is the trip blank for Cyanide present?			X
12) Is the trip blank for VOA present?			X
13) Are samples requiring no headspace, headspace free?			X
14) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/hr)
NA8701	18.4	13

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
B0063538.0002.00003

ACZ Project ID: L76592
Date Received: 6/24/2009
Received By:

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L76592-01	FID 0-25 0-1"									X		☐
L76592-02	FID 0-25 0-6"									X		☐
L76592-03	FID 1-25 0-1"									X		☐
L76592-04	FID 1-25 0-6"									X		☐
L76592-05	FID 2-25 0-1"									X		☐
L76592-06	FID 2-25 0-6"									X		☐
L76592-07	FID 3-25 0-1"									X		☐
L76592-08	FID 3-25 0-6"									X		☐
L76592-09	FID 4-25 0-1"									X		☐
L76592-10	FID 4-25 0-6"									X		☐
L76592-11	FID 6-25 0-1"									X		☐
L76592-12	FID 6-25 0-6"									X		☐
L76592-13	FID 7-25 0-1"									X		☐
L76592-14	FID 7-25 0-6"									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ____________________

L78387

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mines
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS

E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mines
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

YES ☒
NO ☐

Are samples for CO DW Compliance Monitoring? If yes, please include state forms. Results will be reported to PQL.

YES ☐
NO ☒

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper (dry weight)	% moisture	Acd-Base Accounting					
FID 0-25 0-1"	6/18/09 1025	SO	1	x	x						
FID 0-25 0-6"	6/18/09 1026	SO	1	x	x	x	L76592-02				
FID 1-25 0-1"	6/22/09 0938	SO	1	x	x						
FID 1-25 0-6"	6/22/09 0940	SO	1	x	x	x				-04	
FID 2-25 0-1"	6/22/09 1045	SO	1	x	x						
FID 2-25 0-6"	6/22/09 1047	SO	1	x	x	x				-06	
FID 3-25 0-1"	6/18/09 1445	SO	1	x	x						
FID 3-25 0-6"	6/18/09 1447	SO	1	x	x	x				-08	
FID 4-25 0-1"	6/18/09 1707	SO	1	x	x						
FID 4-25 0-6"	6/18/09 1710	SO	1	x	x	x				-10	

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454

NOTE: COC revised on 09-10-09 and resubmitted.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mines
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS

E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mines
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
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Telephone: 575-537-4213

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YES ☒
NO ☐

Are samples for CO DW Compliance Monitoring? If yes, please include state forms. Results will be reported to PQL.

YES ☐
NO ☒

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper (dry weight)	% moisture	Acd-Base Accounting					
FID 5-25 0-1"	Not Sampled										
FID 5-25 0-6"	Not Sampled										
FID 6-25 0-1"	6/18/09 0950	SO	1	x	x						
FID 6-25 0-6"	6/18/09 0955	SO	1	x	x	x	L76592				-12
FID 7-25 0-1"	6/19/09 1415	SO	1	x	x						
FID 7-25 0-6"	6/19/09 1417	SO	1	x	x	x					-14
FID 8-25 0-1"	Not Sampled										
FID 8-25 0-6"	Not Sampled										
FID 9-25 0-1"	Not Sampled										
FID 9-25 0-6"	Not Sampled										

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454

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YES ☒
NO ☐

Are samples for CO DW Compliance Monitoring?
If yes, please include state forms. Results will be reported to PQL.

YES ☐
NO ☒

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper (dry weight)	% moisture	Acd-Base Accounting					
FID 10-25 0-1"	6/19/09 0935	SO	1	x	x						
FID 10-25 0-6"	6/19/09 0938	SO	1	x	x	x	L76593-02				
FID 11-25 0-1"	Not Sampled										
FID 11-25 0-6"	Not Sampled										
FID 12-25 0-1"	6/18/09 1525	SO	1	x	x						
FID 12-25 0-6"	6/18/09 1527	SO	1	x	x	x					-04
FID 13-25 0-1"	6/18/09 1610	SO	1	x	x						
FID 13-25 0-6"	6/18/09 1613	SO	1	x	x	x					-06
FID 14-25 0-1"	Not Sampled										
FID 14-25 0-6"	Not Sampled										

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454

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ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

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If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION — **ANALYSES REQUESTED** *(attach list or use quote number)*

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #: B0063538.0002.00003
Reporting state for compliance testing:
Sampler's Name: K. Thompson/ARCADIS
Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper (dry weight)	% moisture	Acd-Base Accounting					
FID 15-25 0-1"	6/22/09 1523	SO	1	x	x						
FID 15-25 0-6"	6/22/09 1525	SO	1	x	x	x					L76593-08
FID 16-25 0-1"	6/22/09 1455	SO	1	x	x						
FID 16-25 0-6"	6/22/09 1457	SO	1	x	x	x					-10
FID 17-25 0-1"	6/18/09 1539	SO	1	x	x						
FID 17-25 0-6"	6/18/09 1545	SO	1	x	x	x					-12
FID 18-25 0-1"	6/22/09 1405	SO	1	x	x						
FID 18-25 0-6"	6/22/09 1407	SO	1	x	x	x					-14
FID 19-25 0-1"	Not Sampled										
FID 19-25 0-6"	Not Sampled										

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

FMI purchase requisition PR553454

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RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

November 13, 2009

Report to:	Bill to:
Pam Pinson	Accounts Payable
Freeport-McMoRan - Chino Mines Company	Freeport-McMoRan - Chino Mines Company
210 Cortez Ave. Box 7	P.O. Box 13308
Hurley, NM 88043	Phoenix, AZ 85002-3308

cc: Rebecca Lindeman

Project ID:
ACZ Project ID: L78892

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 19, 2009. This project has been assigned to ACZ's project number, L78892. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L78892. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 13, 2009. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company
Project ID:
Sample ID: FID 08-25 0-1"

ACZ Sample ID: ***L78892-01***
Date Sampled: *10/07/09 12:54*
Date Received: *10/19/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	328		*	mg/Kg	1	5	11/11/09 18:30	aeh

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	6.9		*	%	0.1	0.5	11/08/09 19:00	itk
pH, Saturated Paste	USDA No. 60 (21A)	4.4		*	units	0.1	0.1	11/09/09 22:00	itk

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/07/09 11:00	itk
Crush and Pulverize	USDA No. 1, 1972							11/11/09 7:15	brd
Digestion - Hot Plate	M3050B ICP							11/09/09 22:30	jjg
Saturated Paste Extraction	USDA No. 60 (2)							11/09/09 22:00	itk
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/09 10:00	bsu
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/09 10:00	bsu

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:

Sample ID: FID 08-25 0-6"

ACZ Sample ID: ***L78892-02***

Date Sampled: *10/07/09 12:55*

Date Received: *10/19/09*

Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	430		*	mg/Kg	1	5	11/11/09 18:40	aeh

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	4	B		t CaCO3/Kt	1	5	11/12/09 17:16	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	23			t CaCO3/Kt	1	5	11/12/09 17:16	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	19			t CaCO3/Kt	1	5	11/12/09 17:16	calc
Moisture Content	M209F, Gravimetric - 105 C	12.7		*	%	0.1	0.5	11/08/09 21:00	itk
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.3		*	%	0.1	0.5	11/09/09 15:06	itk
pH, Saturated Paste	USDA No. 60 (21A)	6.1		*	units	0.1	0.1	11/10/09 2:00	itk
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.14		*	%	0.01	0.1	11/09/09 16:40	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/07/09 11:48	itk
Crush and Pulverize	USDA No. 1, 1972							11/11/09 7:18	brd
Digestion - Hot Plate	M3050B ICP							11/10/09 6:00	jjg
Saturated Paste Extraction	USDA No. 60 (2)							11/09/09 22:05	itk
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/09 10:18	bsu
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/09 10:18	bsu

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID:
Sample ID: FID 23-25 0-1"

ACZ Sample ID: ***L78892-03***
Date Sampled: *10/07/09 15:56*
Date Received: *10/19/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	168		*	mg/Kg	1	5	11/11/09 18:50	aeh

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	8.1		*	%	0.1	0.5	11/08/09 22:00	itk
pH, Saturated Paste	USDA No. 60 (21A)	3.8		*	units	0.1	0.1	11/10/09 4:00	itk

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/07/09 12:36	itk
Crush and Pulverize	USDA No. 1, 1972							11/11/09 7:21	brd
Digestion - Hot Plate	M3050B ICP							11/10/09 8:30	jjg
Saturated Paste Extraction	USDA No. 60 (2)							11/09/09 22:07	itk
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/09 10:36	bsu
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/09 10:36	bsu

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID:
Sample ID: FID 23-25 0-6"

ACZ Sample ID: ***L78892-04***
Date Sampled: *10/07/09 15:58*
Date Received: *10/19/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	252		*	mg/Kg	1	5	11/11/09 18:53	aeh

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	11/12/09 17:16	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	11/12/09 17:16	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-5			t CaCO3/Kt	1	5	11/12/09 17:16	calc
Moisture Content	M209F, Gravimetric - 105 C	5.5		*	%	0.1	0.5	11/08/09 23:00	itk
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	11/09/09 16:54	itk
pH, Saturated Paste	USDA No. 60 (21A)	3.7		*	units	0.1	0.1	11/10/09 6:00	itk
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.16		*	%	0.01	0.1	11/09/09 17:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/07/09 13:24	itk
Crush and Pulverize	USDA No. 1, 1972							11/11/09 7:24	brd
Digestion - Hot Plate	M3050B ICP							11/10/09 11:00	jjg
Saturated Paste Extraction	USDA No. 60 (2)							11/09/09 22:10	itk
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/09 10:54	bsu
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/09 10:54	bsu

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:
Sample ID: FID 43-25 0-1"

ACZ Sample ID: ***L78892-05***
Date Sampled: *10/07/09 00:00*
Date Received: *10/19/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	229		*	mg/Kg	1	5	11/11/09 19:00	aeh

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	1.8		*	%	0.1	0.5	11/09/09 0:00	itk
pH, Saturated Paste	USDA No. 60 (21A)	3.7		*	units	0.1	0.1	11/10/09 8:00	itk

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/07/09 14:12	itk
Crush and Pulverize	USDA No. 1, 1972							11/11/09 7:27	brd
Digestion - Hot Plate	M3050B ICP							11/10/09 13:30	jjg
Saturated Paste Extraction	USDA No. 60 (2)							11/09/09 22:12	itk
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/09 11:12	bsu
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/09 11:12	bsu

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:
Sample ID: FID 43-25 0-6"

ACZ Sample ID: ***L78892-06***
Date Sampled: *10/07/09 00:00*
Date Received: *10/19/09*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	466		*	mg/Kg	1	5	11/11/09 19:03	aeh

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	29			t CaCO3/Kt	1	5	11/12/09 17:16	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	11/12/09 17:16	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-29			t CaCO3/Kt	1	5	11/12/09 17:16	calc
Moisture Content	M209F, Gravimetric - 105 C	5.9		*	%	0.1	0.5	11/09/09 1:00	itk
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	11/09/09 20:30	itk
pH, Saturated Paste	USDA No. 60 (21A)	4.2		*	units	0.1	0.1	11/10/09 10:00	itk
Sulfur, total	ASTM D-4239-85C, LECO Furnace	0.93		*	%	0.01	0.1	11/09/09 17:40	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/07/09 15:00	itk
Crush and Pulverize	USDA No. 1, 1972							11/11/09 7:30	brd
Digestion - Hot Plate	M3050B ICP							11/10/09 16:00	jjg
Saturated Paste Extraction	USDA No. 60 (2)							11/09/09 22:15	itk
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/09 11:30	bsu
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/09 11:30	bsu

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	LCSWD	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	LFB	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	LFM	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	LFMD	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	LRB	Laboratory Reagent Blank
ICB	Initial Calibration Blank	MS	Matrix Spike
ICV	Initial Calibration Verification standard	MSD	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	PBS	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	PBW	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	PQV	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	SDL	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1)	EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2)	EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3)	EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5)	EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6)	Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2)	Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3)	Animal matrices for Inorganic analyses are reported on an "as received" basis.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Freeport-McMoRan - Chino Mines Company
Project ID:

ACZ Project ID: ***L78892***

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG273958													
WG273958ICV	ICV	11/11/09 18:04	II091007-3	2		1.919	mg/L	96	90	110			
WG273958ICB	ICB	11/11/09 18:07				U	mg/L		-0.03	0.03			
WG273816PBS	PBS	11/11/09 18:20				U	mg/Kg		-3	3			
WG273816LCSS	LCSS	11/11/09 18:23	PCN33547	65.3		65.6	mg/Kg		52.5	78.1			
WG273816LCSSD	LCSSD	11/11/09 18:27	PCN33547	65.3		63.5	mg/Kg		52.5	78.1	3.3	20	
L78892-01MS	MS	11/11/09 18:33	II091023-7	50.5	328	362.3	mg/Kg	67.9	75	125			M3
L78892-01MSD	MSD	11/11/09 18:36	II091023-7	50.5	328	368.6	mg/Kg	80.4	75	125	1.72	20	

Moisture Content M209F, Gravimetric - 105 C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG273745													
WG273745PBS	PBS	11/08/09 18:00				100	%		99.9	100.1			
L78892-01DUP	DUP	11/08/09 20:00			6.9	7.13	%				3.3	20	

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG273779													
WG273779PBS	PBS	11/09/09 11:30				U	%		-0.1	0.1			
WG273779LCSS	LCSS	11/09/09 13:18	PCN33453	100		110.37	%	110.4	80	120			RA
L78892-04DUP	DUP	11/09/09 18:42			U	U	%				0	20	RA

pH, Saturated Paste USDA No. 60 (21A)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG273833													
L78892-01DUP	DUP	11/10/09 0:00			4.4	4.64	units				5.3	20	

Sulfur, total ASTM D-4239-85C, LECO Furnace

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG273776													
WG273776PBS	PBS	11/09/09 16:00				U	%		-0.03	0.03			
WG273776LCSS	LCSS	11/09/09 16:20	PCN33366	4.24		4.27	%	100.7	80	120			
L78892-04DUP	DUP	11/09/09 17:20			.16	.15	%				6.5	20	

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L78892-01	WG273958	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L78892-02	WG273958	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG273779	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78892-03	WG273958	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L78892-04	WG273958	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG273779	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L78892-05	WG273958	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L78892-06	WG273958	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG273779	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Freeport-McMoRan - Chino Mines Company ACZ Project ID: ***L78892***

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Moisture Content	M209F, Gravimetric - 105 C
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3
pH, Saturated Paste	USDA No. 60 (21A)
Sulfur, total	ASTM D-4239-85C, LECO Furnace

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: L78892
Date Received: 11:12:18 AM
Received By:
Date Printed: 10/19/2009

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?			X
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?		X	
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Is the trip blank for Cyanide present?			X
12) Is the trip blank for VOA present?			X
13) Are samples requiring no headspace, headspace free?			X
14) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

The Chain of Custody was not reliquished. There was no contact information for the sampler regarding the un-relinquished COC.

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/hr)
na9543	18	15

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

Sample Receipt

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: L78892
Date Received: 11:12:18 AM
Received By:

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L78892-01	FID 08-25 0-1"									X		☐
L78892-02	FID 08-25 0-6"									X		☐
L78892-03	FID 23-25 0-1"									X		☐
L78892-04	FID 23-25 0-6"									X		☐
L78892-05	FID 43-25 0-1"									X		☐
L78892-06	FID 43-25 0-6"									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ______________________

ACZ Laboratories, Inc. L78890

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: FMI - Chino Mines
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

Copy of Report to:

Name: Rebecca Lindeman
Company: ARCADIS

E-mail: rebecca.lindeman@arcadis-us.com
Telephone: 303-231-9115

Invoice to:

Name: Pam Pinson
Company: FMI - Chino Mines
E-mail: pamela_pinson@fmi.com

Address: 210 Cortez Avenue
Hurley, NM 88043
Telephone: 575-537-4213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.
YES ☒
NO ☐

Are samples for CO DW Compliance Monitoring? If yes, please include state forms. Results will be reported to PQL.
YES ☐
NO ☒

PROJECT INFORMATION

Quote #: CHINO-SOIL-ANALYSIS
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: C. Meyer, ARCADIS
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Copper (dry weight)	% moisture	Acid-Base Accounting					
FID 08-25 0-1"	10/7/09 1254	So	1	X	X						
FID 08-25 0-6"	10/7/09 1255	So	1	X	X	X					
FID 23-25 0-1"	10/7/09 356	So	1	X	X						
FID 23-25 0-6"	10/7/09 358	So	1	X	X	X					
FID 43-25 0-1"	10/7/09	So	1	X	X						
FID 43-25 0-6"	10/7/09	So	1	X	X	X					

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
			10.19.09 11:12

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

April 06, 2011

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

Bill to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

cc: Matthew Barkley

Project ID: ZN01CC
ACZ Project ID: L87074

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 22, 2011. This project has been assigned to ACZ's project number, L87074. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L87074. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 06, 2011. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

Sue Webber

Sue Webber has reviewed and
approved this report.

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC
Sample ID: FID7

ACZ Sample ID: ***L87074-01***
Date Sampled: *11/04/10 12:00*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	550			mg/Kg	1	5	04/04/11 12:43	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	2	B		t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	33			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	31			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	3.3		*	%	0.1	0.5	03/31/11 11:02	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.4			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.9			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	33.8		*	% Passing	0.1	0.5	03/28/11 10:00	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	97.3		*	%	0.1	0.5	03/24/11 12:11	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.04	B	*	%	0.01	0.1	03/31/11 0:00	bsu
Sulfur HNO3 Residue			U	*	%	0.01	0.1	03/31/11 0:00	bsu
Sulfur Organic Residual Mod			U	*	%	0.01	0.1	03/31/11 0:00	bsu
Sulfur Pyritic Sulfide		0.04	B	*	%	0.01	0.1	03/31/11 0:00	bsu
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	03/31/11 0:00	bsu
Sulfur Total		0.05	B	*	%	0.01	0.1	03/31/11 0:00	bsu
Total Sulfur minus Sulfate		0.04	B	*	%	0.01	0.1	03/31/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:00	meg
Digestion - Hot Plate	M3050B ICP							03/30/11 15:24	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

Freeport-McMoRan - Chino Mines Company

Project ID: ZN01CC
Sample ID: FID8

ACZ Sample ID: ***L87074-02***
Date Sampled: *11/05/10 09:30*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	545			mg/Kg	1	5	04/04/11 12:46	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	21			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-21			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 11:15	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.5			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.7			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	29.2		*	% Passing	0.1	0.5	03/28/11 10:02	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	92.8		*	%	0.1	0.5	03/24/11 14:33	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.37		*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur HNO3 Residue		0.06	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Organic Residual Mod		0.06	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Pyritic Sulfide		0.31		*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Sulfate		0.31		*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Total		0.68		*	%	0.01	0.1	04/01/11 0:00	bsu
Total Sulfur minus Sulfate		0.37		*	%	0.01	0.1	04/01/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:03	meg
Digestion - Hot Plate	M3050B ICP							03/30/11 16:32	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC
Sample ID: FID10

ACZ Sample ID: ***L87074-03***
Date Sampled: *11/03/10 11:30*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	2060			mg/Kg	1	5	04/04/11 12:49	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	1	B		t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	2			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	1			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.2	B	*	%	0.1	0.5	03/31/11 11:27	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.8			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.6			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	40.0		*	% Passing	0.1	0.5	03/28/11 10:03	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	98.1		*	%	0.1	0.5	03/24/11 15:44	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.03	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur HNO3 Residue			U	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Organic Residual Mod			U	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Total		0.04	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Total Sulfur minus Sulfate		0.03	B	*	%	0.01	0.1	04/01/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:07	meg
Digestion - Hot Plate	M3050B ICP							03/30/11 17:40	bsu

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN01CC	ACZ Sample ID:	***L87074-04***
Sample ID:	FID15	Date Sampled:	*11/03/10 10:00*
		Date Received:	*03/22/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	2520			mg/Kg	1	5	04/04/11 12:52	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	3	B		t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	1			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-2			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.1	B	*	%	0.1	0.5	03/31/11 11:40	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.9			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.7			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	24.2		*	% Passing	0.1	0.5	03/28/11 10:04	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	97.8		*	%	0.1	0.5	03/24/11 16:55	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.13		*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur HNO3 Residue		0.01	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Organic Residual Mod		0.01	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Pyritic Sulfide		0.12		*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Sulfate			U	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Total		0.11		*	%	0.01	0.1	04/01/11 0:00	bsu
Total Sulfur minus Sulfate		0.11		*	%	0.01	0.1	04/01/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:10	meg
Digestion - Hot Plate	M3050B ICP							03/30/11 18:49	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC
Sample ID: FID16

ACZ Sample ID: ***L87074-05***
Date Sampled: *11/03/10 09:30*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	3550			mg/Kg	1	5	04/04/11 12:55	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	8			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	4			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-4			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.4	B	*	%	0.1	0.5	03/31/11 11:52	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.8			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.7			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	40.5		*	% Passing	0.1	0.5	03/28/11 10:05	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	97.3		*	%	0.1	0.5	03/24/11 18:06	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.22		*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur HNO3 Residue		0.07	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Organic Residual Mod		0.07	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Pyritic Sulfide		0.15		*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Sulfate		0.05	B	*	%	0.01	0.1	04/01/11 0:00	bsu
Sulfur Total		0.27		*	%	0.01	0.1	04/01/11 0:00	bsu
Total Sulfur minus Sulfate		0.22		*	%	0.01	0.1	04/01/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:14	meg
Digestion - Hot Plate	M3050B ICP							03/30/11 19:57	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC
Sample ID: FID17

ACZ Sample ID: ***L87074-06***
Date Sampled: *11/03/10 08:40*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	4550			mg/Kg	1	5	04/04/11 12:59	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	18			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-18			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 12:05	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.1			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.5			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	28.2		*	% Passing	0.1	0.5	03/28/11 10:06	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	98.0		*	%	0.1	0.5	03/24/11 19:17	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.45		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur HNO3 Residue		0.08	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Organic Residual Mod		0.08	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Pyritic Sulfide		0.37		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Sulfate		0.12		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Total		0.57		*	%	0.01	0.1	04/02/11 0:00	bsu
Total Sulfur minus Sulfate		0.45		*	%	0.01	0.1	04/02/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:17	meg
Digestion - Hot Plate	M3050B ICP							03/30/11 21:05	bsu

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC
Sample ID: FID18

ACZ Sample ID: ***L87074-07***
Date Sampled: *11/04/10 14:30*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	559			mg/Kg	1	5	04/04/11 13:11	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	9			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	19			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	10			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1.9		*	%	0.1	0.5	03/31/11 12:17	nrc
pH, Corrosivity	M9045D/M9040C								
pH		3.9			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.6			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	51.1		*	% Passing	0.1	0.5	03/28/11 10:07	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	98.6		*	%	0.1	0.5	03/24/11 20:28	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.16		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Pyritic Sulfide		0.14		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Sulfate		0.14		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Total		0.30		*	%	0.01	0.1	04/02/11 0:00	bsu
Total Sulfur minus Sulfate		0.16		*	%	0.01	0.1	04/02/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:21	meg
Digestion - Hot Plate	M3050B ICP							03/30/11 22:13	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN01CC	ACZ Sample ID:	***L87074-08***
Sample ID:	FID23	Date Sampled:	*11/05/10 11:45*
		Date Received:	*03/22/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	202			mg/Kg	1	5	04/04/11 13:14	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	3	B		t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-3			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 12:30	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.4			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.3			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	38.5		*	% Passing	0.1	0.5	03/28/11 10:08	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	97.2		*	%	0.1	0.5	03/24/11 21:39	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.07	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur HNO3 Residue			U	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Organic Residual Mod			U	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Pyritic Sulfide		0.07	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Sulfate		0.04	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Total		0.11		*	%	0.01	0.1	04/02/11 0:00	bsu
Total Sulfur minus Sulfate		0.07	B	*	%	0.01	0.1	04/02/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:24	meg
Digestion - Hot Plate	M3050B ICP							03/30/11 23:21	bsu

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN01CC
Sample ID: FID22

ACZ Sample ID: ***L87074-09***
Date Sampled: *11/04/10 13:00*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	488			mg/Kg	1	5	04/04/11 13:17	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	10			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	4			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1.0		*	%	0.1	0.5	03/31/11 12:42	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.5			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.7			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	44.9		*	% Passing	0.1	0.5	03/28/11 10:09	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	95.6		*	%	0.1	0.5	03/24/11 22:50	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.15		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Pyritic Sulfide		0.13		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Sulfate		0.05	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Total		0.20		*	%	0.01	0.1	04/02/11 0:00	bsu
Total Sulfur minus Sulfate		0.15		*	%	0.01	0.1	04/02/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:28	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 0:30	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN01CC	ACZ Sample ID:	***L87074-10***
Sample ID:	FID28	Date Sampled:	*11/04/10 10:30*
		Date Received:	*03/22/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	527			mg/Kg	1	5	04/04/11 13:20	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	137			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	131			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	13.7		*	%	0.1	0.5	03/31/11 12:55	nrc
pH, Corrosivity	M9045D/M9040C								
pH		7.7			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.6			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	22.7		*	% Passing	0.1	0.5	03/28/11 10:10	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	96.4		*	%	0.1	0.5	03/25/11 0:01	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.18		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur HNO3 Residue		0.01	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Organic Residual Mod		0.01	B	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Pyritic Sulfide		0.17		*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Sulfate			U	*	%	0.01	0.1	04/02/11 0:00	bsu
Sulfur Total		0.18		*	%	0.01	0.1	04/02/11 0:00	bsu
Total Sulfur minus Sulfate		0.18		*	%	0.01	0.1	04/02/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:31	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 1:38	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN01CC	ACZ Sample ID:	***L87074-11***
Sample ID:	FID37	Date Sampled:	*11/03/10 15:30*
		Date Received:	*03/22/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1210			mg/Kg	1	5	04/04/11 13:24	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	2	B		t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-2			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 13:07	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.8			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.6			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	38.2		*	% Passing	0.1	0.5	03/28/11 10:11	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	98.4		*	%	0.1	0.5	03/25/11 1:12	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.03	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur HNO3 Residue		0.01	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Organic Residual Mod		0.01	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Pyritic Sulfide		0.02	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Sulfate		0.04	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Total		0.07	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Total Sulfur minus Sulfate		0.03	B	*	%	0.01	0.1	04/03/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:35	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 2:46	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN01CC	ACZ Sample ID:	***L87074-12***
Sample ID:	FID43	Date Sampled:	*11/05/10 12:15*
		Date Received:	*03/22/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	636			mg/Kg	1	5	04/04/11 13:27	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	18			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	25			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	7			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	2.5		*	%	0.1	0.5	03/31/11 13:20	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.5			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.5			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	32.0		*	% Passing	0.1	0.5	03/28/11 10:12	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	95.3		*	%	0.1	0.5	03/25/11 2:23	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.22		*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur HNO3 Residue			U	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Organic Residual Mod			U	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Pyritic Sulfide		0.22		*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Sulfate		0.37		*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Total		0.59		*	%	0.01	0.1	04/03/11 0:00	bsu
Total Sulfur minus Sulfate		0.22		*	%	0.01	0.1	04/03/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:38	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 3:54	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC
Sample ID: FID101

ACZ Sample ID: ***L87074-13***
Date Sampled: *11/04/10 14:00*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	405			mg/Kg	1	5	04/04/11 13:30	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	9			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-9			t CaCO3/Kt	1	5	04/06/11 9:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 13:32	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.2			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.6			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	37.6		*	% Passing	0.1	0.5	03/28/11 10:13	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	98.4		*	%	0.1	0.5	03/25/11 3:34	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.22		*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur HNO3 Residue		0.03	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Organic Residual Mod		0.03	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Pyritic Sulfide		0.19		*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Sulfate		0.06	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Total		0.28		*	%	0.01	0.1	04/03/11 0:00	bsu
Total Sulfur minus Sulfate		0.22		*	%	0.01	0.1	04/03/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:42	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 5:02	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC
Sample ID: FID102

ACZ Sample ID: ***L87074-14***
Date Sampled: *11/05/10 13:15*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	358			mg/Kg	1	5	04/04/11 13:33	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	19			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-19			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 13:45	nrc
pH, Corrosivity	M9045D/M9040C								
pH		3.8			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.5			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	30.3		*	% Passing	0.1	0.5	03/28/11 10:14	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	98.6		*	%	0.1	0.5	03/25/11 4:45	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.48		*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur HNO3 Residue		0.05	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Organic Residual Mod		0.05	B	*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Pyritic Sulfide		0.43		*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Sulfate		0.14		*	%	0.01	0.1	04/03/11 0:00	bsu
Sulfur Total		0.62		*	%	0.01	0.1	04/03/11 0:00	bsu
Total Sulfur minus Sulfate		0.48		*	%	0.01	0.1	04/03/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:45	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 6:10	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L87074-15***
Project ID:	ZN01CC	Date Sampled:	*11/05/10 11:30*
Sample ID:	FID103	Date Received:	*03/22/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	443			mg/Kg	1	5	04/04/11 13:36	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	2	B		t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	2			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.2	B	*	%	0.1	0.5	03/31/11 13:57	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.0			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.7			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	46.5		*	% Passing	0.1	0.5	03/28/11 10:15	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	96.3		*	%	0.1	0.5	03/25/11 5:56	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur HNO3 Residue			U	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Organic Residual Mod			U	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Sulfate		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Total		0.06	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Total Sulfur minus Sulfate		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:49	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 7:19	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN01CC

Sample ID: FID104

ACZ Sample ID: ***L87074-16***

Date Sampled: *11/05/10 09:00*

Date Received: *03/22/11*

Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	459			mg/Kg	1	5	04/04/11 13:39	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	31			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-31			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 14:10	nrc
pH, Corrosivity	M9045D/M9040C								
pH		3.8			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.7			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	64.3		*	% Passing	0.1	0.5	03/28/11 10:16	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	93.3		*	%	0.1	0.5	03/25/11 7:07	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.37		*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur HNO3 Residue		0.06	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Organic Residual Mod		0.06	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Pyritic Sulfide		0.31		*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Sulfate		0.61		*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Total		0.98		*	%	0.01	0.1	04/04/11 0:00	bsu
Total Sulfur minus Sulfate		0.37		*	%	0.01	0.1	04/04/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:53	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 8:27	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC
Sample ID: FID105

ACZ Sample ID: ***L87074-17***
Date Sampled: *11/03/10 14:30*
Date Received: *03/22/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1390			mg/Kg	1	5	04/04/11 13:49	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-5			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 14:22	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.6			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.6			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	41.3		*	% Passing	0.1	0.5	03/28/11 10:17	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	95.1		*	%	0.1	0.5	03/25/11 8:18	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.14		*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur HNO3 Residue		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Organic Residual Mod		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Pyritic Sulfide		0.11		*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Sulfate		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Total		0.17		*	%	0.01	0.1	04/04/11 0:00	bsu
Total Sulfur minus Sulfate		0.14		*	%	0.01	0.1	04/04/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 8:56	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 9:35	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN01CC	ACZ Sample ID:	***L87074-18***
Sample ID:	FID106	Date Sampled:	*11/04/10 11:30*
		Date Received:	*03/22/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	454			mg/Kg	1	5	04/04/11 13:52	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	1	B		t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-1			t CaCO3/Kt	1	5	04/06/11 9:13	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	03/31/11 14:35	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.0			units	0.1	0.1	04/05/11 0:00	nrc
pH measured at		21.5			C	0.1	0.1	04/05/11 0:00	nrc
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	61.2		*	% Passing	0.1	0.5	03/28/11 10:18	meg/zsh
Solids, Percent	CLPSOW390, PART F, D-98	95.8		*	%	0.1	0.5	03/25/11 9:29	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur HNO3 Residue			U	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Organic Residual Mod			U	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Sulfur Total		0.04	B	*	%	0.01	0.1	04/04/11 0:00	bsu
Total Sulfur minus Sulfate		0.03	B	*	%	0.01	0.1	04/04/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							03/24/11 9:00	meg
Digestion - Hot Plate	M3050B ICP							03/31/11 10:43	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							03/24/11 13:00	brd

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	LCSWD	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	LFB	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	LFM	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	LFMD	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	LRB	Laboratory Reagent Blank
ICB	Initial Calibration Blank	MS	Matrix Spike
ICV	Initial Calibration Verification standard	MSD	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	PBS	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	PBW	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	PQV	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	SDL	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC

ACZ Project ID: ***L87074***

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299269													
WG299269ICV	ICV	04/04/11 12:18	II110104-3	2		1.986	mg/L	99.3	90	110			
WG299269ICB	ICB	04/04/11 12:21				U	mg/L		-0.03	0.03			
WG299161PBS	PBS	04/04/11 12:34				U	mg/Kg		-3	3			
WG299161LCSS	LCSS	04/04/11 12:37	PCN36182	187		182.1	mg/Kg		157	218			
WG299161LCSSD	LCSSD	04/04/11 12:40	PCN36182	187		191.1	mg/Kg		157	218	4.8	20	
L87074-18MS	MS	04/04/11 13:55	II110321-2	51	454	499.1	mg/Kg	88.4	75	125			
L87074-18MSD	MSD	04/04/11 13:58	II110321-2	51	454	500.6	mg/Kg	91.4	75	125	0.3	20	

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299160													
WG299160PBS	PBS	03/31/11 10:37				U	%		-0.1	0.1			
WG299160LCSS	LCSS	03/31/11 10:50	PCN33453	100		92.98	%	93	80	120			
L87074-18DUP	DUP	03/31/11 15:00			U	.25	%				200	20	RA

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299342													
WG299342ICV	ICV	04/05/11 10:22	PCN36402	4		4.03	units	100.8	90	110			
L87074-18DUP	DUP	04/05/11 12:52			5	4.98	units				0.4	20	

Sieve- 250 um (60 mesh) ASA No.9, 15-4.2.2

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299031													
L87074-01DUP	DUP	03/28/11 10:01			33.8	40.9	% Passin				19	35	

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG298891													
WG298891PBS	PBS	03/24/11 11:00				U	%		99.9	100.1			
L87074-01DUP	DUP	03/24/11 13:22			97.3	96.72	%				0.6	20	

Sulfur Organic Residual Mod M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299217													
L87074-01DUP	DUP	04/01/11 1:39			U	U	%				0	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299217													
L87074-01DUP	DUP	04/01/11 1:39			.04	.03	%				28.6	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299217													
L87074-01DUP	DUP	04/01/11 1:39			.01	.02	%				66.7	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299217													
WG299217PBS	PBS	03/31/11 10:30				U	%		-0.03	0.03			
WG299217LCSS	LCSS	03/31/11 15:33	PCN36956	4.24		4.74	%	111.8	3.392	5.088			
L87074-01DUP	DUP	04/01/11 1:39			.05	.05	%				0	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG299217													
L87074-01DUP	DUP	04/01/11 1:39			.04	.03	%				28.6	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L87074-01	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-02	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-03	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L87074-04	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-05	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-06	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L87074-07	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-08	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-09	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

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ACZ Project ID: ***L87074***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L87074-10	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-11	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-12	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

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ACZ Project ID: ***L87074***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L87074-13	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-14	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-15	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L87074-16	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-17	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87074-18	WG299160	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG299217	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN01CC

ACZ Project ID: L87074
Date Received: 03/22/2011 13:15
Received By: gac
Date Printed: 3/23/2011

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?			X
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?		X	
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Are the trip blanks (VOA and/or Cyanide) present?			X
12) Are samples requiring no headspace, headspace free?			X
13) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

The Chain of Custody was not reliquished.

Contact (For any discrepancies, the client must be contacted)

Matthew Barkley was contacted on 3/22/2011. The client emailed a signed copy of the chain of custody.

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
Na12613		15.6	30
Na12614		16.6	24

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN01CC

ACZ Project ID: L87074
Date Received: 03/22/2011 13:15
Received By: gac
Date Printed: 3/23/2011

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L87074-01	FID7									X		▣
L87074-02	FID8									X		▣
L87074-03	FID10									X		▣
L87074-04	FID15									X		▣
L87074-05	FID16									X		▣
L87074-06	FID17									X		▣
L87074-07	FID18									X		▣
L87074-08	FID23									X		▣
L87074-09	FID22									X		▣
L87074-10	FID28									X		▣
L87074-11	FID37									X		▣
L87074-12	FID43									X		▣
L87074-13	FID101									X		▣
L87074-14	FID102									X		▣
L87074-15	FID103									X		▣
L87074-16	FID104									X		▣
L87074-17	FID105									X		▣
L87074-18	FID106									X		▣

Sample Container Preservation Legend

Abbreviation	**Description**	**Container Type**	**Preservative/Limits**
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: gac

ACZ Laboratories, Inc. L87074

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson

Company: Chino Mines

E-mail: Pamela.Pinson @ FMI.com

Address: 1 Santa Rita Mine Rd
Vanadium, NM

Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley

Company: ARCADIS

E-mail: Matthew.barkley @ arcadis-us.com

Telephone: 303-231-9115 x 157

Invoice to:

Name: Pam Pinson

Company: Chino Mines

E-mail: Pamela.Pinson @ FMI.com

Address: 1 Santa Rita Mine Rd
Vandarium, NM

Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☐ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☐

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: MDLB Sampler's site Information State CO Zip code 8040 Time Zone MST

PROJECT INFORMATION ANALYSES REQUESTED *(attach list or use quote number)*

Quote #:

Project/PO #:

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	pH(9045C)	ABA (Modified Sobek)	Cu (6020)					
FID7	11/4/10 1200	SO	1	X	X	X					
FID8	11/5/10 0930		1								
FID10	11/3/10 1130		1								
FID 15	11/3/10 1000		1								
FID 16	11/3/10 0930		1								
FID17	11/3/10 0840		1								
FID18	11/4/10 1430		1								
FID23	11/5/10 1145		1								
FID22	11/4/10 1300		1								
FID 28	11/4/10 1030	SO	1	X	X	X					

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please report samples in dry weight and sieve to 2000um

Please run FID17, 23, & 10 for the above analyses without sieving.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
			3-20-11 13:10

FRMAD050.02.11.11 White - Return with sample. Yellow - Retain for your records.

L87074 Chain of Custody

ACZ Laboratories, Inc. L87074

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson

Company: Chino Mines

E-mail: Pamela.Pinson @ FMI.com

Address: 1 Santa Rita Mine Rd

Vanadium, NM

Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley

Company: ARCADIS

E-mail: matthew.barkley@arcadis-us.com

Telephone: 303-231-9115 x 157

Invoice to:

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Address: 1 Santa Rita Mine Rd

Vanadium, NM

Telephone: 575-912-5213

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Are samples for SDWA Compliance Monitoring? Yes ☐ No ☐

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: MDLB Sampler's site Information State CO Zip code 804 Time Zone MST

PROJECT INFORMATION **ANALYSES REQUESTED** *(attach list or use quote number)*

Quote #:

Project/PO #:

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	pH(9045C)	ABA (modified Sobek)	Cu (6020C)					
FID37	11/3/10 1530	SO	1	X	X	X					
FID43	11/5/10 1215	SO	1								
FID101	11/4/10 1400	SO	1								
FID102	11/5/10 1315	SO	1								
FID103	11/5/10 1130	SO	1								
FID104	11/5/10 0900	SO	1								
FID105	11/3/10 1430	SO	1								
FID106	11/4/10 1130	SO	1	X	X	X					

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please report samples in dry weight and sieve to 2000um

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
			3022.11 1310

FRMAD050.02.11.11 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L87074

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines
E-mail: Pamela.Pinson@FMI.com

Address: 1 Santa Rita Mine Rd
Vanadium, NM
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: matthew.barkley@arcadis-us.com
Telephone: 303-231-9115 x 157

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Are samples for SDWA Compliance Monitoring? Yes ☐ No ☐

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: MDLB Sampler's site information State CO Zip code 804 Time Zone MST

PROJECT INFORMATION

ANALYSES REQUESTED *(attach list or use quote number)*

Quote #:
Project/PO #:
Reporting state for compliance testing:
Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	pH(9045C)	ABA (modified Sobek)	Cu(6020)					
FID7	11/4/10 1200	SO	1	X	X	X					
FID8	11/5/10 0930	│	1	│	│	│					
FID10	11/3/10 1130	│	1	│	│	│					
FID 15	11/3/10 1000	│	1	│	│	│					
FID 16	11/3/10 0930	│	1	│	│	│					
FID17	11/3/10 0840	│	1	│	│	│					
FID18	11/4/10 1430	│	1	│	│	│					
FID23	11/5/10 1145	│	1	│	│	│					
FID22	11/4/10 1300	│	1	│	│	│					
FID 28	11/4/10 1030	SO	1	X	X	X					

Matrix SW (Surface Water) · GW (Ground Water) WW (Waste Water) · DW (Drinking Water) · SL (Sludge) SO (Soil) OL (Oil) · Other (Specify)

REMARKS

Please report samples in dry weight and sieve to 2000um
Please run FID17, 23, & 10 for the above analyses without sieving.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	3/21/11 0930		3-22-11 13:10

FRMAD050.02.11.11 White - Return with sample. Yellow - Retain for your records.

1

ACZ Laboratories, Inc. L87074

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines
E-mail: Pamela.Pinson @ FMI.com
Address: 1 Santa Rita Mine Rd
Vanadium, NM
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
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E-mail: matthew.barkley @ arcadis-us.com
Telephone: 303-231-9115 x 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines
E-mail: Pamela-Pinson @ FMI.com
Address: 1 Santa Rita Mine Rd
Vanadium, NM
Telephone: 575-912-5213

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If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☐

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name. MDLB Sampler's site information State CO Zip code 804 Time Zone MST

PROJECT INFORMATION ANALYSES REQUESTED *(attach list or use quote number)*

Quote #:
Project/PO #:
Reporting state for compliance testing:
Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	pH (9045C)	ABA (Modified Sobek)	Cu (6020)					
FID37	11/3/10 1530	SO	1	X	X	X					
FID43	11/5/10 1215	SO	1								
FID101	11/4/10 1400	SO	1								
FID102	11/5/10 1315	SO	1								
FID103	11/5/10 1130	SO	1								
FID104	11/5/10 0900	SO	1								
FID105	11/3/10 1430	SO	1								
FID106	11/4/10 1130	SO	1	X	X	X					

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please report samples in dry weight and sieve to 2000um

Please refer to ACZ's terms & conditions located on the réverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Matt B	3/21/11 0930		3.22.11 1310

FRMAD050.02.11 11 White - Return with sample. Yellow - Retain for your records.

2

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

Page 1 of 2
3/21/2011

Quote Number: TOTAL-CU-ABA

Matrix: Soil

Analysis of Freeport-McMoRan Chino Mine Soil Samples

Parameter	Method	Detection Limit	Cost/Sample
Metals Analysis			
Copper, total (3050)	M6010B ICP	1 mg/Kg	$9.00
Misc.			
Electronic Data Deliverable			$0.00
Quality Control Summary			$0.00
Setup charge for ICP, total			$18.00
Sample Preparation			
Air Dry at 34 Degrees C	USDA No. 1, 1972		$7.20
Crush and Pulverize	USDA No. 1, 1972		$10.80
Digestion - Hot Plate	M3050B ICP		$14.40
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2		$10.80
Soil Analysis			
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	Calculation	$0.00
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	Calculation	$0.00
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	Calculation	$0.00
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No	0.1 %	$41.40
pH, Corrosivity	M9045D/M9040C	0.1 C	$16.20
Sieve- 250 um (60 mesh)	ASA No.9, 15-4.2.2	0.1 % Passing	$13.50
Solids, Percent	CLPSOW390, PART F, D-98	0.1 %	$7.20
Sulfur Forms	M600/2-78-054 3.2.4-MOD	0.01 %	$66.60
		Cost/Sample:	**$215.10**

Prices are based on a standard turnaround time of 3 weeks or 15 working days and reflect a 10% discount.

Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

Quote Number: TOTAL-CU-ABA

Pricing includes shipment of all standard sample containers and related paperwork by UPS Ground Service. Please allow three to five days for delivery when ordering containers. ACZ must be notified prior to receiving samples of all special requests such as electronic data deliverables or special reporting reqirements. The client will be charged for special sample containers or express shipping and additional charges may apply for non-standard requests.

This quotation is valid for six months from the bid date unless specified otherwise in the bid. All bids must be signed and returned to ACZ before project(s) is received. The authorized signature represents acceptance of the pricing as well as the general terms and conditions of ACZ Laboratories, Inc. Our general terms and conditions can be downloaded from our web site at http://www.acz.com/PDF/termsconditions.pdf. Please note that MDL's in this quote may possibly increase due to sample matrix or samples with high TDS.
All orders that require shipping of coolers are subject to a minimum charge of $200.00. Local orders without shipping are subject to a minimum charge of $125.00. Samples may incur a $10.00/sample disposal fee for any samples deemed to be hazardous.

ACZ Representative (Authorized signature and date) ____________________

Client Representative (Authorized signature and date) ____________________

ACZ Laboratories, Inc.
2773 Downhill Drive   Steamboat Springs, CO 80487   (800) 334-5493

Analytical Report

May 17, 2011

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

Bill to:
Accounts Payable
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

cc: Matthew Barkley

Project ID: ZN01CC
ACZ Project ID: L87617

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on April 27, 2011. This project has been assigned to ACZ's project number, L87617. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L87617. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after June 17, 2011. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN01CC	ACZ Sample ID:	***L87617-01***
Sample ID:	FID17	Date Sampled:	*11/03/10 08:40*
		Date Received:	*04/27/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	3900	H	*	mg/Kg	1	5	05/10/11 21:52	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	20			t CaCO3/Kt	1	5	05/16/11 16:46	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	3			t CaCO3/Kt	1	5	05/16/11 16:46	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-17			t CaCO3/Kt	1	5	05/16/11 16:46	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.3	B	*	%	0.1	0.5	05/03/11 5:12	bsu
pH, Corrosivity	M9045D/M9040C								
pH		5.3	H		units	0.1	0.1	05/06/11 0:00	nrc
pH measured at		25.1			C	0.1	0.1	05/06/11 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	97.7	H	*	%	0.1	0.5	05/10/11 4:06	zsh
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.58	H	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur HNO3 Residue		0.07	BH	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur Organic Residual Mod		0.07	BH	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur Pyritic Sulfide		0.51	H	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur Sulfate		0.07	BH	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur Total		0.65	H	*	%	0.01	0.1	05/11/11 0:00	bsu
Total Sulfur minus Sulfate		0.58	H	*	%	0.01	0.1	05/11/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Crush and Pulverize	USDA No. 1, 1972							05/02/11 10:00	bsu
Digestion - Hot Plate	M3050B ICP		H					05/09/11 14:11	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							05/02/11 10:00	bsu

Note: This report is for the re-analysis of the sample previously reported as ACZ project L87074-06.

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN01CC
Sample ID: FID23

ACZ Sample ID: ***L87617-02***
Date Sampled: *11/05/10 11:45*
Date Received: *04/27/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	182	H	*	mg/Kg	1	5	05/10/11 22:02	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	4	B		t CaCO3/Kt	1	5	05/16/11 16:46	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	05/16/11 16:46	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-4			t CaCO3/Kt	1	5	05/16/11 16:46	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	05/03/11 12:29	bsu
pH, Corrosivity	M9045D/M9040C								
pH		4.4	H		units	0.1	0.1	05/06/11 0:00	nrc
pH measured at		24.5			C	0.1	0.1	05/06/11 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	97.7	H	*	%	0.1	0.5	05/10/11 5:42	zsh
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.08	BH	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur HNO3 Residue		0.01	BH	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur Organic Residual Mod		0.01	BH	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur Pyritic Sulfide		0.07	BH	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur Sulfate		0.05	BH	*	%	0.01	0.1	05/11/11 0:00	bsu
Sulfur Total		0.13	H	*	%	0.01	0.1	05/11/11 0:00	bsu
Total Sulfur minus Sulfate		0.08	BH	*	%	0.01	0.1	05/11/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Crush and Pulverize	USDA No. 1, 1972							05/02/11 10:30	bsu
Digestion - Hot Plate	M3050B ICP		H					05/09/11 16:52	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							05/02/11 10:30	bsu

Note: This report is for the re-analysis of the sample previously reported as ACZ project L87074-08.

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	LCSWD	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	LFB	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	LFM	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	LFMD	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	LRB	Laboratory Reagent Blank
ICB	Initial Calibration Blank	MS	Matrix Spike
ICV	Initial Calibration Verification standard	MSD	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	PBS	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	PBW	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	PQV	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	SDL	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG301213													
WG301213ICV	ICV	05/10/11 21:25	II110104-3	2		1.99	mg/L	99.5	90	110			
WG301213ICB	ICB	05/10/11 21:28				U	mg/L		-0.03	0.03			
WG301106PBS	PBS	05/10/11 21:42				U	mg/Kg		-3	3			
WG301106LCSS	LCSS	05/10/11 21:45	PCN36183	187		186.8	mg/Kg		157	218			
WG301106LCSSD	LCSSD	05/10/11 21:49	PCN36183	187		189.5	mg/Kg		157	218	1.4	20	
L87617-01MS	MS	05/10/11 21:56	II110421-4	50.5	3900	3841.4	mg/Kg	-116	75	125			M3
L87617-01MSD	MSD	05/10/11 21:59	II110421-4	50.5	3900	3563	mg/Kg	-667.3	75	125	7.52	20	M3

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG300734													
WG300734PBS	PBS	05/02/11 21:55				U	%		-0.1	0.1			
WG300734LCSS	LCSS	05/03/11 1:34	PCN33453	100		97.84	%	97.8	80	120			
L87617-01DUP	DUP	05/03/11 8:51			.3	.3	%				0	20	RA

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG301073													
WG301073ICV	ICV	05/06/11 13:20	PCN36402	4		4.03	units	100.8	97	103			
L87521-01DUP	DUP	05/06/11 14:13			7.5	7.52	units				0.3	20	

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG301179													
WG301179PBS	PBS	05/10/11 2:30				U	%		99.9	100.1			
L87712-01DUP	DUP	05/10/11 8:55			75.7	79.59	%				5	20	

Sulfur Organic Residual Mod M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG301184													
L87617-01DUP	DUP	05/11/11 10:00			.07	.07	%				0	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG301184													
L87617-01DUP	DUP	05/11/11 10:00			.51	.49	%				4	20	

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG301184													
L87617-01DUP	DUP	05/11/11 10:00			.07	.09	%				25	20	RA

Freeport-McMoRan - Chino Mines Company
Project ID: ZN01CC

ACZ Project ID: ***L87617***

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG301184													
L87617-01DUP	DUP	05/11/11 10:00			.65	.65	%				0	20	
WG301184LCSS	LCSS	05/11/11 10:00	PCN36956	4.24		4.79	%	113	3.392	5.088			
WG301184PBS	PBS	05/11/11 10:00				U	%		-0.03	0.03			

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG301184													
L87617-01DUP	DUP	05/11/11 10:00			.58	.56	%				3.5	20	

Inorganic Extended Qualifier Report

Freeport-McMoRan - Chino Mines Company ACZ Project ID: ***L87617***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L87617-01	WG301213	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG300734	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG301184	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L87617-02	WG301213	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG300734	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG301184	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Certification Qualifiers

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L87617***

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN01CC

ACZ Project ID: L87074
Date Received: 03/22/2011 13:15
Received By: gac
Date Printed: 3/23/2011

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?			X
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?		X	
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Are the trip blanks (VOA and/or Cyanide) present?			X
12) Are samples requiring no headspace, headspace free?			X
13) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

The Chain of Custody was not reliquished.

Contact (For any discrepancies, the client must be contacted)

Matthew Barkley was contacted on 3/22/2011. The client emailed a signed copy of the chain of custody.

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
Na12613		15.6	30
Na12614		16.6	24

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN01CC

ACZ Project ID: L87074
Date Received: 03/22/2011 13:15
Received By: gac
Date Printed: 3/23/2011

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L87074-01	FID7									X		☐
L87074-02	FID8									X		☐
L87074-03	FID10									X		☐
L87074-04	FID15									X		☐
L87074-05	FID16									X		☐
L87074-06	FID17									X		☐
L87074-07	FID18									X		☐
L87074-08	FID23									X		☐
L87074-09	FID22									X		☐
L87074-10	FID28									X		☐
L87074-11	FID37									X		☐
L87074-12	FID43									X		☐
L87074-13	FID101									X		☐
L87074-14	FID102									X		☐
L87074-15	FID103									X		☐
L87074-16	FID104									X		☐
L87074-17	FID105									X		☐
L87074-18	FID106									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: gac

L87617-Relog

ACZ Laboratories, Inc. ~~L87074~~ ~~L004271~~

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson

Company: Chino Mines

E-mail: Pamela_Pinson @ FMI.com

Address: 1 Santa Rita Mine Rd
Vanadium, NM

Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley

Company: ARCADIS

E-mail: Matthew.barkley @ arcadis-us.com

Telephone: 303-231-9115 x 157

Invoice to:

Name: Pam Pinson

Company: Chino Mines

E-mail: Pamela_Pinson @ FMI.com

Address: 1 Santa Rita Mine Rd
Vanadium, NM

Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☐ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☐

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: MDLB Sampler's site Information State CO Zip code 804 Time Zone MST

PROJECT INFORMATION

ANALYSES REQUESTED *(attach list or use quote number)*

Quote #:

Project/PO #:

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	pH(9045C)	ABA (Modified Sobek)	Cu(6020)					
FID7	11/4/10 1200	SO	1	X	X	X					
FID8	11/5/10 0930	│	1	│	│	│					
FID10	11/3/10 1130	│	1	│	│	│					
FID 15	11/3/10 1000	│	1	│	│	│					
FID 16	11/3/10 0930	│	1	│	│	│					
FID17	11/3/10 0840	│	1	│	│	│					
FID18	11/4/10 1430	│	1	│	│	│					
FID23	11/5/10 1145	│	1	│	│	│					
FID22	11/4/10 1300	│	1	│	│	│					
FID 28	11/4/10 1030	SO	1	X	X	X					

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please report samples in dry weight and sieve to 2000um

Please run FID17, 23, & 10 for the above analyses without sieving.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
		LZB	3.22.11 13:10

FRMAD050.02.11.11 White - Return with sample. Yellow - Retain for your records.

L87617 Chain of Custody

~~L87074 Chain of Custody~~

L004271

1

ACZ Laboratories, Inc.
2773 Downhill Drive   Steamboat Springs, CO 80487   (800) 334-5493

Analytical Report

November 30, 2011

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

Bill to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

cc: Matthew Barkley, Sheri Fling

Project ID: ZN000000J8
ACZ Project ID: L91358

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 18, 2011. This project has been assigned to ACZ's project number, L91358. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L91358. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 30, 2011. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID37

ACZ Sample ID: ***L91358-01***
Date Sampled: *10/11/11 09:45*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	654		*	mg/Kg	1	5	11/17/11 9:42	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	1	B		t CaCO3/Kt	1	5	11/30/11 10:13	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	1			t CaCO3/Kt	1	5	11/30/11 10:13	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	11/30/11 10:13	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.1	B	*	%	0.1	0.5	11/17/11 0:07	brd
pH, Saturated Paste	USDA No. 60 (21A)	4.6		*	units	0.1	0.1	11/21/11 19:53	bsu
Solids, Percent	CLPSOW390, PART F, D-98	93.6		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.03	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Pyritic Sulfide		0.01	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Sulfate			U	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Total		0.04	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Total Sulfur minus Sulfate		0.04	B	*	%	0.01	0.1	11/16/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:26	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 13:00	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 11:00	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:00	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 15:48	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 15:48	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID101

ACZ Sample ID: ***L91358-03***
Date Sampled: *10/12/11 16:45*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	272		*	mg/Kg	1	5	11/17/11 10:01	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	2			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-4			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.2	B	*	%	0.1	0.5	11/17/11 4:37	brd
pH, Saturated Paste	USDA No. 60 (21A)	3.8		*	units	0.1	0.1	11/21/11 21:19	bsu
Solids, Percent	CLPSOW390, PART F, D-98	93.8		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.11		*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Pyritic Sulfide		0.02	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Sulfate		0.06	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Total		0.19		*	%	0.01	0.1	11/16/11 0:00	bsu
Total Sulfur minus Sulfate		0.13		*	%	0.01	0.1	11/16/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:31	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 13:17	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 12:20	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:08	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 15:59	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 15:59	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L91358-04***
Sample ID:	STS-PH-2011-REFPLOT3	Date Sampled:	*10/07/11 11:50*
		Date Received:	*10/18/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1950		*	mg/Kg	1	5	11/17/11 10:04	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	3	B		t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	10			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.3		*	%	0.1	0.5	11/17/11 2:26	brd
pH, Saturated Paste	USDA No. 60 (21A)	5.6		*	units	0.1	0.1	11/21/11 22:02	bsu
Solids, Percent	CLPSOW390, PART F, D-98	91.2		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.07	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Pyritic Sulfide		0.01	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Sulfate		0.02	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Total		0.10		*	%	0.01	0.1	11/16/11 0:00	bsu
Total Sulfur minus Sulfate		0.08	B	*	%	0.01	0.1	11/16/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:33	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 13:35	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 12:40	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:13	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:05	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:05	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-REFPLOT4

ACZ Sample ID: ***L91358-05***
Date Sampled: *10/06/11 10:39*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1130		*	mg/Kg	1	5	11/17/11 10:07	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	7			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-7			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	11/28/11 14:33	mss2
pH, Saturated Paste	USDA No. 60 (21A)	5.4		*	units	0.1	0.1	11/21/11 22:46	bsu
Solids, Percent	CLPSOW390, PART F, D-98	90.8		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.13		*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Sulfate		0.05	B	*	%	0.01	0.1	11/16/11 0:00	bsu
Sulfur Total		0.21		*	%	0.01	0.1	11/16/11 0:00	bsu
Total Sulfur minus Sulfate		0.16		*	%	0.01	0.1	11/16/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:35	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 13:52	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 13:00	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:17	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:10	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:10	cra/thf

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L91358-06***
Sample ID:	DUP11	Date Sampled:	*10/12/11 00:00*
		Date Received:	*10/18/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	341		*	mg/Kg	1	5	11/17/11 10:14	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-6			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	11/17/11 6:35	brd
pH, Saturated Paste	USDA No. 60 (21A)	3.9		*	units	0.1	0.1	11/21/11 23:29	bsu
Solids, Percent	CLPSOW390, PART F, D-98	93.7		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.13		*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide			U	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.06	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.19		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.13		*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:37	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 14:10	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 13:20	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:22	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:16	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:16	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID105

ACZ Sample ID: ***L91358-07***
Date Sampled: *10/06/11 13:30*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	668		*	mg/Kg	1	5	11/17/11 10:17	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	3	B		t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	8			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.8		*	%	0.1	0.5	11/17/11 8:32	brd
pH, Saturated Paste	USDA No. 60 (21A)	4.9		*	units	0.1	0.1	11/22/11 0:12	bsu
Solids, Percent	CLPSOW390, PART F, D-98	91.1		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.07	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide		0.01	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.02	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.10		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.08	B	*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:39	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 14:27	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 13:40	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:26	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:22	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:22	cra/thf

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: DUP12

ACZ Sample ID: ***L91358-08***
Date Sampled: *10/13/11 00:00*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	467		*	mg/Kg	1	5	11/17/11 10:20	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	26			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	20			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.6		*	%	0.1	0.5	11/17/11 10:30	brd
pH, Saturated Paste	USDA No. 60 (21A)	6.3		*	units	0.1	0.1	11/22/11 0:55	bsu
Solids, Percent	CLPSOW390, PART F, D-98	95.3		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.12		*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.04	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.19		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.15		*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:42	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 14:45	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 14:00	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:30	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:27	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:27	cra/thf

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-REFPLOT1

ACZ Sample ID: ***L91358-09***
Date Sampled: *10/04/11 11:09*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	597		*	mg/Kg	1	5	11/17/11 10:23	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	2	B		t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	101			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	99			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	10.1		*	%	0.1	0.5	11/17/11 7:05	brd
pH, Saturated Paste	USDA No. 60 (21A)	7.5		*	units	0.1	0.1	11/22/11 1:39	bsu
Solids, Percent	CLPSOW390, PART F, D-98	92.7		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.06	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide			U	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate			U	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.05	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.05	B	*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:44	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 15:02	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 14:20	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:35	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:33	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:33	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L91358-10***
Project ID:	ZN000000J8	Date Sampled:	*10/05/11 12:30*
Sample ID:	STS-PH-2011-REFPLOT2	Date Received:	*10/18/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	687		*	mg/Kg	1	5	11/17/11 10:26	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	11			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	11			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.1		*	%	0.1	0.5	11/17/11 12:27	brd
pH, Saturated Paste	USDA No. 60 (21A)	6.0		*	units	0.1	0.1	11/22/11 2:22	bsu
Solids, Percent	CLPSOW390, PART F, D-98	91.9		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.02	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide			U	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate			U	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.02	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.02	B	*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:46	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 15:20	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 14:40	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:39	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:39	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:39	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID22

ACZ Sample ID: ***L91358-11***
Date Sampled: *10/13/11 16:40*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	430			mg/Kg	1	5	11/17/11 10:29	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	16			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	10			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.6		*	%	0.1	0.5	11/17/11 16:22	brd
pH, Saturated Paste	USDA No. 60 (21A)	6.2		*	units	0.1	0.1	11/22/11 3:49	bsu
Solids, Percent	CLPSOW390, PART F, D-98	95.4		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.11		*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide		0.04	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.04	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.19		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.15		*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:48	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 15:37	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 15:00	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:44	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:44	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:44	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8

Sample ID: STS-PH-2011-FID10

ACZ Sample ID: ***L91358-12***

Date Sampled: *10/07/11 14:35*

Date Received: *10/18/11*

Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	2140		*	mg/Kg	1	5	11/17/11 10:38	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	3	B		t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	2			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.5	B	*	%	0.1	0.5	11/17/11 18:20	brd
pH, Saturated Paste	USDA No. 60 (21A)	4.8		*	units	0.1	0.1	11/22/11 4:32	bsu
Solids, Percent	CLPSOW390, PART F, D-98	91.5		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.07	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide		0.02	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.10		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.09	B	*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:50	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 15:55	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 15:20	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:48	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:50	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:50	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID15

ACZ Sample ID: ***L91358-13***
Date Sampled: *10/10/11 11:50*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	2260		*	mg/Kg	1	5	11/17/11 10:41	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-6			t CaCO3/Kt	1	5	11/30/11 10:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	11/17/11 20:17	brd
pH, Saturated Paste	USDA No. 60 (21A)	4.8		*	units	0.1	0.1	11/22/11 5:15	bsu
Solids, Percent	CLPSOW390, PART F, D-98	92.8		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.13		*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide		0.04	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.02	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.19		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.17		*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:53	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 16:12	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 15:40	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:53	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 16:56	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 16:56	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L91358-14***
Sample ID:	STS-PH-2011-FID16	Date Sampled:	*10/10/11 12:30*
		Date Received:	*10/18/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	2020		*	mg/Kg	1	5	11/17/11 10:44	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	5	B		t CaCO3/Kt	1	5	11/30/11 10:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/30/11 10:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-5			t CaCO3/Kt	1	5	11/30/11 10:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	11/17/11 22:15	brd
pH, Saturated Paste	USDA No. 60 (21A)	4.5		*	units	0.1	0.1	11/22/11 5:58	bsu
Solids, Percent	CLPSOW390, PART F, D-98	90.9		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.16		*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide			U	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.02	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.15		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.13		*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:55	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 16:30	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 16:00	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 17:57	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 17:01	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 17:01	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID17

ACZ Sample ID: ***L91358-15***
Date Sampled: *10/11/11 17:35*
Date Received: *10/18/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	4220		*	mg/Kg	1	5	11/17/11 10:48	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	14			t CaCO3/Kt	1	5	11/30/11 10:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	8			t CaCO3/Kt	1	5	11/30/11 10:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-6			t CaCO3/Kt	1	5	11/30/11 10:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.8		*	%	0.1	0.5	11/18/11 0:12	brd
pH, Saturated Paste	USDA No. 60 (21A)	6.0		*	units	0.1	0.1	11/22/11 6:42	bsu
Solids, Percent	CLPSOW390, PART F, D-98	94.0		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.21		*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide		0.18		*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.06	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.45		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.39		*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:57	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 16:47	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 16:20	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 18:01	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 17:07	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 17:07	cra/thf

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L91358-16***
Sample ID:	STS-PH-2011-FID18	Date Sampled:	*10/12/11 15:55*
		Date Received:	*10/18/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	254		*	mg/Kg	1	5	11/17/11 10:51	aeb

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	11/30/11 10:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/30/11 10:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-5			t CaCO3/Kt	1	5	11/30/11 10:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	*	%	0.1	0.5	11/18/11 2:10	brd
pH, Saturated Paste	USDA No. 60 (21A)	4.3		*	units	0.1	0.1	11/22/11 7:25	bsu
Solids, Percent	CLPSOW390, PART F, D-98	96.5		*	%	0.1	0.5	11/16/11 16:00	ndj
Sulfur Forms	M600/2-78-054 3.2.4								
Sulfur Organic Residual		0.10		*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Pyritic Sulfide		0.06	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	11/17/11 0:00	bsu
Sulfur Total		0.17		*	%	0.01	0.1	11/17/11 0:00	bsu
Total Sulfur minus Sulfate		0.16		*	%	0.01	0.1	11/17/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/11/11 11:59	zsh
Crush and Pulverize	USDA No. 1, 1972							11/15/11 17:05	cra
Digestion - Hot Plate	M3050B ICP							11/16/11 16:40	mss2
Saturated Paste Extraction	USDA No. 60 (2)							11/21/11 18:06	bsu
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/15/11 17:13	cra/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/15/11 17:13	cra/thf

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(5) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8

ACZ Project ID: ***L91358***

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313764													
WG313764ICV	ICV	11/17/11 9:08	II111012-2	2		1.983	mg/L	99.2	90	110			
WG313764ICB	ICB	11/17/11 9:11				U	mg/L		-0.03	0.03			
WG313764PQV	PQV	11/17/11 9:15	II111024-4	.05		.052	mg/L	104	70	130			
WG313764ICSAB	ICSAB	11/17/11 9:18	II110922-1	.255		.244	mg/L	95.7	80	120			
WG313678PBS	PBS	11/17/11 9:24				U	mg/Kg		-3	3			
WG313678LCSS1	LCSS	11/17/11 9:27	PCN38231	117		120.3	mg/Kg		98	136			
WG313678LCSSD1	LCSSD	11/17/11 9:30	PCN38231	117		122	mg/Kg		98	136	1.4	20	
L91358-01MS	MS	11/17/11 9:46	II111115-2	50.5	654	690.1	mg/Kg	71.5	75	125			M3
L91358-01MSD	MSD	11/17/11 9:49	II111115-2	50.5	654	729.8	mg/Kg	150.1	75	125	5.59	20	M3
WG313764CCV1	CCV	11/17/11 9:55	II111031-1	1		.995	mg/L	99.5	90	110			
WG313764CCB1	CCB	11/17/11 9:58				U	mg/L		-0.03	0.03			
L91358-05SDL	SDL	11/17/11 10:10			1130	1187.5	mg/Kg				5.1	10	
WG313764CCV2	CCV	11/17/11 10:32	II111031-1	1		.989	mg/L	98.9	90	110			
WG313764CCB2	CCB	11/17/11 10:35				U	mg/L		-0.03	0.03			
WG313764CCV3	CCV	11/17/11 10:57	II111031-1	1		.989	mg/L	98.9	90	110			
WG313764CCB3	CCB	11/17/11 11:00				U	mg/L		-0.03	0.03			

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313690													
WG313690PBS	PBS	11/16/11 18:50				U	%		-0.1	0.1			
WG313690LCSS	LCSS	11/16/11 20:47	PCN33453	100		111.12	%	111.1	80	120			
L91597-04DUP	DUP	11/18/11 8:02			U	.13	%				200	20	RA
WG313692													
L91597-05DUP	DUP	11/17/11 16:23			5.1	5.07	%				0.6	20	
WG313692LCSS	LCSS	11/18/11 8:40	PCN33453	100		113.44	%	113.4	80	120			
WG313692PBS	PBS	11/18/11 11:00				U	%		-0.1	0.1			
WG314263													
L91350-09DUP	DUP	11/28/11 13:51			12.3	12.32	%				0.2	20	
WG314263LCSS	LCSS	11/28/11 16:39	PCN33453	100		108.26	%	108.3	80	120			
WG314263PBS	PBS	11/28/11 17:00				U	%		-0.1	0.1			

pH, Saturated Paste USDA No. 60 (21A)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314045													
WG314045ICV	ICV	11/21/11 19:09	PCN36616	4		4.01	units	100.3	97	103			
WG314045CCV1	CCV	11/22/11 3:05	PCN36616	4		4.02	units	100.5	97	103			
L91396-01DUP	DUP	11/22/11 8:51			7.2	7.67	units				6.3	20	
WG314045CCV2	CCV	11/22/11 9:35	PCN36616	4		4.09	units	102.3	97	103			

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313740													
WG313740PBS	PBS	11/16/11 16:00				U	%		99.9	100.1			
L91358-13DUP	DUP	11/16/11 16:00			92.8	92.93	%				0.1	20	

Sulfur Organic Residual M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313719													
L91358-01DUP	DUP	11/16/11 18:17			.03	.04	%				28.6	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313719													
L91358-01DUP	DUP	11/16/11 18:17			.01	.02	%				66.7	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313719													
L91358-01DUP	DUP	11/16/11 18:17			U	U	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313719													
WG313719PBS	PBS	11/16/11 14:00				U	%		-0.03	0.03			
WG313719LCSS	LCSS	11/16/11 15:25	PCN38174	4.07		4.13	%	101.5					
L91358-01DUP	DUP	11/16/11 18:17			.04	.05	%				22.2	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313719													
L91358-01DUP	DUP	11/16/11 18:17			.04	.05	%				22.2	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91358-01	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-02	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L91358-03	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-04	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91358-05	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-06	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-07	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91358-08	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-09	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-10	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91358-11	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-12	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-13	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91358-14	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91358-15	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91358-16	WG313764	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG313690	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG313719	Sulfur Organic Residual	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Certification Qualifiers

Freeport-McMoRan - Chino Mines Company ACZ Project ID: ***L91358***

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3
pH, Saturated Paste	USDA No. 60 (21A)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur Organic Residual	M600/2-78-054 3.2.4
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4
Sulfur Sulfate	M600/2-78-054 3.2.4
Sulfur Total	M600/2-78-054 3.2.4
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4

Freeport-McMoRan - Chino Mines Company
ZN000000J8

ACZ Project ID: L91358
Date Received: 10/18/2011 09:23
Received By: ksj
Date Printed: 10/19/2011

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Are the trip blanks (VOA and/or Cyanide) present?			X
12) Are samples requiring no headspace, headspace free?			X
13) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
3282		9.2	18
3164		10.4	18
3045		13.6	20

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000000J8

ACZ Project ID: L91358
Date Received: 10/18/2011 09:23
Received By: ksj
Date Printed: 10/19/2011

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L91358-01	STS-PH-2011-FID37									X		☐
L91358-02	STS-PCUG-2011-40									X		☐
L91358-03	STS-PH-2011-FID101									X		☐
L91358-04	STS-PH-2011-REFPLOT3									X		☐
L91358-05	STS-PH-2011-REFPLOT4									X		☐
L91358-06	DUP11									X		☐
L91358-07	STS-PH-2011-FID105									X		☐
L91358-08	DUP12									X		☐
L91358-09	STS-PH-2011-REFPLOT1									X		☐
L91358-10	STS-PH-2011-REFPLOT2									X		☐
L91358-11	STS-PH-2011-FID22									X		☐
L91358-12	STS-PH-2011-FID10									X		☐
L91358-13	STS-PH-2011-FID15									X		☐
L91358-14	STS-PH-2011-FID16									X		☐
L91358-15	STS-PH-2011-FID17									X		☐
L91358-16	STS-PH-2011-FID18									X		☐

Sample Container Preservation Legend

Abbreviation	**Description**	**Container Type**	**Preservative/Limits**
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ksj

ACZ Laboratories, Inc. L91358

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Carolyn Meyer
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2011-FID37	10.11.11 : 09:45"	SO	1	✗	✗	✗	✗				
STS-PCUG-2011-40	10.13.11 : 13:55"	SO	1	✗	✗	✗					
STS-PH-2011-FID101	10.12.11 : 16:45"	SO	1	✗	✗	✗	✗				
STS-PH-2011-REFPLOT3	10.7.11 : 11:50"	SO	1	✗	✗	✗	✗				
STS-PH-2011-REFPLOT4	10.6.11 : 10:39"	SO	1	✗	✗	✗	✗				
DUP11	10.12.11 : ---"	SO	1	✗	✗	✗	✗				
STS-PH-2011-FID105	10.6.11 : 13:30"	SO	1	✗	✗	✗	✗				
DUP12	10.13.11 : --- "	SO	1	✗	✗	✗	✗				
STS-PH-2011-REFPLOT1	10.4.11 : 11:09"	SO	1	✗	✗	✗	✗				
STS-PH-2011-REFPLOT2	10.5.11 : 12:30"	SO	1	✗	✗	✗	✗				

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY	DATE:TIME	RECEIVED BY	DATE:TIME
	10.14.11 10:30		
			[illegible]-11 9:30

①

L91358 Chain of Custody

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L91358

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley

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E-mail: Matthew.Barkley@arcadis-us.com

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Name: Pam Pinson

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If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐

If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

Quote #:

Project/PO #:

Reporting state for compliance testing:

Sampler's Name: Carolyn Meyer

Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2011-FID22	10.13.11 : 16:40	SO	1	X	X	X	X				
mb ~~STS-PH-2011-FID8~~	~~10.12.11 : 15:55~~	~~SO~~	~~1~~	~~X~~	~~X~~	~~X~~	~~X~~				
STS-PH-2011-FID10	10.7.11 : 14:35	SO	1	X	X	X	X				
STS-PH-2011-FID15	10.10.11 : 11:50	SO	1	X	X	X	X				
STS-PH-2011-FID16	10.10.11 : 12:30	SO	1	X	X	X	X				
STS-PH-2011-FID17	10.11.11 : 17:35	SO	1	X	X	X	X				
STS-PH-2011-FID18	10.12.11 : 15:55	SO	1	X	X	X	X				

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.

Methods:

pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	10.14.11 10:30		
			[illegible]-11 9:12

②

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

December 05, 2011

Report to:	Bill to:
Pam Pinson	Pam Pinson
Freeport-McMoRan - Chino Mines Company	Freeport-McMoRan - Chino Mines Company
PO Box 10	P.O. Box 13308
Bayard, NM 88023	Phoenix, AZ 85002-3308

cc: Matthew Barkley, Sheri Fling

Project ID: ZN000000J8
ACZ Project ID: L91526

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 26, 2011. This project has been assigned to ACZ's project number, L91526. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L91526. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after January 05, 2012. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L91526-09***
Sample ID:	STS-PH-2011-FID106	Date Sampled:	*10/18/11 12:05*
		Date Received:	*10/26/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	254			mg/Kg	1	5	11/28/11 22:19	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	1	B		t CaCO3/Kt	1	5	12/05/11 13:30	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	12/05/11 13:30	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-1			t CaCO3/Kt	1	5	12/05/11 13:30	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	11/29/11 7:48	bsu
pH, Corrosivity	M9045D/M9040C								
pH		5.0			units	0.1	0.1	11/29/11 0:00	mss2
pH measured at		22.2			C	0.1	0.1	11/29/11 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	96.4		*	%	0.1	0.5	11/29/11 21:25	nrc
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.03	B	*	%	0.01	0.1	11/28/11 0:00	bsu
Sulfur HNO3 Residue		0.03	B	*	%	0.01	0.1	11/28/11 0:00	bsu
Sulfur Organic Residual Mod		0.03	B	*	%	0.01	0.1	11/28/11 0:00	bsu
Sulfur Pyritic Sulfide			U	*	%	0.01	0.1	11/28/11 0:00	bsu
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	11/28/11 0:00	bsu
Sulfur Total		0.04	B	*	%	0.01	0.1	11/28/11 0:00	bsu
Total Sulfur minus Sulfate		0.03	B	*	%	0.01	0.1	11/28/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/15/11 16:12	ndj
Crush and Pulverize	USDA No. 1, 1972							11/22/11 0:57	mfm/thf
Digestion - Hot Plate	M3050B ICP							11/23/11 13:47	nrc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/22/11 0:57	mfm/thf
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/22/11 0:57	mfm/thf

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(5) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314273													
WG314273ICV	ICV	11/28/11 21:16	II111012-2	2		1.944	mg/L	97.2	90	110			
WG314273ICB	ICB	11/28/11 21:19				U	mg/L		-0.03	0.03			
WG314273PQV	PQV	11/28/11 21:22	II111128-2	.05		.051	mg/L	102	70	130			
WG314273ICSAB	ICSAB	11/28/11 21:25	II110922-1	.255		.261	mg/L	102.4	80	120			
WG314166PBS	PBS	11/28/11 21:31				U	mg/Kg		-3	3			
WG314166LCSS	LCSS	11/28/11 21:34	PCN38811	82.8		89.6	mg/Kg		64.2	101			
WG314166LCSSD	LCSSD	11/28/11 21:37	PCN38811	82.8		84.4	mg/Kg		64.2	101	6	20	
L91526-01MS	MS	11/28/11 21:43	II111115-2	50.5	438	496	mg/Kg	114.9	75	125			
L91526-01MSD	MSD	11/28/11 21:46	II111115-2	50.5	438	484.2	mg/Kg	91.5	75	125	2.41	20	
L91526-04SDL	SDL	11/28/11 21:58			458	498	mg/Kg				8.7	10	
WG314273CCV1	CCV	11/28/11 22:01	II111031-1	1		.991	mg/L	99.1	90	110			
WG314273CCB1	CCB	11/28/11 22:04				U	mg/L		-0.03	0.03			
WG314273CCV2	CCV	11/28/11 22:37	II111031-1	1		.997	mg/L	99.7	90	110			
WG314273CCB2	CCB	11/28/11 22:40				U	mg/L		-0.03	0.03			
WG314273CCV3	CCV	11/28/11 23:01	II111031-1	1		1.018	mg/L	101.8	90	110			
WG314273CCB3	CCB	11/28/11 23:04				.023	mg/L		-0.03	0.03			

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314242													
WG314242PBS	PBS	11/29/11 4:42				U	%		-0.1	0.1			
WG314242LCSS	LCSS	11/29/11 6:15	PCN33453	100		100.04	%	100	80	120			
L91526-09DUP	DUP	11/29/11 9:21			U	U	%				0	20	RA

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314357													
WG314357ICV	ICV	11/29/11 16:18	PCN37501	4		4.06	units	101.5	97	103			
L91526-01DUP	DUP	11/29/11 16:30			6.9	6.89	units				0.1	20	
WG314357CCV1	CCV	11/29/11 17:24	PCN37501	4		4.04	units	101	97	103			
WG314357CCV2	CCV	11/29/11 18:00	PCN37501	4		4.03	units	100.8	97	103			

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314188													
WG314188PBS	PBS	11/29/11 12:00				U	%		99.9	100.1			
L91526-20DUP	DUP	11/30/11 9:59			95.2	95.64	%				0.5	20	

Sulfur Organic Residual Mod M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
L91526-09DUP	DUP	11/29/11 0:19			.03	.01	%				100	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
L91526-09DUP	DUP	11/29/11 0:19			U	.03	%				200	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
L91526-09DUP	DUP	11/29/11 0:19			.01	.01	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
WG314230PBS	PBS	11/28/11 12:00				U	%		-0.03	0.03			
WG314230LCSS	LCSS	11/28/11 16:06	PCN38175	4.07		3.98	%	97.8					
L91526-09DUP	DUP	11/29/11 0:19			.04	.05	%				22.2	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
L91526-09DUP	DUP	11/29/11 0:19			.03	.04	%				28.6	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91526-09	WG314242	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG314230	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000000J8

ACZ Project ID: L91526
Date Received: 10/26/2011 09:47
Received By: ksj
Date Printed: 10/27/2011

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Are the trip blanks (VOA and/or Cyanide) present?			X
12) Are samples requiring no headspace, headspace free?			X
13) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
3139		6.4	20
2638		8.5	23
3325		8.4	19

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000000J8

ACZ Project ID: L91526
Date Received: 10/26/2011 09:47
Received By: ksj
Date Printed: 10/27/2011

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L91526-01	STS-PCUG-2011-27									X		☐
L91526-02	STS-PCUG-2011-31									X		☐
L91526-03	DUP4									X		☐
L91526-04	STS-PCUG-2011-5									X		☐
L91526-05	STS-PCUG-2011-6									X		☐
L91526-06	STS-PCUG-2011-8									X		☐
L91526-07	STS-PCUG-2011-9									X		☐
L91526-08	STS-PCUG-2011-15									X		☐
L91526-09	STS-PH-2011-FID106									X		☐
L91526-10	STS-PCUG-2011-32									X		☐
L91526-11	STS-PCUG-2011-34									X		☐
L91526-12	STS-PCUG-2011-35									X		☐
L91526-13	STS-PCUG-2011-36									X		☐
L91526-14	STS-PCUG-2011-37									X		☐
L91526-15	DUP10									X		☐
L91526-16	STS-CG-2011-44									X		☐
L91526-17	STS-CG-2011-47									X		☐
L91526-18	STS-CG-2011-48									X		☐
L91526-19	STS-CG-2011-16									X		☐
L91526-20	STS-CG-2011-7									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ksj

ACZ Laboratories, Inc. L91526

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Carolyn Meyer
Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU					
STS-PCUG-2011-27	10.20.11 - 16:05'	SO	1	x	x	x					
STS-PCUG-2011-31	10.19.11 - 10:50'	SO	1	x	x	x					
DUP4	10.19.11 - ---'	SO	1	x	x	x					
STS-PCUG-2011-5	10.20.11 - 13:25'	SO	1	x	x	x					
STS-PCUG-2011-6	10.18.11 - 10:55'	SO	1	x	x	x					
STS-PCUG-2011-8	10.20.11 - 12:15'	SO	1	x	x	x					
STS-PCUG-2011-9	10.18.11 - 14:05'	SO	1	x	x	x					
STS-PCUG-2011-15	10.18.11 - 10:15'	SO	1	x	x	x					

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C and Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	10.24.11 1500		
			26.11 9:47

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

L91526 Chain of Custody

ACZ Laboratories, Inc. L91526

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

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Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Carolyn Meyer
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2011-FID106	10.18.11 - 12:05'	SO	1	✗	✗	✗	✗				
STS-PCUG-2011-32	10.19.11 - 11:25'	SO	1	✗	✗	✗					
STS-PCUG-2011-34	10.19.11 - 12:00'	SO	1	✗	✗	✗					
STS-PCUG-2011-35	10.18.11 - 13:30'	SO	1	✗	✗	✗					
STS-PCUG-2011-36	10.18.11 - 12:40'	SO	1	✗	✗	✗					
STS-PCUG-2011-37	10.19.11 - 10:05'	SO	1	✗	✗	✗					

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C and Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY	DATE:TIME	RECEIVED BY	DATE:TIME
10.24.11	1500		
		10.26.11	9:47

2

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L91526

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

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Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Carolyn Meyer
Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	Total Copper						
DUP10	10.19.11 - ---'	SO	1	✗	✗						
STS-CG-2011-44	10.20.11 - 11:25'	SO	1	✗	✗						
STS-CG-2011-47	10.20.11 - 14:30'	SO	1	✗	✗						
STS-CG-2011-48	10.20.11 - 09:30'	SO	1	✗	✗						
STS-CG-2011-16	10.19.11 - 17:40'	SO	1	✗	✗						
STS-CG-2011-7	10.19.11 - 15:30'	SO	1	✗	✗						

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	10-24-11 1600		10-26-11 9:40

3

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive   Steamboat Springs, CO 80487   (800) 334-5493

Analytical Report

December 02, 2011

Report to:	Bill to:
Pam Pinson	Pam Pinson
Freeport-McMoRan - Chino Mines Company	Freeport-McMoRan - Chino Mines Company
PO Box 10	P.O. Box 13308
Bayard, NM 88023	Phoenix, AZ 85002-3308

cc: Matthew Barkley, Sheri Fling

Project ID: ZN000000J8
ACZ Project ID: L91528

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 26, 2011. This project has been assigned to ACZ's project number, L91528. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L91528. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after January 02, 2012. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

ACCREDITED IN ACCORDANCE WITH nelac

ACIL

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID102

ACZ Sample ID: ***L91528-01***
Date Sampled: *10/19/11 09:15*
Date Received: *10/26/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	303		*	mg/Kg	1	5	11/30/11 13:43	scp

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	23			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-23			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	11/29/11 10:54	bsu
pH, Corrosivity	M9045D/M9040C								
pH		3.6			units	0.1	0.1	11/15/11 0:00	mss2
pH measured at		22.5			C	0.1	0.1	11/15/11 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	95.8		*	%	0.1	0.5	11/22/11 4:08	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.48		*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur HNO3 Residue		0.04	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Organic Residual Mod		0.04	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Pyritic Sulfide		0.44		*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Sulfate		0.27		*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Total		0.75		*	%	0.01	0.1	11/29/11 0:00	bsu
Total Sulfur minus Sulfate		0.48		*	%	0.01	0.1	11/29/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/05/11 12:34	nrc
Crush and Pulverize	USDA No. 1, 1972							11/09/11 10:00	mss2
Digestion - Hot Plate	M3050B ICP							11/29/11 12:40	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/11 11:52	lwt
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/11 11:52	lwt

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID7

ACZ Sample ID: ***L91528-02***
Date Sampled: *10/18/11 11:45*
Date Received: *10/26/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	494		*	mg/Kg	1	5	11/30/11 13:53	scp

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	4	B		t CaCO3/Kt	1	5	12/01/11 11:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-4			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	11/29/11 12:27	bsu
pH, Corrosivity	M9045D/M9040C								
pH		4.8			units	0.1	0.1	11/15/11 0:00	mss2
pH measured at		22.4			C	0.1	0.1	11/15/11 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	97.4		*	%	0.1	0.5	11/22/11 5:08	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.06	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Pyritic Sulfide		0.04	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Sulfate		0.07	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Total		0.13		*	%	0.01	0.1	11/29/11 0:00	bsu
Total Sulfur minus Sulfate		0.06	B	*	%	0.01	0.1	11/29/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/05/11 12:42	nrc
Crush and Pulverize	USDA No. 1, 1972							11/09/11 10:20	mss2
Digestion - Hot Plate	M3050B ICP							11/29/11 15:20	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/11 11:55	lwt
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/11 11:55	lwt

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L91528-03***
Sample ID:	STS-PH-2011-FID8	Date Sampled:	*10/19/11 17:00*
		Date Received:	*10/26/11*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	332		*	mg/Kg	1	5	11/30/11 13:56	scp

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	15			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	16			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	1			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1.6		*	%	0.1	0.5	11/29/11 9:42	bsu
pH, Corrosivity	M9045D/M9040C								
pH		6.4			units	0.1	0.1	11/15/11 0:00	mss2
pH measured at		22.2			C	0.1	0.1	11/15/11 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	92.9		*	%	0.1	0.5	11/22/11 6:09	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.25		*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur HNO3 Residue		0.03	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Organic Residual Mod		0.03	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Pyritic Sulfide		0.22		*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Sulfate		0.22		*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Total		0.47		*	%	0.01	0.1	11/29/11 0:00	bsu
Total Sulfur minus Sulfate		0.25		*	%	0.01	0.1	11/29/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/05/11 12:51	nrc
Crush and Pulverize	USDA No. 1, 1972							11/09/11 10:40	mss2
Digestion - Hot Plate	M3050B ICP							11/29/11 16:13	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/11 11:57	lwt
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/11 11:57	lwt

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID28

ACZ Sample ID: ***L91528-04***
Date Sampled: *10/18/11 15:35*
Date Received: *10/26/11*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	400		*	mg/Kg	1	5	11/30/11 13:59	scp

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 1.3	4	B		t CaCO3/Kt	1	5	12/01/11 11:12	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	35			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	31			t CaCO3/Kt	1	5	12/01/11 11:12	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	3.5		*	%	0.1	0.5	11/29/11 12:36	bsu
pH, Corrosivity	M9045D/M9040C								
pH		6.9			units	0.1	0.1	11/15/11 0:00	mss2
pH measured at		22.2			C	0.1	0.1	11/15/11 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	97.5		*	%	0.1	0.5	11/22/11 7:10	bsu
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.12		*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur HNO3 Residue		0.04	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Organic Residual Mod		0.04	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Pyritic Sulfide		0.08	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	11/29/11 0:00	bsu
Sulfur Total		0.13		*	%	0.01	0.1	11/29/11 0:00	bsu
Total Sulfur minus Sulfate		0.12		*	%	0.01	0.1	11/29/11 0:00	bsu

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/05/11 12:59	nrc
Crush and Pulverize	USDA No. 1, 1972							11/09/11 11:00	mss2
Digestion - Hot Plate	M3050B ICP							11/29/11 17:06	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/09/11 12:00	lwt
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2							11/09/11 12:00	lwt

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(5) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314417													
WG314417ICV	ICV	11/30/11 13:19	II111025-1	2		1.979	mg/L	99	90	110			
WG314417ICB	ICB	11/30/11 13:22				U	mg/L		-0.03	0.03			
WG314417PQV	PQV	11/30/11 13:25	II111128-2	.05		.052	mg/L	104	70	130			
WG314417ICSAB	ICSAB	11/30/11 13:28	II111129-1	.255		.259	mg/L	101.6	80	120			
WG314320PBS	PBS	11/30/11 13:34				U	mg/Kg		-3	3			
WG314320LCSS	LCSS	11/30/11 13:37	PCN38811	82.8		77	mg/Kg		64.2	101			
WG314320LCSSD	LCSSD	11/30/11 13:40	PCN38811	82.8		77.9	mg/Kg		64.2	101	1.2	20	
L91528-01MS	MS	11/30/11 13:46	II111115-2	50.5	303	350.7	mg/Kg	94.5	75	125			
L91528-01MSD	MSD	11/30/11 13:49	II111115-2	50.5	303	345.2	mg/Kg	83.6	75	125	1.58	20	
L91528-04SDL	SDL	11/30/11 14:02			400	447	mg/Kg				11.8	10	ZH
WG314417CCV1	CCV	11/30/11 14:05	II111021-2	1		1.011	mg/L	101.1	90	110			
WG314417CCB1	CCB	11/30/11 14:08				U	mg/L		-0.03	0.03			
WG314417CCV2	CCV	11/30/11 14:41	II111021-2	1		1.006	mg/L	100.6	90	110			
WG314417CCB2	CCB	11/30/11 14:45				U	mg/L		-0.03	0.03			
WG314417CCV3	CCV	11/30/11 15:19	II111021-2	1		.995	mg/L	99.5	90	110			
WG314417CCB3	CCB	11/30/11 15:22				U	mg/L		-0.03	0.03			
L91603-20SDL	SDL	11/30/11 15:47			2380	2537	mg/Kg				6.6	10	
WG314417CCV4	CCV	11/30/11 15:50	II111021-2	1		.992	mg/L	99.2	90	110			
WG314417CCB4	CCB	11/30/11 15:53				U	mg/L		-0.03	0.03			

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314241													
WG314241PBS	PBS	11/28/11 22:06				U	%		-0.1	0.1			
WG314241LCSS	LCSS	11/29/11 1:00	PCN33453	100		82.5	%	82.5	80	120			
L91396-01DUP	DUP	11/29/11 6:48			2.9	2.88	%				0.7	20	
WG314242													
WG314242PBS	PBS	11/29/11 4:42				U	%		-0.1	0.1			
WG314242LCSS	LCSS	11/29/11 6:15	PCN33453	100		100.04	%	100	80	120			
L91526-09DUP	DUP	11/29/11 9:21			U	U	%				0	20	RA

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG313577													
L91817-01DUP	DUP	11/15/11 10:25			7.5	7.5	units				0	20	
WG313577CCV	CCV	11/15/11 10:32	PCN36616	4		4.07	units	101.8	97	103			
WG313577ICV	ICV	11/15/11 10:59	PCN36616	4		4.06	units	101.5	97	103			

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314028													
WG314028PBS	PBS	11/21/11 16:00				U	%		99.9	100.1			
L91360-01DUP	DUP	11/21/11 18:01			90.6	90.08	%				0.6	20	

Sulfur Organic Residual Mod M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
L91526-09DUP	DUP	11/29/11 0:19			.03	.01	%				100	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
L91526-09DUP	DUP	11/29/11 0:19			U	.03	%				200	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
L91526-09DUP	DUP	11/29/11 0:19			.01	.01	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
WG314230PBS	PBS	11/28/11 12:00				U	%		-0.03	0.03			
WG314230LCSS	LCSS	11/28/11 16:06	PCN38175	4.07		3.98	%	97.8					
L91526-09DUP	DUP	11/29/11 0:19			.04	.05	%				22.2	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG314230													
L91526-09DUP	DUP	11/29/11 0:19			.03	.04	%				28.6	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91528-01	WG314417	Copper, total (3050)	M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG314242	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG314230	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91528-02	WG314417	Copper, total (3050)	M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG314242	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG314230	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L91528-03	WG314417	Copper, total (3050)	M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG314230	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L91528-04	WG314417	Copper, total (3050)	M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG314230	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000000J8

ACZ Project ID: L91528
Date Received: 10/26/2011 09:46
Received By: ksj
Date Printed: 10/27/2011

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Are the trip blanks (VOA and/or Cyanide) present?			X
12) Are samples requiring no headspace, headspace free?			X
13) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
2638		8.5	23
3325		8.4	19

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000000J8

ACZ Project ID: L91528
Date Received: 10/26/2011 09:46
Received By: ksj
Date Printed: 10/27/2011

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L91528-01	STS-PH-2011-FID102									X		☐
L91528-02	STS-PH-2011-FID7									X		☐
L91528-03	STS-PH-2011-FID8									X		☐
L91528-04	STS-PH-2011-FID28									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ksj

ACZ Laboratories, Inc. L91528

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒

If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Carolyn Meyer
Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2011-FID102	10.19.11 - 09:15'	SO	1	✗	✗	✗	✗				
STS-PH-2011-FID7	10.18.11 - 11:45'	SO	1	✗	✗	✗	✗				
STS-PH-2011-FID8	10.19.11 - 17:00'	SO	1	✗	✗	✗	✗				
STS-PH-2011-FID28	10.18.11 - 15:35'	SO	1	✗	✗	✗	✗				

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	10.24.11 15:00		10-26-11

L91528 Chain of Custody

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive   Steamboat Springs, CO 80487   (800) 334-5493

Analytical Report

December 15, 2011

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

Bill to:
Accounts Payable
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

cc: Matthew Barkley, Sheri Fling

Project ID: ZN000000J8
ACZ Project ID: L92172

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on December 02, 2011. This project has been assigned to ACZ's project number, L92172. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L92172. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after January 15, 2012. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L92172-01***
Sample ID:	STS-PH-2011-FID37	Date Sampled:	*10/11/11 09:45*
		Date Received:	*12/02/11*
		Sample Matrix:	*Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.05	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur Sulfate			U	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur Total		0.05	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.05	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8

Sample ID: STS-PH-2011-FID101

ACZ Sample ID: ***L92172-02***

Date Sampled: *10/12/11 16:45*

Date Received: *12/02/11*

Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.15		*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.13		*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur Sulfate		0.06	B	*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Sulfur Total		0.21		*	%	0.01	0.1	12/12/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.15		*	%	0.01	0.1	12/12/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L92172-03***
Sample ID:	STS-PH-2011-REFPLOT3	Date Sampled:	*10/07/11 11:50*
		Date Received:	*12/02/11*
		Sample Matrix:	*Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.09	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.07	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate		0.07	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.16		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.09	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8
Sample ID: STS-PH-2011-REFPLOT4

ACZ Sample ID: ***L92172-04***
Date Sampled: *10/06/11 10:39*
Date Received: *12/02/11*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.18		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.04	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.04	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.14		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate		0.05	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.23		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.18		*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID105

ACZ Sample ID: ***L92172-05***
Date Sampled: *10/06/11 13:30*
Date Received: *12/02/11*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.09	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.04	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.04	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.05	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.10		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.09	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L92172-06***
Sample ID:	STS-PH-2011-REFPLOT1	Date Sampled:	*10/04/11 11:09*
		Date Received:	*12/02/11*
		Sample Matrix:	*Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.05	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate		0.04	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.09	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.05	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L92172-07***
Sample ID:	STS-PH-2011-REFPLOT2	Date Sampled:	*10/05/11 12:30*
		Date Received:	*12/02/11*
		Sample Matrix:	*Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.05	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.05	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide			U	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate			U	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8

Sample ID: STS-PH-2011-FID22

ACZ Sample ID: ***L92172-08***

Date Sampled: *10/13/11 16:40*

Date Received: *12/02/11*

Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.23		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.03	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.03	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.20		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate		0.05	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.28		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.23		*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID10

ACZ Sample ID: ***L92172-09***
Date Sampled: *10/07/11 14:35*
Date Received: *12/02/11*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.09	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.07	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.11		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.09	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID15

ACZ Sample ID: ***L92172-10***
Date Sampled: *10/10/11 11:50*
Date Received: *12/02/11*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.19		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.17		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate		0.02	B	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.21		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.19		*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID16

ACZ Sample ID: ***L92172-11***
Date Sampled: *10/10/11 12:30*
Date Received: *12/02/11*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.13		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.14		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.14		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Pyritic Sulfide			U	*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Sulfate		0.13		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Sulfur Total		0.26		*	%	0.01	0.1	12/13/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.13		*	%	0.01	0.1	12/13/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L92172-12***
Sample ID:	STS-PH-2011-FID17	Date Sampled:	*10/11/11 17:35*
		Date Received:	*12/02/11*
		Sample Matrix:	*Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.43		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.05	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.05	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.38		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Sulfate		0.05	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Total		0.48		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.43		*	%	0.01	0.1	12/14/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8

Sample ID: STS-PH-2011-FID18

ACZ Sample ID: ***L92172-13***

Date Sampled: *10/12/11 15:55*

Date Received: *12/02/11*

Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.13		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.11		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Sulfate		0.03	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Total		0.16		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.13		*	%	0.01	0.1	12/14/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8

Sample ID: STS-PH-2011-FID106

ACZ Sample ID: ***L92172-14***

Date Sampled: *10/18/11 12:05*

Date Received: *12/02/11*

Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.04	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.02	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.02	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Total		0.05	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.04	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000000J8	ACZ Sample ID:	***L92172-15***
Sample ID:	STS-PH-2011-FID102	Date Sampled:	*10/19/11 09:15*
		Date Received:	*12/02/11*
		Sample Matrix:	*Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.56		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.06	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.06	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.50		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Sulfate		0.36		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Total		0.92		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.56		*	%	0.01	0.1	12/14/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID7

ACZ Sample ID: ***L92172-16***
Date Sampled: *10/18/11 11:45*
Date Received: *12/02/11*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.06	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.03	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.03	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Total		0.07	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.06	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID8

ACZ Sample ID: ***L92172-17***
Date Sampled: *10/19/11 17:00*
Date Received: *12/02/11*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.32		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.06	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.06	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.26		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Sulfate		0.27		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Total		0.59		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.32		*	%	0.01	0.1	12/14/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000000J8
Sample ID: STS-PH-2011-FID28

ACZ Sample ID: ***L92172-18***
Date Sampled: *10/18/11 15:35*
Date Received: *12/02/11*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.12		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur HNO3 Residue		0.04	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Organic Residual Mod		0.04	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Pyritic Sulfide		0.08	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Sulfate		0.07	B	*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Sulfur Total		0.19		*	%	0.01	0.1	12/14/11 0:00	bsu/brd
Total Sulfur minus Sulfate		0.12		*	%	0.01	0.1	12/14/11 0:00	bsu/brd

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(5) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995 & 20th edition (1998).

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Sulfur Organic Residual Mod M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG315136													
L92172-01DUP	DUP	12/12/11 19:20			.02	.03	%				40	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG315136													
L92172-01DUP	DUP	12/12/11 19:20			.03	.04	%				28.6	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG315136													
L92172-01DUP	DUP	12/12/11 19:20			U	U	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG315136													
WG315136PBS	PBS	12/12/11 10:45				U	%		-0.03	0.03			
WG315136LCSS	LCSS	12/12/11 13:36	PCN38175	4.07		3.93	%	96.6					
L92172-01DUP	DUP	12/12/11 19:20			.05	.05	%				0	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG315136													
L92172-01DUP	DUP	12/12/11 19:20			.05	.05	%				0	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L92172-01	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-02	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-03	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-04	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L92172-05	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-06	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-07	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-08	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L92172-09	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-10	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-11	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-12	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L92172-13	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-14	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-15	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-16	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L92172-17	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L92172-18	WG315136	Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual Mod	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000000J8

ACZ Project ID: L91358
Date Received: 10/18/2011 09:23
Received By: ksj
Date Printed: 10/19/2011

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Are the trip blanks (VOA and/or Cyanide) present?			X
12) Are samples requiring no headspace, headspace free?			X
13) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

N/A

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id		Temp (℃)	Rad (µR/hr)
3282		9.2	18
3164		10.4	18
3045		13.6	20

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000000J8

ACZ Project ID: L91358
Date Received: 10/18/2011 09:23
Received By: ksj
Date Printed: 10/19/2011

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L91358-01	STS-PH-2011-FID37									X		☐
L91358-02	STS-PCUG-2011-40									X		☐
L91358-03	STS-PH-2011-FID101									X		☐
L91358-04	STS-PH-2011-REFPLOT3									X		☐
L91358-05	STS-PH-2011-REFPLOT4									X		☐
L91358-06	DUP11									X		☐
L91358-07	STS-PH-2011-FID105									X		☐
L91358-08	DUP12									X		☐
L91358-09	STS-PH-2011-REFPLOT1									X		☐
L91358-10	STS-PH-2011-REFPLOT2									X		☐
L91358-11	STS-PH-2011-FID22									X		☐
L91358-12	STS-PH-2011-FID10									X		☐
L91358-13	STS-PH-2011-FID15									X		☐
L91358-14	STS-PH-2011-FID16									X		☐
L91358-15	STS-PH-2011-FID17									X		☐
L91358-16	STS-PH-2011-FID18									X		☐

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: ksj

L92172-Reloq

ACZ Laboratories, Inc. ~~L91358~~ L80 12.2.11
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Carolyn Meyer
Are any samples NRC licensable material? Yes No

			# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2011-FID37	10.11.11 : 09:45"	SO	1	x	x	x	x	L91358-01			
STS-PCUG-2011-40	10.13.11 : 13:55"	SO	1	x	x	x					
STS-PH-2011-FID101	10.12.11 : 16:45"	SO	1	x	x	x	x	L91358-~~02~~03			
STS-PH-2011-REFPLOT3	10.7.11 : 11:50"	SO	1	x	x	x	x	L91358-~~03~~04			
STS-PH-2011-REFPLOT4	10.6.11 : 10:39"	SO	1	x	x	x	x	L91358-05			
DUP11	10.12.11 : ---"	SO	1	x	x	x	x				
STS-PH-2011-FID105	10.6.11 : 13:30"	SO	1	x	x	x	x	L91358-07			
DUP12	10.13.11 : ---"	SO	1	x	x	x	x				
STS-PH-2011-REFPLOT1	10.4.11 : 11:09"	SO	1	x	x	x	x	L91358-~~08~~09			
STS-PH-2011-REFPLOT2	10.5.11 : 12:30"	SO	1	x	x	x	x	L91358-10			

L80 12.2.11

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

	10.14.11 10:50		

①

L92172 Chain of Custody
~~L91358 Chain of Custody~~ L80 12.2.11

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. ~~L91358~~

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

L91358

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Carolyn Meyer
Are any samples NRC licensable material? Yes No

			# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2011-FID22	10.13.11 : 16:40	SO	1	x	x	x	x	L91358-11			
nb ~~STS-PH-2011-FID8~~	~~10.12.11 : 15:55~~	~~SO~~	~~1~~	~~x~~	~~x~~	~~x~~	~~x~~				
STS-PH-2011-FID10	10.7.11 : 14:35	SO	1	x	x	x	x	L91358-12			
STS-PH-2011-FID15	10.10.11 : 11:50	SO	1	x	x	x	x				-13
STS-PH-2011-FID16	10.10.11 : 12:30	SO	1	x	x	x	x				-14
STS-PH-2011-FID17	10.11.11 : 17:35	SO	1	x	x	x	x				-15
STS-PH-2011-FID18	10.12.11 : 15:55	SO	1	x	x	x	x				-16

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

	10.14.11 10:50		
		[illegible] 10-18-11 9:12	

(2)

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L91526

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493 L86112·2-[illegible]

CHAIN of CUSTODY

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10

Bayard, NM 88023

Telephone: 575-912-5213

Name: Matthew Barkley

Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com

Telephone: 303-231-9115 ext 157

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10

Bayard, NM 88023

Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

Quote #:

Project/PO #:

Reporting state for compliance testing:

Sampler's Name: Carolyn Meyer

Are any samples NRC licensable material? Yes No

			# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2011-FID106	10.18.11 - 12:05'	SO	1	x	x	x	x	L91526-09			
STS-PCUG-2011-32	10.19.11 - 11:25'	SO	1	x	x	x					
STS-PCUG-2011-34	10.19.11 - 12:00'	SO	1	x	x	x					
STS-PCUG-2011-35	10.18.11 - 13:30'	SO	1	x	x	x					
STS-PCUG-2011-36	10.18.11 - 12:40'	SO	1	x	x	x					
STS-PCUG-2011-37	10.19.11 - 10:05'	SO	1	x	x	x					

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C and Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

10.24.11	1500		
		10.26.11	9:47

2

FRMAD050.01.15.09 **White - Return with sample. Yellow - Retain for your records.**

ACZ Laboratories, Inc. L91528

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Carolyn Meyer
Are any samples NRC licensable material? Yes No

			# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2011-FID102	10.19.11 - 09:15'	SO	1	x	x	x	x	L91528-01			
STS-PH-2011-FID7	10.18.11 - 11:45'	SO	1	x	x	x	x		|		-02
STS-PH-2011-FID8	10.19.11 - 17:00'	SO	1	x	x	x	x		|		-03
STS-PH-2011-FID28	10.18.11 - 15:35'	SO	1	x	x	x	x		|		-04

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

L91528 Chain of Custody

L50 12.21.11

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

	10.24.11 15:00		
		10-26-11	

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

November 21, 2012

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

Bill to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

cc: Matthew Barkley

Project ID: ZN000001M5
ACZ Project ID: L97383

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 16, 2012. This project has been assigned to ACZ's project number, L97383. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L97383. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 21, 2012. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000001M5
Sample ID: DUP5

ACZ Sample ID: ***L97383-09***
Date Sampled: *10/09/12 00:00*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP							11/19/12 17:49	aeb

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper (1312)	M6010B ICP		U		mg/L	0.01	0.05	11/20/12 15:08	aeb
Copper, total (3050)	M6010B ICP	159		*	mg/Kg	1	5	11/13/12 15:28	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, Saturated Paste	USDA No. 60 (21A)	7.6		*	units	0.1	0.1	11/13/12 10:50	mss2
Solids, Percent	CLPSOW390, PART F, D-98	83.5		*	%	0.1	0.5	11/13/12 12:00	mjj

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 2:15	mjj
Digestion - Hot Plate	M3050B ICP							11/12/12 15:26	mjj
Saturated Paste Extraction	USDA No. 60 (2)							11/12/12 16:52	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 9:50	brd
Synthetic Precip. Leaching Procedure	M1312							11/16/12 7:09	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97383-10***
Sample ID:	DUP6	Date Sampled:	*10/10/12 00:00*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Inorganic Prep

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP							11/19/12 18:10	aeb

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper (1312)	M6010B ICP		U		mg/L	0.01	0.05	11/20/12 15:11	aeb
Copper, total (3050)	M6010B ICP	52		*	mg/Kg	1	5	11/13/12 15:38	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, Saturated Paste	USDA No. 60 (21A)	7.9		*	units	0.1	0.1	11/13/12 10:55	mss2
Solids, Percent	CLPSOW390, PART F, D-98	81.5		*	%	0.1	0.5	11/13/12 14:00	mjj

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 4:11	mjj
Digestion - Hot Plate	M3050B ICP							11/12/12 16:22	mjj
Saturated Paste Extraction	USDA No. 60 (2)							11/12/12 16:56	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 9:56	brd
Synthetic Precip. Leaching Procedure	M1312							11/16/12 9:34	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97383-11***
Sample ID:	STS-PH-2012-FID7	Date Sampled:	*10/11/12 15:15*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	514		*	mg/Kg	1	5	11/13/12 15:41	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	8			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	8			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.8		*	%	0.1	0.5	11/14/12 9:00	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.7			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	95.6		*	%	0.1	0.5	11/13/12 16:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.02	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Organic Residual			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Pyritic Sulfide		0.02	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Sulfate			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Total		0.02	B	*	%	0.01	0.1	11/12/12 0:00	cra
Total Sulfur minus Sulfate		0.02	B	*	%	0.01	0.1	11/12/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 6:07	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 9:36	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 16:41	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:03	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-FID8

ACZ Sample ID: ***L97383-12***
Date Sampled: *10/12/12 10:40*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	252		*	mg/Kg	1	5	11/13/12 15:44	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	3	B		t CaCO3/Kt	1	5	11/21/12 9:48	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	3			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.3	B	*	%	0.1	0.5	11/14/12 12:03	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.5			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	94.9		*	%	0.1	0.5	11/13/12 18:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.04	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Organic Residual			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Pyritic Sulfide		0.04	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Sulfate		0.07	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Total		0.11		*	%	0.01	0.1	11/12/12 0:00	cra
Total Sulfur minus Sulfate		0.04	B	*	%	0.01	0.1	11/12/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 8:02	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 9:46	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 17:00	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:09	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000001M5
Sample ID: STS-PH-2012-FID10

ACZ Sample ID: ***L97383-13***
Date Sampled: *10/11/12 08:20*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	2210		*	mg/Kg	1	5	11/13/12 15:50	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	2	B		t CaCO3/Kt	1	5	11/21/12 9:48	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	1			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-1			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.1	B	*	%	0.1	0.5	11/14/12 13:35	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.0			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	95.5		*	%	0.1	0.5	11/13/12 20:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.05	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Organic Residual			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Pyritic Sulfide		0.05	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Sulfate			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Total		0.05	B	*	%	0.01	0.1	11/12/12 0:00	cra
Total Sulfur minus Sulfate		0.05	B	*	%	0.01	0.1	11/12/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 9:58	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 9:55	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 17:18	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:15	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-FID15

ACZ Sample ID: ***L97383-14***
Date Sampled: *10/11/12 17:00*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1030		*	mg/Kg	1	5	11/13/12 15:53	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	2			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	2			t CaCO3/Kt	1	5	11/21/12 9:48	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.2	B	*	%	0.1	0.5	11/14/12 15:07	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.6			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	96.2		*	%	0.1	0.5	11/13/12 22:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.02	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Organic Residual			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Pyritic Sulfide		0.02	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Total		0.03	B	*	%	0.01	0.1	11/12/12 0:00	cra
Total Sulfur minus Sulfate		0.02	B	*	%	0.01	0.1	11/12/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 11:54	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 10:04	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 17:37	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:22	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-FID16

ACZ Sample ID: ***L97383-15***
Date Sampled: *10/11/12 17:45*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1450		*	mg/Kg	1	5	11/13/12 16:02	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	2	B		t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-2			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	11/14/12 16:38	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.3			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	96.0		*	%	0.1	0.5	11/14/12 0:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.04	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Organic Residual			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Pyritic Sulfide		0.04	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Sulfate		0.02	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Total		0.06	B	*	%	0.01	0.1	11/12/12 0:00	cra
Total Sulfur minus Sulfate		0.04	B	*	%	0.01	0.1	11/12/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 13:50	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 10:13	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 17:56	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:28	brd

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L97383-16***
Project ID:	ZN000001M5	Date Sampled:	*10/11/12 09:05*
Sample ID:	STS-PH-2012-FID17	Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	5150		*	mg/Kg	1	5	11/13/12 16:05	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	21			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-16			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.5	B	*	%	0.1	0.5	11/14/12 18:10	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.9			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	95.9		*	%	0.1	0.5	11/14/12 2:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.61		*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur HNO3 Residue		0.05	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Organic Residual		0.05	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Pyritic Sulfide		0.56		*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Sulfate		0.07	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Total		0.68		*	%	0.01	0.1	11/12/12 0:00	cra
Total Sulfur minus Sulfate		0.61		*	%	0.01	0.1	11/12/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 15:46	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 10:23	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 18:15	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:34	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97383-17***
Sample ID:	STS-PH-2012-FID18	Date Sampled:	*10/12/12 09:00*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	192		*	mg/Kg	1	5	11/13/12 16:08	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	5	B		t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	1			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-4			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.1	B	*	%	0.1	0.5	11/14/12 19:42	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.4			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	96.6		*	%	0.1	0.5	11/14/12 4:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.09	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Organic Residual			U	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Pyritic Sulfide		0.09	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Sulfate		0.06	B	*	%	0.01	0.1	11/12/12 0:00	cra
Sulfur Total		0.15		*	%	0.01	0.1	11/12/12 0:00	cra
Total Sulfur minus Sulfate		0.09	B	*	%	0.01	0.1	11/12/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 17:42	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 10:32	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 18:33	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:41	brd

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-FID22

ACZ Sample ID: ***L97383-18***
Date Sampled: *10/11/12 13:45*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	308		*	mg/Kg	1	5	11/13/12 16:11	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	3	B		t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	2			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.5	B	*	%	0.1	0.5	11/14/12 21:14	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.4			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	95.7		*	%	0.1	0.5	11/14/12 6:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.07	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Organic Residual			U	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Pyritic Sulfide		0.07	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Sulfate		0.03	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Total		0.10		*	%	0.01	0.1	11/13/12 0:00	cra
Total Sulfur minus Sulfate		0.07	B	*	%	0.01	0.1	11/13/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 19:37	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 10:41	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 18:52	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:47	brd

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-ERA2

ACZ Sample ID: ***L97383-19***
Date Sampled: *10/10/12 14:40*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	960		*	mg/Kg	1	5	11/13/12 16:14	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	5	B		t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-5			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	11/14/12 22:45	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.4			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	95.9		*	%	0.1	0.5	11/14/12 8:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.09	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Organic Residual		0.02	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Pyritic Sulfide		0.07	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Sulfate		0.06	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Total		0.15		*	%	0.01	0.1	11/13/12 0:00	cra
Total Sulfur minus Sulfate		0.09	B	*	%	0.01	0.1	11/13/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 21:33	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 10:50	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 19:11	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 10:53	brd

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97383-20***
Sample ID:	STS-PH-2012-FID28	Date Sampled:	*10/11/12 11:10*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	271		*	mg/Kg	1	5	11/13/12 16:17	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	64			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	64			t CaCO3/Kt	1	5	11/21/12 9:49	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	6.4		*	%	0.1	0.5	11/14/12 9:00	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.7			units	0.1	0.1	11/14/12 0:00	nrc
pH measured at		22.7			C	0.1	0.1	11/14/12 0:00	nrc
Solids, Percent	CLPSOW390, PART F, D-98	96.9		*	%	0.1	0.5	11/14/12 10:00	mjj
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.05	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Organic Residual			U	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Pyritic Sulfide		0.05	B	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Sulfate			U	*	%	0.01	0.1	11/13/12 0:00	cra
Sulfur Total			U	*	%	0.01	0.1	11/13/12 0:00	cra
Total Sulfur minus Sulfate			U	*	%	0.01	0.1	11/13/12 0:00	cra

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							11/08/12 23:29	mjj
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/12/12 11:00	brd
Digestion - Hot Plate	M3050B ICP							11/12/12 19:30	mjj
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/12/12 11:00	brd

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Calcium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334022													
WG334022ICV	ICV	11/13/12 14:33	II120914-3	100		98.44	mg/L	98.4	90	110			
WG334022ICB	ICB	11/13/12 14:36				U	mg/L		-0.6	0.6			
WG333921PBS	PBS	11/13/12 14:49				U	mg/Kg		-60	60			
WG333921LCSS	LCSS	11/13/12 14:52	PCN41127	6160		6452	mg/Kg		5070	7240			
WG333921LCSSD	LCSSD	11/13/12 14:55	PCN41127	6160		6268	mg/Kg		5070	7240	2.9	20	
L97383-09MS	MS	11/13/12 15:31	II121029-3	7069.45616	8320	14789	mg/Kg	91.5	75	125			
L97383-09MSD	MSD	11/13/12 15:34	II121029-3	7069.45616	8320	14945	mg/Kg	93.7	75	125	1.05	20	

Carbon, total (TC) ASA No.9 29-2.2.4 Combustion/IR

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333902													
WG333902PBS	PBS	11/12/12 9:30				U	%		-0.3	0.3			
WG333902LCSS	LCSS	11/12/12 9:55	PCN41310	4.19		4.3	%		80	120			
L97382-05DUP	DUP	11/12/12 10:47			.5	.5	%				0	20	RA

Carbon, total organic (TOC) ASA No.9 29-2.2.4 Combustion/IR

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333902													
WG333902PBS	PBS	11/12/12 9:30				U	%		-0.3	0.3			
L97382-05DUP	DUP	11/12/12 10:47			.5	.5	%				0	20	RA ZQ

Copper (1312) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334432													
WG334432ICV	ICV	11/20/12 13:59	II120914-3	2		1.939	mg/L	97	90	110			
WG334432ICB	ICB	11/20/12 14:02				U	mg/L		-0.03	0.03			
WG334099PBS	PBS	11/20/12 14:15				U	mg/L		-0.03	0.03			
WG334099LFB	LFB	11/20/12 14:18	II121029-3	.5		.496	mg/L	99.2	85	115			
L97383-01DUP	DUP	11/20/12 14:24			.22	.193	mg/L				13.1	20	
L97383-02MS	MS	11/20/12 14:30	II121029-3	.5	.15	.649	mg/L	99.8	75	125			
L97383-02MSD	MSD	11/20/12 14:33	II121029-3	.5	.15	.613	mg/L	92.6	75	125	5.71	20	

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334022													
WG334022ICV	ICV	11/13/12 14:33	II120914-3	2		1.936	mg/L	96.8	90	110			
WG334022ICB	ICB	11/13/12 14:36				U	mg/L		-0.03	0.03			
WG333921PBS	PBS	11/13/12 14:49				U	mg/Kg		-3	3			
WG333921LCSS	LCSS	11/13/12 14:52	PCN41127	78		80.5	mg/Kg		65.3	90.6			
WG333921LCSSD	LCSSD	11/13/12 14:55	PCN41127	78		80.7	mg/Kg		65.3	90.6	0.2	20	
L97383-09MS	MS	11/13/12 15:31	II121029-3	52	159	196.6	mg/Kg	72.3	75	125			M3
L97383-09MSD	MSD	11/13/12 15:34	II121029-3	52	159	200	mg/Kg	78.8	75	125	1.71	20	

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334080													
L97383-11DUP	DUP	11/14/12 10:31			.8	.8	%				0	20	RA
WG334080LCSS	LCSS	11/15/12 9:28	PCN33453	100		99	%	99	80	120			
WG334080PBS	PBS	11/15/12 11:00				U	%		-0.1	0.1			
WG334082													
L97383-20DUP	DUP	11/14/12 11:21			6.4	6.5	%				1.6	20	
WG334082LCSS	LCSS	11/15/12 8:38	PCN33453	100		95	%	95	80	120			
WG334082PBS	PBS	11/15/12 10:59				U	%		-0.1	0.1			

Nitrate/Nitrite as N, soluble (Water) M353.2 - Automated Cadmium Reduction

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334061													
WG334061ICV	ICV	11/13/12 20:37	WI121009-1	2.416		2.448	mg/L	101.3	90	110			
WG334061ICB	ICB	11/13/12 20:38				U	mg/L		-0.06	0.06			
WG334065													
WG334065LFB	LFB	11/13/12 22:12	WI120814-9	2		1.994	mg/Kg	99.7	90	110			
WG333946PBS	PBS	11/13/12 22:13				.12	mg/Kg		-0.3	0.3			
L97380-03AS	AS	11/13/12 22:15	WI120814-9	50	40.6	89.76	mg/Kg	98.3	90	110			
L97383-08DUP	DUP	11/13/12 22:37			17.7	18.12	mg/Kg				2.3	20	

Nitrite as N, soluble (Water) M353.2 - Automated Cadmium Reduction

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334061													
WG334061ICV	ICV	11/13/12 20:37	WI121009-1	.609		.62	mg/L	101.8	90	110			
WG334061ICB	ICB	11/13/12 20:38				U	mg/L		-0.03	0.03			
WG334065													
WG334065LFB	LFB	11/13/12 22:12	WI120814-9	1		1.002	mg/Kg	100.2	90	110			
WG333946PBS	PBS	11/13/12 22:13				U	mg/Kg		-0.15	0.15			
L97380-03AS	AS	11/13/12 22:15	WI120814-9	25	.7	26.3	mg/Kg	102.4	90	110			
L97383-08DUP	DUP	11/13/12 22:37			.13	.116	mg/Kg				11.4	20	RA

Nitrogen, ammonia (Water) M350.1 - Automated Phenate

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334103													
WG334103ICV	ICV	11/14/12 12:02	WI121105-5	1.003		.995	mg/L	99.2	90	110			
WG334103ICB	ICB	11/14/12 12:03				U	mg/L		-0.15	0.15			
WG334114													
WG334114LFB	LFB	11/14/12 13:32	WI111101-3	1		.967	mg/L	96.7	90	110			
WG333946PBS	PBS	11/14/12 13:33				U	mg/Kg		-0.9	0.9			
L97380-03MS	MS	11/14/12 13:35	NH3-WE50X	2500	U	53.3	mg/Kg	106.6	75	125			
L97383-08DUP	DUP	11/14/12 13:55			3	4.8	mg/Kg				46.2	20	RA

Nitrogen, total Kjeldahl — M351.2 - TKN by Block Digester

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333403													
WG333403ICV	ICV	11/02/12 11:48	WI121005-1	4		4.03	mg/L	100.8	90	110			
WG333403ICB	ICB	11/02/12 11:49				U	mg/L		-0.3	0.3			
WG333336PBS	PBS	11/02/12 11:50				.00032	%		-0.0006	0.0006			
WG333336LFB	LFB	11/02/12 11:51	WI120814-2	2.5		2.66	%	106.4	85	115			
L97382-08DUP	DUP	11/02/12 12:13			.052	.0426	%				19.9	20	
L97382-07MS	MS	11/02/12 12:25	10XPTSTKN	.0055	.034	.0468	%	232.7	75	125			M3

Ph — M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334125													
WG334125ICV	ICV	11/14/12 13:22	PCN38642	4		4.04	units	101	97	103			
L97383-20DUP	DUP	11/14/12 14:52			6.7	6.69	units				0.1	20	

pH, Saturated Paste — USDA No. 60 (21A)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333994													
WG333994ICV	ICV	11/13/12 9:36	PCN38642	4		3.98	units	99.5	97	103			
L97383-10DUP	DUP	11/13/12 10:57			7.9	7.84	units				0.8	20	

Potassium, total (3050) — M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG334022													
WG334022ICV	ICV	11/13/12 14:33	II120914-3	20		19.76	mg/L	98.8	90	110			
WG334022ICB	ICB	11/13/12 14:36				U	mg/L		-0.9	0.9			
WG333921PBS	PBS	11/13/12 14:49				U	mg/Kg		-90	90			
WG333921LCSS	LCSS	11/13/12 14:52	PCN41127	3820		4242	mg/Kg		2810	4830			
WG333921LCSSD	LCSSD	11/13/12 14:55	PCN41127	3820		4353	mg/Kg		2810	4830	2.6	20	
L97383-09MS	MS	11/13/12 15:31	II121029-3	10390.50272	5470	16172	mg/Kg	103	75	125			
L97383-09MSD	MSD	11/13/12 15:34	II121029-3	10390.50272	5470	15995	mg/Kg	101.3	75	125	1.1	20	

Solids, Percent — CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333963													
WG333963PBS	PBS	11/12/12 16:00				U	%		99.9	100.1			
L97383-01DUP	DUP	11/12/12 20:00			92.6	93.04	%				0.5	20	

Sulfur Organic Residual — M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333901													
L97383-11DUP	DUP	11/12/12 14:27			U	U	%				0	20	RA

Sulfur Pyritic Sulfide — M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333901													
L97383-11DUP	DUP	11/12/12 14:27			.02	.02	%				0	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333901													
L97383-11DUP	DUP	11/12/12 14:27			U	U	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333901													
WG333901PBS	PBS	11/12/12 10:00				U	%		-0.03	0.03			
WG333901LCSS	LCSS	11/12/12 11:29	PCN41310	4.07		4.34	%	106.6					
L97383-11DUP	DUP	11/12/12 14:27			.02	.02	%				0	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333901													
L97383-11DUP	DUP	11/12/12 14:27			.02	.02	%				0	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-01	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L97383-02	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L97383-03	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L97383-04	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L97383-05	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG333902	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG334065	Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
		Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG334114	Nitrogen, ammonia (Water)	M350.1 - Automated Phenate	DD	Sample required dilution due to matrix color or odor.
			M350.1 - Automated Phenate	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 - Automated Phenate	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333403	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-06	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG333902	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG334065	Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
		Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	D1	Sample required dilution due to matrix.
			M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG334114	Nitrogen, ammonia (Water)	M350.1 - Automated Phenate	DD	Sample required dilution due to matrix color or odor.
			M350.1 - Automated Phenate	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 - Automated Phenate	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333403	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-07	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG333902	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG334065	Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
		Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	D1	Sample required dilution due to matrix.
			M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG334114	Nitrogen, ammonia (Water)	M350.1 - Automated Phenate	DD	Sample required dilution due to matrix color or odor.
			M350.1 - Automated Phenate	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 - Automated Phenate	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333403	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-08	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG333902	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG334065	Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
		Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG334114	Nitrogen, ammonia (Water)	M350.1 - Automated Phenate	DD	Sample required dilution due to matrix color or odor.
			M350.1 - Automated Phenate	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 - Automated Phenate	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333403	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
L97383-09	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L97383-10	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-11	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97383-12	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-13	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97383-14	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-15	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97383-16	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-17	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97383-18	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97383-19	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG334080	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97383-20	WG334022	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG333901	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
pH, Saturated Paste	USDA No. 60 (21A)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

Wet Chemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction
Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction
Nitrogen, ammonia (Water)	M350.1 - Automated Phenate
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000001M5

ACZ Project ID: L97383
Date Received: 10/16/2012 10:18
Received By: ksj
Date Printed: 10/16/2012

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody or other directive shipping papers present?	X		▨
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody complete and accurate?	X		▨
7) Were any changes made to the Chain of Custody prior to ACZ receiving the samples?		X	▨

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		▨
9) Are all labels on containers and are they intact and legible?	X		▨
10) Do the sample labels and Chain of Custody match for Sample ID, Date, and Time?	X		▨
11) For preserved bottle types, was the pH checked and within limits?			X
12) Is there sufficient sample volume to perform all requested work?	X		▨
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		▨
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		▨

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/Hr)	Custody Seal Intact?
2392	14.9	17	Yes
3181	14.4	15	Yes
3638	14.6	15	Yes
3742	15.1	15	Yes
NA16404	14.4	16	Yes
NA16405	13.8	15	Yes
NA16406	14.7	15	Yes
NA16408	14.6	16	Yes

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc. L97383

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley

Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com

Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒

If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:

Project/PO #:

Reporting state for compliance testing:

Sampler's Name: Garett Ferguson

Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	Copper (Total and SPLP)	pH	Calcium, Potassium, Total Organic Carbom	TKN (see below)	Nitrate/nitrite as N (see below)	Ammonia (see below)	
STS-AMD-2012F-NEREF5 0-6	10/9/12 : 1545	SO	1	x	x	x					
STS-AMD-2012F-NEREF6 0-6	10/9/12 : 1550	SO	1	x	x	x					
STS-AMD-2012F-NEREF7 0-6	10/9/12 : 1600	SO	1	x	x	x					
STS-AMD-2012F-NEREF8 0-6	10/9/12 : 1605	SO	1	x	x	x					
DUP1	10/8/12	SO	1	x	x	x	x	x	x	x	
DUP2	10/9/12	SO	1	x	x	x	x	x	x	x	
DUP3	10/9/12	SO	1	x	x	x	x	x	x	x	
DUP4	10/9/12	SO	1	x	x	x	x	x	x	x	
DUP5	10/9/12	SO	1	x	x	x					
DUP6	10/10/12	SO	1	x	x	x					

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.

Methods:

pH - 9045C, Calcium - 6010B, Potassium - 6010B, Ammonia - 350.1, TKN - SM4500 (organic), Nitrate/Nitrite - 353.2, Total Organic Carbon - 9060, Copper - Modified 1312 extraction, 3010A digestion, 6010B analysis

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	10/12/12 : 1300		10.16.12 10:00

L97383 Chain of Custody

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L97383
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson	Address: P.O. Box 10
Company: Chino Mines Company	Bayard, NM 88023
E-mail: Pamela_Pinson@FMI.com	Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley	E-mail: Matthew.Barkley@arcadis-us.com
Company: ARCADIS	Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson	Address: P.O. Box 10
Company: Chino Mines Company	Bayard, NM 88023
E-mail: Pamela_Pinson@FMI.com	Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Garett Ferguson
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED (attach list or use quote number)

	SAMPLE IDENTIFICATION	DATE TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
✓	STS-PH-2012-FID7	10/11/12 : 1515	SO	1	✗	✗	✗	✗				
✓	STS-PH-2012-FID8	10/12/12 : 1040	SO	1	✗	✗	✗	✗				
✓	STS-PH-2012-FID10	10/11/12 : 0820	SO	1	✗	✗	✗	✗				
✓	STS-PH-2012-FID15	10/11/12 : 1700	SO	1	✗	✗	✗	✗				
✓	STS-PH-2012-FID16	10/11/12 : 1745	SO	1	✗	✗	✗	✗				
✓	STS-PH-2012-FID17	10/11/12 : 0905	SO	1	✗	✗	✗	✗				
✓	STS-PH-2012-FID18	10/12/12 : 0900	SO	1	✗	✗	✗	✗				
✓	STS-PH-2012-FID22	10/11/12 : 1345	SO	1	✗	✗	✗	✗				
	STS-PH-2012-ERA2	10/10/12 : 1440	SO	1	✗	✗	✗	✗				
✓	STS-PH-2012-FID28	10/11/12 : 1110	SO	1	✗	✗	✗	✗				

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE TIME	RECEIVED BY:	DATE TIME
	10/12/12 13:00		10.16.12 10:00

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

2

ACZ Laboratories, Inc.
2773 Downhill Drive   Steamboat Springs, CO 80487   (800) 334-5493

Analytical Report

November 15, 2012

Report to:	Bill to:
Pam Pinson	Pam Pinson
Freeport-McMoRan - Chino Mines Company	Freeport-McMoRan - Chino Mines Company
PO Box 10	P.O. Box 13308
Bayard, NM 88023	Phoenix, AZ 85002-3308

cc: Matthew Barkley

Project ID: ZN000001M5
ACZ Project ID: L97384

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 16, 2012. This project has been assigned to ACZ's project number, L97384. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L97384. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 15, 2012. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000001M5
Sample ID: STS-PH-2012-FID37

ACZ Sample ID: ***L97384-01***
Date Sampled: *10/12/12 08:15*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	765			mg/Kg	1	5	11/09/12 10:12	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	11/12/12 18:54	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.5			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	95.8		*	%	0.1	0.5	10/30/12 19:25	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.01	B	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur Pyritic Sulfide		0.01	B	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur Total		0.02	B	*	%	0.01	0.1	11/03/12 0:00	mss2
Total Sulfur minus Sulfate		0.01	B	*	%	0.01	0.1	11/03/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:36	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/02/12 9:33	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 9:57	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/02/12 9:33	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-ERA3

ACZ Sample ID: ***L97384-02***
Date Sampled: *10/10/12 15:20*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	624			mg/Kg	1	5	11/09/12 10:15	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	6			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	7			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1.3		*	%	0.1	0.5	11/14/12 13:43	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.4			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	93.1		*	%	0.1	0.5	10/30/12 20:12	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.08	B	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur HNO3 Residue		0.03	B	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur Organic Residual		0.03	B	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur Pyritic Sulfide		0.05	B	*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur Sulfate		0.11		*	%	0.01	0.1	11/03/12 0:00	mss2
Sulfur Total		0.19		*	%	0.01	0.1	11/03/12 0:00	mss2
Total Sulfur minus Sulfate		0.08	B	*	%	0.01	0.1	11/03/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:40	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/02/12 16:26	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 10:16	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/02/12 15:34	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-FID101

ACZ Sample ID: ***L97384-03***
Date Sampled: *10/12/12 09:30*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	290			mg/Kg	1	5	11/09/12 10:18	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	5	B		t CaCO3/Kt	1	5	11/15/12 14:57	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	-5			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	11/12/12 22:12	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.2			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	96.4		*	%	0.1	0.5	10/30/12 21:00	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.06	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Pyritic Sulfide		0.06	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Sulfate		0.09	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Total		0.15		*	%	0.01	0.1	11/04/12 0:00	mss2
Total Sulfur minus Sulfate		0.06	B	*	%	0.01	0.1	11/04/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:44	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/02/12 23:19	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 10:35	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/02/12 21:36	cdb

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-FID102

ACZ Sample ID: ***L97384-04***
Date Sampled: *10/12/12 11:15*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	230			mg/Kg	1	5	11/09/12 10:27	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	15			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	28			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	13			t CaCO3/Kt	1	5	11/15/12 14:57	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	2.8		*	%	0.1	0.5	11/12/12 23:51	nrc
pH, Corrosivity	M9045D/M9040C								
pH		3.7			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	97.2		*	%	0.1	0.5	10/30/12 21:47	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.18		*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur HNO3 Residue		0.02	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Organic Residual		0.02	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Pyritic Sulfide		0.16		*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Sulfate		0.29		*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Total		0.47		*	%	0.01	0.1	11/04/12 0:00	mss2
Total Sulfur minus Sulfate		0.18		*	%	0.01	0.1	11/04/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:48	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/03/12 6:13	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 11:32	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/03/12 3:38	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97384-05***
Sample ID:	STS-PH-2012-ERA4	Date Sampled:	*10/10/12 17:48*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	514			mg/Kg	1	5	11/09/12 10:30	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	2	B		t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	8			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.8		*	%	0.1	0.5	11/13/12 1:30	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.8			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	97.6		*	%	0.1	0.5	10/30/12 22:34	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.03	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Sulfate		0.02	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Total		0.05	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Total Sulfur minus Sulfate		0.03	B	*	%	0.01	0.1	11/04/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:52	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/03/12 13:06	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 11:51	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/03/12 9:39	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-ERA10

ACZ Sample ID: ***L97384-06***
Date Sampled: *10/11/12 14:30*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	299			mg/Kg	1	5	11/09/12 10:39	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	0.0			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	0			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)		U	*	%	0.1	0.5	11/13/12 3:09	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.7			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	94.9		*	%	0.1	0.5	10/30/12 23:21	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.01	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Pyritic Sulfide		0.01	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Sulfate			U	*	%	0.01	0.1	11/04/12 0:00	mss2
Sulfur Total		0.01	B	*	%	0.01	0.1	11/04/12 0:00	mss2
Total Sulfur minus Sulfate		0.01	B	*	%	0.01	0.1	11/04/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:56	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/03/12 19:59	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 12:10	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/03/12 15:41	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97384-07***
Sample ID:	STS-PH-2012-FID105	Date Sampled:	*10/10/12 16:00*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	799			mg/Kg	1	5	11/09/12 10:42	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	3	B		t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	2			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.5		*	%	0.1	0.5	11/13/12 4:48	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.6			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	94.1		*	%	0.1	0.5	10/31/12 0:08	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.05	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur HNO3 Residue		0.01	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Organic Residual		0.01	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Pyritic Sulfide		0.04	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Sulfate		0.05	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Total		0.10		*	%	0.01	0.1	11/05/12 0:00	mss2
Total Sulfur minus Sulfate		0.05	B	*	%	0.01	0.1	11/05/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 16:00	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/04/12 2:53	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 12:29	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/03/12 21:43	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97384-08***
Sample ID:	STS-PH-2012-FID106	Date Sampled:	*10/11/12 15:50*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	408			mg/Kg	1	5	11/09/12 10:45	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	13			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1.3		*	%	0.1	0.5	11/13/12 6:27	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.7			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	96.4		*	%	0.1	0.5	10/31/12 0:55	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.02	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Pyritic Sulfide		0.02	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Sulfate		0.01	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Total		0.03	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Total Sulfur minus Sulfate		0.02	B	*	%	0.01	0.1	11/05/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:30	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/04/12 9:46	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 12:49	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/04/12 3:44	cdb

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-REFPLOT1

ACZ Sample ID: ***L97384-09***
Date Sampled: *10/08/12 18:20*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1120			mg/Kg	1	5	11/09/12 10:48	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	61			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	61			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	6.1		*	%	0.1	0.5	11/14/12 16:05	nrc
pH, Corrosivity	M9045D/M9040C								
pH		7.6			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	96.6		*	%	0.1	0.5	10/31/12 1:42	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.03	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Sulfate			U	*	%	0.01	0.1	11/05/12 0:00	mss2
Sulfur Total			U	*	%	0.01	0.1	11/05/12 0:00	mss2
Total Sulfur minus Sulfate			U	*	%	0.01	0.1	11/05/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:33	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/04/12 16:39	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 13:08	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/04/12 9:46	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2012-REFPLOT2

ACZ Sample ID: *L97384-10*
Date Sampled: *10/09/12 10:55*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1170			mg/Kg	1	5	11/09/12 10:51	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	6			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.6		*	%	0.1	0.5	11/13/12 9:45	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.8			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	97.2		*	%	0.1	0.5	10/31/12 2:30	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Pyritic Sulfide			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Sulfate			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Total			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Total Sulfur minus Sulfate			U	*	%	0.01	0.1	11/06/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:36	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/04/12 23:33	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 13:27	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/04/12 15:48	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000001M5
Sample ID: DUP7

ACZ Sample ID: ***L97384-11***
Date Sampled: *10/10/12 00:00*
Date Received: *10/16/12*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP							11/12/12 17:19	jjc

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper (1312)	M6010B ICP	0.05	B	*	mg/L	0.01	0.05	11/13/12 12:48	jjc
Copper, total (3050)	M6010B ICP	609			mg/Kg	1	5	11/09/12 10:54	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, Saturated Paste	USDA No. 60 (21A)	6.9		*	units	0.1	0.1	11/10/12 11:25	cdb
Solids, Percent	CLPSOW390, PART F, D-98	91.7		*	%	0.1	0.5	10/31/12 3:17	cdb

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:40	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 13:46	cra
Saturated Paste Extraction	USDA No. 60 (2)							11/10/12 8:00	cdb
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/04/12 21:49	cdb
Synthetic Precip. Leaching Procedure	M1312							11/10/12 3:32	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97384-12***
Sample ID:	DUP8	Date Sampled:	*10/10/12 00:00*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Inorganic Prep

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP							11/12/12 18:56	jjc

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper (1312)	M6010B ICP	0.03	B	*	mg/L	0.01	0.05	11/13/12 12:58	jjc
Copper, total (3050)	M6010B ICP	949			mg/Kg	1	5	11/09/12 10:57	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, Saturated Paste	USDA No. 60 (21A)	6.6		*	units	0.1	0.1	11/10/12 12:17	cdb
Solids, Percent	CLPSOW390, PART F, D-98	93.8		*	%	0.1	0.5	10/31/12 4:04	cdb

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:43	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 14:05	cra
Saturated Paste Extraction	USDA No. 60 (2)							11/10/12 11:00	cdb
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/05/12 3:51	cdb
Synthetic Precip. Leaching Procedure	M1312							11/10/12 7:43	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97384-13***
Sample ID:	STS-PH-2012-REFPLOT3	Date Sampled:	*10/09/12 17:55*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	2250			mg/Kg	1	5	11/09/12 11:03	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	2	B		t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	3			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	1			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.3	B	*	%	0.1	0.5	11/13/12 11:24	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.1			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	92.4		*	%	0.1	0.5	10/31/12 4:51	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.03	B	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Pyritic Sulfide		0.03	B	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Sulfate		0.03	B	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Total		0.06	B	*	%	0.01	0.1	11/06/12 0:00	mss2
Total Sulfur minus Sulfate		0.03	B	*	%	0.01	0.1	11/06/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:46	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/05/12 6:26	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 14:24	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/05/12 9:53	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97384-14***
Sample ID:	STS-PH-2012-REFPLOT4	Date Sampled:	*10/10/12 13:10*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	1210			mg/Kg	1	5	11/09/12 11:06	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	3	B		t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	8			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	5			t CaCO3/Kt	1	5	11/15/12 14:58	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	0.8		*	%	0.1	0.5	11/13/12 13:03	nrc
pH, Corrosivity	M9045D/M9040C								
pH		4.8			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	94.6		*	%	0.1	0.5	10/31/12 5:38	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.06	B	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Pyritic Sulfide		0.06	B	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Sulfate		0.04	B	*	%	0.01	0.1	11/06/12 0:00	mss2
Sulfur Total		0.10		*	%	0.01	0.1	11/06/12 0:00	mss2
Total Sulfur minus Sulfate		0.06	B	*	%	0.01	0.1	11/06/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:50	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/05/12 13:19	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 14:43	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/05/12 15:54	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L97384-15***
Project ID:	ZN000001M5	Date Sampled:	*10/11/12 11:55*
Sample ID:	STS-PH-2012-ERA13	Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	292			mg/Kg	1	5	11/09/12 11:16	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	19			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	19			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1.9		*	%	0.1	0.5	11/13/12 14:42	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.6			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	95.9		*	%	0.1	0.5	10/31/12 6:25	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.02	B	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Pyritic Sulfide		0.02	B	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Sulfate			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Total			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Total Sulfur minus Sulfate			U	*	%	0.01	0.1	11/07/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:53	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/05/12 20:13	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 15:02	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/05/12 21:56	cdb

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97384-16***
Sample ID:	DUP9	Date Sampled:	*10/10/12 00:00*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	953			mg/Kg	1	5	11/09/12 11:19	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	15			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	15			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1.5		*	%	0.1	0.5	11/14/12 18:27	nrc
pH, Corrosivity	M9045D/M9040C								
pH		6.4			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	95.8		*	%	0.1	0.5	10/31/12 7:13	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.05	B	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Pyritic Sulfide		0.05	B	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Sulfate			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Total			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Total Sulfur minus Sulfate			U	*	%	0.01	0.1	11/07/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 15:56	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/06/12 3:06	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 15:21	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/06/12 3:58	cdb

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L97384-17***
Sample ID:	DUP10	Date Sampled:	*10/11/12 00:00*
		Date Received:	*10/16/12*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	257			mg/Kg	1	5	11/09/12 11:22	jjc

Soil Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	0			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	13			t CaCO3/Kt	1	5	11/15/12 14:59	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1.3		*	%	0.1	0.5	11/13/12 16:21	nrc
pH, Corrosivity	M9045D/M9040C								
pH		5.7			units	0.1	0.1	11/10/12 0:00	cdb
pH measured at		20.5			C	0.1	0.1	11/10/12 0:00	cdb
Solids, Percent	CLPSOW390, PART F, D-98	94.6		*	%	0.1	0.5	10/31/12 8:00	cdb
Sulfur Forms	M600/2-78-054 3.2.4-MOD								
Sulfur HCl Residue		0.01	B	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur HNO3 Residue			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Organic Residual			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Pyritic Sulfide		0.01	B	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Sulfate			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Sulfur Total			U	*	%	0.01	0.1	11/07/12 0:00	mss2
Total Sulfur minus Sulfate			U	*	%	0.01	0.1	11/07/12 0:00	mss2

Soil Preparation

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972							10/26/12 16:00	cdb
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3							11/06/12 9:59	cdb
Digestion - Hot Plate	M3050B ICP							11/08/12 15:40	cra
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2							11/06/12 9:59	cdb

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L97384***

Copper (1312) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333999													
WG333999ICV	ICV	11/13/12 12:27	II120914-3	2		1.947	mg/L	97.4	90	110			
WG333999ICB	ICB	11/13/12 12:30				U	mg/L		-0.03	0.03			
WG333869PBS	PBS	11/13/12 12:42				U	mg/L		-0.03	0.03			
WG333869LFB	LFB	11/13/12 12:45	II121029-3	.5		.509	mg/L	101.8	85	115			
L97384-11DUP	DUP	11/13/12 12:55			.05	.048	mg/L				4.1	20	RA
L97384-12MS	MS	11/13/12 13:01	II121029-3	.5	.03	.541	mg/L	102.2	75	125			
L97384-12MSD	MSD	11/13/12 13:04	II121029-3	.5	.03	.544	mg/L	102.8	75	125	0.55	20	

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333809													
WG333809ICV	ICV	11/09/12 9:47	II120914-3	2		1.927	mg/L	96.4	90	110			
WG333809ICB	ICB	11/09/12 9:50				U	mg/L		-0.03	0.03			
WG333717PBS	PBS	11/09/12 10:02				U	mg/Kg		-3	3			
WG333717LCSS	LCSS	11/09/12 10:06	PCN41127	78		77.7	mg/Kg		65.3	90.6			
WG333717LCSSD	LCSSD	11/09/12 10:09	PCN41127	78		77.9	mg/Kg		65.3	90.6	0.3	20	
L97384-03MS	MS	11/09/12 10:21	II121029-3	50.5	290	340.7	mg/Kg	100.4	75	125			
L97384-03MSD	MSD	11/09/12 10:24	II121029-3	50.5	290	344.9	mg/Kg	108.7	75	125	1.23	20	

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333730													
WG333730PBS	PBS	11/12/12 15:36				U	%		-0.1	0.1			
WG333730LCSS	LCSS	11/12/12 17:15	PCN33453	100		102	%	102	80	120			
L97384-01DUP	DUP	11/12/12 20:33			U	U	%				0	20	RA
WG334082													
L97383-20DUP	DUP	11/14/12 11:21			6.4	6.5	%				1.6	20	
WG334082LCSS	LCSS	11/15/12 8:38	PCN33453	100		95	%	95	80	120			
WG334082PBS	PBS	11/15/12 10:59				U	%		-0.1	0.1			

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333868													
WG333868ICV	ICV	11/10/12 8:51	PCN38642	4		3.98	units	99.5	97	103			
L97384-01DUP	DUP	11/10/12 9:25			4.5	4.54	units				0.9	20	

pH, Saturated Paste USDA No. 60 (21A)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333867													
WG333867ICV	ICV	11/10/12 10:34	PCN38642	4		3.98	units	99.5	97	103			
L97384-12DUP	DUP	11/10/12 13:08			6.6	6.64	units				0.6	20	

Solids, Percent

CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333178													
WG333178PBS	PBS	10/30/12 15:30				U	%		99.9	100.1			
L97307-01DUP	DUP	10/30/12 17:04			98.5	98.48	%				0	20	

Sulfur Organic Residual

M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333442													
L97384-01DUP	DUP	11/03/12 12:10			U	U	%				0	20	RA

Sulfur Pyritic Sulfide

M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333442													
L97384-01DUP	DUP	11/03/12 12:10			.01	.01	%				0	20	RA

Sulfur Sulfate

M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333442													
L97384-01DUP	DUP	11/03/12 12:10			.01	.01	%				0	20	RA

Sulfur Total

M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333442													
WG333442LCSS	LCSS	11/02/12 22:03	PCN41310	4.07		4.47	%	109.8					
L97384-01DUP	DUP	11/03/12 12:10			.02	.02	%				0	20	RA

Total Sulfur Minus Sulfate

M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG333442													
L97384-01DUP	DUP	11/03/12 12:10			.01	.01	%				0	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97384-01	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-02	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-03	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97384-04	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-05	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-06	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97384-07	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-08	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-09	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97384-10	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-11	WG333999	Copper (1312)	M6010B ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-12	WG333999	Copper (1312)	M6010B ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-13	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-14	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L97384-15	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-16	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L97384-17	WG333730	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG333442	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
pH, Saturated Paste	USDA No. 60 (21A)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000001M5

ACZ Project ID: L97384
Date Received: 10/16/2012 10:17
Received By: ksj
Date Printed: 10/16/2012

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody or other directive shipping papers present?	X		▨
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody complete and accurate?	X		▨
7) Were any changes made to the Chain of Custody prior to ACZ receiving the samples?	X		▨

A change was made in the page 2 lines 3-6 and page 3 lines 4-7 section prior to ACZ custody.

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		▨
9) Are all labels on containers and are they intact and legible?	X		▨
10) Do the sample labels and Chain of Custody match for Sample ID, Date, and Time?	X		▨
11) For preserved bottle types, was the pH checked and within limits?			X
12) Is there sufficient sample volume to perform all requested work?	X		▨
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		▨
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		▨

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/Hr)	Custody Seal Intact?
3181	14.4	15	Yes
3742	15.1	15	Yes
NA16404	14.4	16	Yes
NA16405	13.8	15	Yes

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc. L97384

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Garett Ferguson
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED [illegible]

	SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
✓	STS-PH-2012-FID37	10/12/12 : 0815	SO	1	x	x	x	x				
✓	STS-PH-2012-ERA3	10/10/12 : 1520	SO	1	x	x	x	x				
✓	STS-PH-2012-FID101	10/12/12 : 0930	SO	1	x	x	x	x				
✓	STS-PH-2012-FID102	10/12/12 : 1115	SO	1	x	x	x	x				
✓	STS-PH-2012-ERA4	10/10/12 : 1148	SO	1	x	x	x	x				
✓	STS-PH-2012-ERA10	10/11/12 : 1430	SO	1	x	x	x	x				
✓	STS-PH-2012-FID105	10/10/12 : 1600	SO	1	x	x	x	x				
✓	STS-PH-2012-FID106	10/11/12 : 1550	SO	1	x	x	x	x				
✓	STS-PH-2012-REFPLOT1	10/8/12 : 1820	SO	1	x	x	x	x				
✓	STS-PH-2012-REFPLOT2	10/9/12 : 1055	SO	1	x	x	x	x				

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	[illegible]		10.16.12 10:00

L97384 Chain of Custody

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L97384

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

Copy of Report to

Name: Matthew Barkley

Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com

Telephone: 303-231-9115 ext 157

Invoice to

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐

If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #:

Project/PO #:

Reporting state for compliance testing:

Sampler's Name: Garett Ferguson

Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	Copper (Total and SPLP)	pH	Total Copper				
DUP7	10/10/12	SO	1	x	x	x					
DUP8	10/10/12	SO	1	x	x	x					
~~RINSATE1~~	~~10/10/12 : 0915~~	~~W~~	~~1~~				~~x~~				
~~RINSATE2~~	~~10/10/12 1000~~	~~W~~	~~1~~				~~x~~				
~~RINSATE3~~	~~10/10/12 1115~~	~~W~~	~~1~~				~~x~~				
~~RINSATE4~~	~~10/10/12 1315~~	~~W~~	~~1~~				~~x~~				

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.

Methods:

pH - 9045C, Calcium - 6010B, Potassium - 6010B, Total Organic Carbon - 9060, Copper - Modified 1312 extraction, 3010A digestion, 6010B analysis

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	10/12/12 :1300		10-16-12 10:00

2

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L97384

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
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E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION | **ANALYSES REQUESTED (attach list or use quote number)**

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Garett Ferguson
Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
✓ STS-PH-2012-REFPLOT3	10/9/12 : 1755	SO	1	x	x	x	x				
✓ STS-PH-2012-REFPLOT4	10/10/12 : 1310	SO	1	x	x	x	x				
✓ STS-PH-2012-ERA13	10/11/12 : 1155	SO	1	x	x	x	x				
~~DUP11~~ DUP9	10/10/12	SO	1	x	x	x	x				
~~DUP12~~ DUP10	10/11/12 SO	~~SW~~	1	X	X	x	X	LCD 10-16-12			
GF ~~RINSATE RINSATE 5~~	~~10/10/12 1225~~										
GF ~~STS-PH-2012-ERA02~~	~~10/10/12 1440~~	~~SO~~	~~1~~								

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE TIME	RECEIVED BY:	DATE TIME
	10/12/12 :1300	LCD	10·16·12 10:00

3

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

November 15, 2013

Report to:	Bill to:
Pam Pinson	Pam Pinson
Freeport-McMoRan - Chino Mines Company	Freeport-McMoRan - Chino Mines Company
PO Box 10	P.O. Box 13308
Bayard, NM 88023	Phoenix, AZ 85002-3308

cc: Matthew Barkley

Project ID: ZN000001M5
ACZ Project ID: L15301

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 30, 2013. This project has been assigned to ACZ's project number, L15301. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L15301. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 15, 2013. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID7

ACZ Sample ID: ***L15301-01***
Date Sampled: *10/25/13 13:10*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	375			mg/Kg	1	5	11/07/13 19:06	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		2	B		t CaCO3/Kt	1	5	11/14/13 17:01	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		1			t CaCO3/Kt	1	5	11/14/13 17:01	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-1			t CaCO3/Kt	1	5	11/14/13 17:01	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.1	B	*	%	0.1	0.5	11/12/13 16:41	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	5.4			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	22			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	96.2		*	%	0.1	0.5	10/31/13 20:16	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.04	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur HNO3 Residue		1	0.01	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Organic Residual		1	0.01	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.03	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Total		1	0.05	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.04	B	*	%	0.01	0.1	11/06/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:10	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 14:35	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 10:20	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 15:00	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 15:00	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L15301-02***
Sample ID:	STS-PH-2013-FID8	Date Sampled:	*10/24/13 11:00*
		Date Received:	*10/30/13*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	102	358			mg/Kg	1	5	11/07/13 19:16	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		11			t CaCO3/Kt	1	5	11/14/13 17:01	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		17			t CaCO3/Kt	1	5	11/14/13 17:01	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		6			t CaCO3/Kt	1	5	11/14/13 17:01	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	1.7		*	%	0.1	0.5	11/12/13 18:35	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6.5			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.7			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	94.2		*	%	0.1	0.5	10/31/13 22:49	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.23		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.20		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Sulfate		1	0.11		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Total		1	0.34		*	%	0.01	0.1	11/06/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.23		*	%	0.01	0.1	11/06/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:14	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 14:53	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 11:11	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 15:16	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 15:16	spl

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID10

ACZ Sample ID: ***L15301-03***
Date Sampled: *10/23/13 15:15*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	1780			mg/Kg	1	5	11/07/13 19:22	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		4	B		t CaCO3/Kt	1	5	11/14/13 17:01	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2			t CaCO3/Kt	1	5	11/14/13 17:01	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-2			t CaCO3/Kt	1	5	11/14/13 17:01	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/12/13 19:32	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	5			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.9			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	94.6		*	%	0.1	0.5	11/01/13 0:06	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.13		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.11		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Total		1	0.13		*	%	0.01	0.1	11/06/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.13		*	%	0.01	0.1	11/06/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:18	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 15:11	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 11:28	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 15:33	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 15:33	spl

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID15

ACZ Sample ID: ***L15301-04***
Date Sampled: *10/23/13 10:50*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	1950			mg/Kg	1	5	11/07/13 19:25	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		9			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		5			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-4			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.5		*	%	0.1	0.5	11/12/13 20:29	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	5.2			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.8			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	96.8		*	%	0.1	0.5	11/01/13 1:22	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.24		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.21		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Sulfate		1	0.04	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Total		1	0.28		*	%	0.01	0.1	11/06/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.24		*	%	0.01	0.1	11/06/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:23	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 15:29	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 11:45	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 15:50	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 15:50	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L15301-05***
Project ID:	ZN000001M5	Date Sampled:	*10/23/13 11:10*
Sample ID:	STS-PH-2013-FID16	Date Received:	*10/30/13*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	100	1290			mg/Kg	1	5	11/07/13 19:34	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		7			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-7			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/12/13 21:25	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	4.7			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.7			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	96.9		*	%	0.1	0.5	11/01/13 2:39	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.16		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.13		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Sulfate		1	0.06	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Total		1	0.22		*	%	0.01	0.1	11/06/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.16		*	%	0.01	0.1	11/06/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:27	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 15:47	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 12:02	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 16:06	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 16:06	spl

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5
Sample ID:	STS-PH-2013-FID18
ACZ Sample ID:	***L15301-06***
Date Sampled:	*10/24/13 15:35*
Date Received:	*10/30/13*
Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	100	141			mg/Kg	1	5	11/07/13 19:37	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		3	B		t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-3			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/12/13 22:22	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	4.3			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.8			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	96.6		*	%	0.1	0.5	11/01/13 3:55	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.06	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur HNO3 Residue		1	0.01	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Organic Residual		1	0.01	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.05	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Sulfate		1	0.02	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Total		1	0.08	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.06	B	*	%	0.01	0.1	11/06/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:32	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 16:05	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 12:19	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 16:23	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 16:23	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID22

ACZ Sample ID: ***L15301-07***
Date Sampled: *10/25/13 15:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	296			mg/Kg	1	5	11/07/13 19:40	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		6			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		12			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		6			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	1.2		*	%	0.1	0.5	11/12/13 23:19	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6.3			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.7			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	95.9		*	%	0.1	0.5	11/01/13 5:12	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.13		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.11		*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Sulfate		1	0.06	B	*	%	0.01	0.1	11/06/13 0:00	mss2
Sulfur Total		1	0.19		*	%	0.01	0.1	11/06/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.13		*	%	0.01	0.1	11/06/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:36	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 16:23	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 12:36	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 16:40	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 16:40	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID28

ACZ Sample ID: ***L15301-08***
Date Sampled: *10/22/13 09:30*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	318			mg/Kg	1	5	11/07/13 19:43	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		6			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		90			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		84			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	9		*	%	0.1	0.5	11/13/13 2:16	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6.8			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.3			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	97.1		*	%	0.1	0.5	11/01/13 6:28	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.19		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.17		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.18		*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.18		*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:41	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 16:41	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 12:53	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 16:56	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 16:56	spl

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID37

ACZ Sample ID: ***L15301-09***
Date Sampled: *10/24/13 17:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	432			mg/Kg	1	5	11/07/13 19:46	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		2			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/13/13 1:13	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	5.3			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.8			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	95.2		*	%	0.1	0.5	11/01/13 7:45	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:45	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 16:59	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 13:10	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 17:13	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 17:13	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID101

ACZ Sample ID: ***L15301-10***
Date Sampled: *10/24/13 14:35*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	100	221			mg/Kg	1	5	11/07/13 19:49	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		9			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-9			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/13/13 2:10	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	4.2			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.6			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	97.1		*	%	0.1	0.5	11/01/13 9:01	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.18		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.04	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.04	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.14		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1	0.12		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.30		*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.18		*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:50	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 17:17	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 13:27	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 17:30	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 17:30	spl

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID102

ACZ Sample ID: ***L15301-11***
Date Sampled: *10/24/13 13:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	171			mg/Kg	1	5	11/07/13 19:52	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		15			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-13			t CaCO3/Kt	1	5	11/14/13 17:02	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/13/13 3:07	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	3.7			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.5			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	96.1		*	%	0.1	0.5	11/01/13 10:18	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.23		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.20		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1	0.25		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.48		*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.23		*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:54	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 17:35	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 13:44	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 17:46	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 17:46	spl

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-FID105

ACZ Sample ID: ***L15301-12***
Date Sampled: *10/23/13 18:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	816			mg/Kg	1	5	11/07/13 19:56	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		5			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-3			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/13/13 4:04	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	4.7			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.4			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	94.9		*	%	0.1	0.5	11/01/13 11:34	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.12		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.04	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.04	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.08	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1	0.04	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.16		*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.12		*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 16:58	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 17:53	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 14:01	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 18:03	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 18:03	spl

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L15301-13***
Project ID:	ZN000001M5	Date Sampled:	*10/25/13 13:40*
Sample ID:	STS-PH-2013-FID106	Date Received:	*10/30/13*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	247			mg/Kg	1	5	11/07/13 19:59	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		2			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/13/13 5:01	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	4.6			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.1			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	96.0		*	%	0.1	0.5	11/01/13 12:51	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.03	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.03	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 17:03	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 18:11	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 14:18	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 18:20	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 18:20	spl

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-REFPLOT1

ACZ Sample ID: ***L15301-14***
Date Sampled: *10/24/13 14:30*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	605			mg/Kg	1	5	11/07/13 20:02	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		166			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		166			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	16.6		*	%	0.1	0.5	11/13/13 7:21	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	7.5			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.1			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	97.2		*	%	0.1	0.5	11/01/13 14:07	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.04	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 17:07	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 18:29	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 14:35	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 18:36	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 18:36	spl

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L15301-15***
Sample ID:	STS-PH-2013-REFPLOT2	Date Sampled:	*10/25/13 15:50*
		Date Received:	*10/30/13*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	578			mg/Kg	1	5	11/07/13 20:11	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		5			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		5			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.5		*	%	0.1	0.5	11/13/13 5:58	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.3			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	96.6		*	%	0.1	0.5	11/01/13 15:24	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 17:12	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 18:47	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 14:52	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 18:53	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 18:53	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN000001M5	ACZ Sample ID:	***L15301-16***
Sample ID:	STS-PH-2013-REFPLOT3	Date Sampled:	*10/24/13 11:20*
		Date Received:	*10/30/13*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	102	1090			mg/Kg	1	5	11/07/13 20:14	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		4	B		t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		11			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		7			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	1.1		*	%	0.1	0.5	11/13/13 6:54	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6.7			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.3			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	91.3		*	%	0.1	0.5	11/01/13 16:40	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.10		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.08	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.12		*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.10		*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 17:16	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 19:05	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 15:09	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 19:10	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 19:10	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN000001M5
Sample ID: STS-PH-2013-REFPLOT4

ACZ Sample ID: ***L15301-17***
Date Sampled: *10/25/13 13:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	923			mg/Kg	1	5	11/07/13 20:17	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		7			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		3			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-4			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.3	B	*	%	0.1	0.5	11/13/13 7:51	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.4			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	92.6		*	%	0.1	0.5	11/01/13 17:57	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.18		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.15		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1	0.05	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.23		*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.18		*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 17:21	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 19:23	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 15:25	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 19:26	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 19:26	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-ERA02

ACZ Sample ID: ***L15301-18***
Date Sampled: *10/24/13 10:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	420			mg/Kg	1	5	11/07/13 20:20	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		18			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		18			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	1.8		*	%	0.1	0.5	11/13/13 9:54	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	7			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.2			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	94.2		*	%	0.1	0.5	11/01/13 19:13	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.07	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.05	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1		U	*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 17:25	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 19:41	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 15:42	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 19:43	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 19:43	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-ERA03

ACZ Sample ID: ***L15301-19***
Date Sampled: *10/23/13 17:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	807			mg/Kg	1	5	11/07/13 20:23	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		9			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		3			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-6			t CaCO3/Kt	1	5	11/14/13 17:03	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.3	B	*	%	0.1	0.5	11/13/13 8:48	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6			units	0.1	0.1	11/13/13 0:00	mss2
pH measured at		1	21.1			C	0.1	0.1	11/13/13 0:00	mss2
Solids, Percent	CLPSOW390, PART F, D-98	1	95.6		*	%	0.1	0.5	11/01/13 20:30	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.18		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur HNO3 Residue		1	0.06	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Organic Residual		1	0.06	B	*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.12		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Sulfate		1	0.10		*	%	0.01	0.1	11/07/13 0:00	mss2
Sulfur Total		1	0.28		*	%	0.01	0.1	11/07/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.18		*	%	0.01	0.1	11/07/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				10/31/13 17:30	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/05/13 19:59	spl
Digestion - Hot Plate	M3050B ICP								11/06/13 15:59	mss2
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/05/13 20:00	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/05/13 20:00	spl

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354475													
WG354475ICV	ICV	11/07/13 18:42	II130820-1	2		1.968	mg/L	98.4	90	110			
WG354475ICB	ICB	11/07/13 18:45				U	mg/L		-0.03	0.03			
WG354384PBS	PBS	11/07/13 18:57				U	mg/Kg		-3	3			
WG354384LCSS	LCSS	11/07/13 19:00	PCN42472	162		162.6	mg/Kg		135	190			
WG354384LCSSD	LCSSD	11/07/13 19:03	PCN42472	162		164.1	mg/Kg		135	190	0.9	20	
L15301-01MS	MS	11/07/13 19:09	II131029-2	50.5	375	436.1	mg/Kg	121	75	125			
L15301-01MSD	MSD	11/07/13 19:13	II131029-2	50.5	375	429.9	mg/Kg	108.7	75	125	1.43	20	

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354638													
WG354638PBS	PBS	11/12/13 14:47				U	%		-0.1	0.1			
WG354638LCSS	LCSS	11/12/13 15:44	PCN33453	100		100	%	100	80	120			
L15301-01DUP	DUP	11/12/13 17:38			.1	.15	%				40	20	RA
WG354635													
WG354635PBS	PBS	11/12/13 21:10				U	%		-0.1	0.1			
WG354635LCSS	LCSS	11/12/13 23:43	PCN33453	100		102.5	%	102.5	80	120			
L15301-08DUP	DUP	11/13/13 4:49			9	9	%				0	20	

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354823													
WG354823ICV	ICV	11/13/13 16:01	PCN42578	4		3.95	units	98.8	97	103			
L15301-01DUP	DUP	11/13/13 16:12			5.4	5.37	units				0.6	20	

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354097													
WG354097PBS	PBS	10/31/13 19:00				U	%		99.9	100.1			
L15301-01DUP	DUP	10/31/13 21:33			96.2	96.02	%				0.2	20	

Sulfur Organic Residual M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354385													
L15301-01DUP	DUP	11/06/13 14:17			.01	.01	%				0	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354385													
L15301-01DUP	DUP	11/06/13 14:17			.03	.03	%				0	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354385													
L15301-01DUP	DUP	11/06/13 14:17			.01	U	%				200	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354385													
WG354385LCSS	LCSS	11/06/13 11:25	PCN42346	4.07		4.57	%	112.3					
L15301-01DUP	DUP	11/06/13 14:17			.05	.04	%				22.2	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354385													
L15301-01DUP	DUP	11/06/13 14:17			.04	.04	%				0	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15301-01	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-02	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-03	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15301-04	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-05	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-06	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15301-07	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-08	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-09	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15301-10	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-11	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-12	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15301-13	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-14	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-15	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15301-16	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-17	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15301-18	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15301-19	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354385	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by AZ certificate #AZ0102.	
Solids, Percent	CLPSOW390, PART F, D-98
The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.	
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000001M5

ACZ Project ID: L15301
Date Received: 10/30/2013 10:02
Received By: mtb
Date Printed: 10/30/2013

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody or other directive shipping papers present?	X		▨
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody complete and accurate?	X		▨
7) Were any changes made to the Chain of Custody prior to ACZ receiving the samples?	X		▨

`A change was made in the ID Line 6 section prior to ACZ custody.`

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		▨
9) Are all labels on containers and are they intact and legible?	X		▨
10) Do the sample labels and Chain of Custody match for Sample ID, Date, and Time?	X		▨
11) For preserved bottle types, was the pH checked and within limits?			X
12) Is there sufficient sample volume to perform all requested work?	X		▨
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		▨
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		▨

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/Hr)	Custody Seal Intact?
4057	10.8	13	Yes
NA18647	10.6	15	N/A

Was ice present in the shipment container(s)?

`No - Wet or gel ice was not present in the shipment container(s).`

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

L15301

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

ANALYSES REQUESTED *(attach list or use quote number)*

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Patrick Quinn
Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2013-FID7	10/25/13 1310	SO	1	x	x	x	x				
STS-PH-2013-FID8	10/24/13 1100	SO	1	x	x	x	x				
STS-PH-2013-FID10	10/23/13 1515	SO	1	x	x	x	x				
STS-PH-2013-FID15	10/23/13 1050	SO	1	x	x	x	x				
STS-PH-2013-FID16	10/23/13 1110	SO	1	x	x	x	x				
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]				
STS-PH-2013-FID18	10/24/13 1535	SO	1	x	x	x	x				
STS-PH-2013-FID22	10/25/13 1500	SO	1	x	x	x	x				
STS-PH-2013-FID28	10/22/13 0930	SO	1	x	x	x	x				
STS-PH-2013-FID37	10/24/13 1700	SO	1	x	x	x	x				

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B
Please include sulfur forms for ABA

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Matth Bar	10/25/13 1940		
		LRL 10-30-13 10:02	

L15301 Chain of Custody

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

1

C15301

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley

Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com

Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

Quote #:

Project/PO #:

Reporting state for compliance testing:

Sampler's Name: Patrick Quinn

Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2013-FID101	10/24/13 1435	SO	1	x	x	x	x				
STS-PH-2013-FID102	10/24/13 1300	SO	1	x	x	x	x				
STS-PH-2013-FID105	10/23/13 1800	SO	1	x	x	x	x				
STS-PH-2013-FID106	10/25/13 1340	SO	1	x	x	x	x				
STS-PH-2013-REFPLOT1	10/24/13 1430	SO	1	x	x	x	x				
STS-PH-2013-REFPLOT2	10/25/13 1550	SO	1	x	x	x	x				
STS-PH-2013-REFPLOT3	10/24/13 1920	SO	1	x	x	x	x				
STS-PH-2013-REFPLOT4	10/25/13 1300	SO	1	x	x	x	x				
STS-PH-2013-ERA02	10/24/13 1000	SO	1	x	x	x	x				
STS-PH-2013-ERA03	10/23/13 1700	SO	1	x	x	x	x				

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B
Please include sulfur forms for ABA

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
		LPL 10-30-13 10:02	

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

②

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

November 20, 2013

Report to:	Bill to:
Pam Pinson	Pam Pinson
Freeport-McMoRan - Chino Mines Company	Freeport-McMoRan - Chino Mines Company
PO Box 10	P.O. Box 13308
Bayard, NM 88023	Phoenix, AZ 85002-3308

cc: Matthew Barkley

Project ID: ZN000001M5
ACZ Project ID: L15302

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 30, 2013. This project has been assigned to ACZ's project number, L15302. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L15302. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 20, 2013. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-ERA04

ACZ Sample ID: ***L15302-01***
Date Sampled: *10/24/13 16:30*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	215		*	mg/Kg	1	5	11/11/13 14:41	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0			t CaCO3/Kt	1	5	11/19/13 13:22	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		5			t CaCO3/Kt	1	5	11/19/13 13:22	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		5			t CaCO3/Kt	1	5	11/19/13 13:22	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.5		*	%	0.1	0.5	11/13/13 9:45	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6.4			units	0.1	0.1	11/15/13 0:00	cra
pH measured at		1	22			C	0.1	0.1	11/15/13 0:00	cra
Solids, Percent	CLPSOW390, PART F, D-98	1	97.3		*	%	0.1	0.5	11/13/13 2:22	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.04	B	*	%	0.01	0.1	11/11/13 0:00	mss2
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/11/13 0:00	mss2
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/11/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/11/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/11/13 0:00	mss2
Sulfur Total		1		U	*	%	0.01	0.1	11/11/13 0:00	mss2
Total Sulfur minus Sulfate		1		U	*	%	0.01	0.1	11/11/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/02/13 11:30	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/06/13 12:50	spl
Digestion - Hot Plate	M3050B ICP								11/07/13 20:21	spl
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/06/13 12:45	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/06/13 12:45	spl

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: STS-PH-2013-ERA10

ACZ Sample ID: ***L15302-02***
Date Sampled: *10/25/13 12:30*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	102	232		*	mg/Kg	1	5	11/11/13 14:50	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		1	B		t CaCO3/Kt	1	5	11/19/13 13:23	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		3			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		2			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.3	B	*	%	0.1	0.5	11/13/13 11:39	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	5.2			units	0.1	0.1	11/15/13 0:00	cra
pH measured at		1	21.4			C	0.1	0.1	11/15/13 0:00	cra
Solids, Percent	CLPSOW390, PART F, D-98	1	93.9		*	%	0.1	0.5	11/13/13 17:07	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.06	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur HNO3 Residue		1	0.01	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Organic Residual		1	0.01	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.05	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Total		1	0.04	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.04	B	*	%	0.01	0.1	11/12/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/02/13 11:36	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/06/13 13:03	spl
Digestion - Hot Plate	M3050B ICP								11/08/13 3:42	spl
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/06/13 13:00	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/06/13 13:00	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company		ACZ Sample ID:	***L15302-03***
Project ID:	ZN000001M5	Date Sampled:	*10/22/13 14:00*
Sample ID:	STS-PH-2013-ERA13	Date Received:	*10/30/13*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	91		*	mg/Kg	1	5	11/11/13 14:56	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		6			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		6			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.6		*	%	0.1	0.5	11/13/13 12:36	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	5.6			units	0.1	0.1	11/15/13 0:00	cra
pH measured at		1	21.9			C	0.1	0.1	11/15/13 0:00	cra
Solids, Percent	CLPSOW390, PART F, D-98	1	93.7		*	%	0.1	0.5	11/14/13 0:30	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.03	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.03	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Total		1	0.02	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.02	B	*	%	0.01	0.1	11/12/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/02/13 11:42	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/06/13 13:17	spl
Digestion - Hot Plate	M3050B ICP								11/08/13 8:36	spl
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/06/13 13:15	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/06/13 13:15	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: DUP PH 1

ACZ Sample ID: ***L15302-04***
Date Sampled: *10/24/13 00:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	365		*	mg/Kg	1	5	11/11/13 14:59	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		3			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		3			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.3	B	*	%	0.1	0.5	11/13/13 13:33	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	5.2			units	0.1	0.1	11/15/13 0:00	cra
pH measured at		1	21.5			C	0.1	0.1	11/15/13 0:00	cra
Solids, Percent	CLPSOW390, PART F, D-98	1	95.6		*	%	0.1	0.5	11/14/13 7:52	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.02	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Total		1	0.01	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.01	B	*	%	0.01	0.1	11/12/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/02/13 11:49	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/06/13 13:31	spl
Digestion - Hot Plate	M3050B ICP								11/08/13 11:03	spl
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/06/13 13:30	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/06/13 13:30	spl

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN000001M5
Sample ID: DUP PH 2

ACZ Sample ID: ***L15302-05***
Date Sampled: *10/24/13 00:00*
Date Received: *10/30/13*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	230		*	mg/Kg	1	5	11/11/13 15:09	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		6			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		81			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		75			t CaCO3/Kt	1	5	11/19/13 13:23	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	8.1		*	%	0.1	0.5	11/13/13 12:27	cdb
pH, Corrosivity	M9045D/M9040C									
pH		1	6.8			units	0.1	0.1	11/15/13 0:00	cra
pH measured at		1	21.4			C	0.1	0.1	11/15/13 0:00	cra
Solids, Percent	CLPSOW390, PART F, D-98	1	97.1		*	%	0.1	0.5	11/14/13 15:15	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.22		*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Pyritic Sulfide		1	0.19		*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/12/13 0:00	mss2
Sulfur Total		1	0.19		*	%	0.01	0.1	11/12/13 0:00	mss2
Total Sulfur minus Sulfate		1	0.19		*	%	0.01	0.1	11/12/13 0:00	mss2

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/02/13 11:55	spl
Crush and Pulverize	EPA-600/2-78-054 3.1.3								11/06/13 13:45	spl
Digestion - Hot Plate	M3050B ICP								11/08/13 13:30	spl
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/06/13 13:45	spl
Sieve-250 um (60 mesh)	ASA No.9, 15-4.2.2								11/06/13 13:45	spl

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354640													
WG354640ICV	ICV	11/11/13 14:17	II130820-1	2		1.951	mg/L	97.6	90	110			
WG354640ICB	ICB	11/11/13 14:20				U	mg/L		-0.03	0.03			
WG354486PBS	PBS	11/11/13 14:32				U	mg/Kg		-3	3			
WG354486LCSS	LCSS	11/11/13 14:35	PCN42472	162		149.9	mg/Kg		135	190			
WG354486LCSSD	LCSSD	11/11/13 14:38	PCN42472	162		158.1	mg/Kg		135	190	5.3	20	
L15302-01MS	MS	11/11/13 14:44	II131029-2	50.5	215	261.2	mg/Kg	91.5	75	125			
L15302-01MSD	MSD	11/11/13 14:47	II131029-2	50.5	215	292.6	mg/Kg	153.7	75	125	11.34	20	M3

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354638													
WG354638PBS	PBS	11/12/13 14:47				U	%		-0.1	0.1			
WG354638LCSS	LCSS	11/12/13 15:44	PCN33453	100		100	%	100	80	120			
L15301-01DUP	DUP	11/12/13 17:38			.1	.15	%				40	20	RA
WG354635													
WG354635PBS	PBS	11/12/13 21:10				U	%		-0.1	0.1			
WG354635LCSS	LCSS	11/12/13 23:43	PCN33453	100		102.5	%	102.5	80	120			
L15301-08DUP	DUP	11/13/13 4:49			9	9	%				0	20	

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354951													
WG354951ICV	ICV	11/15/13 13:10	PCN42578	4		3.97	units	99.3	97	103			
L15302-01DUP	DUP	11/15/13 13:37			6.4	6.54	units				2.2	20	

Solids, Percent CLPSOW390, PART F, D-98

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354758													
WG354758PBS	PBS	11/12/13 19:00				U	%		99.9	100.1			
L15302-01DUP	DUP	11/13/13 9:45			97.3	97.39	%				0.1	20	

Sulfur Organic Residual M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354653													
L15302-01DUP	DUP	11/11/13 23:45			.02	.02	%				0	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354653													
L15302-01DUP	DUP	11/11/13 23:45			.02	.03	%				40	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354653													
L15302-01DUP	DUP	11/11/13 23:45			U	U	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354653													
WG354653LCSS	LCSS	11/11/13 15:55	PCN42350	4.07		4.43	%	108.8					
L15302-01DUP	DUP	11/11/13 23:45			U	U	%				0	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG354653													
L15302-01DUP	DUP	11/11/13 23:45			U	U	%				0	20	RA

Inorganic Extended Qualifier Report

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L15302***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15302-01	WG354640	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354653	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15302-02	WG354640	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354653	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L15302-03	WG354640	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354653	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15302-04	WG354640	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG354638	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG354653	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L15302-05	WG354640	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG354653	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Solids, Percent	CLPSOW390, PART F, D-98
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN000001M5

ACZ Project ID: L15302
Date Received: 10/30/2013 10:04
Received By: mtb
Date Printed: 10/30/2013

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody or other directive shipping papers present?	X		▨
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody complete and accurate?	X		▨
7) Were any changes made to the Chain of Custody prior to ACZ receiving the samples?	X		▨

```
A change was made in the ID Lines 4-6 section prior to ACZ
custody.
```

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		▨
9) Are all labels on containers and are they intact and legible?	X		▨
10) Do the sample labels and Chain of Custody match for Sample ID, Date, and Time?	X		▨
11) For preserved bottle types, was the pH checked and within limits?			X
12) Is there sufficient sample volume to perform all requested work?	X		▨
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		▨
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		▨

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

```
Cooler Id      Temp (°C)      Rad (µR/Hr)      Custody Seal Intact?
---------      ---------      -----------      --------------------
4057           10.8           13               Yes
NA18647        10.6           15               N/A
```

Was ice present in the shipment container(s)?

```
No - Wet or gel ice was not present in the shipment container(s).
```

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc. L15302

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION — **ANALYSES REQUESTED** *(attach list or use quote number)*

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Patrick Quinn
Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA					
STS-PH-2013-ERA04	10/24/13 1630	SO	1	x	x	x	x					
STS-PH-2013-ERA10	10/25/13 1230	SO	1	x	x	x	x					
STS-PH-2013-ERA13	10/22/13 1400	SO	1	x	x	x	x					
[redacted] DupPH1	———	SO	1	x	x	x	x					
[redacted] DupPH2	———	SO	1	x	x	x	x					
[redacted]		[redacted]				[redacted]						
Rinsate PH		SW	1			✓						

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B
Please include sulfur forms for ABA

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Matth Bk	10/25/13 1940		
		RPC 10-30-13 10:02	

L15302 Chain of Custody

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

December 01, 2014

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

cc: Matthew Barkley

Bill to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

Project ID: ZN0000036K
ACZ Project ID: L21500

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on November 11, 2014. This project has been assigned to ACZ's project number, L21500. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L21500. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 31, 2014. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

ACCREDITED IN ACCORDANCE WITH nelac

ACIL

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN0000036K
Sample ID: STS-PH-2014-FID37

ACZ Sample ID: ***L21500-01***
Date Sampled: *11/05/14 15:15*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	708		*	mg/Kg	1	5	11/21/14 14:20	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.9	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2.0			t CaCO3/Kt	1	5	12/01/14 8:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		1.1			t CaCO3/Kt			12/01/14 8:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/20/14 22:28	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.7			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	20.4			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	90.9		*	%	0.1	0.5	11/19/14 15:03	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.02	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Total		1	0.03	B	*	%	0.01	0.1	11/24/14 0:00	cra
Total Sulfur minus Sulfate		1	0.02	B	*	%	0.01	0.1	11/24/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 11:30	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 11:00	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 12:33	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 11:30	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN0000036K
Sample ID: STS-PH-2014-ERA3

ACZ Sample ID: ***L21500-02***
Date Sampled: *11/04/14 11:00*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	102	652		*	mg/Kg	1	5	11/21/14 14:30	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		7.8			t CaCO3/Kt	0.31	3.1	12/01/14 8:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		5.0			t CaCO3/Kt	1	5	12/01/14 8:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-2.8			t CaCO3/Kt			12/01/14 8:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.5		*	%	0.1	0.5	11/21/14 1:52	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	5.9			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	20.1			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	90.1		*	%	0.1	0.5	11/19/14 17:09	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.16		*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur HNO3 Residue		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Organic Residual		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.09	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Sulfate		1	0.09	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Total		1	0.25		*	%	0.01	0.1	11/24/14 0:00	cra
Total Sulfur minus Sulfate		1	0.16		*	%	0.01	0.1	11/24/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 11:43	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 11:13	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 15:37	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 11:43	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-03***
Sample ID:	STS-PH-2014-FID101	Date Sampled:	*11/06/14 08:43*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	100	285		*	mg/Kg	1	5	11/21/14 14:33	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		5.6			t CaCO3/Kt	0.31	3.1	12/01/14 8:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-5.6			t CaCO3/Kt			12/01/14 8:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/21/14 5:17	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	3.9			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	20.2			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	91.7		*	%	0.1	0.5	11/19/14 18:12	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.10		*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Sulfate		1	0.08	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Total		1	0.18		*	%	0.01	0.1	11/24/14 0:00	cra
Total Sulfur minus Sulfate		1	0.10		*	%	0.01	0.1	11/24/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 11:56	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 11:27	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 16:39	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 11:56	pta

Arizona license number: AZ0102

Freeport-McMoRan - Chino Mines Company

Project ID: ZN0000036K
Sample ID: STS-PH-2014-FID102

ACZ Sample ID: ***L21500-04***
Date Sampled: *11/06/14 11:00*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	282		*	mg/Kg	1	5	11/21/14 14:36	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		16.9			t CaCO3/Kt	0.31	3.1	12/01/14 8:14	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:14	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-16.9			t CaCO3/Kt			12/01/14 8:14	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/21/14 6:59	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	3.5			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.8			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	92.4		*	%	0.1	0.5	11/19/14 19:15	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.21		*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.18		*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Sulfate		1	0.33		*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Total		1	0.54		*	%	0.01	0.1	11/24/14 0:00	cra
Total Sulfur minus Sulfate		1	0.21		*	%	0.01	0.1	11/24/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 12:10	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 11:41	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 17:40	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 12:10	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-05***
Sample ID:	STS-PH-2014-ERA4	Date Sampled:	*11/05/14 14:30*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	562		*	mg/Kg	1	5	11/21/14 14:40	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		2.2	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		4.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		1.8			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.4	B	*	%	0.1	0.5	11/21/14 8:41	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	5.4			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.6			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	94.3		*	%	0.1	0.5	11/19/14 20:18	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.07	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 12:23	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 11:55	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 18:41	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 12:23	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-06***
Sample ID:	STS-PH-2014-ERA10	Date Sampled:	*11/05/14 12:35*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	102	310		*	mg/Kg	1	5	11/21/14 14:49	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.9	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-0.9			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/21/14 10:23	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	5.3			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.6			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	87.7		*	%	0.1	0.5	11/19/14 21:21	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 12:36	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 12:09	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 19:43	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 12:36	pta

Arizona license number: AZ0102

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-07***
Sample ID:	STS-PH-2014-FID105	Date Sampled:	*11/04/14 11:34*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	102	834		*	mg/Kg	1	5	11/21/14 14:52	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		4.7			t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-4.7			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/21/14 13:48	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.5			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.5			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	89.6		*	%	0.1	0.5	11/19/14 22:24	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.10		*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.05	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.05	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.05	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.05	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.15		*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.10		*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 12:50	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 12:23	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 20:44	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 12:50	pta

Arizona license number: AZ0102

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-08***
Sample ID:	STS-PH-2014-FID106	Date Sampled:	*11/05/14 11:30*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	102	516		*	mg/Kg	1	5	11/21/14 14:55	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		1.9	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-1.9			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/21/14 15:30	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.4			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.7			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	92.9		*	%	0.1	0.5	11/19/14 23:27	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.06	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 13:03	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 12:37	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 21:45	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 13:03	pta

Arizona license number: AZ0102

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-09***
Sample ID:	STS-PH-2014-REFPLOT1	Date Sampled:	*11/04/14 08:55*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	882		*	mg/Kg	1	5	11/21/14 14:59	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		1.3	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		58.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		56.8			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	5.8		*	%	0.1	0.5	11/20/14 12:15	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	8.0			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.9			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	90.8		*	%	0.1	0.5	11/20/14 0:30	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 13:16	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 12:51	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 22:46	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 13:16	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN0000036K
Sample ID: STS-PH-2014-REFPLOT2

ACZ Sample ID: ***L21500-10***
Date Sampled: *11/04/14 15:45*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	760		*	mg/Kg	1	5	11/21/14 15:05	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.6	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		5.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		4.4			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.5		*	%	0.1	0.5	11/21/14 17:12	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	6.2			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	20.0			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	90.7		*	%	0.1	0.5	11/20/14 1:33	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 13:30	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 13:05	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 23:48	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 13:30	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID: ZN0000036K
Sample ID: STS-PH-2014-FID7

ACZ Sample ID: ***L21500-11***
Date Sampled: *11/05/14 12:00*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	491		*	mg/Kg	1	5	11/21/14 15:08	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		1.3	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		0.8			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/21/14 18:54	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	5.1			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.4			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	92.5		*	%	0.1	0.5	11/20/14 2:36	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 13:43	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 13:19	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 0:49	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 13:43	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN0000036K
Sample ID: STS-PH-2014-FID8

ACZ Sample ID: ***L21500-12***
Date Sampled: *11/06/14 10:00*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	103	473		*	mg/Kg	1	5	11/21/14 15:11	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		4.1			t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		1.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-3.1			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.1	B	*	%	0.1	0.5	11/21/14 20:37	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.6			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.3			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	87.9		*	%	0.1	0.5	11/20/14 3:39	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.09	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.08	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.13		*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.09	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 13:56	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 13:33	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 1:50	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 13:56	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-13***
Sample ID:	STS-PH-2014-FID10	Date Sampled:	*11/04/14 15:00*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	2550		*	mg/Kg	1	5	11/21/14 15:15	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		3.1			t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		4.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		0.9			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.4	B	*	%	0.1	0.5	11/21/14 22:19	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.7			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.4			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	89.1		*	%	0.1	0.5	11/20/14 4:42	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Sulfate		1	0.03	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Total		1	0.10		*	%	0.01	0.1	11/24/14 0:00	cra
Total Sulfur minus Sulfate		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 14:10	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 13:47	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 2:52	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 14:10	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN0000036K
Sample ID: STS-PH-2014-FID15

ACZ Sample ID: ***L21500-14***
Date Sampled: *11/04/14 12:38*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	1850		*	mg/Kg	1	5	11/21/14 15:18	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		3.8			t CaCO3/Kt	0.31	3.1	12/01/14 8:15	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		3.0			t CaCO3/Kt	1	5	12/01/14 8:15	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-0.7			t CaCO3/Kt			12/01/14 8:15	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.3	B	*	%	0.1	0.5	11/22/14 0:01	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	5.6			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.6			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	90.1		*	%	0.1	0.5	11/20/14 5:45	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.09	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur HNO3 Residue		1	0.01	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Organic Residual		1	0.01	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.08	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Sulfate		1	0.03	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Total		1	0.12		*	%	0.01	0.1	11/24/14 0:00	cra
Total Sulfur minus Sulfate		1	0.09	B	*	%	0.01	0.1	11/24/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 14:23	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 14:00	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 3:53	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 14:23	pta

Arizona license number: AZ0102

Freeport-McMoRan - Chino Mines Company

Project ID: ZN0000036K
Sample ID: STS-PH-2014-FID16

ACZ Sample ID: ***L21500-15***
Date Sampled: *11/04/14 13:06*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	1440		*	mg/Kg	1	5	11/21/14 15:27	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		3.1			t CaCO3/Kt	0.31	3.1	12/01/14 8:16	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:16	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-3.1			t CaCO3/Kt			12/01/14 8:16	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/22/14 1:43	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.8			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.8			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	88.1		*	%	0.1	0.5	11/20/14 6:48	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.05	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Sulfate		1	0.03	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Total		1	0.10		*	%	0.01	0.1	11/24/14 0:00	cra
Total Sulfur minus Sulfate		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 14:36	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 14:14	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 4:54	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 14:36	pta

Arizona license number: AZ0102

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-16***
Sample ID:	STS-PH-2014-FID18	Date Sampled:	*11/06/14 09:00*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	310		*	mg/Kg	1	5	11/21/14 15:30	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		2.8	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:16	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2.0			t CaCO3/Kt	1	5	12/01/14 8:16	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-0.8			t CaCO3/Kt			12/01/14 8:16	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/22/14 3:25	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.2			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.7			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	92.4		*	%	0.1	0.5	11/20/14 7:51	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur HNO3 Residue		1	0.01	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Organic Residual		1	0.01	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.06	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Sulfate		1	0.02	B	*	%	0.01	0.1	11/24/14 0:00	cra
Sulfur Total		1	0.09	B	*	%	0.01	0.1	11/24/14 0:00	cra
Total Sulfur minus Sulfate		1	0.07	B	*	%	0.01	0.1	11/24/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 14:50	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 14:28	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 5:56	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 14:50	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21500-17***
Sample ID:	STS-PH-2014-FID22	Date Sampled:	*11/05/14 13:30*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	378		*	mg/Kg	1	5	11/21/14 15:34	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		4.1			t CaCO3/Kt	0.31	3.1	12/01/14 8:16	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		9.0			t CaCO3/Kt	1	5	12/01/14 8:16	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		4.9			t CaCO3/Kt			12/01/14 8:16	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.9		*	%	0.1	0.5	11/22/14 5:08	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	6.9			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.9			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	92.3		*	%	0.1	0.5	11/20/14 8:54	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.10		*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.08	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.03	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.13		*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.10		*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 15:03	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 14:42	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 6:57	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 15:03	pta

Arizona license number: AZ0102

Freeport-McMoRan - Chino Mines Company

Project ID: ZN0000036K
Sample ID: STS-PH-2014-ERA2

ACZ Sample ID: ***L21500-18***
Date Sampled: *11/04/14 09:50*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	1000		*	mg/Kg	1	5	11/21/14 15:37	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		3.8			t CaCO3/Kt	0.31	3.1	12/01/14 8:16	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		5.0			t CaCO3/Kt	1	5	12/01/14 8:16	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		1.3			t CaCO3/Kt			12/01/14 8:16	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.5		*	%	0.1	0.5	11/22/14 8:32	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	6.0			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.7			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	90.1		*	%	0.1	0.5	11/20/14 9:57	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.08	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.06	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.04	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.12		*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.08	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 15:16	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 14:56	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 7:58	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 15:16	pta

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN0000036K
Sample ID: STS-PH-2014-FID28

ACZ Sample ID: ***L21500-19***
Date Sampled: *11/05/14 09:10*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	423		*	mg/Kg	1	5	11/21/14 15:40	aeb

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		1.9	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:16	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		41.0			t CaCO3/Kt	1	5	12/01/14 8:16	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		39.1			t CaCO3/Kt			12/01/14 8:16	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	4.1		*	%	0.1	0.5	11/20/14 12:15	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	7.3			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.8			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	90.1		*	%	0.1	0.5	11/20/14 11:00	mns
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.06	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.05	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.06	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.06	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				11/18/14 15:30	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				11/19/14 15:10	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 8:59	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2				*				11/18/14 15:30	pta

Arizona license number: AZ0102

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Freeport-McMoRan - Chino Mines Company ACZ Project ID: ***L21500***

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375105													
WG375105ICV	ICV	11/21/14 13:55	II141028-4	2		1.977	mg/L	99	90	110			
WG375105ICB	ICB	11/21/14 13:58				U	mg/L		-0.03	0.03			
WG374918PBS	PBS	11/21/14 14:11				U	mg/Kg		-3	3			
WG374918LCSS	LCSS	11/21/14 14:14	PCN46662	268		237.5	mg/Kg		219	317			
WG374918LCSSD	LCSSD	11/21/14 14:17	PCN46662	268		252.6	mg/Kg		219	317	6	20	
L21500-01MS	MS	11/21/14 14:24	II141030-2	50.4495	708	781.7	mg/Kg	146	75	125			M3
L21500-01MSD	MSD	11/21/14 14:27	II141030-2	50.4495	708	729.7	mg/Kg	43	75	125	7	20	M3

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375042													
L21500-09DUP	DUP	11/20/14 12:15			5.8	5.75	%				1	20	
WG375042PBS	PBS	11/20/14 12:15				U	%		-0.2	0.2			
L21500-19MS	MS	11/20/14 12:15	SI141024-2	3	4.1	7.13	%	101	70	130			
WG375042LCSS	LCSS	11/20/14 12:15	PCN45869	5.23		5.13	%	98	80	120			
WG375050													
WG375050PBS	PBS	11/20/14 19:03				U	%		-0.2	0.2			M1
WG375050LCSS	LCSS	11/20/14 20:46	PCN45868	4.66		4.7	%	101	80	120			M1
L21500-01DUP	DUP	11/21/14 0:10			.2	.23	%				14	20	M1 RA
L21500-02MS	MS	11/21/14 3:34	SI141024-1	1	.5	3.23	%	273	70	130			M1

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375075													
WG375075ICV	ICV	11/21/14 10:58	PCN45365	4		4	units	100	3.9	4.1			
L21500-01DUP	DUP	11/21/14 11:18			4.7	4.7	units				0	20	

Solids, Percent D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG374886													
WG374886PBS	PBS	11/19/14 14:00				U	%		-0.1	0.1			
L21500-01DUP	DUP	11/19/14 16:06			90.9	90.86	%				0	20	

Sulfur Organic Residual M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375163													
L21500-01DUP	DUP	11/24/14 16:36			U	U	%				0	20	RA
WG375164													
L21500-13DUP	DUP	11/24/14 16:48			U	.01	%				200	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375163													
L21500-01DUP	DUP	11/24/14 16:36			.02	.02	%				0	20	RA
WG375164													
L21500-13DUP	DUP	11/24/14 16:48			.07	.06	%				15	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375163													
L21500-01DUP	DUP	11/24/14 16:36			.01	.01	%				0	20	RA
WG375164													
L21500-13DUP	DUP	11/24/14 16:48			.03	.03	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375163													
WG375163PBS	PBS	11/24/14 8:00				U	%		-0.03	0.03			
WG375163LCSS	LCSS	11/24/14 10:09	PCN45915	4.07		3.91	%	96	80	120			
L21500-01MS	MS	11/24/14 14:27	PCN45351	1.1	.03	1.05	%	93	80	120			
L21500-01DUP	DUP	11/24/14 16:36			.03	.03	%				0	20	RA
WG375164													
WG375164PBS	PBS	11/24/14 8:00				U	%		-0.03	0.03			
WG375164LCSS	LCSS	11/24/14 10:12	PCN45915	4.07		4.16	%	102	80	120			
L21500-13MS	MS	11/24/14 14:36	PCN45351	1.1	.1	1.16	%	96	80	120			
L21500-13DUP	DUP	11/24/14 16:48			.1	.1	%				0	20	

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375163													
L21500-01DUP	DUP	11/24/14 16:36			.02	.02	%				0	20	RA
WG375164													
L21500-13DUP	DUP	11/24/14 16:48			.07	.07	%				0	20	RA

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-01	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-02	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-03	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-04	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-05	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-06	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-07	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-08	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-09	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-10	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-11	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-12	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375163	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-13	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-14	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-15	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-16	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-17	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21500-18	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375050	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21500-19	WG375105	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by AZ certificate #AZ0102.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Solids, Percent	D2216-80
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Solids, Percent	D2216-80
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN0000036K

ACZ Project ID: L21500
Date Received: 11/11/2014 09:58
Received By: ddp
Date Printed: 11/11/2014

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody complete and accurate?	X		
7) Were any changes made to the Chain of Custody prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits?			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/Hr)	Custody Seal Intact?
NA20759	4.8	17	Yes

Was ice present in the shipment container(s)?

`No - Wet or gel ice was not present in the shipment container(s).`

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc. L21500

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

ANALYSES REQUESTED *(attach list or use quote number)*

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Garett Ferguson
Are any samples NRC licensable material? Yes No

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA				
STS-PH-2014-FID37	11/5/14 1515	SO	1	x	x	x	x				
STS-PH-2014-ERA3	11/4/14 1100	SO	1	x	x	x	x				
STS-PH-2014-FID101	11/6/14 0843	SO	1	x	x	x	x				
STS-PH-2014-FID102	11/6/14 1100	SO	1	x	x	x	x				
STS-PH-2014-ERA4	11/5/14 1430	SO	1	x	x	x	x				
STS-PH-2014-ERA10	11/5/14 1235	SO	1	x	x	x	x				
STS-PH-2014-FID105	11/4/14 1734	SO	1	x	x	x	x				
STS-PH-2014-FID106	11/5/14 1130	SO	1	x	x	x	x				
STS-PH-2014-REFPLOT1	11/4/14 0855	SO	1	x	x	x	x				
STS-PH-2014-REFPLOT2	11/4/14 1545	SO	1	x	x	x	x				

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Matt F	11/6/14 1700		11·11·14 9:50

1/2

L21500 Chain of Custody

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc. L21500

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐
If yes, please include state forms. Results will be reported to PQL. NO ☒

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Garett Ferguson
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA					
STS-PH-2014-FID7	11/5/14 1200	SO	1	x	x	x	x					
STS-PH-2014-FID8	11/6/14 1000	SO	1	x	x	x	x					
STS-PH-2014-FID10	11/9/14 1500	SO	1	x	x	x	x					
STS-PH-2014-FID15	11/4/14 1238	SO	1	x	x	x	x					
STS-PH-2014-FID16	11/4/14 1306	SO	1	x	x	x	x					
~~STS-PH-2014-FID17~~	[illegible]	[illegible]	~~1~~	~~x~~	~~x~~	~~x~~	~~x~~					
STS-PH-2014-FID18	11/6/14 0900	SO	1	x	x	x	x					
STS-PH-2014-FID22	11/5/14 1330	SO	1	x	x	x	x					
STS-PH-2014-ERA2	11/4/14 0950	SO	1	x	x	x	x					
STS-PH-2014-FID28	11/5/14 0910	SO	1	x	x	x	x					

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	11/6/14 1700		11.11.14 9:50

2/2

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

December 01, 2014

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

cc: Matthew Barkley

Bill to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

Project ID: ZN0000036K
ACZ Project ID: L21501

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on November 11, 2014. This project has been assigned to ACZ's project number, L21501. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L21501. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 31, 2014. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

ACCREDITED IN ACCORDANCE WITH nelac

ACIL

Inorganic Analytical Results

Freeport-McMoRan - Chino Mines Company
Project ID: ZN0000036K
Sample ID: STS-PH-2014-REFPLOT3

ACZ Sample ID: ***L21501-01***
Date Sampled: *11/04/14 14:05*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	102	1540		*	mg/Kg	1	5	11/22/14 2:40	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		1.9	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:25	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:25	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-1.9			t CaCO3/Kt			12/01/14 8:25	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/20/14 12:15	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	5.4			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	20.0			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	87.8		*	%	0.1	0.5	11/18/14 19:40	pta
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.05	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.05	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.06	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.05	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								11/18/14 15:00	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								11/19/14 15:24	mns
Digestion - Hot Plate	M3050B ICP								11/19/14 22:41	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/18/14 15:00	pta

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K
Sample ID:	STS-PH-2014-REFPLOT4
ACZ Sample ID:	***L21501-02***
Date Sampled:	*11/04/14 10:25*
Date Received:	*11/11/14*
Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	1020		*	mg/Kg	1	5	11/22/14 2:46	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		3.4			t CaCO3/Kt	0.31	3.1	12/01/14 8:25	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		4.0			t CaCO3/Kt	1	5	12/01/14 8:25	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		0.6			t CaCO3/Kt			12/01/14 8:25	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.4	B	*	%	0.1	0.5	11/20/14 12:15	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.9			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.9			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	88.9		*	%	0.1	0.5	11/18/14 22:50	pta
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.10		*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.08	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.11		*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.10		*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								11/18/14 15:07	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								11/19/14 15:38	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 0:34	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/18/14 15:07	pta

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN0000036K
Sample ID: STS-PH-2014-ERA13

ACZ Sample ID: ***L21501-03***
Date Sampled: *11/05/14 10:00*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	282		*	mg/Kg	1	5	11/22/14 2:56	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.6	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:25	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:25	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-0.6			t CaCO3/Kt			12/01/14 8:25	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/20/14 12:15	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	5.5			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	20.2			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	92.2		*	%	0.1	0.5	11/19/14 5:10	pta
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								11/18/14 15:15	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								11/19/14 15:52	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 6:13	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/18/14 15:15	pta

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company

Project ID:	ZN0000036K	ACZ Sample ID:	***L21501-04***
Sample ID:	DUP1	Date Sampled:	*11/04/14 00:00*
		Date Received:	*11/11/14*
		Sample Matrix:	*Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	685		*	mg/Kg	1	5	11/22/14 2:59	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.6	B		t CaCO3/Kt	0.31	3.1	12/01/14 8:25	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		0.0			t CaCO3/Kt	1	5	12/01/14 8:25	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-0.6			t CaCO3/Kt			12/01/14 8:25	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1		U	*	%	0.1	0.5	11/20/14 12:15	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	4.9			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.9			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	90.9		*	%	0.1	0.5	11/19/14 8:20	pta
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1		U	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								11/18/14 15:22	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								11/19/14 16:06	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 8:07	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/18/14 15:22	pta

** Please refer to Qualifier Reports for details.*

Freeport-McMoRan - Chino Mines Company
Project ID: ZN0000036K
Sample ID: DUP2

ACZ Sample ID: ***L21501-05***
Date Sampled: *11/04/14 00:00*
Date Received: *11/11/14*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total (3050)	M6010B ICP	101	291		*	mg/Kg	1	5	11/22/14 3:08	jjc

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		6.6			t CaCO3/Kt	0.31	3.1	12/01/14 8:26	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		2.0			t CaCO3/Kt	1	5	12/01/14 8:26	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-4.6			t CaCO3/Kt			12/01/14 8:26	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	1	0.2	B	*	%	0.1	0.5	11/20/14 12:15	spl
pH, Corrosivity	M9045D/M9040C									
pH		1	3.9			units	0.1	0.1	11/21/14 0:00	pta
pH measured at		1	19.9			C	0.1	0.1	11/21/14 0:00	pta
Solids, Percent	D2216-80	1	91.8		*	%	0.1	0.5	11/19/14 11:30	pta
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.12		*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.10		*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Sulfate		1	0.09	B	*	%	0.01	0.1	11/25/14 0:00	cra
Sulfur Total		1	0.21		*	%	0.01	0.1	11/25/14 0:00	cra
Total Sulfur minus Sulfate		1	0.12		*	%	0.01	0.1	11/25/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								11/18/14 15:30	pta
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								11/19/14 16:20	mns
Digestion - Hot Plate	M3050B ICP								11/20/14 10:00	pta
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/18/14 15:30	pta

** Please refer to Qualifier Reports for details.*

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375135													
WG375135ICV	ICV	11/22/14 2:14	II141028-4	2		1.965	mg/L	98	90	110			
WG375135ICB	ICB	11/22/14 2:17				U	mg/L		-0.03	0.03			
WG374928PBS	PBS	11/22/14 2:30				U	mg/Kg		-3	3			
WG374928LCSS	LCSS	11/22/14 2:34	PCN46662	268		245.4	mg/Kg		219	317			
WG374928LCSSD	LCSSD	11/22/14 2:37	PCN46662	268		240.6	mg/Kg		219	317	2	20	
L21501-02MS	MS	11/22/14 2:49	II141030-2	50.4495	1020	1039.3	mg/Kg	38	75	125			M3
L21501-02MSD	MSD	11/22/14 2:52	II141030-2	50.4495	1020	996.9	mg/Kg	-46	75	125	4	20	M3

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3 - Modified (No Heat)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375051													
WG375051PBS	PBS	11/20/14 12:15				U	%		-0.2	0.2			
L21501-01DUP	DUP	11/20/14 12:15			U	U	%				0	20	RA
L21501-02MS	MS	11/20/14 12:15	SI141024-1	1	.4	1.2	%	80	70	130			
WG375051LCSS	LCSS	11/20/14 12:15	PCN45868	4.66		4.75	%	102	80	120			

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375076													
WG375076ICV	ICV	11/21/14 11:00	PCN45365	4		4	units	100	3.9	4.1			
L21501-03DUP	DUP	11/21/14 13:00			5.5	5.5	units				0	20	

Solids, Percent D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG374888													
WG374888PBS	PBS	11/18/14 16:30				U	%		-0.1	0.1			
L21501-02DUP	DUP	11/19/14 2:00			88.9	88.93	%				0	20	

Sulfur Organic Residual M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375164													
L21500-13DUP	DUP	11/24/14 16:48			U	.01	%				200	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375164													
L21500-13DUP	DUP	11/24/14 16:48			.07	.06	%				15	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375164													
L21500-13DUP	DUP	11/24/14 16:48			.03	.03	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375164													
WG375164PBS	PBS	11/24/14 8:00				U	%		-0.03	0.03			
WG375164LCSS	LCSS	11/24/14 10:12	PCN45915	4.07		4.16	%	102	80	120			
L21500-13MS	MS	11/24/14 14:36	PCN45351	1.1	.1	1.16	%	96	80	120			
L21500-13DUP	DUP	11/24/14 16:48			.1	.1	%				0	20	

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375164													
L21500-13DUP	DUP	11/24/14 16:48			.07	.07	%				0	20	RA

Inorganic Extended Qualifier Report

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L21501***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21501-01	WG375135	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG375051	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21501-02	WG375135	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG375051	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21501-03	WG375135	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG375051	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21501-04	WG375135	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG375051	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L21501-05	WG375135	Copper, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6010B ICP	ZH	Serial Dilution exceeded the acceptance criteria. Matrix interference [physical or chemical] is suspected.
	WG375051	Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG375164	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3 - Modified (No Heat)
Solids, Percent	D2216-80
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN0000036K

ACZ Project ID: L21501
Date Received: 11/11/2014 09:58
Received By: ddp
Date Printed: 11/11/2014

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody or other directive shipping papers present?	X		▨
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody complete and accurate?	X		▨
7) Were any changes made to the Chain of Custody prior to ACZ receiving the samples?		X	▨

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		▨
9) Are all labels on containers and are they intact and legible?	X		▨
10) Do the sample labels and Chain of Custody match for Sample ID, Date, and Time?	X		▨
11) For preserved bottle types, was the pH checked and within limits?			X
12) Is there sufficient sample volume to perform all requested work?	X		▨
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		▨
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		▨

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

```
Cooler Id      Temp (°C)      Rad (µR/Hr)      Custody Seal Intact?
---------      ---------      -----------      --------------------
NA20759        4.8            17               Yes
```

Was ice present in the shipment container(s)?

```
No - Wet or gel ice was not present in the shipment container(s).
```

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc. L21501

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley
Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com
Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson
Company: Chino Mines Company
E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023
Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒
If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:
Project/PO #:
Reporting state for compliance testing:
Sampler's Name: Garett Ferguson
Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA					
1. STS-PH-2014-REFPLOT3	11/4/14 1405	SO	1	x	x	x	x					
2. STS-PH-2014-REFPLOT4	11/4/14 1025	SO	1	x	x	x	x					
3. STS-PH-2014-ERA13	11/5/14 1000	SO	1	x	x	x	x					
4. DUP1	—	SO	1	x	x	x	x					
5. DUP2	—	S[illegible]	1			x						
RINSATE	—	SW			X	X						

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Mat	11/6/14 1700		11.11.14 9:58

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

L21501 Chain of Custody

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

November 24, 2014

Report to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
PO Box 10
Bayard, NM 88023

cc: Matthew Barkley

Bill to:
Pam Pinson
Freeport-McMoRan - Chino Mines Company
P.O. Box 13308
Phoenix, AZ 85002-3308

Project ID: ZN0000036K
ACZ Project ID: L21502

Pam Pinson:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on November 11, 2014. This project has been assigned to ACZ's project number, L21502. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L21502. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 24, 2014. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Freeport-McMoRan - Chino Mines Company

Project ID: ZN0000036K
Sample ID: RINSATE1

ACZ Sample ID: ***L21502-01***
Date Sampled: *11/05/14 00:00*
Date Received: *11/11/14*
Sample Matrix: *Surface Water*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M200.2 ICP-MS				*				11/19/14 20:00	scp

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Copper, total	M200.8 ICP-MS	1	0.0072			mg/L	0.0005	0.003	11/21/14 1:26	msh

Arizona license number: AZ0102

REPIN.02.06.05.01

** Please refer to Qualifier Reports for details.*

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click: http://www.acz.com/public/extquallist.pdf

Copper, total M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG375082													
WG375082ICV	ICV	11/21/14 0:15	MS141027-2	.05		.05143	mg/L	103	90	110			
WG375082ICB	ICB	11/21/14 0:17				U	mg/L		-0.0015	0.0015			
WG374983LRB	LRB	11/21/14 0:20				U	mg/L		-0.0011	0.0011			
WG374983LFB	LFB	11/21/14 0:22	MS141103-2	.05		.04864	mg/L	97	85	115			
L21496-04LFM	LFM	11/21/14 0:59	MS141103-2	.05	.0009	.04516	mg/L	89	70	130			
L21496-04LFMD	LFMD	11/21/14 1:01	MS141103-2	.05	.0009	.04596	mg/L	90	70	130	2	20	

Inorganic Extended Qualifier Report

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L21502***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L21502-01	WG374983	Total Hot Plate Digestion	M200.2 ICP-MS	Q5	Sample received with inadequate chemical preservation. Additional preservation performed by the laboratory.

Certification Qualifiers

Freeport-McMoRan - Chino Mines Company

ACZ Project ID: ***L21502***

No certification qualifiers associated with this analysis

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Freeport-McMoRan - Chino Mines Company
ZN0000036K

ACZ Project ID: L21502
Date Received: 11/11/2014 09:58
Received By: ddp
Date Printed: 11/11/2014

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody or other directive shipping papers present?	X		▨
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody complete and accurate?	X		▨
7) Were any changes made to the Chain of Custody prior to ACZ receiving the samples?		X	▨

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		▨
9) Are all labels on containers and are they intact and legible?	X		▨
10) Do the sample labels and Chain of Custody match for Sample ID, Date, and Time?	X		▨
11) For preserved bottle types, was the pH checked and within limits?	X		
12) Is there sufficient sample volume to perform all requested work?	X		▨
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?		X	▨
`L21502-01 : A Red container not received and a new container created from the White .`			
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		▨

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

```
Cooler Id      Temp (°C)      Rad (µR/Hr)      Custody Seal Intact?
---------      ---------      -----------      --------------------
NA20759        4.8            17               Yes
```

Was ice present in the shipment container(s)?

`No - Wet or gel ice was not present in the shipment container(s).`

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Freeport-McMoRan - Chino Mines Company
ZN0000036K

ACZ Project ID:	L21502
Date Received:	11/11/2014 09:58
Received By:	ddp
Date Printed:	11/11/2014

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

21502

CHAIN of CUSTODY

Report to:

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

Copy of Report to:

Name: Matthew Barkley

Company: ARCADIS

E-mail: Matthew.Barkley@arcadis-us.com

Telephone: 303-231-9115 ext 157

Invoice to:

Name: Pam Pinson

Company: Chino Mines Company

E-mail: Pamela_Pinson@FMI.com

Address: P.O. Box 10
Bayard, NM 88023

Telephone: 575-912-5213

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for CO DW Compliance Monitoring? YES ☐ NO ☒

If yes, please include state forms. Results will be reported to PQL.

PROJECT INFORMATION

Quote #:

Project/PO #:

Reporting state for compliance testing:

Sampler's Name: Garett Ferguson

Are any samples NRC licensable material? Yes No

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	soil sieved to < 2mm	pH	Total CU	ABA					
STS-PH-2014-REFPLOT3	11/4/14 1405	SO	1	x	x	x	x					
STS-PH-2014-REFPLOT4	11/4/14 1025	SO	1	x	x	x	x					
STS-PH-2014-ERA13	11/5/14 1000	SO	1	x	x	x	x					
DUP1	—	SO	1	x	x	x	x					
DUP2	—	S[illegible]	1			x						
RINSATE	—	SW			X	X						

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please send to Sheri Fling at URS for validation. Sieve all soil samples to <2 mm prior to analysis. Soil should be reported on a dry weight basis.
Methods:
pH - 9045C, Total Copper - 6010B

COPY

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
	11/6/14 1700		11.11.14 9:58

FRMAD050.01.15.09 White - Return with sample. Yellow - Retain for your records.

L21502 Chain of Custody

Laboratory Data Package

November 30, 2009

Prepared for:

ARCADIS

Prepared by:
Laboratory for Environmental and Geological Studies (LEGS)
University of Colorado
Benson Earth Science
2200 Colorado Ave.
Boulder, CO 80309

Table of Contents

Statement of Work

ARCADIS provided LEGS with 24 samples on 10/20/09 (see attached COC). From these, 12 samples were selected by the client for As-Cd-Cu-Fe *in vitro* analyses and EMPA Cu speciation. Another 12 samples were selected for a "bird *in vitro*" analyses for copper. All data is provided on enclosed CD along with a brief review of the methodology used.

Speciation Methodology

The Laboratory for Environmental and Geological Studies (LEGS) at the University of Colorado, Department of Geological Sciences contains the following equipment was used for this project:

> A JOEL 8600 electron microprobe, with four wavelength dispersive detectors (TAP, LIF, PET, LdB, LdC and Ld1 crystals) and an energy dispersive detector. The system includes backscatter and secondary detectors for imaging and can produce both x-ray spectra and photomicrographs in TIF format. Certified mineral standards for all elements of concern are available for EMPA standardization. SOP for metal speciation is available at our website:
>
> http://www.colorado.edu/GeolSci/legs/speciation.html

Representative backscatter photomicrographs (BSPM) illustrating sample characteristics were acquired and EDS spectra acquired and it is recommended the client review these images. Data from EMPA will be summarized using two methods as illustrated below.

The first method is the determination of **FREQUENCY OF OCCURRENCE**. This is calculated by summing the longest dimension of all the copper-bearing phases observed and then dividing each phase by the total.

Equation 1.0 will serve as an example to the calculation for an copper-bearing compound. Other metals follow a similar calculation.

F_{Cu} - Frequency of occurrence of copper in a single phase.

PLD - An individual particles longest dimension

$$F_{Cu} \text{ in phase-1} = \frac{3\ (PLD)_{\text{phase-1}}}{3\ (PLD)_{\text{phase-1}} + 3\ (PLD)_{\text{phase-2}} + 3\ (PLD)_{\text{phase-n}}}$$

$$\%F_{Cu} \text{ in phase-1} = F_{Cu} \text{ in phase-1} * 100$$

This data thus illustrates which copper-bearing phase(s) are the most commonly observed in the sample or relative volume percent.

The second calculation used in this report is the determination of **RELATIVE COPPER MASS** of a metal-bearing phase. These data are calculated (using arsenic as an example) by substituting the PLD term in the equation above with the value of M_{Cu}. This term is calculated as defined below.

M_{Cu} - Mass of copper in a phase

SG - Specific Gravity of a phase

ppm_{Cu} - Concentration in ppm of copper in phase

$$M_{Cu} = F_{Cu} * SG * ppm_{Cu}$$

The advantage in reviewing the RELATIVE COPPER MASS determinations is that it gives one information as to which metal-bearing phase(s) in a sample are likely to control the total bulk concentration for copper. As an example, PHASE-1 may by relative volume comprise 98% of the sample, however it has a low specific gravity and contains only 1000 ppm copper, while PHASE-2 comprises 2% of the sample, has a high specific gravity and contains 850000 ppm of copper. In this example it is PHASE-2 that is the dominant source of copper to the sample.

Sample Preparation

1) Logging the samples of which polished mounts will be prepared

2) Inspection of all plastic cups, making sure each is clean and dry

3) Labeling each "mold" with its corresponding sample number.

4) All samples will be split to produce a homogeneous 1-4 gram sample.

5) Mixing epoxy resin and hardener according to manufacturer's directions.

6) Pour 1 gram of sample into mold. Double checking to make sure sample numbers on mold and sample match. Pouring epoxy into mold to just cover sample grains.

7) Using a new wood stirring stick with each sample, carefully blend epoxy and grains so as to coat all grains with epoxy.

8) Setting molds to cure at ROOM TEMPERATURE in a clean restricted area. Adding labels with sample numbers and covering with more epoxy resin. Leaving to cure completely at room temperature.

9) One at a time, removing each sample from its mold and grinding flat the back side of the mount.

10) Using 600 grit wet abrasive paper stretched across a grinding wheel for removing the bottom layer and exposing as many mineral grains as possible. Follow with 1000 grit paper.

11) Start polishing with 15μ oil based diamond paste on a polishing paper fixed to a lap. Using paper instead of cloth minimizes relief.

12) Next use 6 μ diamond polish on a similar lap.

13) Finally polish the sample with 1μ oil based diamond past on polishing paper. Followed by .05 μ alumina in water suspension. The quality should be checked after each step. Typical polishing times are 30 minutes for 15μ, 20 minutes for 6μ, 15 minutes for 1μ and 10 minutes for.05μ.

NOTE: use low speed on the polishing laps to avoid "plucking" of sample grains.

14) Samples should be completely cleaned in an ultrasonic cleaner with isopropyl alcohol or similar solvent to remove oil and finger prints.

15) To insure that no particles of lead are being cross contaminated with sample preparation procedures, a blank epoxy only) mold will be made every 50th sample following all of the above procedures. This mold will then be speciated along with the other samples.

16) Each sample be carbon coated. Once coated the samples should be stored in a clean, dry environment with the carbon surface protected from scratches or handling.

POINT COUNTING

Counts are made by traversing each sample from left-to-right and top-to-bottom. The amount of vertical movement for each traverse would depend on magnification and CRT (cathode-ray tube) size. This movement should be minimized so that NO portion of the sample is missed when the end of a traverse is reached. Two magnification settings should be used. One ranging from 40-100X and a second from 300-600X. The last setting will allow one to find the smallest identifiable (1-2 micron) phases.

The portion of the sample examined in the second pass, under the higher magnification, will depend on the time available, the number of copper-bearing particles, and the complexity of metal mineralogy. A maximum of 8 hours will be spent per sample.

Speciation Results

There is no single species of copper that dominates the samples studied. However, four species of copper are found more often; FeOOH, Cu-FeO, Cubanite ($CuFe_2S_3$) and Bornite (Cu_5FeS_4) in the studied samples, Figures 1-6. The FeOOH phases ranges in size from 7 to 19 microns with an average copper concentration of 2.6 wt.%. The Cu-FeO phases ranges in size from 10 to 42 microns with an average copper concentration of 22 wt.%. Cubanite ranges in size from 4 to 60 microns with a copper concentration of 23.3 wt.% , while bornite ranges in size from 13 to 78 microns with a copper concentration of 63 wt.%.

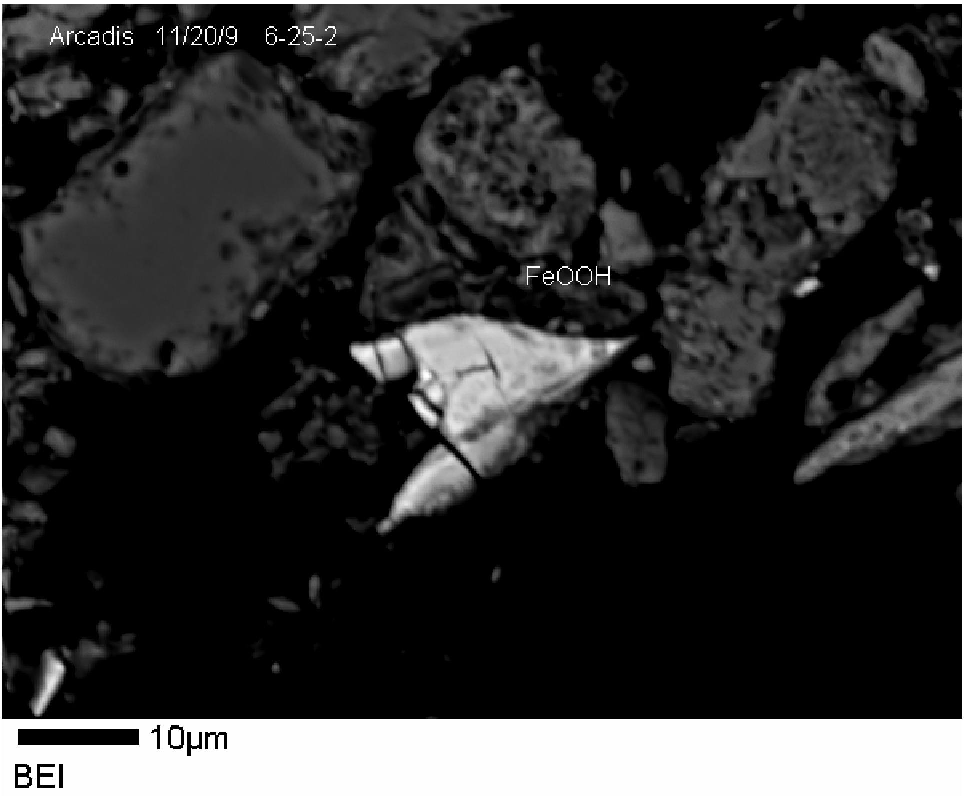
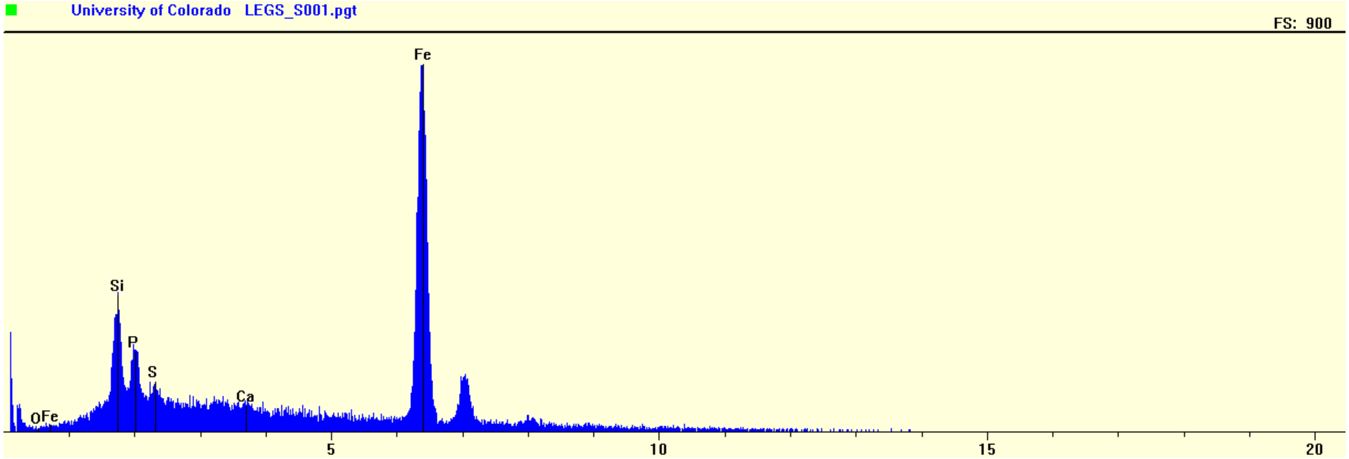

Arcadis 11/20/9 6-25-2
FeOOH
10μm
BEI

Figure 1.


University of Colorado LEGS_S001.pgt
FS: 900
Fe
Si
P
S
Ca
OFe
5
10
15
20

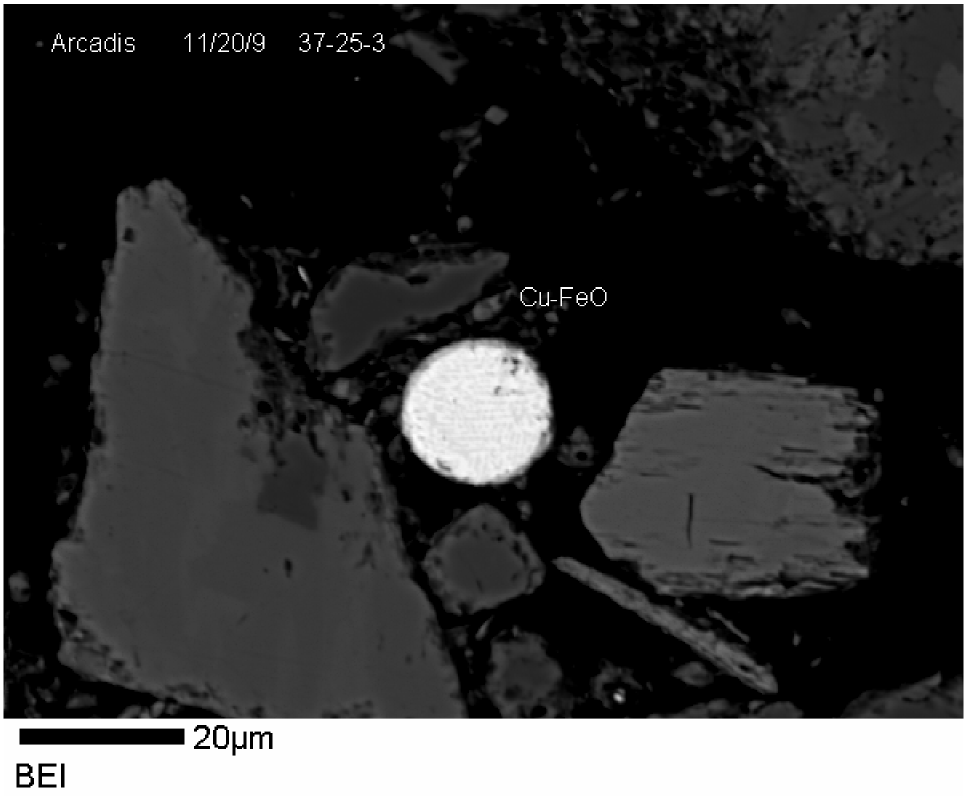
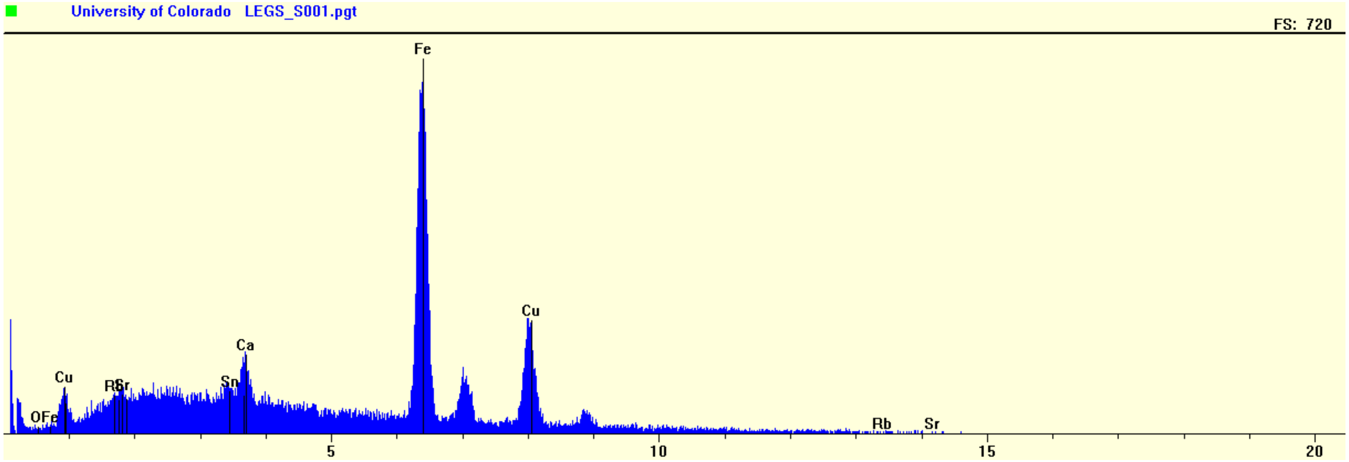

Arcadis 11/20/9 37-25-3
Cu-FeO
20µm
BEI

Figure 2.


University of Colorado LEGS_S001.pgt
FS: 720
Fe
Cu
Ca
Cu
RbSr
Sn
OFe
Rb
Sr
5
10
15
20

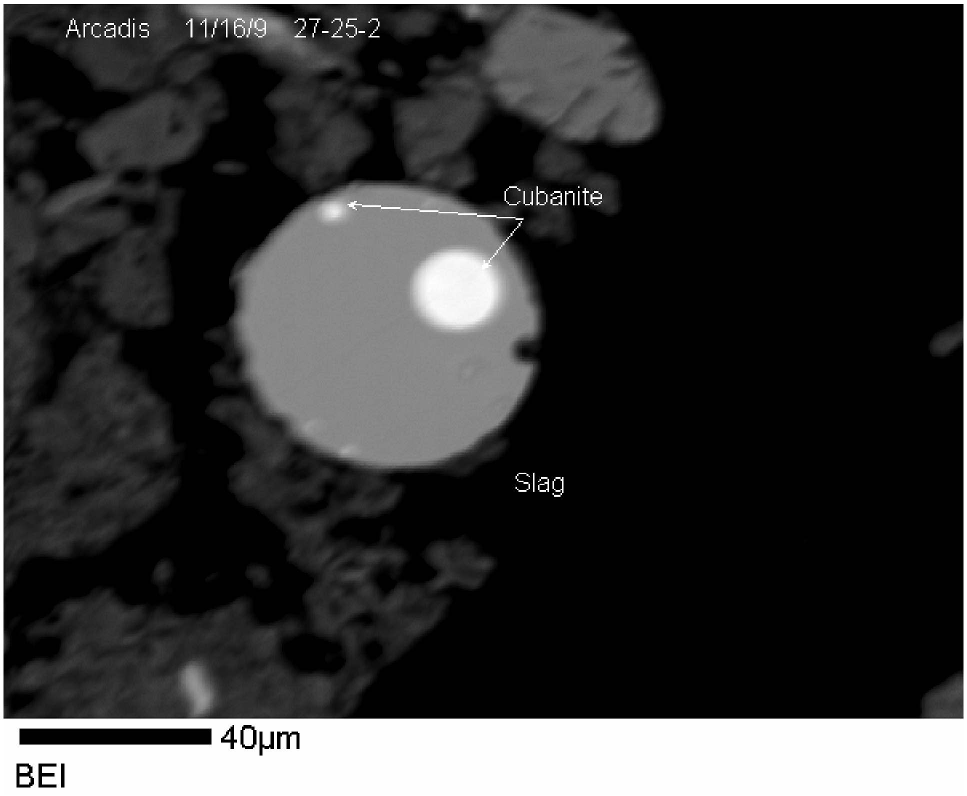
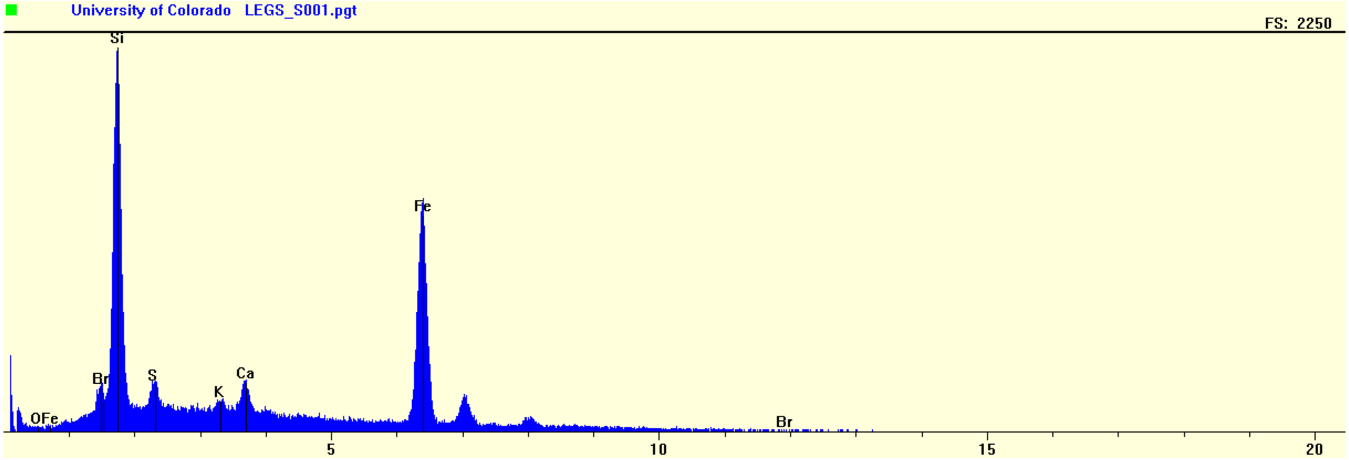

Arcadis 11/16/9 27-25-2
Cubanite
Slag
40µm
BEI

Figure 3.


University of Colorado LEGS_S001.pgt
FS: 2250
Si
Fe
Br
S
K
Ca
OFe
Br
5
10
15
20

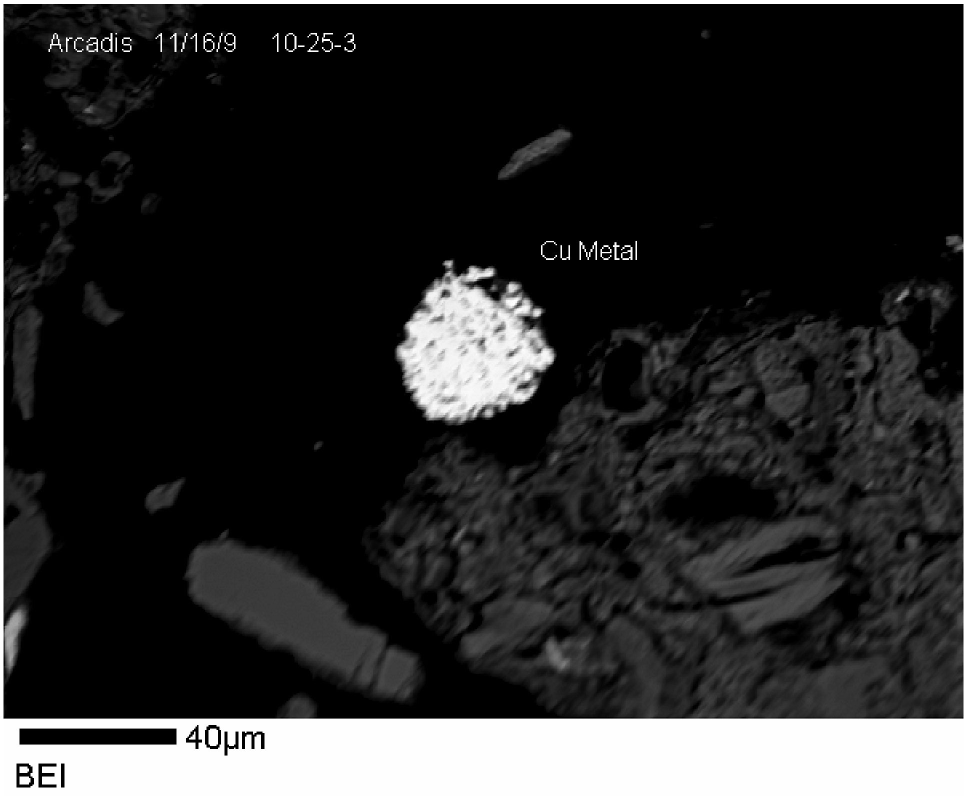
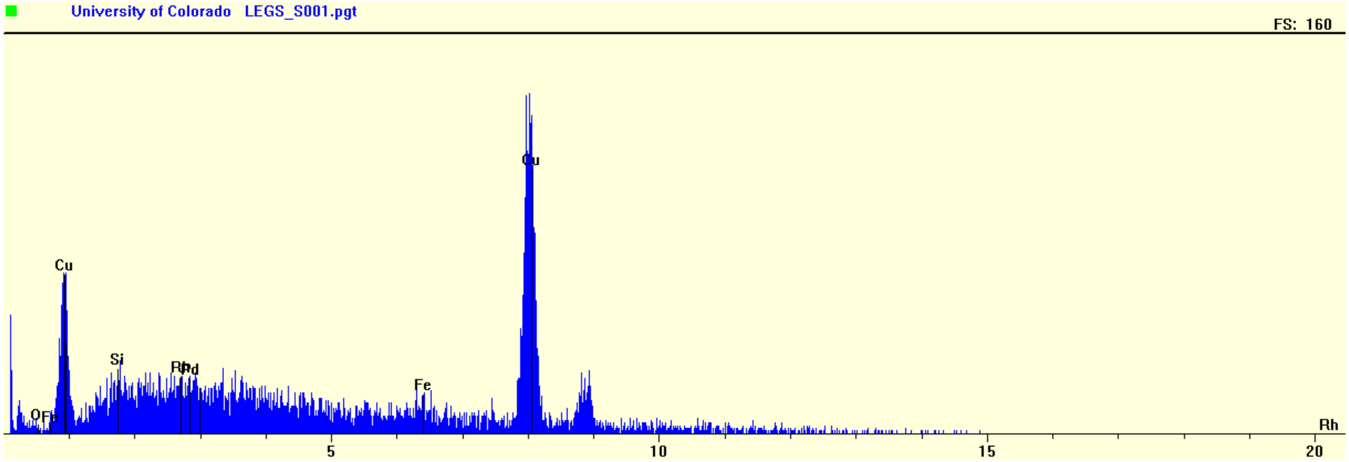

Arcadis 11/16/9 10-25-3
Cu Metal
40µm
BEI

Figure 4.


University of Colorado LEGS_S001.pgt
FS: 160
Cu
O
Fe
Cu
Si
Rh
Pd
Fe
Rh
5
10
15
20

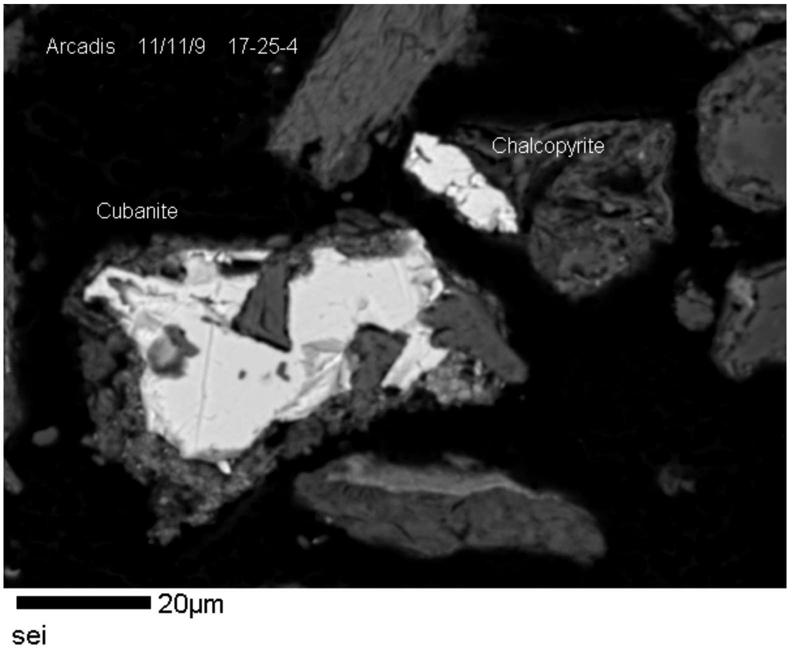
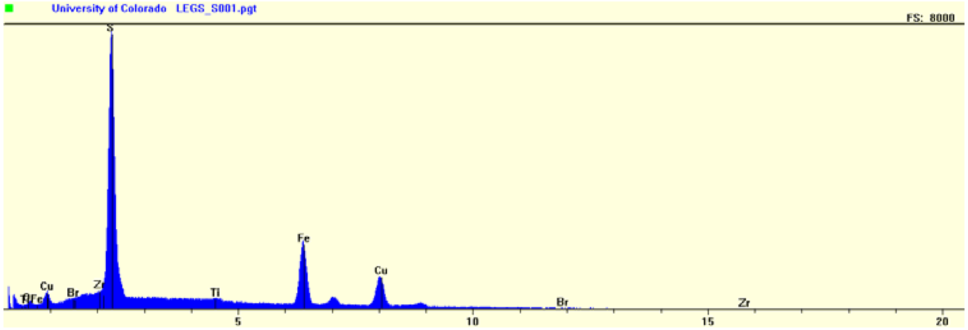
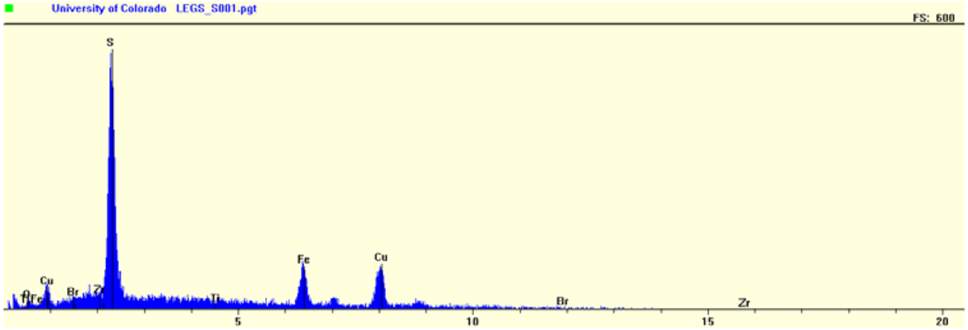

Arcadis 11/11/9 17-25-4
Chalcopyrite
Cubanite
20µm
sei

Figure 5.


University of Colorado LEGS_S001.pgt
FS: 8000
S
Fe
Cu
Cu
Br
Zr
Ti
Br
Zr
5
10
15
20


University of Colorado LEGS_S001.pgt
FS: 600
S
Fe
Cu
Cu
Br
Zr
Ti
Br
Zr
5
10
15
20

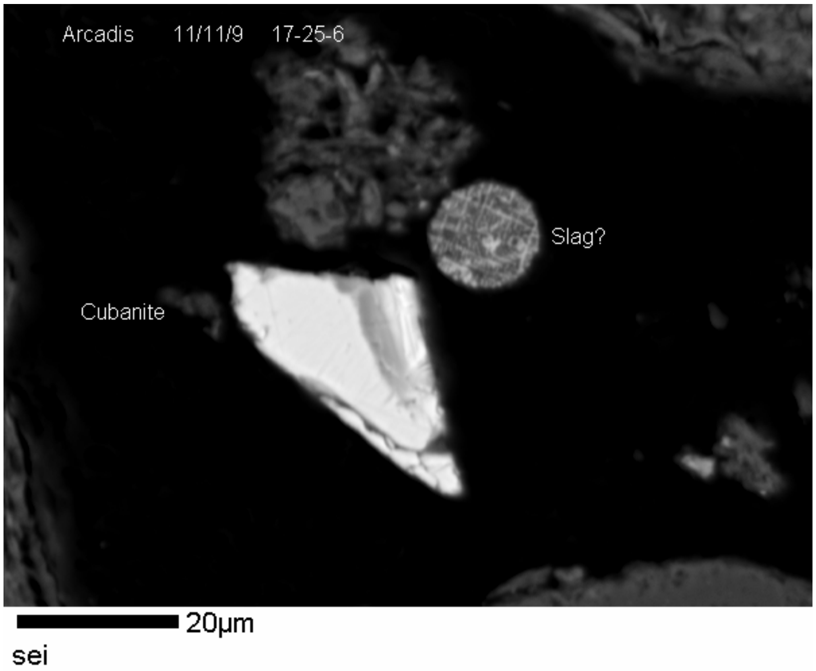
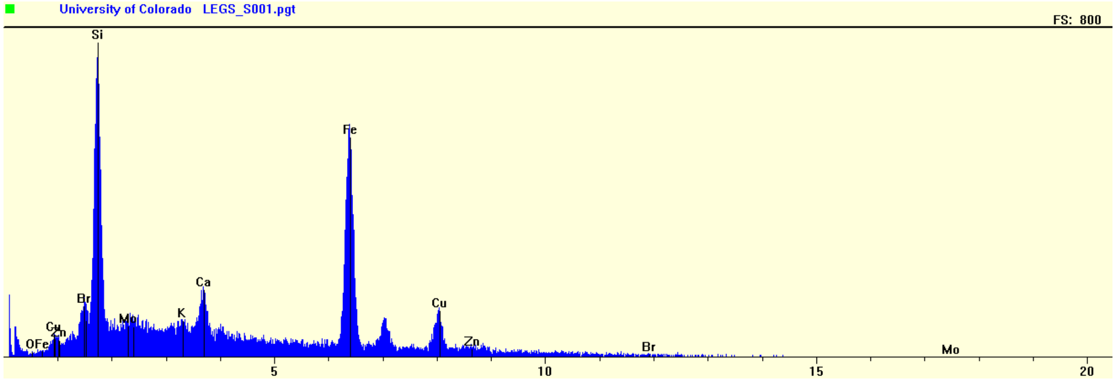
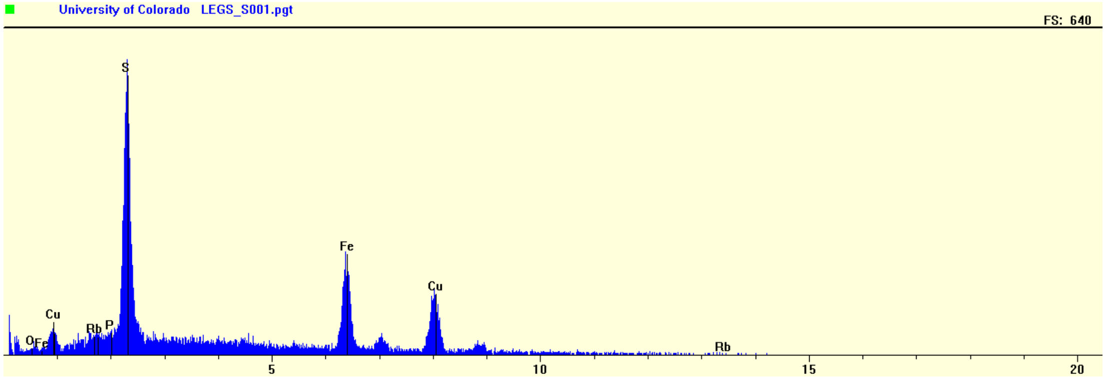

Arcadis 11/11/9 17-25-6
Slag?
Cubanite
20µm
sei

Figure 6.


University of Colorado LEGS_S001.pgt
FS: 800
Si
Fe
Ca
Br
Cu
Zn
Mo
K
O
Fe
Cu
Zn
Br
Mo
5
10
15
20


University of Colorado LEGS_S001.pgt
FS: 640
S
Fe
Cu
Cu
O
Fe
Rb
P
Rb
5
10
15
20

In Vitro Bioassay

Arsenic relative bioavailabilty, was determined using the method developed at the University of Colorado, Boulder and calibrated to EPA's Region VIII Swine Model Medlin and Drexler, 1996, Medlin, 1997, Drexler and Brattin 2007. The method has a high level of correlation to the Swine Model for lead (r=0.96) however, at present the correlation for arsenic is not as good (r=0.76). Based on these data it is recommended that one interpret arsenic bioavailability results with greater caution. All additional metals requested by ARCADIS have NO animal data for calibration. The "bird *in vitro*" method was provided by ARCADIS.

The method follows a carefully designed laboratory SOP, which is available on request. The procedure uses 1.0 grams of the <250µm size fraction, this material is placed in 125ml wide-mouth HDPE bottles along with 100ml of 1.5 pH stomach solution. The mixture is rotated end-on-end at 37ºC in a water bath for one hour. After one hour 10ml of sample is removed, filtered (0.45µm), and analyzed for lead and/or arsenic following Methods 6010B, 6020, or 7061A. Results from this extraction procedure are then used to calculated bioavailable lead and/or arsenic from the bulk <250µm concentrations.

Quality assurance and a more complete SOP can be obtained at our web site:

http://www.colorado.edu/geolsci/legs

APPENDIX I

2

30065538.000_ .0000 3
FMI Chino, Hurley NM
Drexler
Rebecca Lindeman, ARCADIS
K. Thompson ARCADIS
C. Meyer, ARCADIS

			Human test for Cd, As, Cu, Fe	Bird test for Cu
• FID 06-25 0-6"	S	6/18/09 0955		x
• FID 34-25 0-1"	S	6/18/09 1228	x	
• FID 34-25 0-6"	S	6/18/09 1230		x
• FID [illegible]	[illegible]	[illegible]	x	
• [illegible]	[illegible]	[illegible]		x
• FID [illegible]	S	[illegible]	x	
• FID [illegible]	[illegible]	[illegible]		x
• FID 08-25 0-1"	S	10/7/09 1256	X	
• FID 08-25 0-6"	S	10/7/09 1258		X

sieve bird samples to <2,000 μm; sieve human samples to <250 μm
Call Carolyn Meyer, ARCADIS at 303-231-9115 ext 124 if questions on analysis
X FedEx

B0063538.0002.00003
FMI Chino, Hurley NM
Drexler
Rebecca Lindeman, ARCADIS
K. Thompson, ARCADIS

			Human test for Cd, As, Cu, Fe	Bird test for Cu
• FID 21-25 0-1"	S	6/19/09 1452	X	
• FID 21-25 0-6"	S	6/19/09 1455		X
• FID 20-25 0-6"	S	6/19/09 1025		X
• FID 20-25 0-1"	S	6/19/09 1023	X	
• FID 26-25 0-1"	S	6/19/09 1127	X	
• FID 26-25 0-6"	S	6/19/09 1130		X
• FID 10-25 0-1"	S	6/19/09 0935	X	
• FID 10-25 0-6"	S	6/19/09 0938		X
• FID 17-25 0-1"	S	6/18/09 1539	X	
• FID 17-25 0-6"	S	6/18/09 1545		X
• FID 27-25 0-1"	S	6/18/09 1405	X	
• FID 27-25 0-6"	S	6/18/09 1408		X
• FID 12-25 0-1"	S	6/18/09 1525	X	
• FID 12-25 0-6"	S	6/18/09 1527		X
• FID 06-25 0-1"	S	6/18/09 0950	X	

sieve bird samples to <2,000 um ; sieve human samples to <250 um
Call Carolyn Meyer, ARCADIS at 303-231-9115 ext 124 if questions on analysis.
X FedEx

SPECIATION FIGURES

Figure No.
1a

Sample:
FID 6

Description:
Micrograph 1

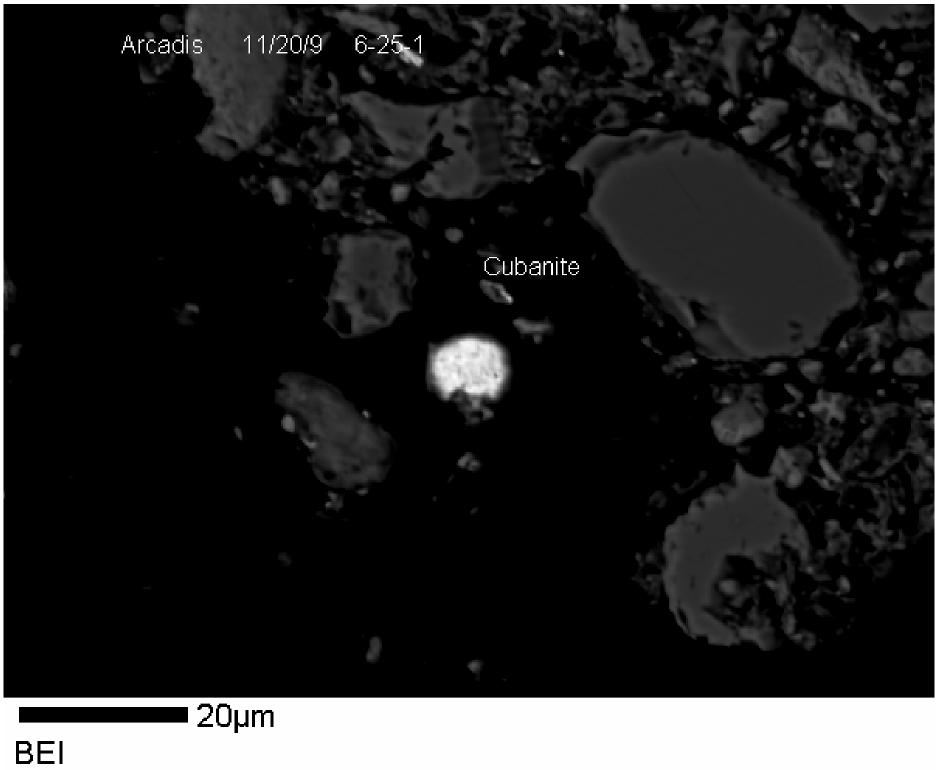
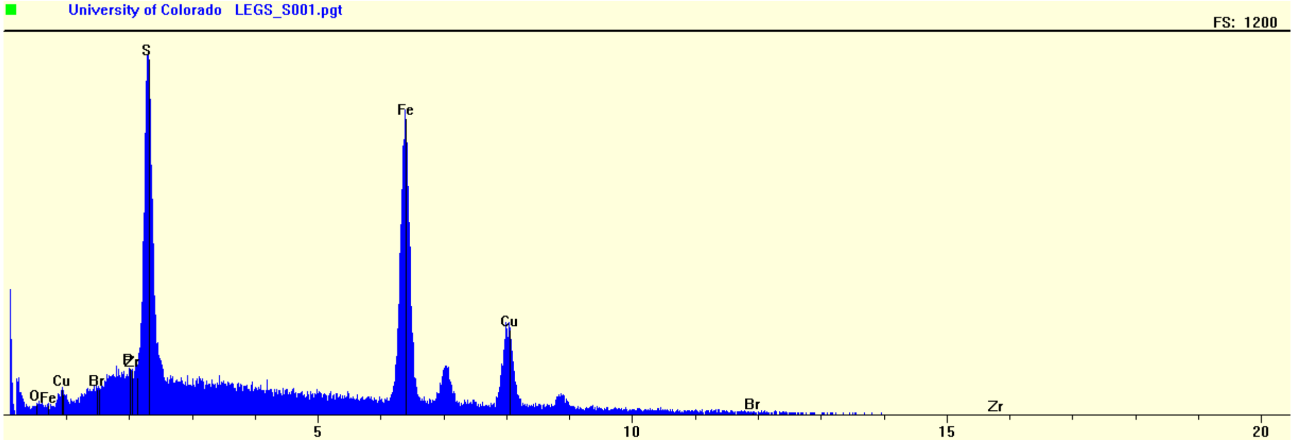


Figure No.
1b

Sample:
FID 6

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
1c

Sample:
FID 6

Description:
Micrograph 2

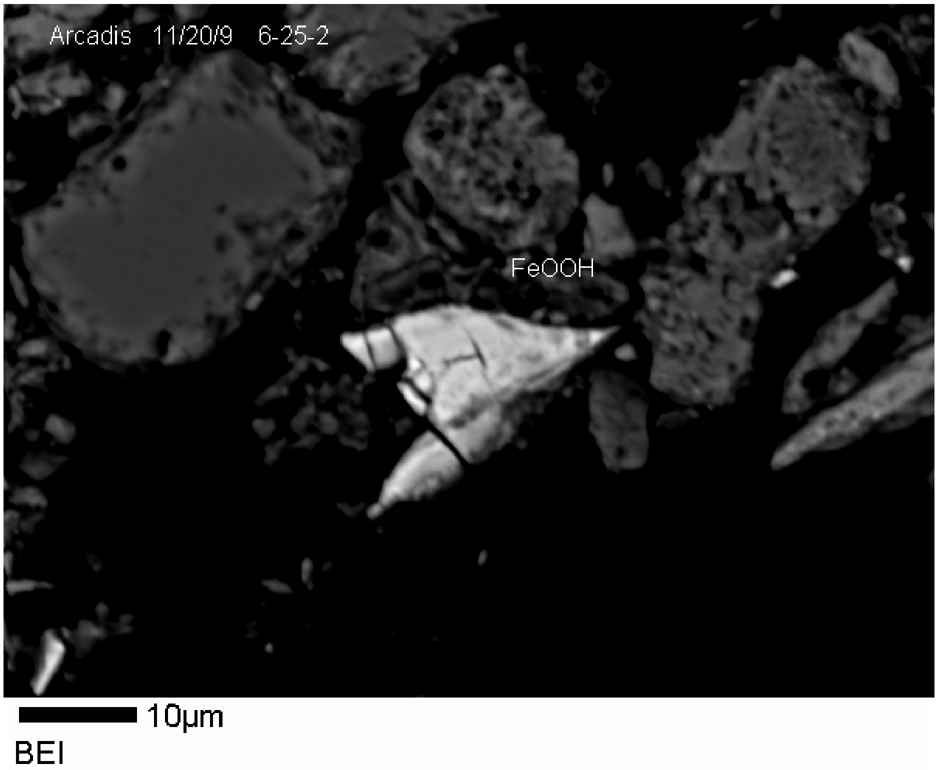
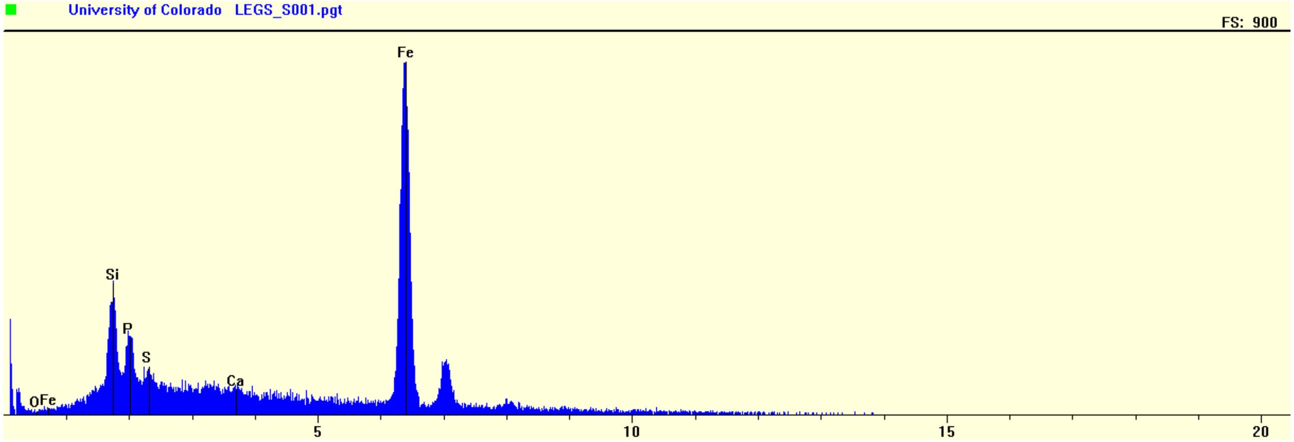


Figure No.
1d

Sample:
FID 6

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
1e

Sample:
FID 6

Description:
Micrograph 3

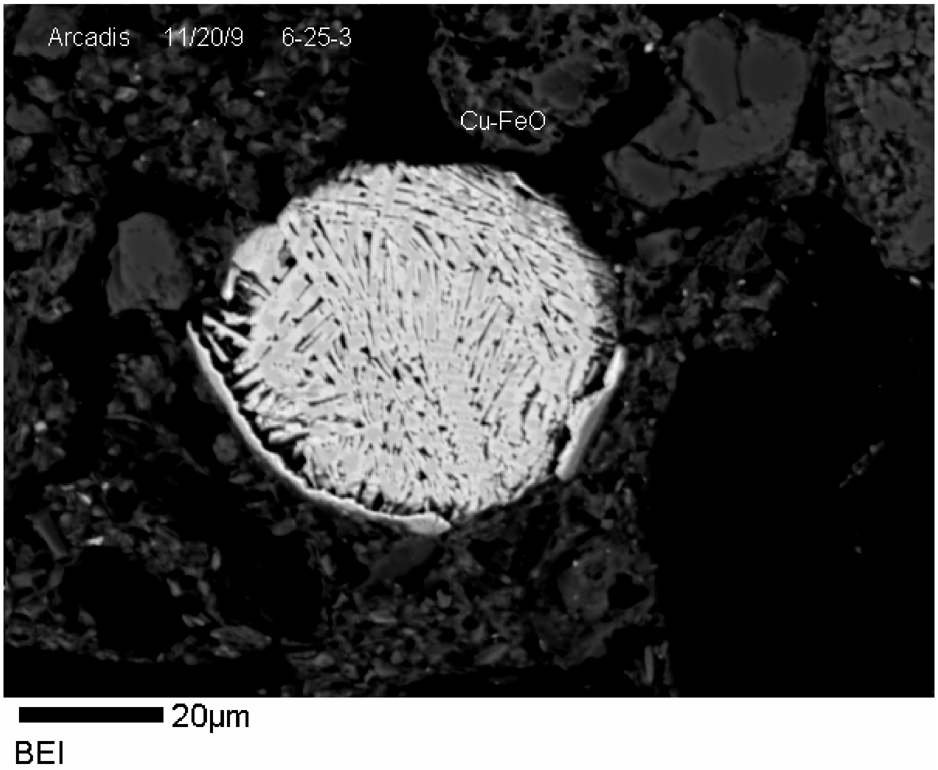
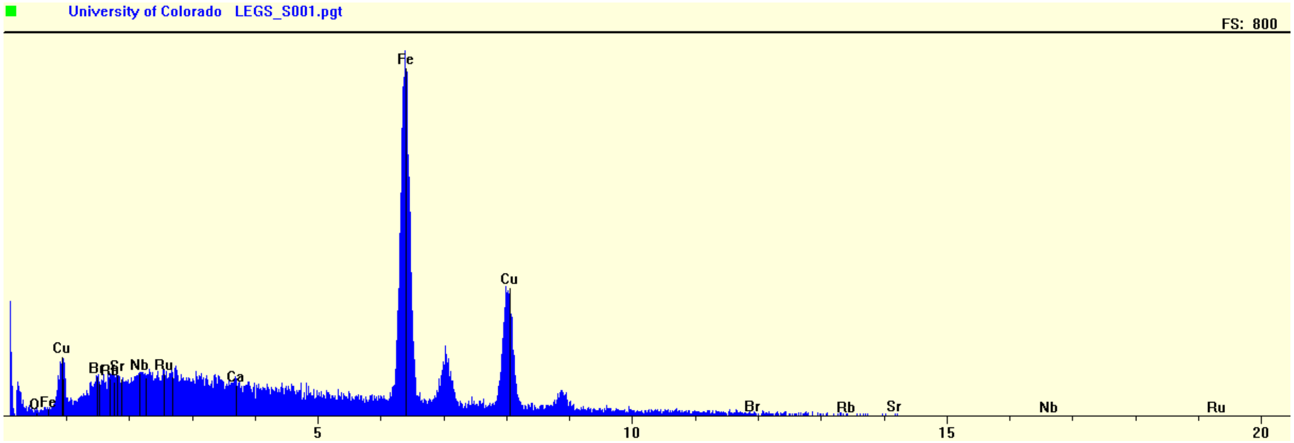


Figure No.
1f

Sample:
FID 6

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
1g

Sample:
FID 6

Description:
Micrograph 4

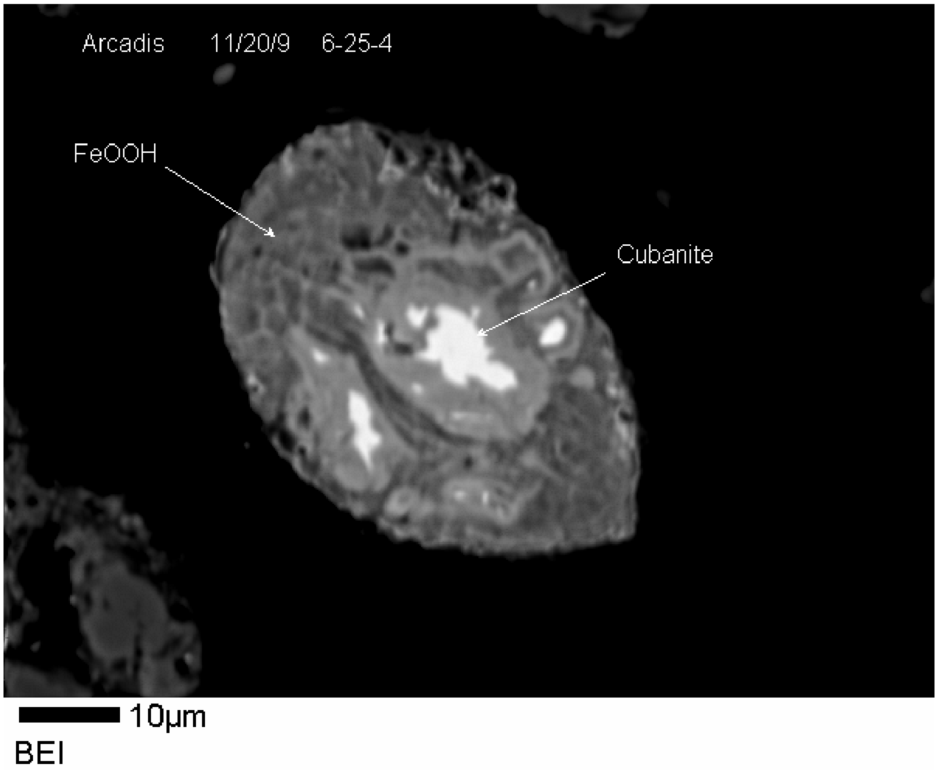
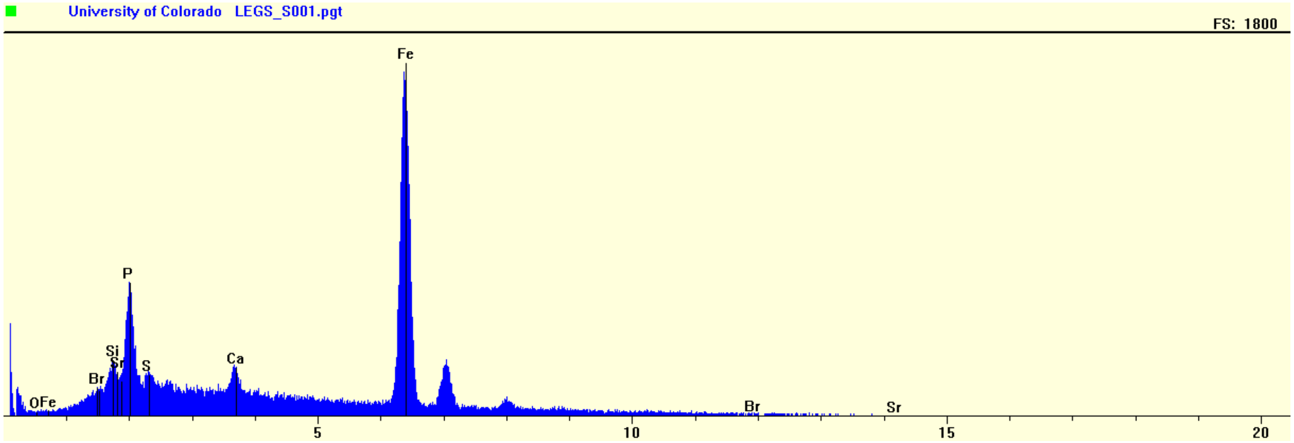


Figure No.
1h

Sample:
FID 6

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
1i

Sample:
FID 6

Description:
Micrograph 5

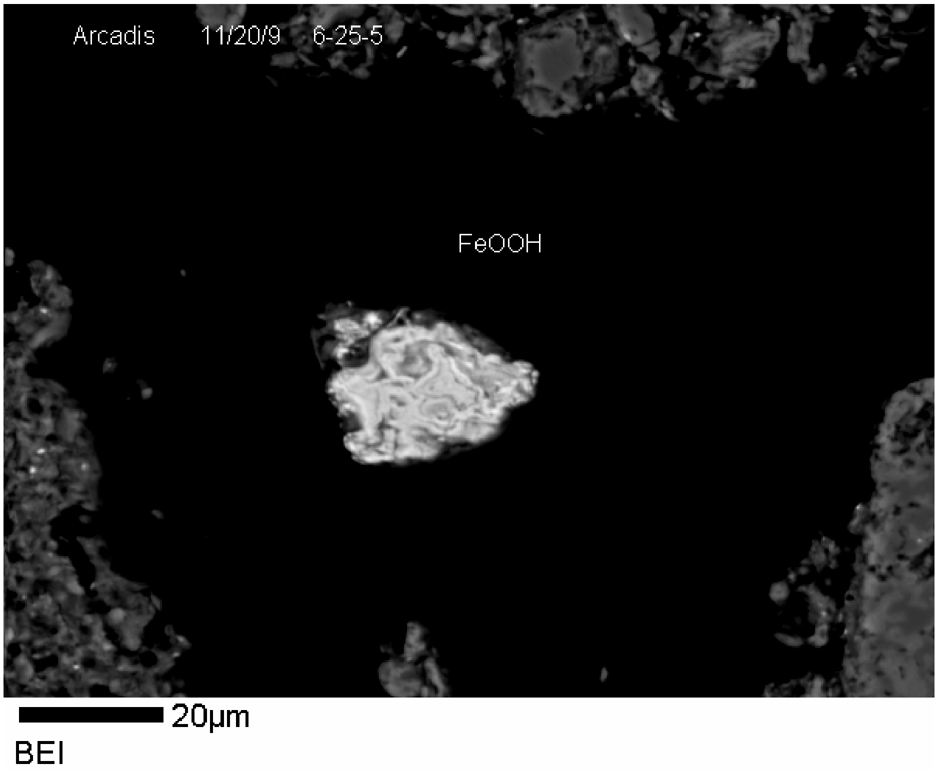
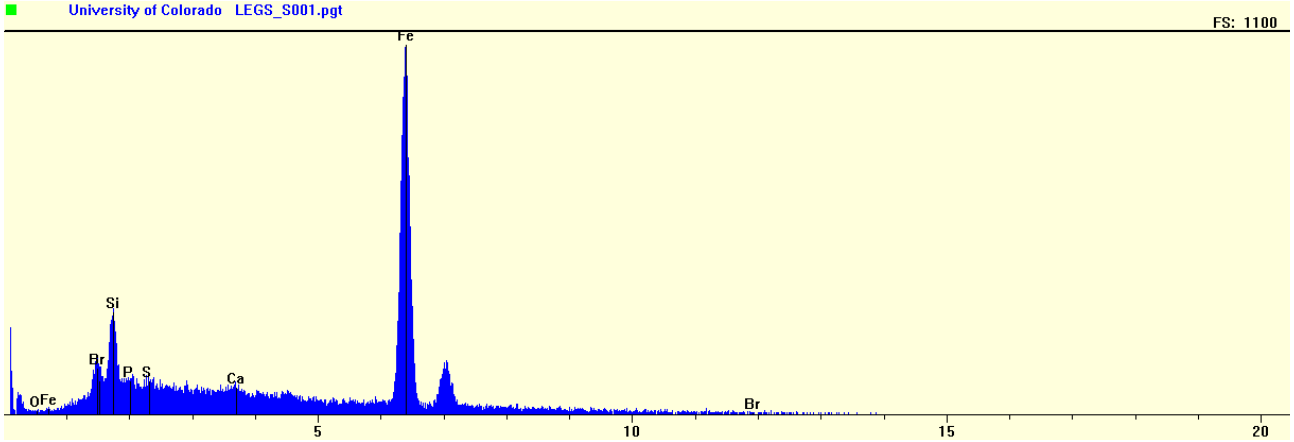


Figure No.
1j

Sample:
FID 6

Description:
Histogram 5



SPECIATION FIGURES

Figure No.
2a

Sample:
FID 8

Description:
Micrograph 1

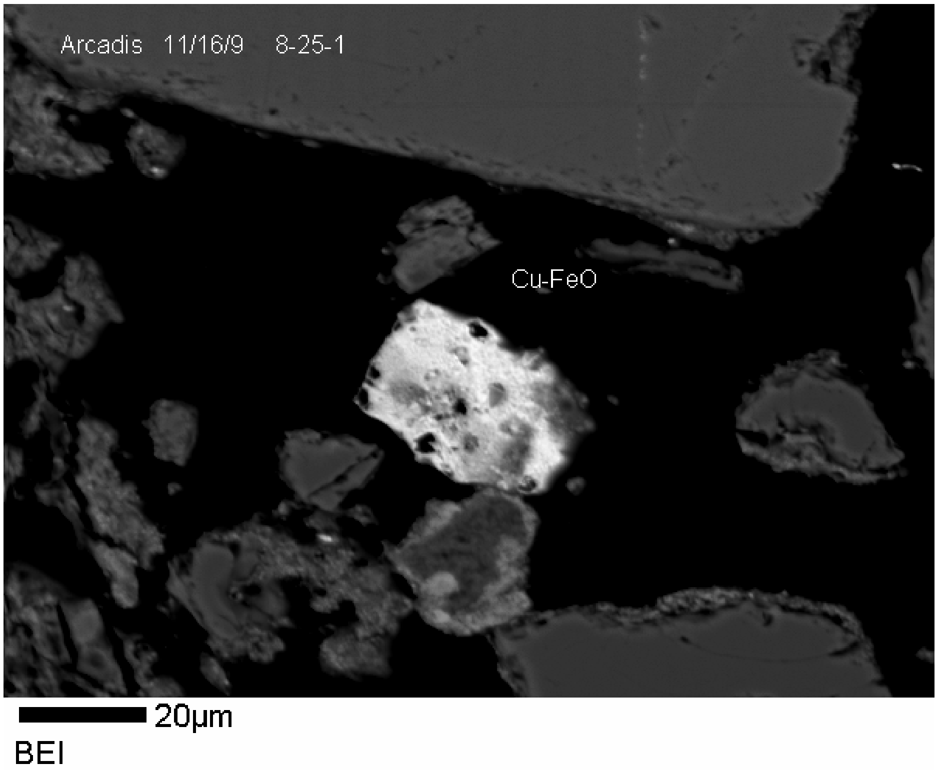
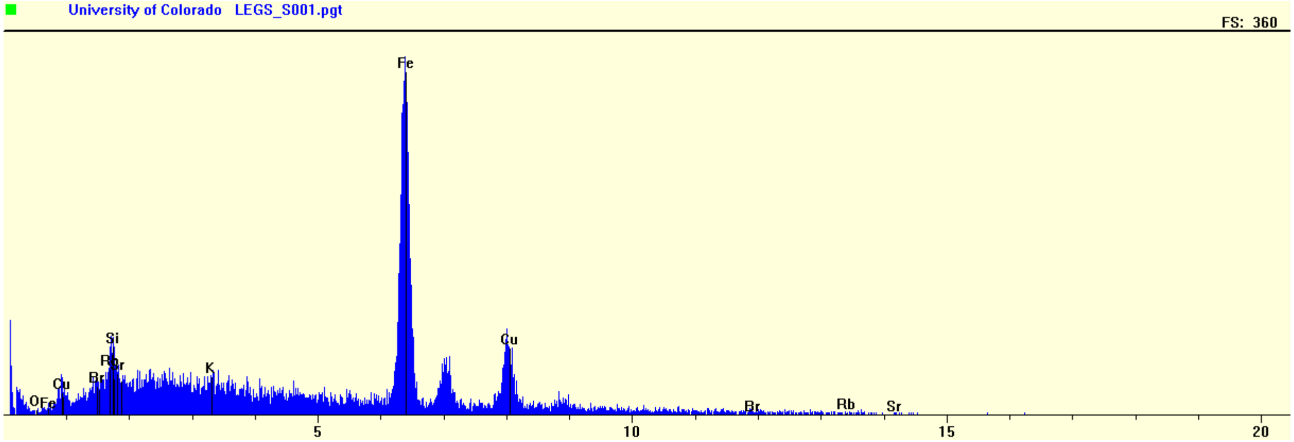


Figure No.
2b

Sample:
FID 8

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
2c

Sample:
FID 8

Description:
Micrograph 2

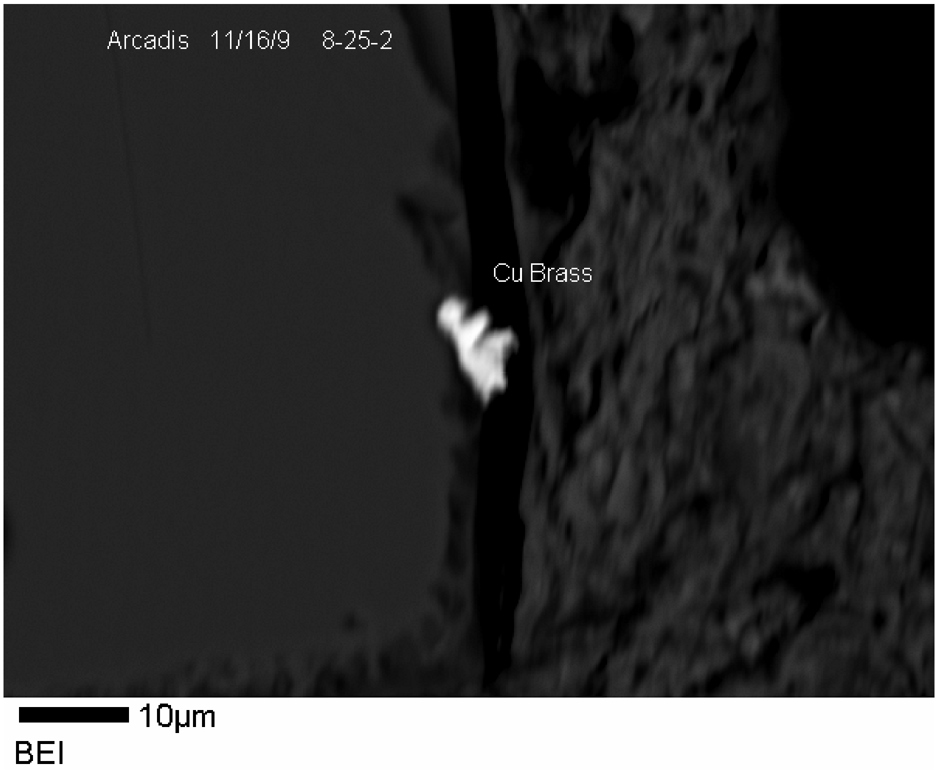
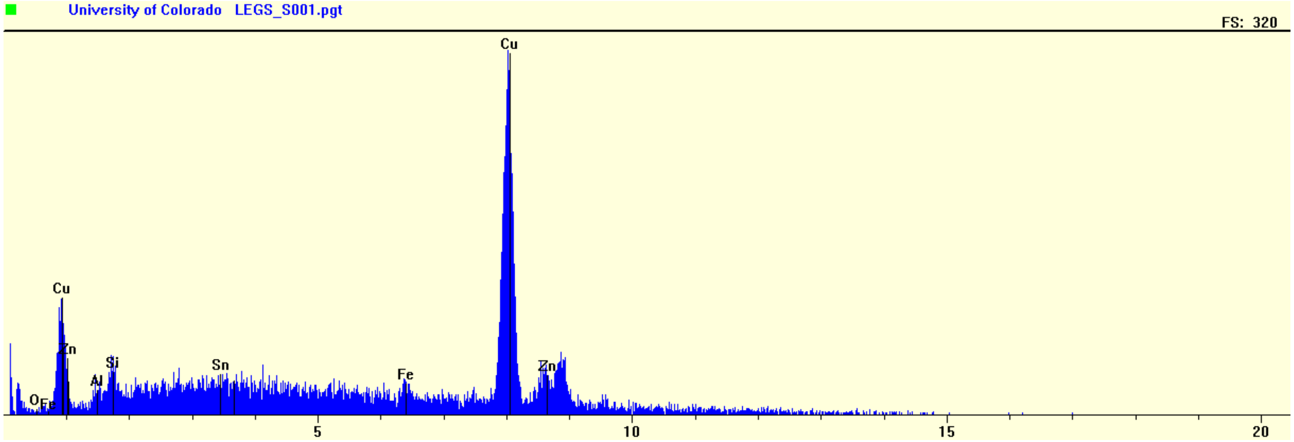


Figure No.
2d

Sample:
FID 8

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
2e

Sample:
FID 8

Description:
Micrograph 3

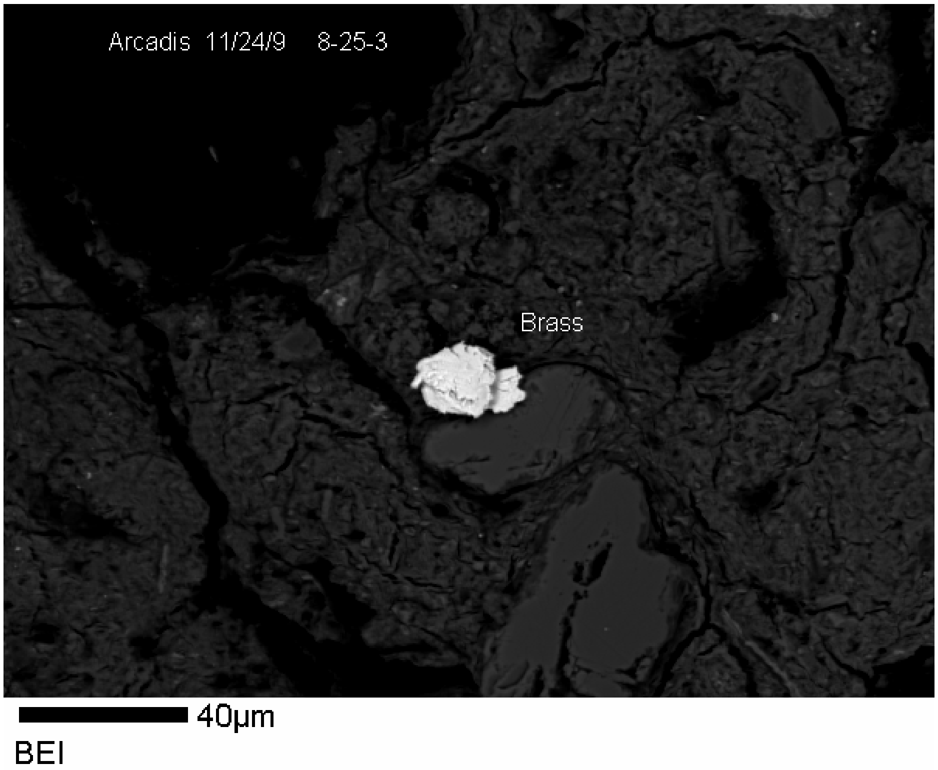
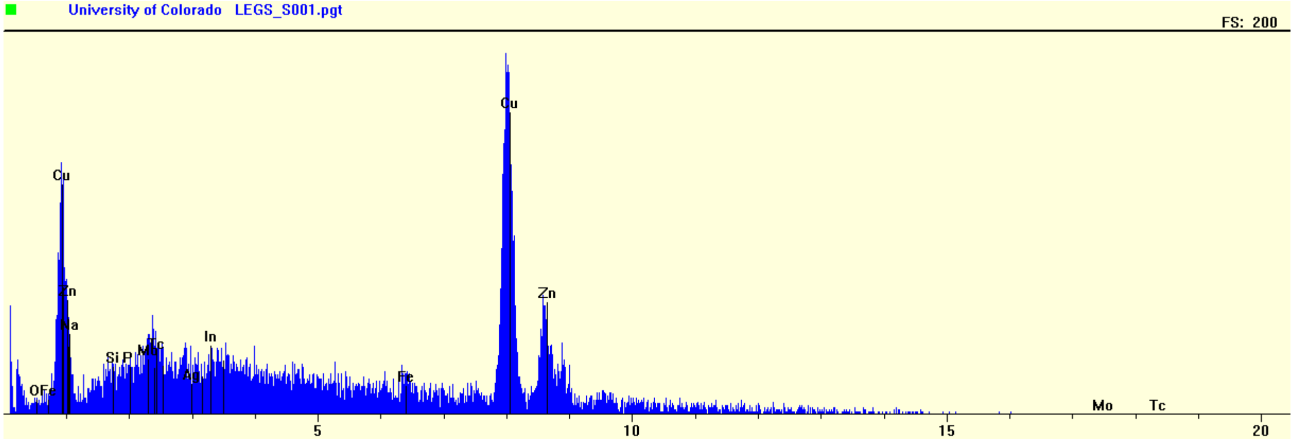


Figure No.
2f

Sample:
FID 8

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
2g

Sample:
FID 8

Description:
Micrograph 4

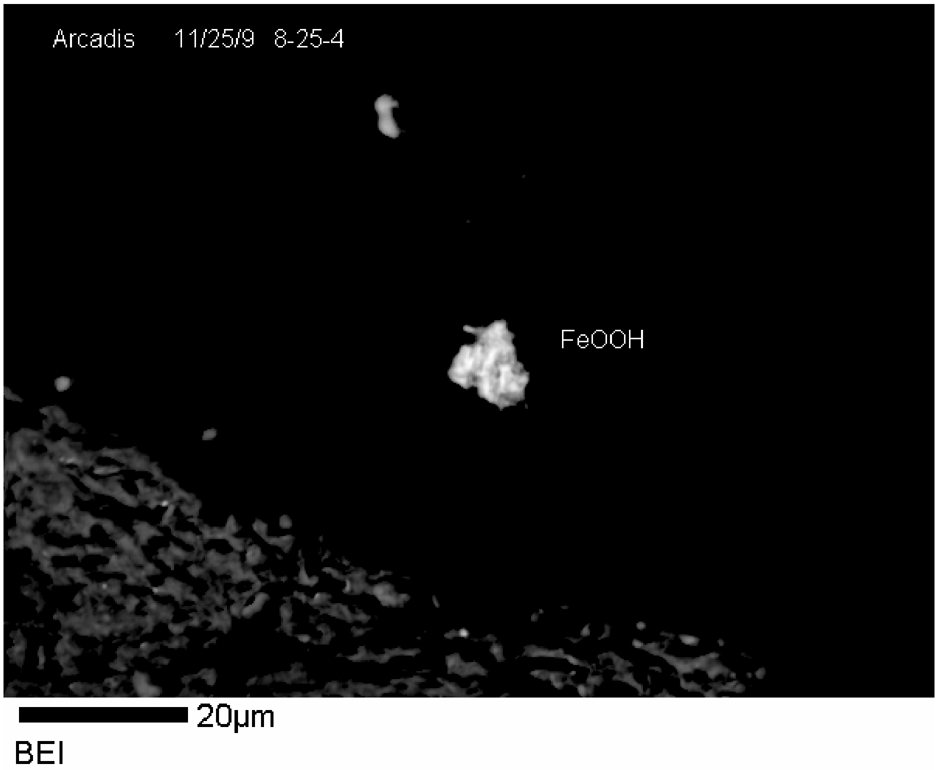
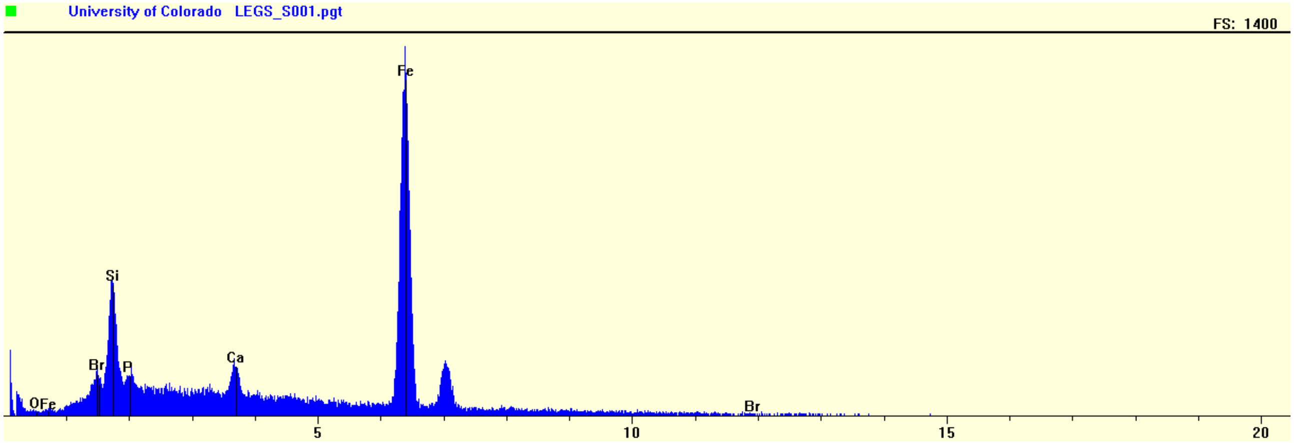


Figure No.
2h

Sample:
FID 8

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
3a

Sample:
FID 10

Description:
Micrograph 1

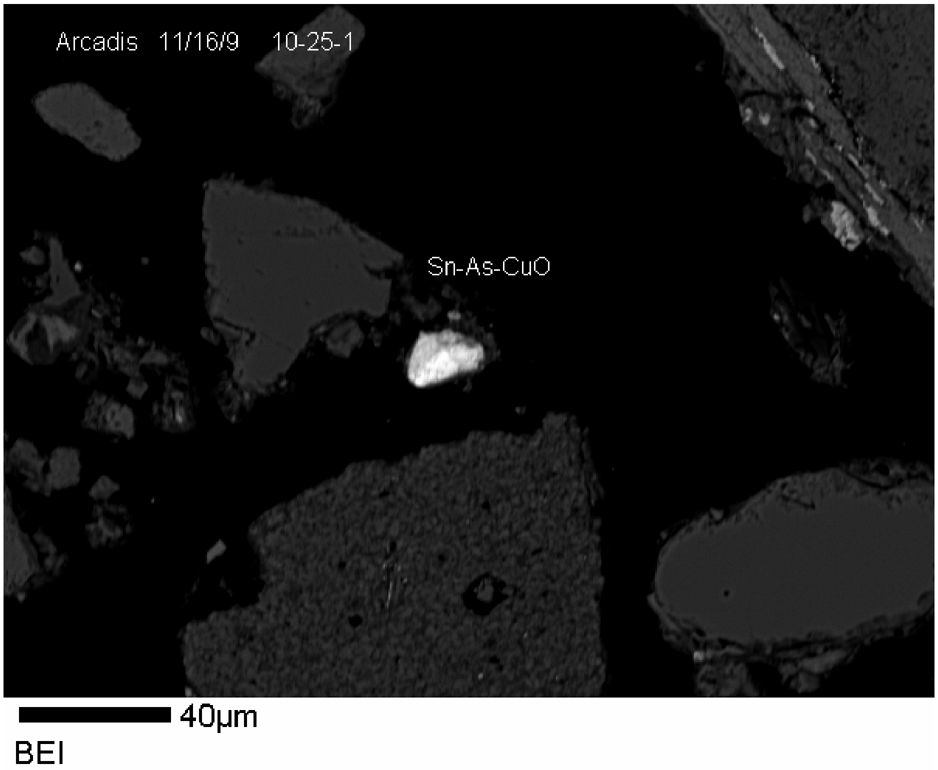
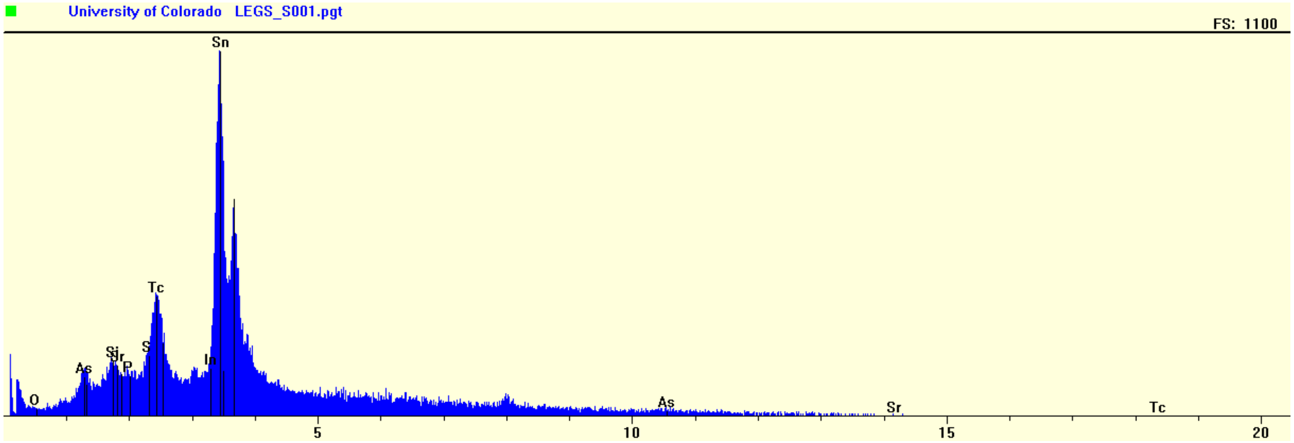


Figure No.
3b

Sample:
FID 10

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
3c

Sample:
FID 10

Description:
Micrograph 2

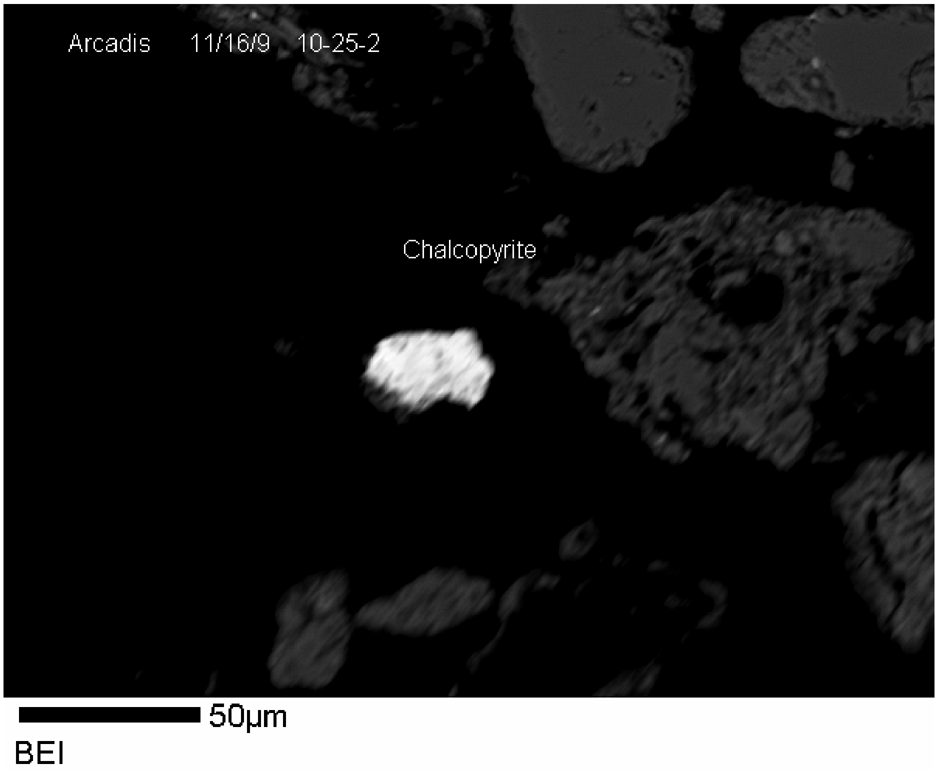
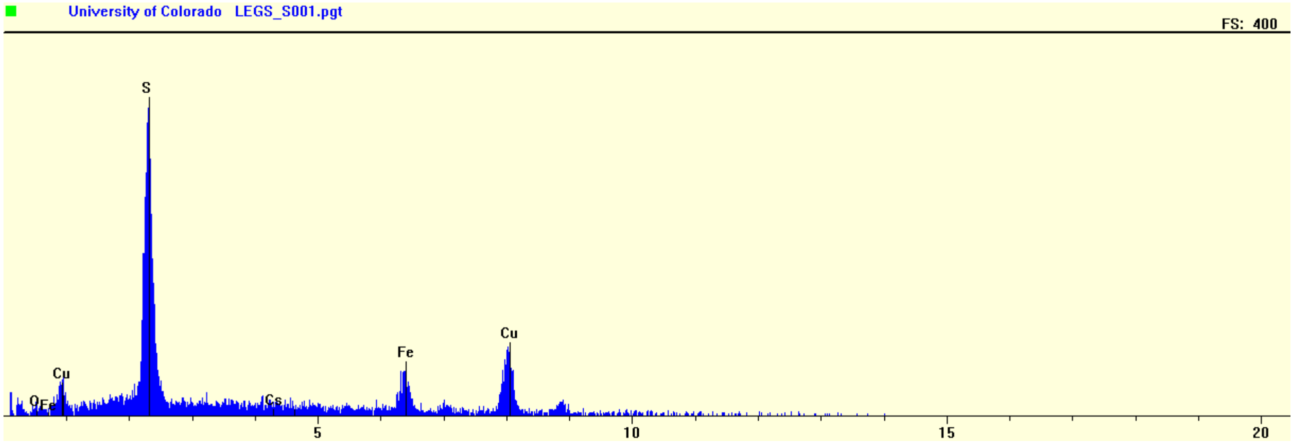


Figure No.
3d

Sample:
FID 10

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
3e

Sample:
FID 10

Description:
Micrograph 3

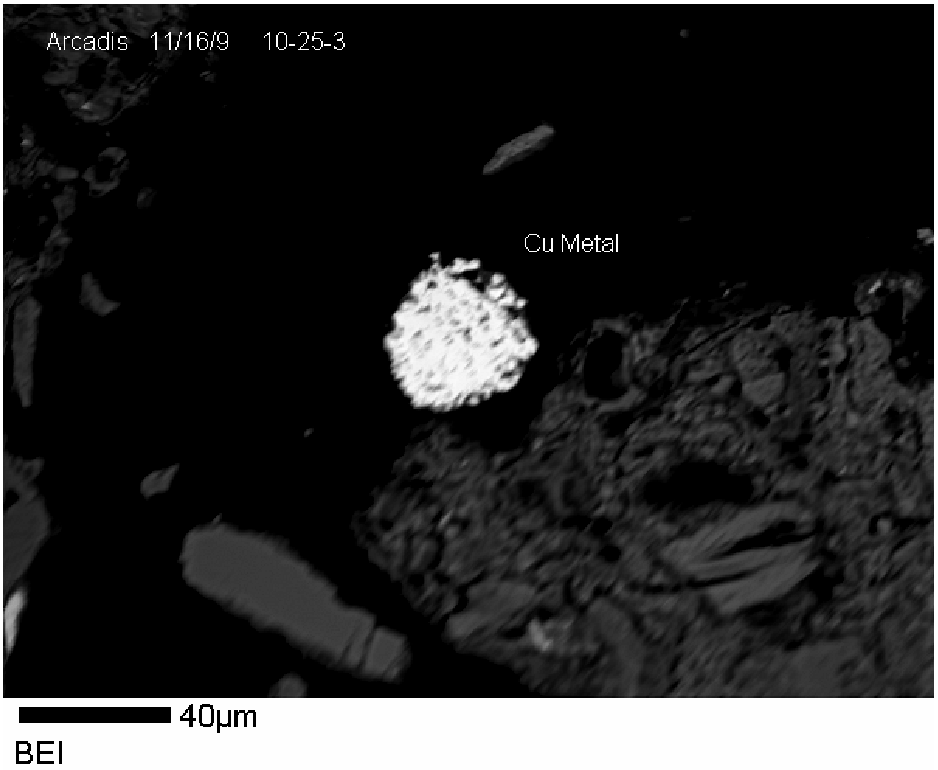
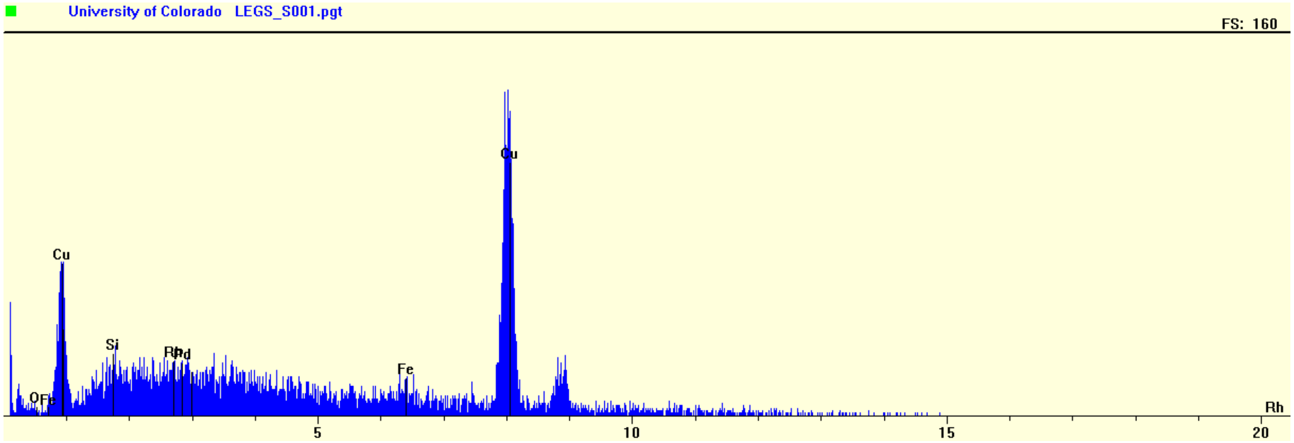


Figure No.
3f

Sample:
FID 10

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
3g

Sample:
FID 10

Description:
Micrograph 4

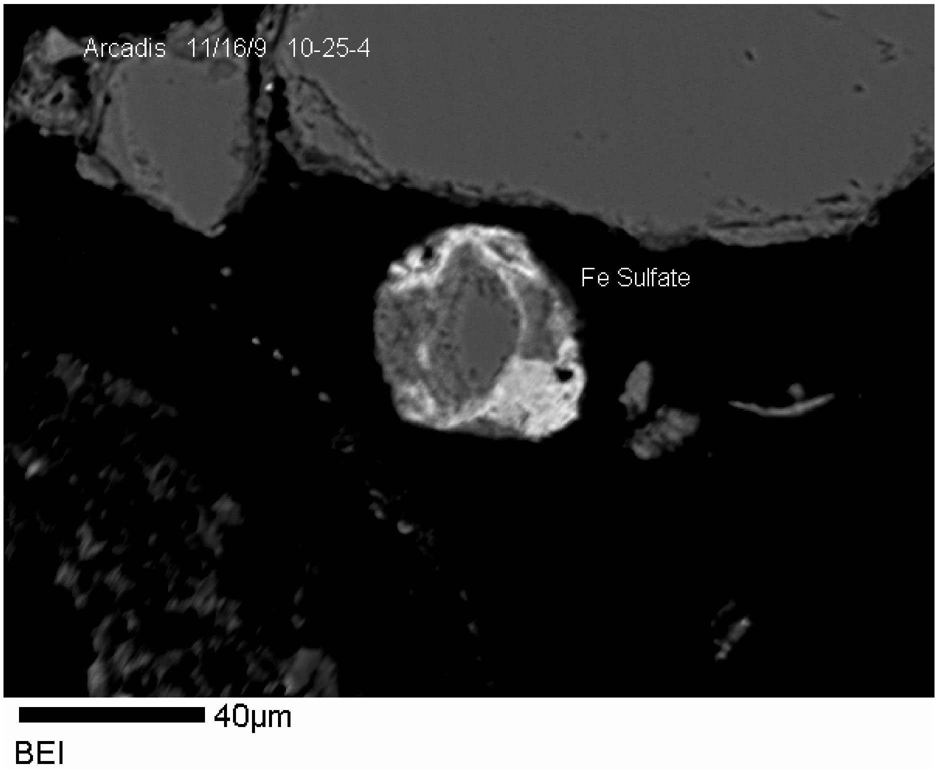
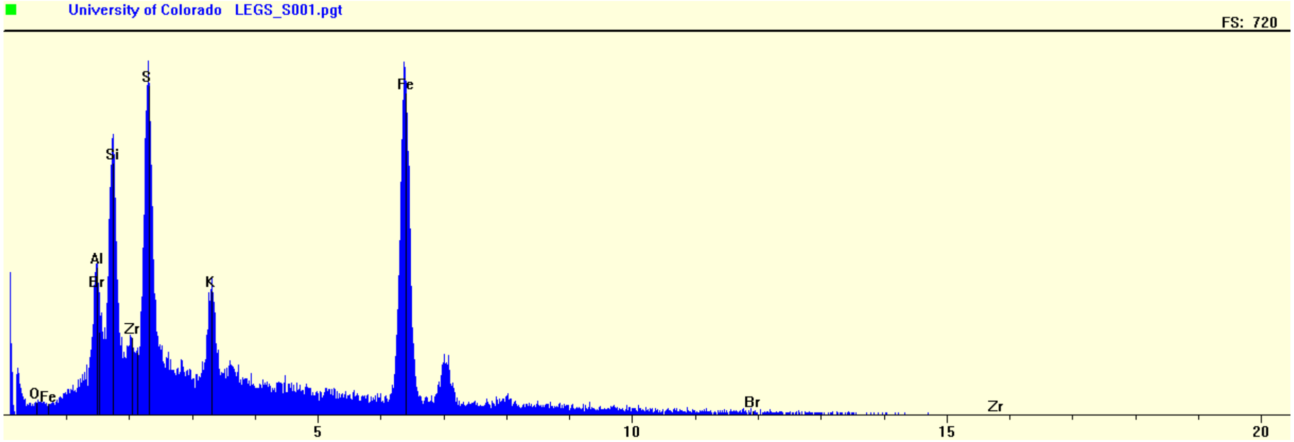


Figure No.
3h

Sample:
FID 10

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
3i

Sample:
FID 10

Description:
Micrograph 5

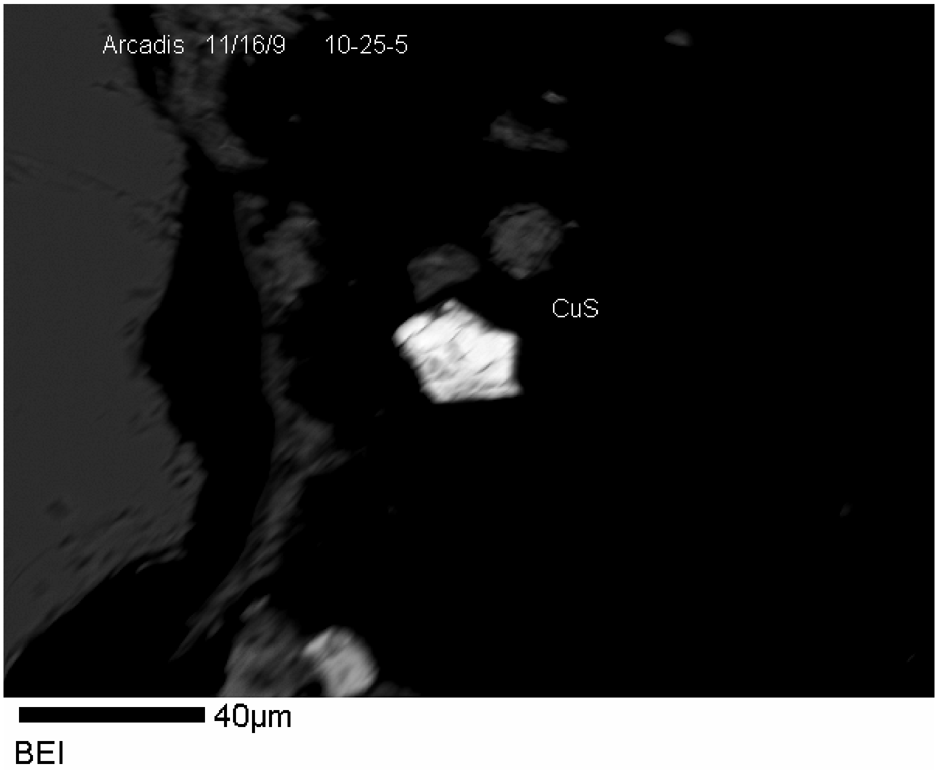
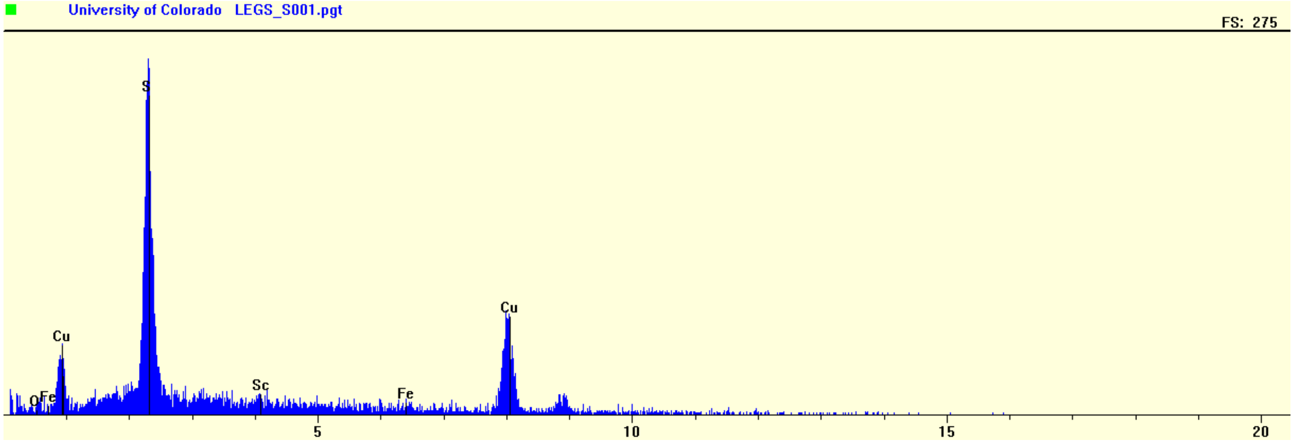


Figure No.
3j

Sample:
FID 10

Description:
Histogram 5



SPECIATION FIGURES

Figure No.
4a

Sample:
FID 12

Description:
Micrograph 1

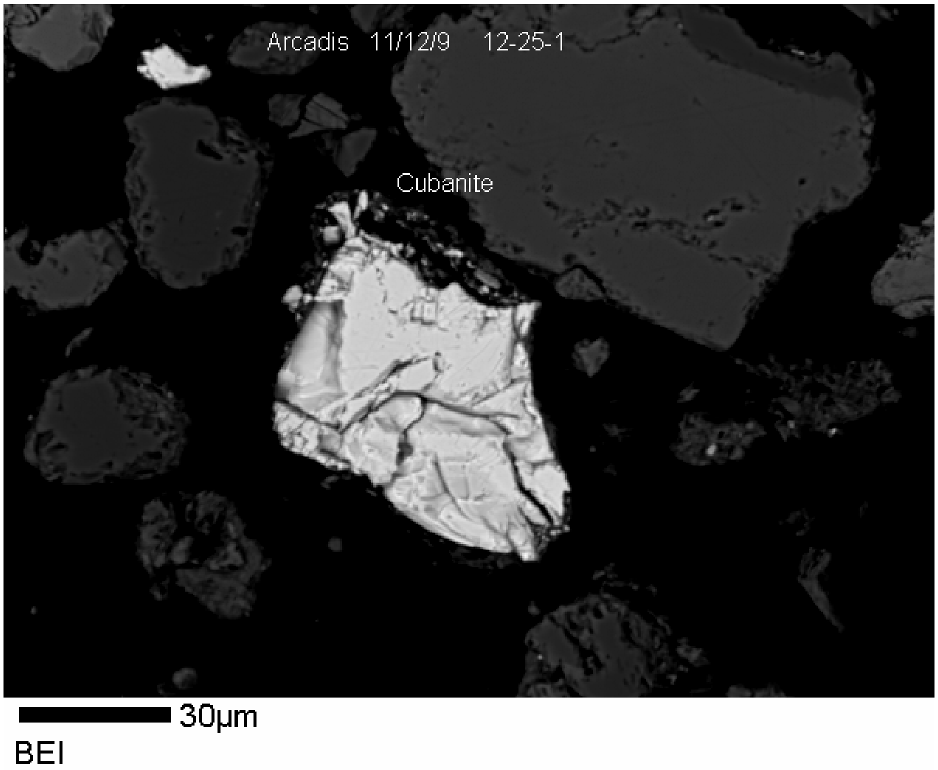
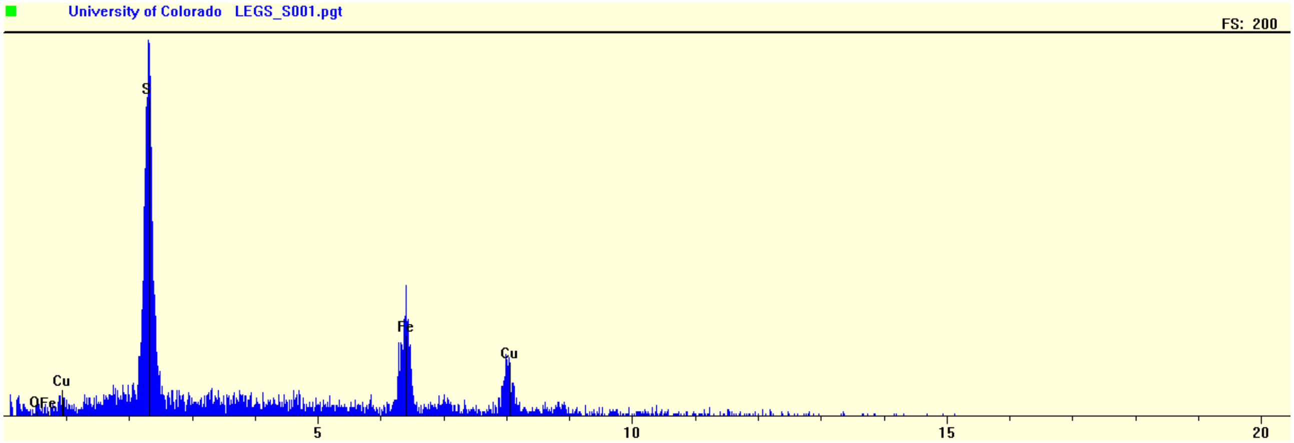


Figure No.
4b

Sample:
FID 12

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
4c

Sample:
FID 12

Description:
Micrograph 2

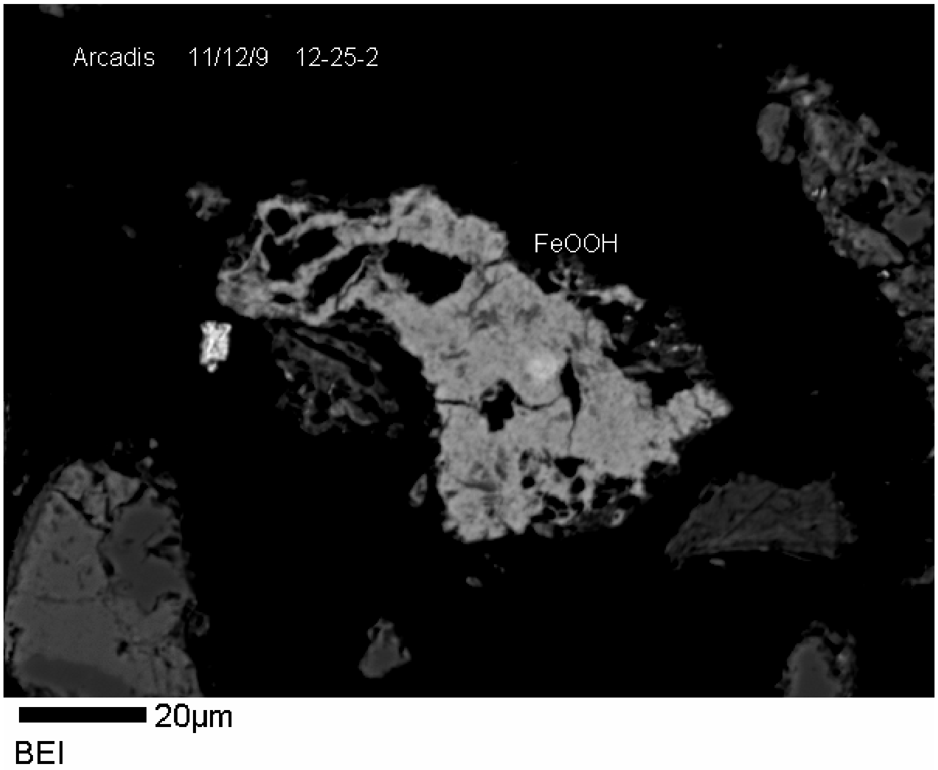
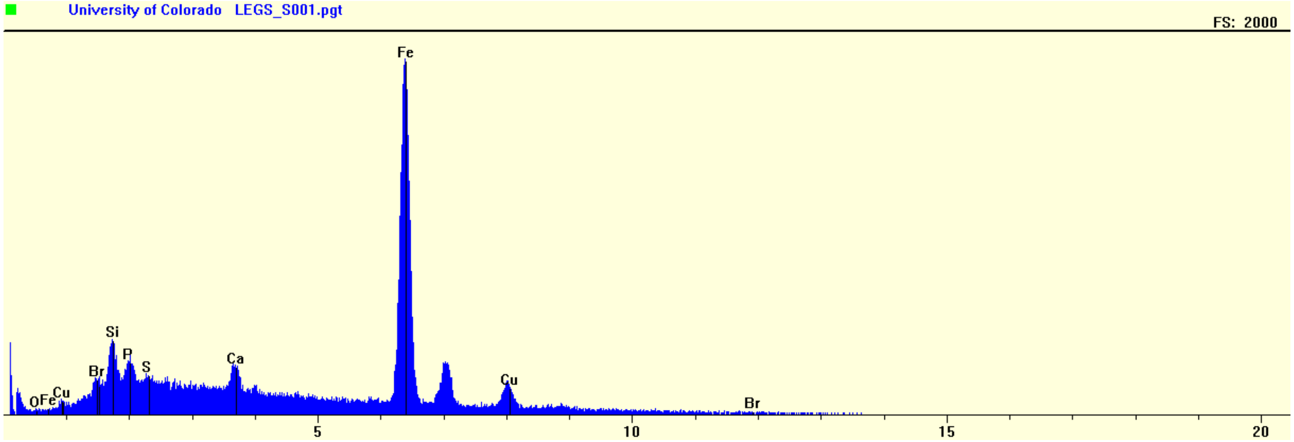


Figure No.
4d

Sample:
FID 12

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
4e

Sample:
FID 12

Description:
Micrograph 3

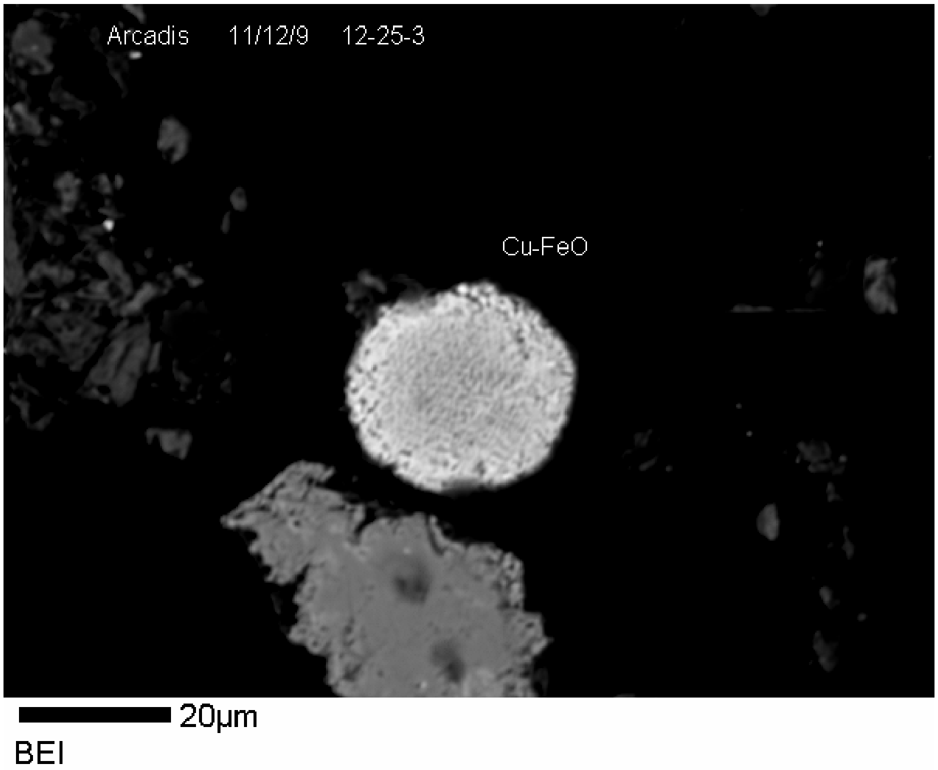
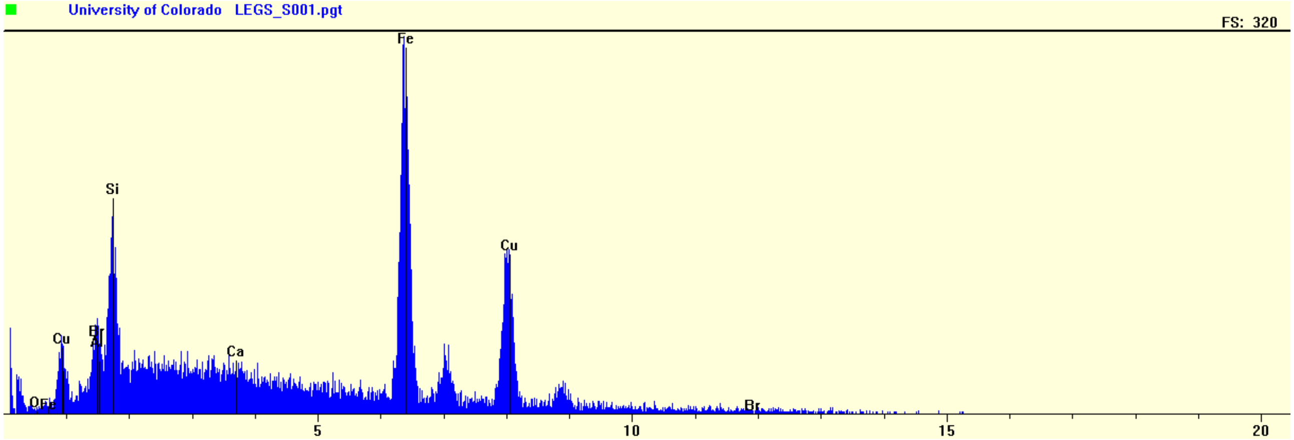


Figure No.
4f

Sample:
FID 12

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
4g

Sample:
FID 12

Description:
Micrograph 4

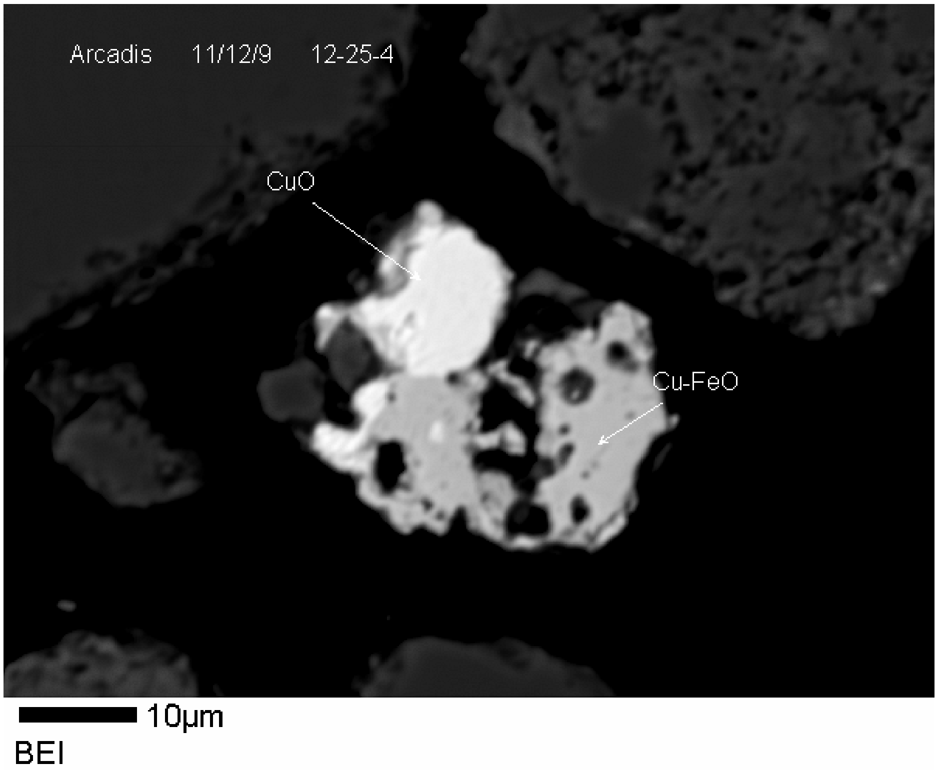
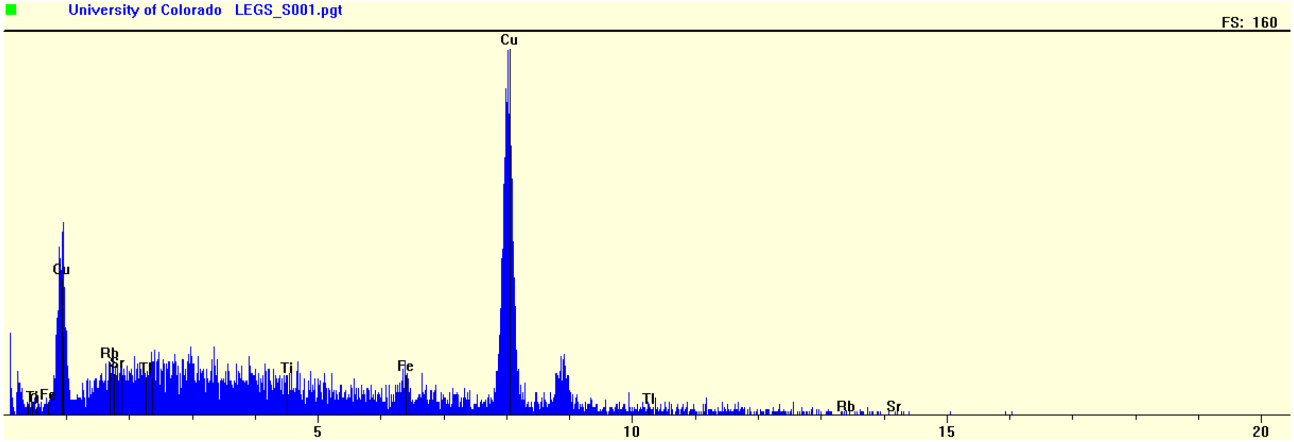


Figure No.
4h

Sample:
FID 12

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
4i

Sample:
FID 12

Description:
Micrograph 5

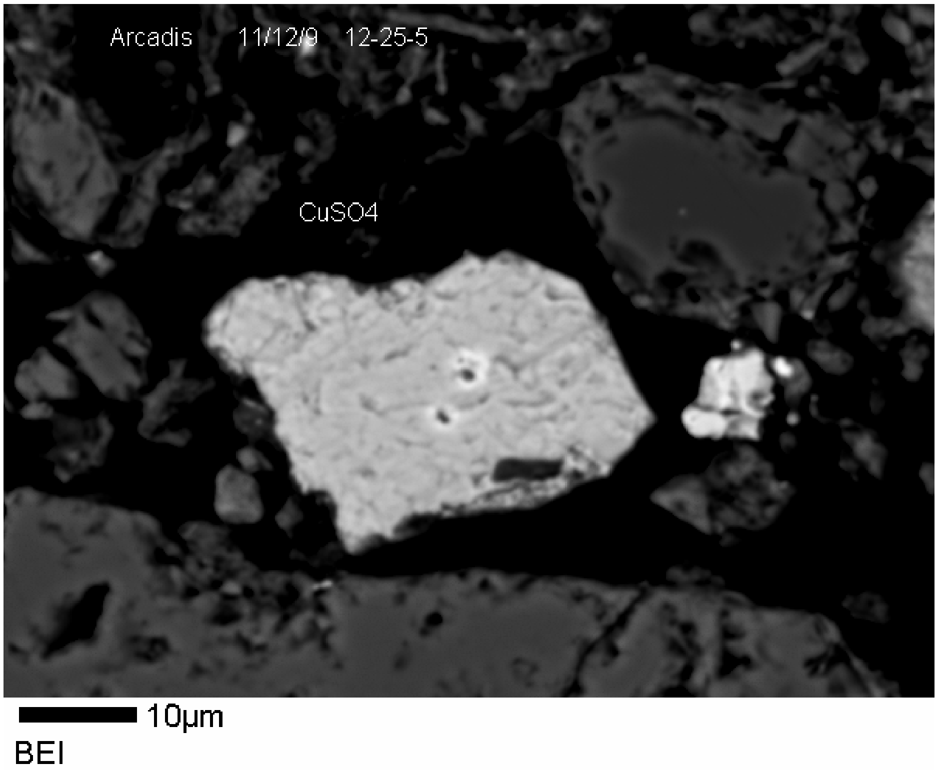
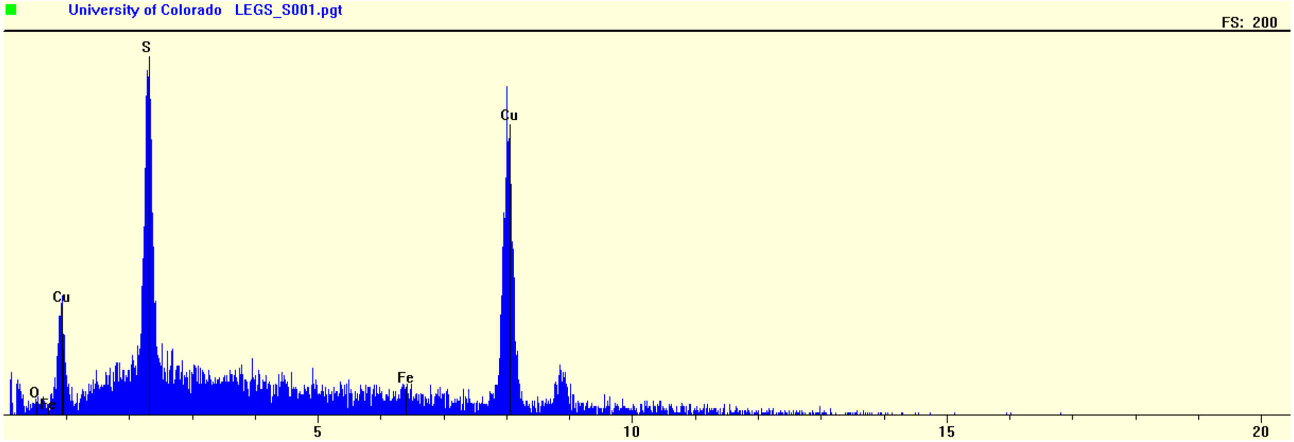


Figure No.
4j

Sample:
FID 12

Description:
Histogram 5



SPECIATION FIGURES

Figure No.
5a

Sample:
FID 17

Description:
Micrograph 1

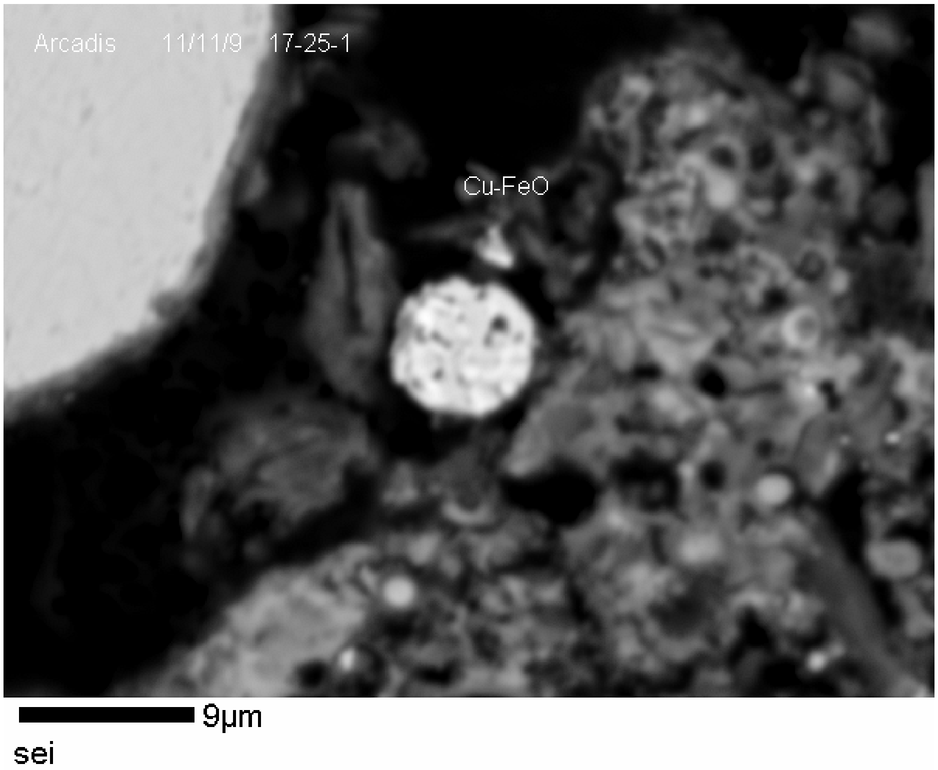
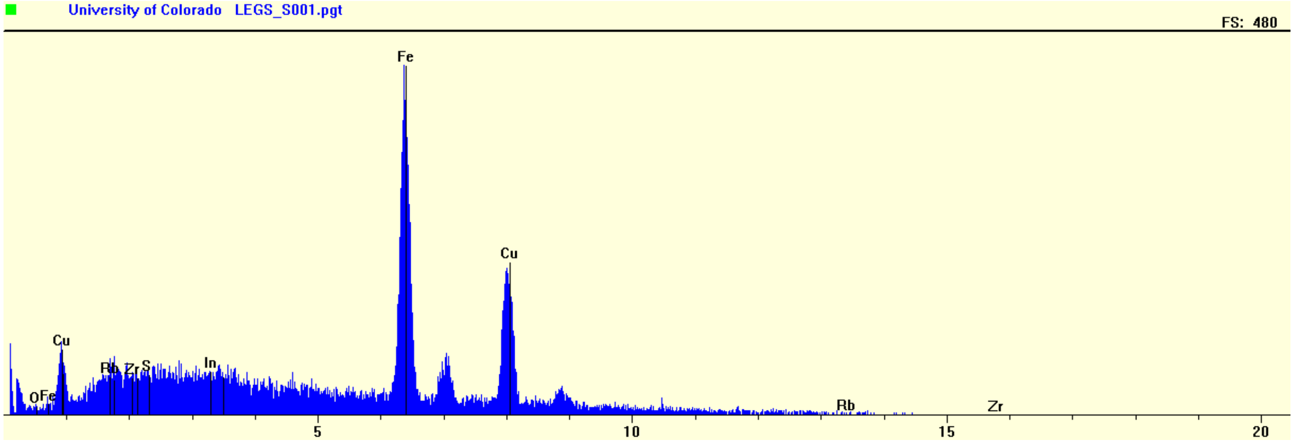


Figure No.
5b

Sample:
FID 17

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
5c

Sample:
FID 17

Description:
Micrograph 2

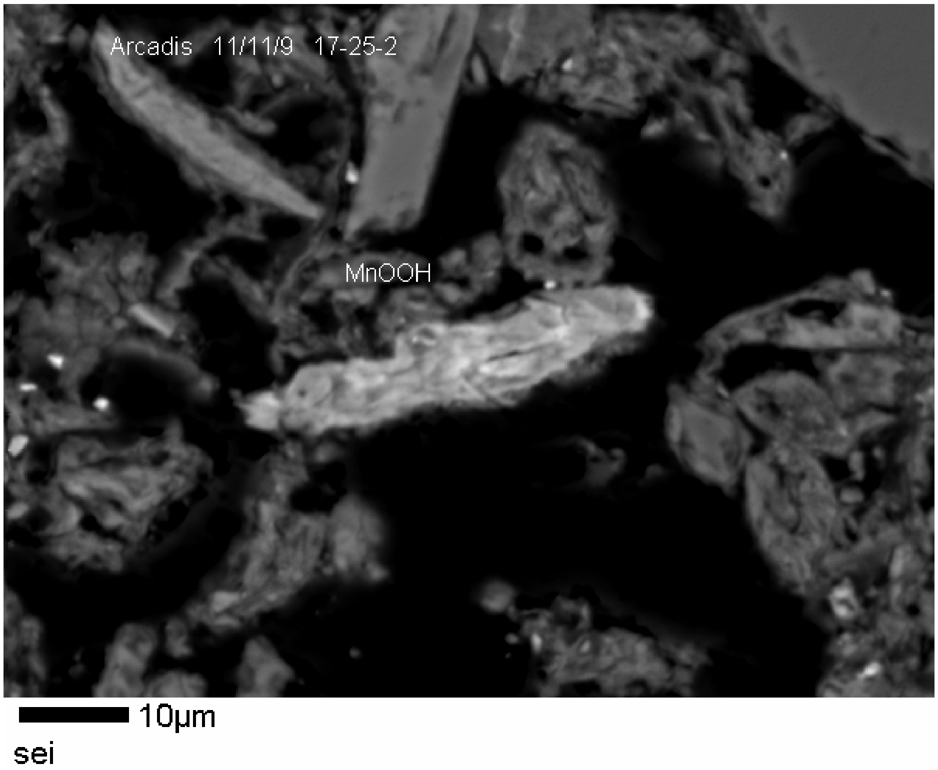
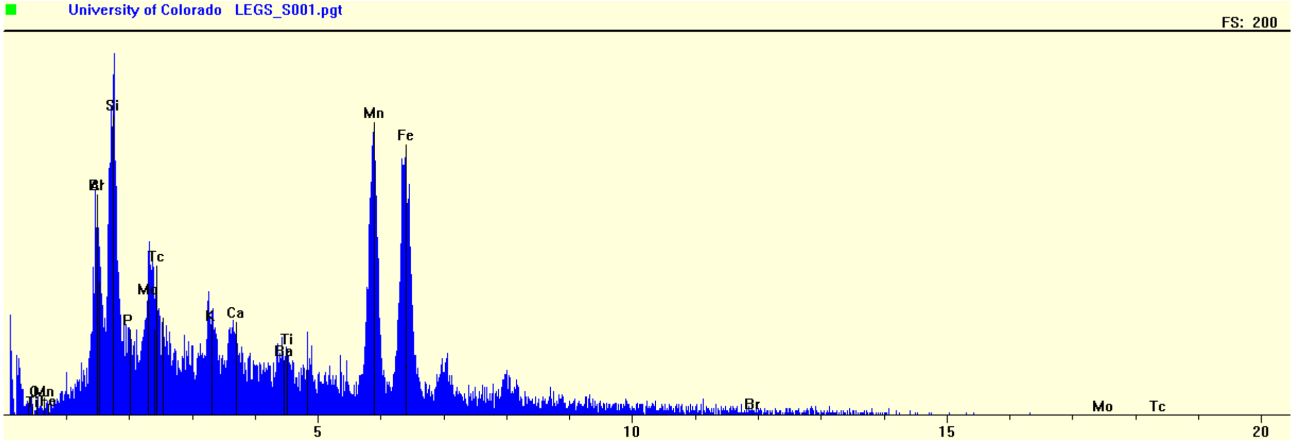


Figure No.
5d

Sample:
FID 17

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
5e

Sample:
FID 17

Description:
Micrograph 3

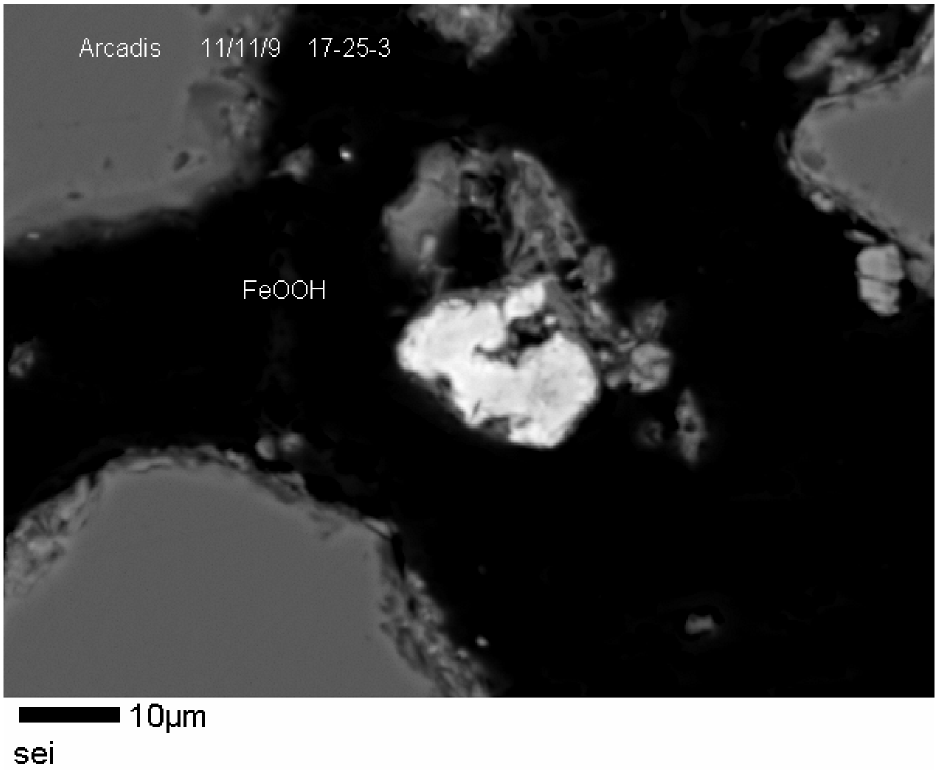
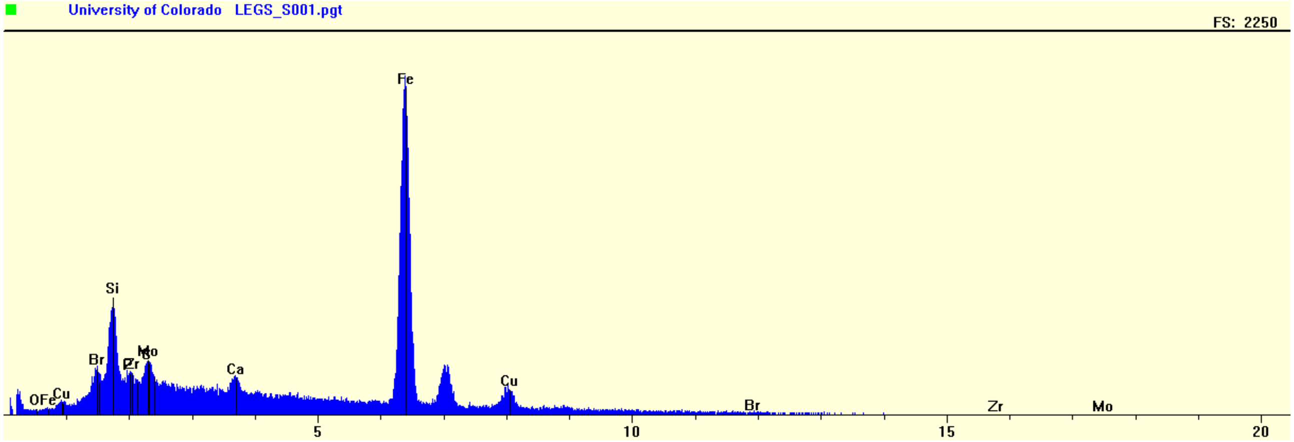


Figure No.
5f

Sample:
FID 17

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
5g

Sample:
FID 17

Description:
Micrograph 4

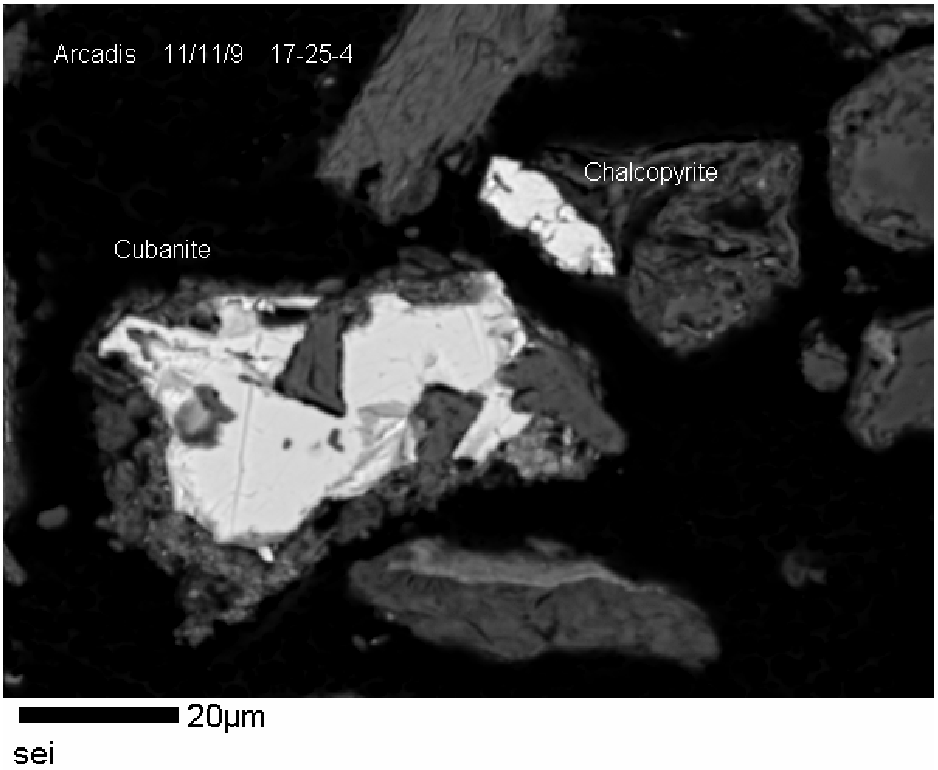
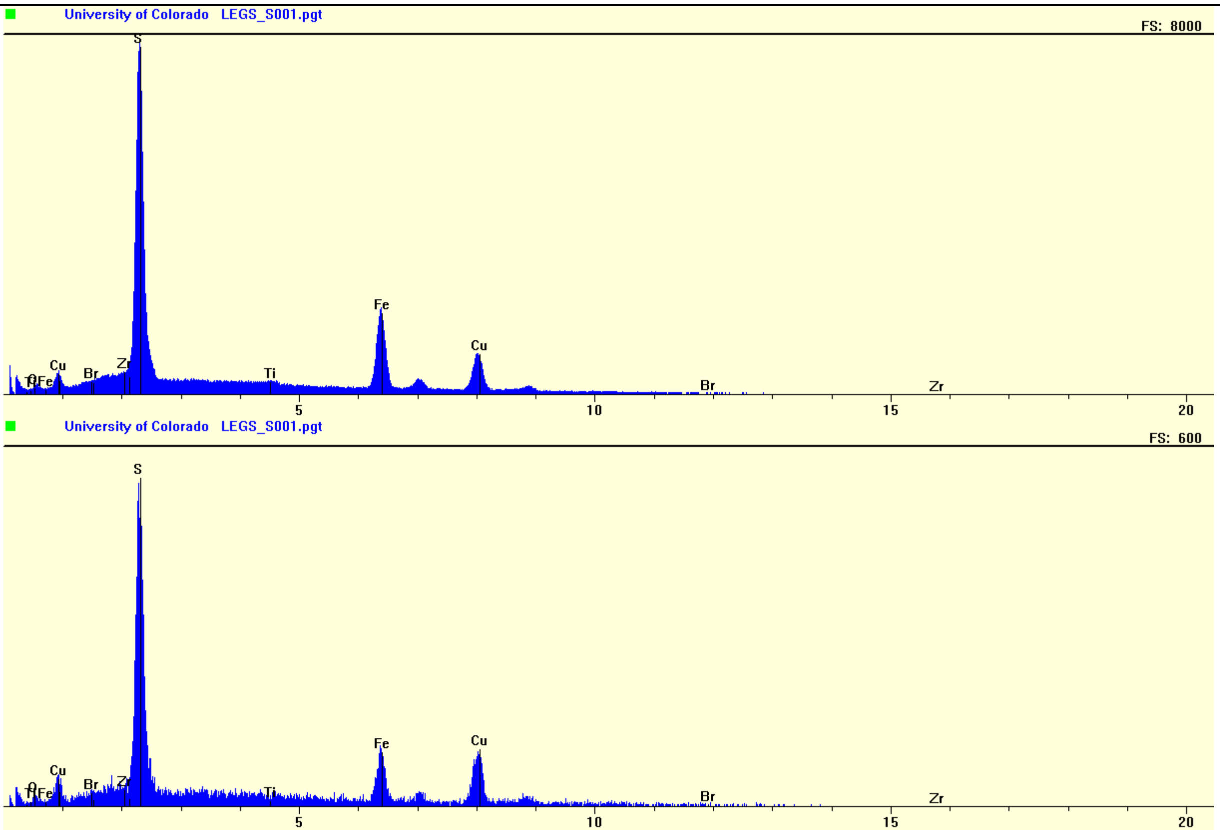


Figure No.
5h

Sample:
FID 17

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
5i

Sample:
FID 17

Description:
Micrograph 5

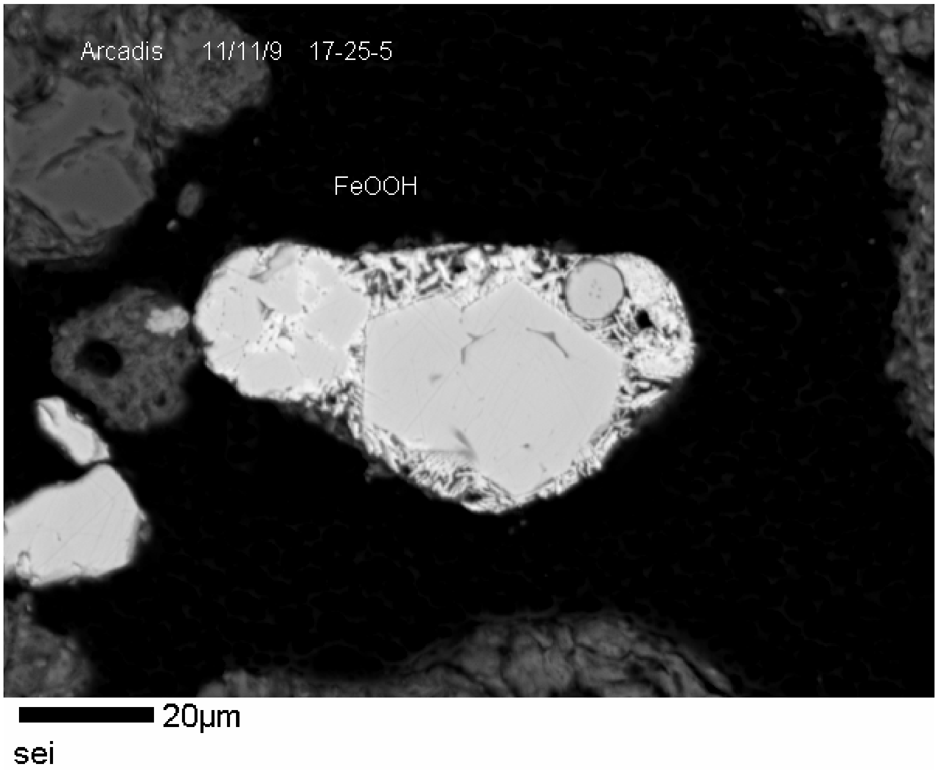
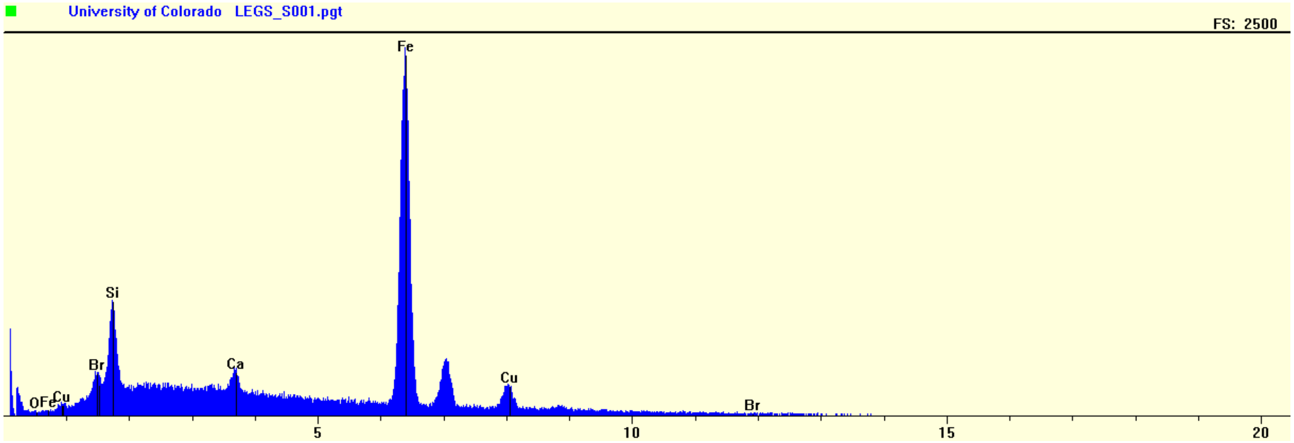


Figure No.
5j

Sample:
FID 17

Description:
Histogram 5



SPECIATION FIGURES

Figure No.
5k

Sample:
FID 17

Description:
Micrograph 6

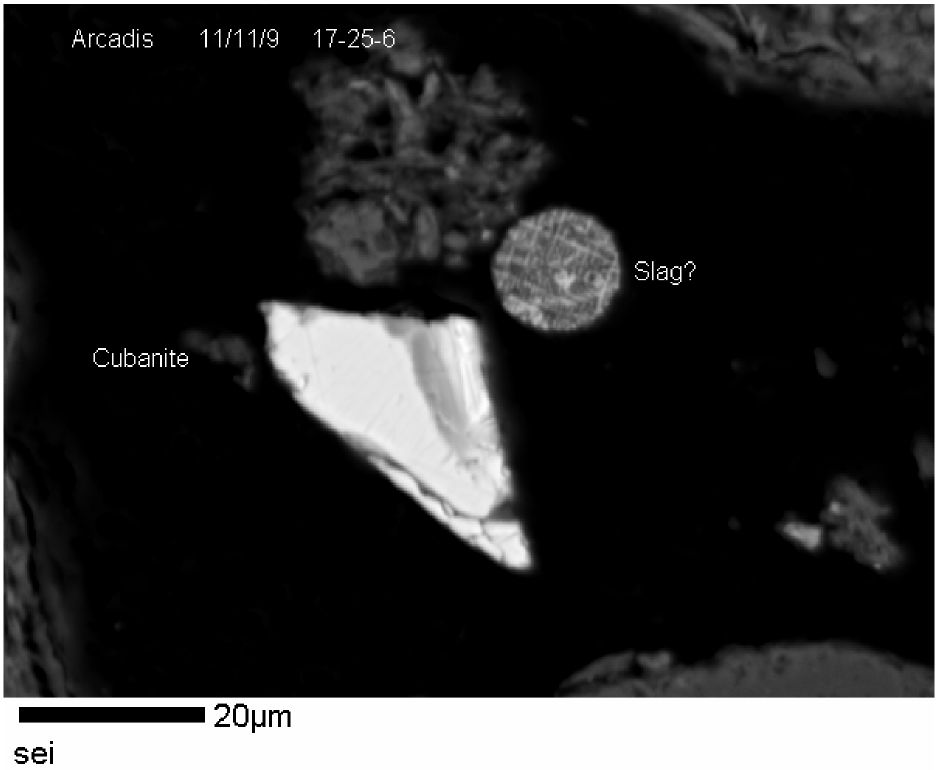
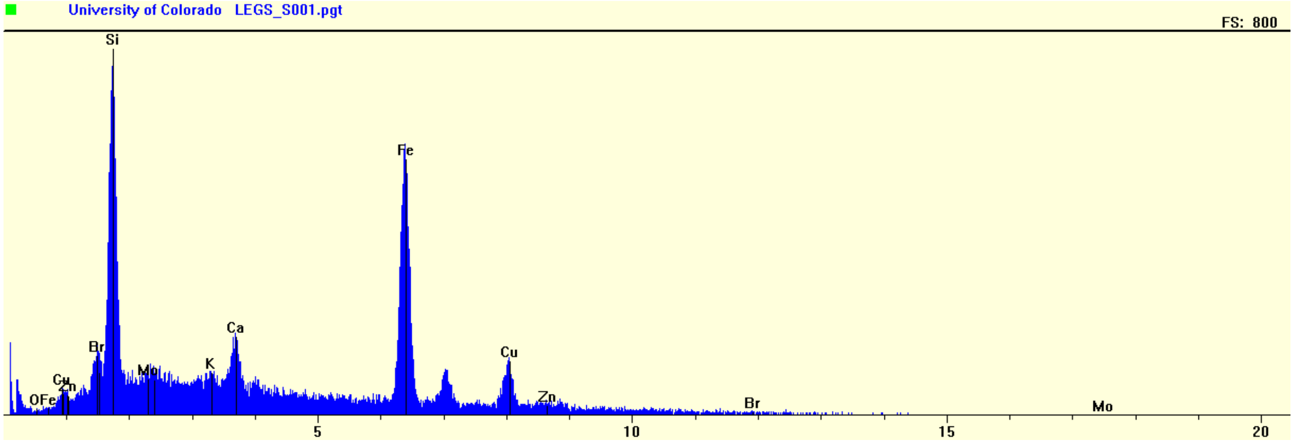


Figure No.
5l

Sample:
FID 17

Description:
Histogram 6



SPECIATION FIGURES

Figure No.
5m

Sample:
FID 17

Description:
Micrograph 7

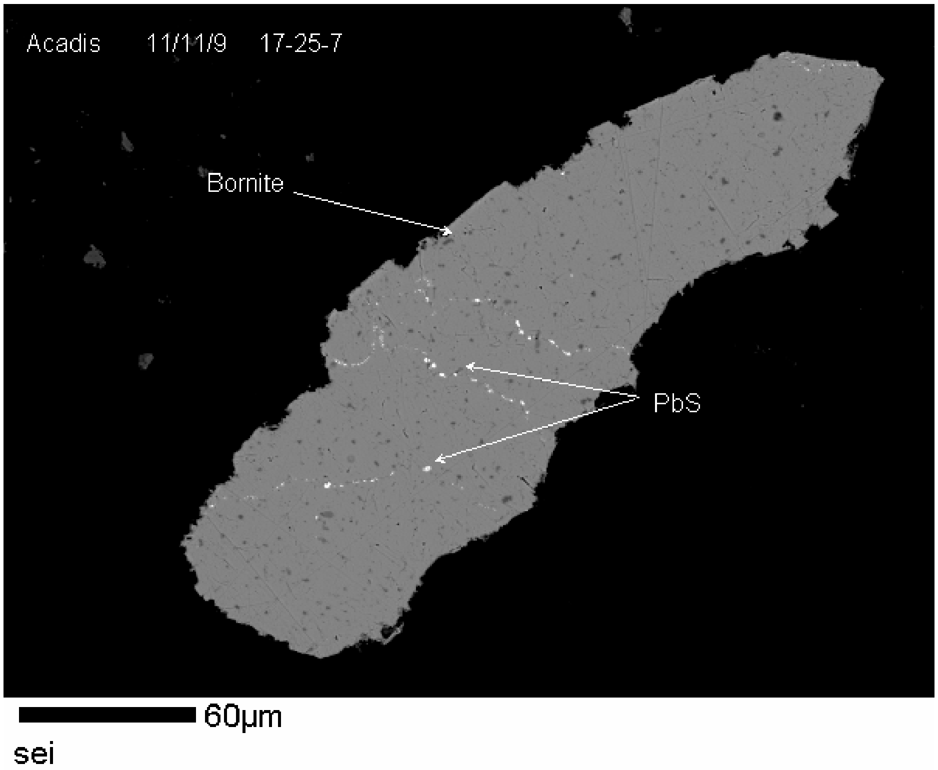
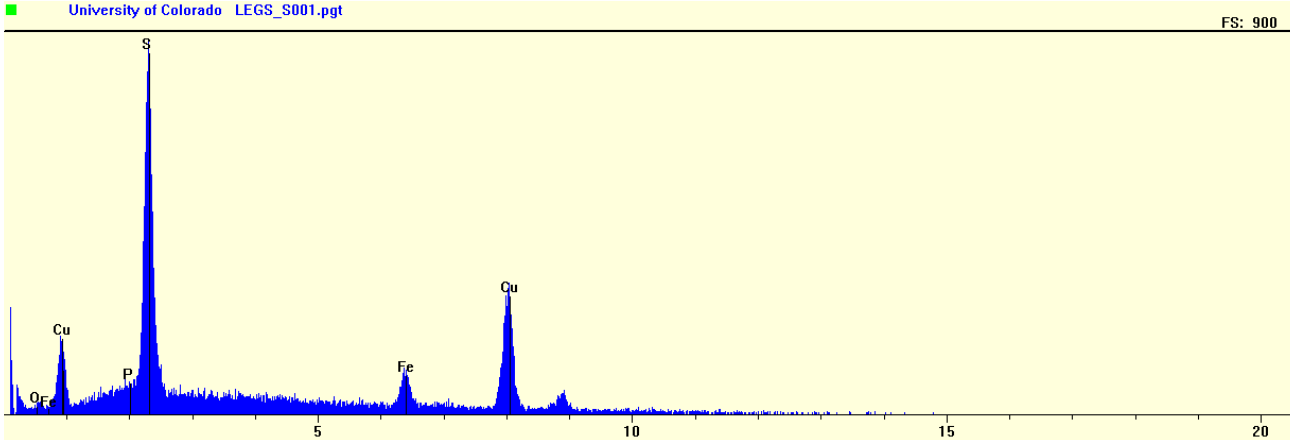


Figure No.
5n

Sample:
FID 17

Description:
Histogram 7



SPECIATION FIGURES

Figure No.
6a

Sample:
FID 18

Description:
Micrograph 1

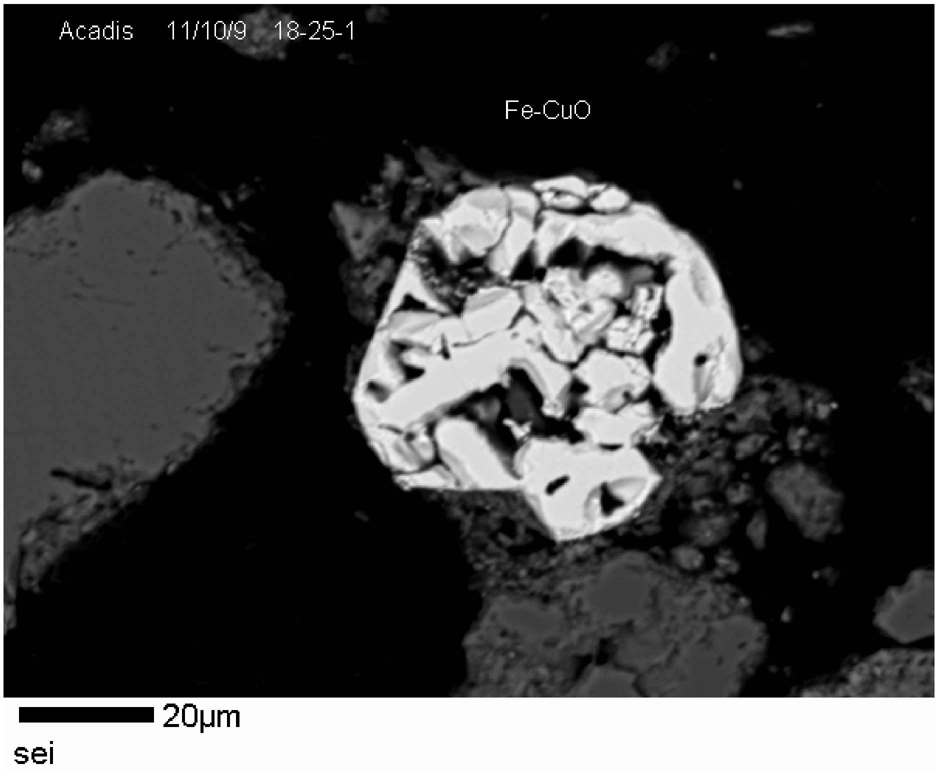
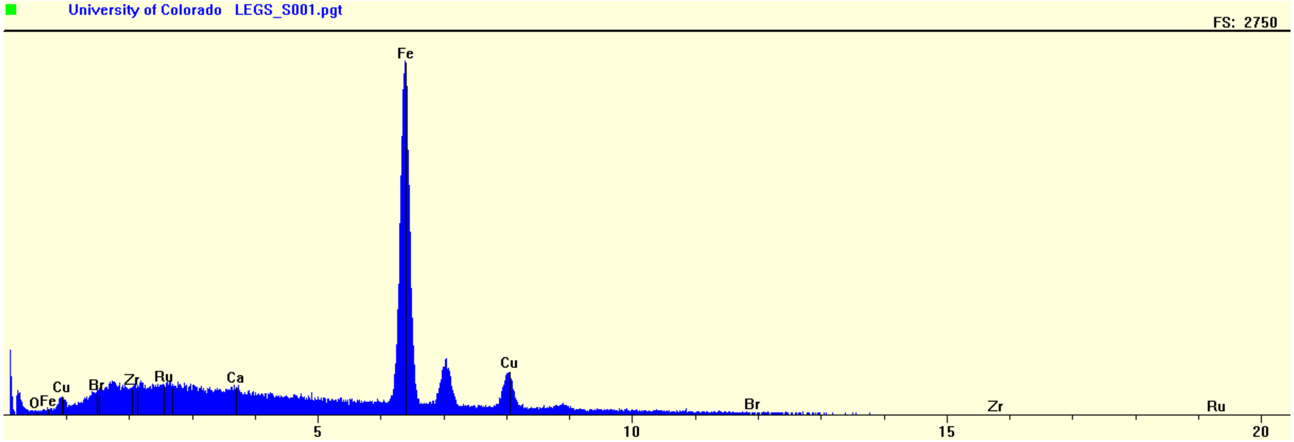


Figure No.
6b

Sample:
FID 18

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
6c

Sample:
FID 18

Description:
Micrograph 2

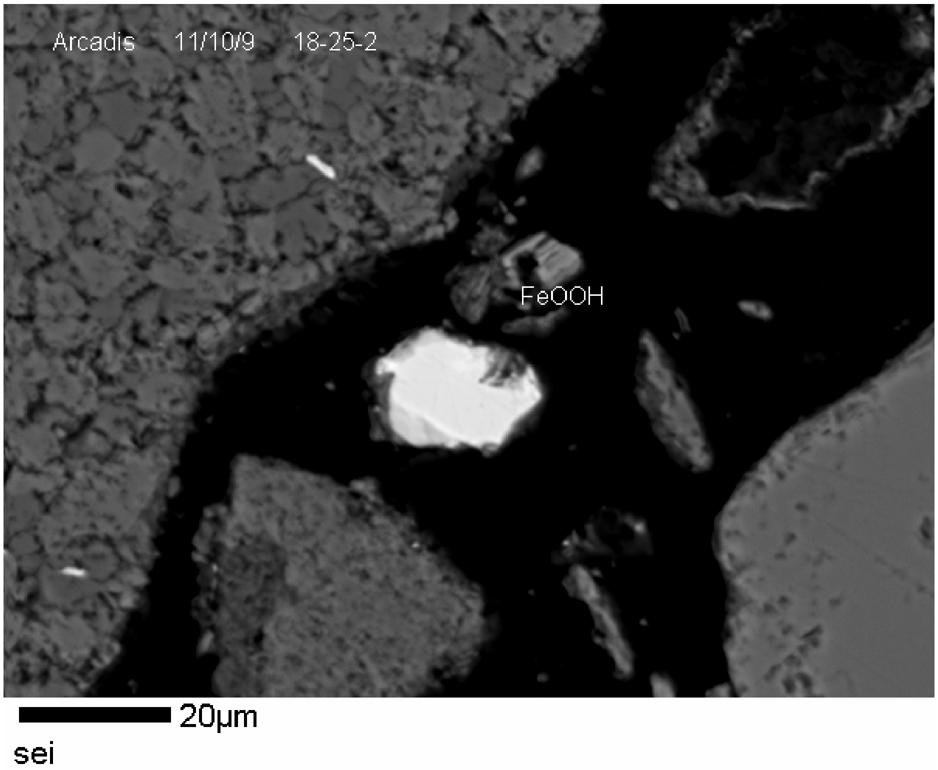
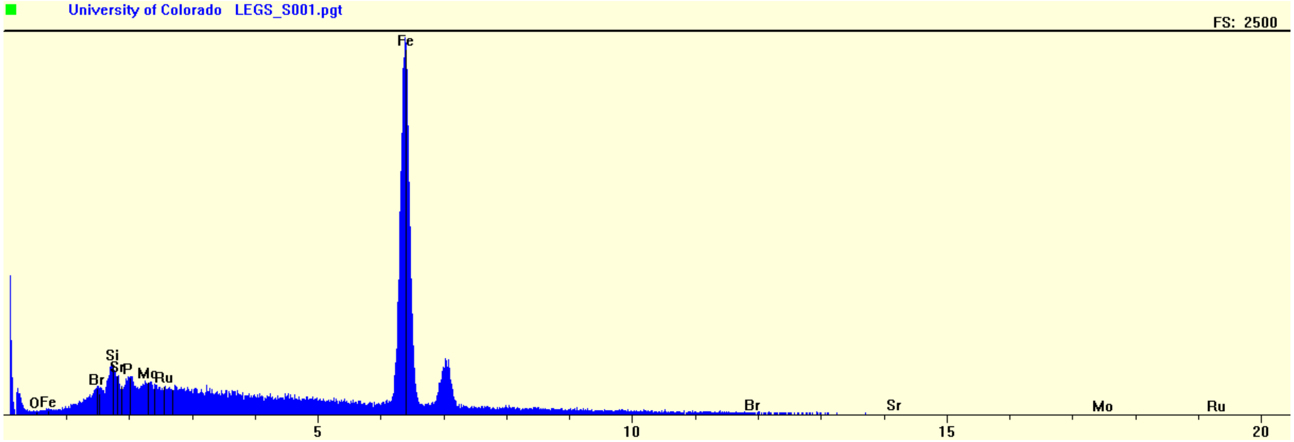


Figure No.
6d

Sample:
FID 18

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
6e

Sample:
FID 18

Description:
Micrograph 3

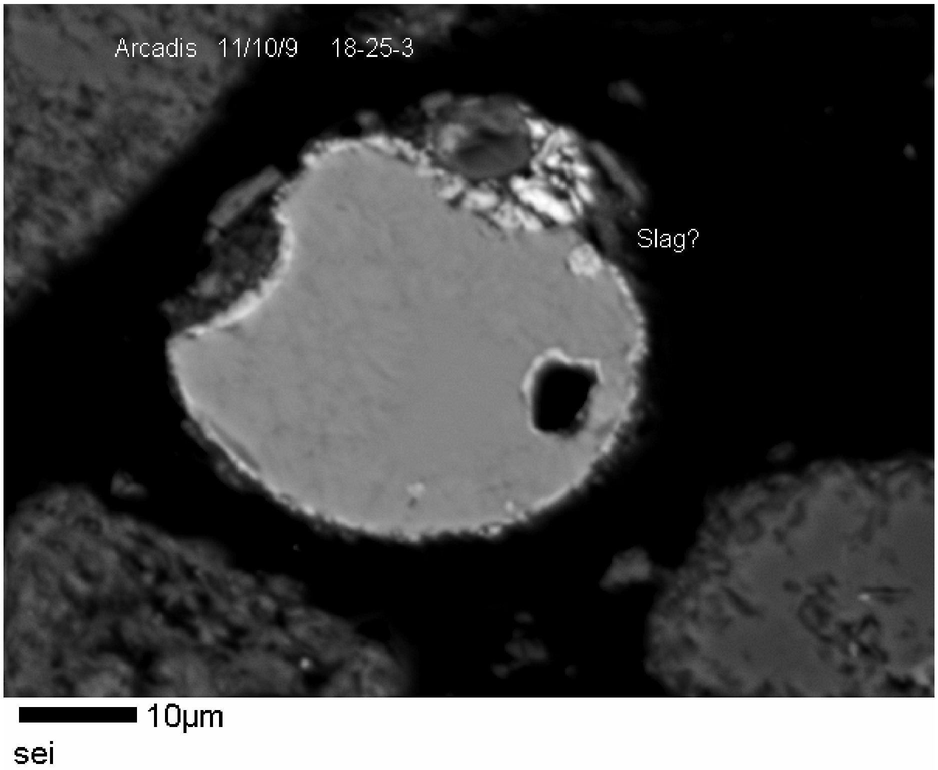
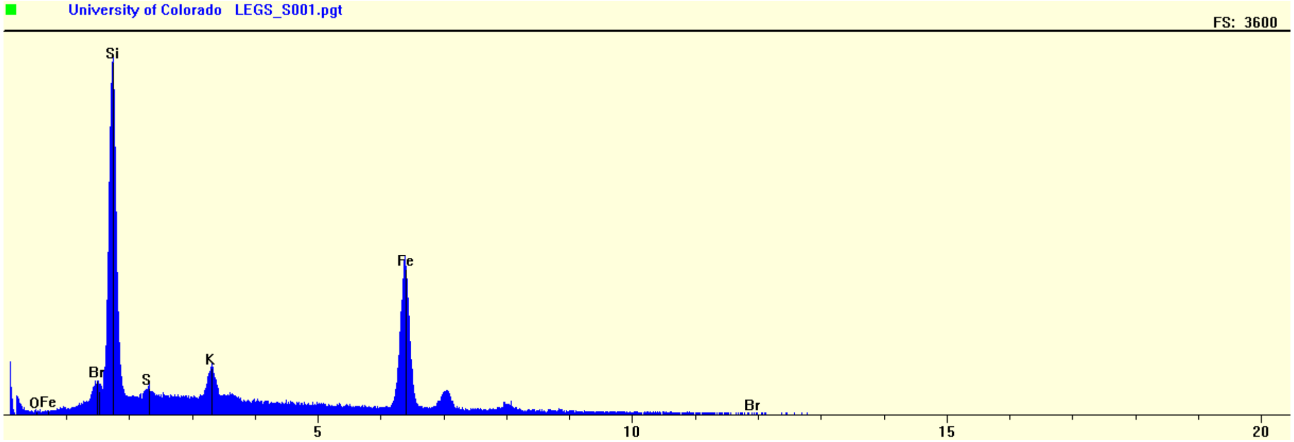


Figure No.
6f

Sample:
FID 18

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
6g

Sample:
FID 18

Description:
Micrograph 4

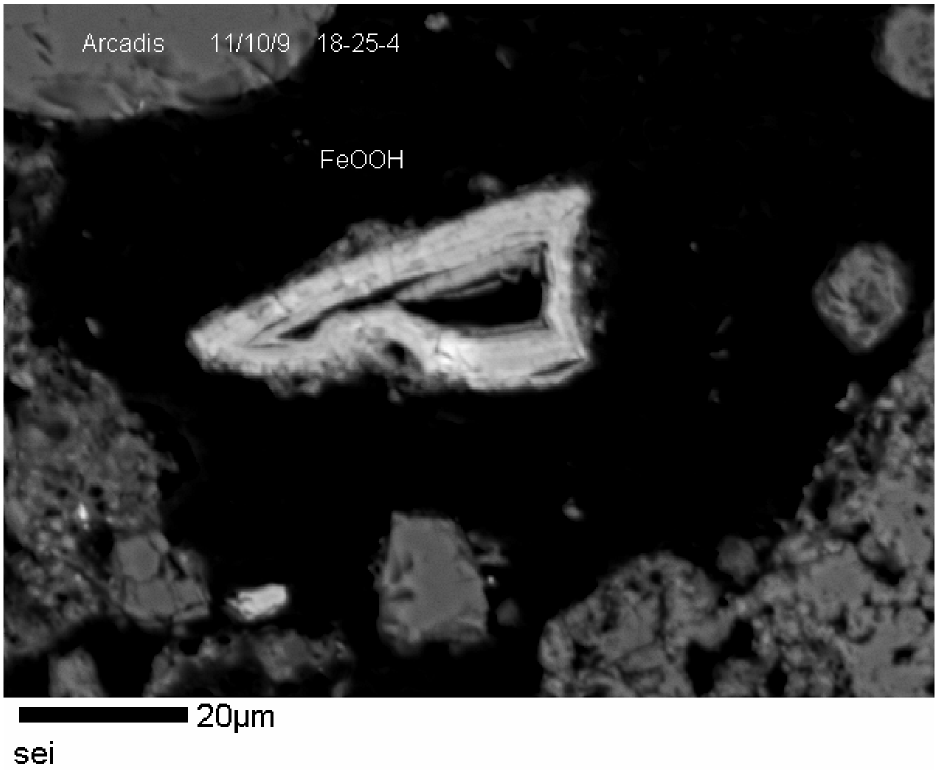
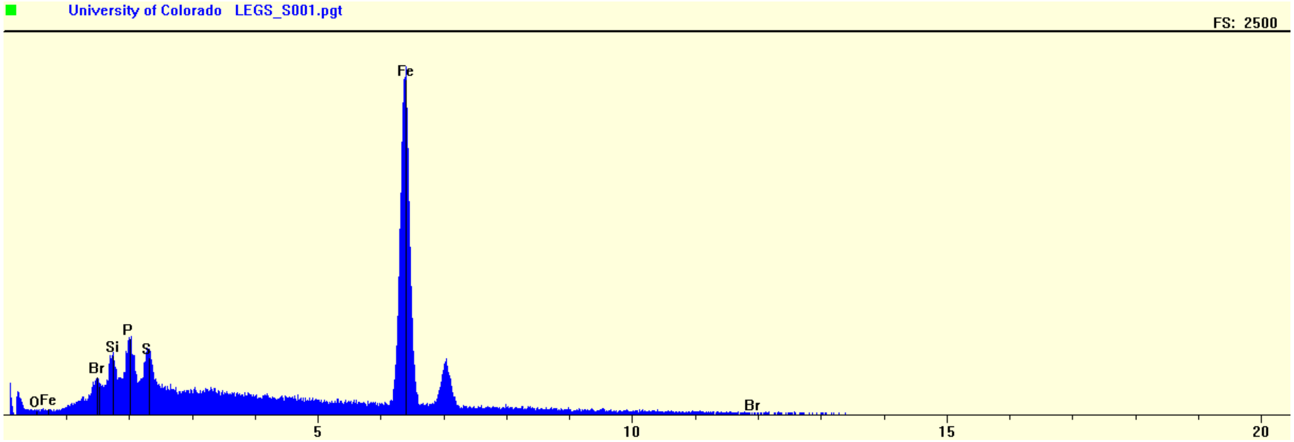


Figure No.
6h

Sample:
FID 18

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
6i

Sample:
FID 18

Description:
Micrograph 5

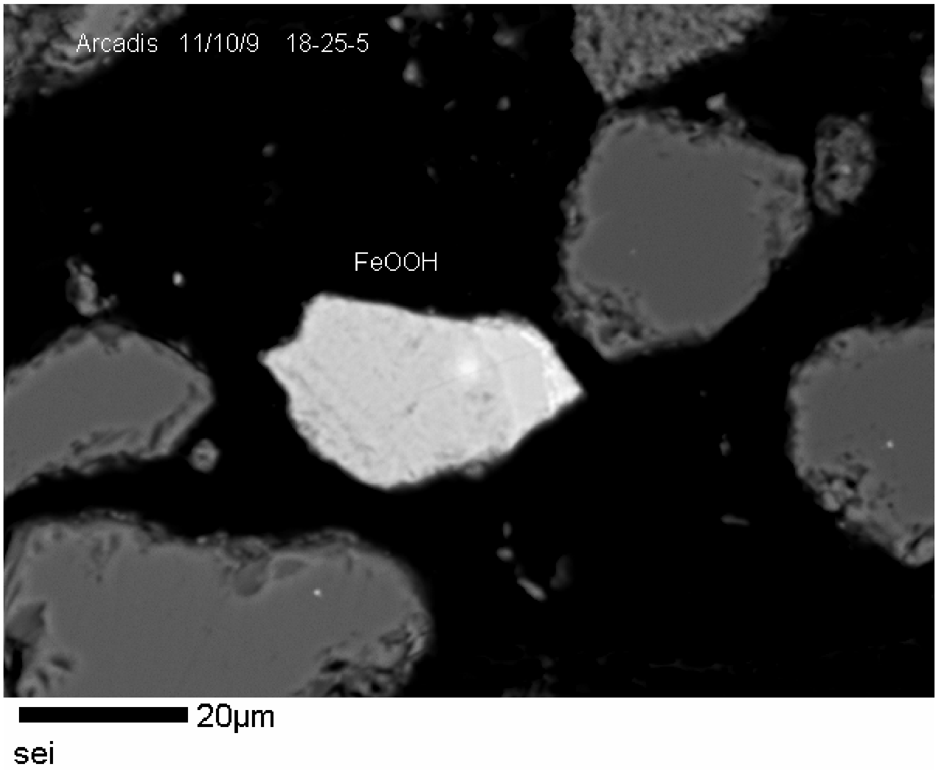
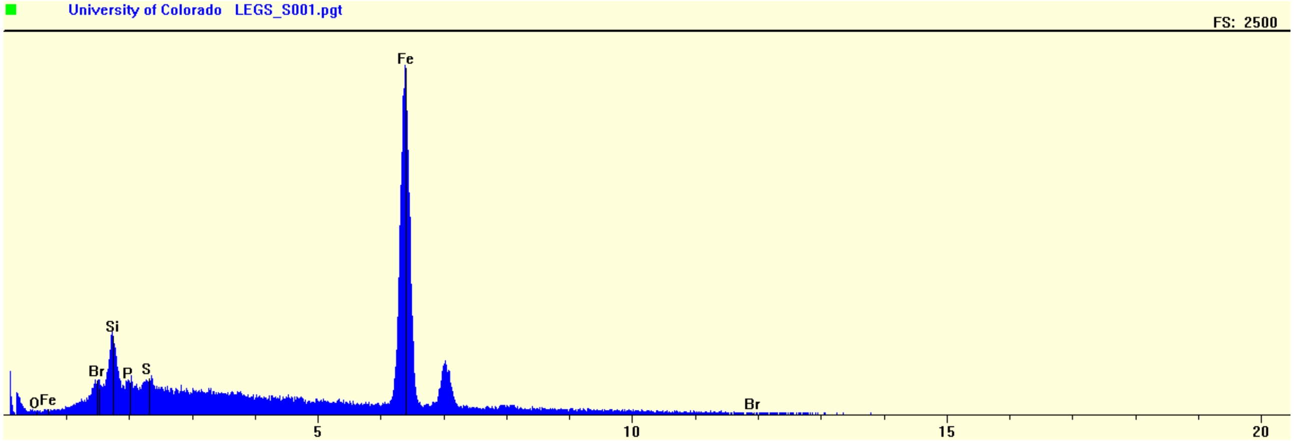


Figure No.
6j

Sample:
FID 18

Description:
Histogram 5



SPECIATION FIGURES

Figure No.
6k

Sample:
FID 18

Description:
Micrograph 6

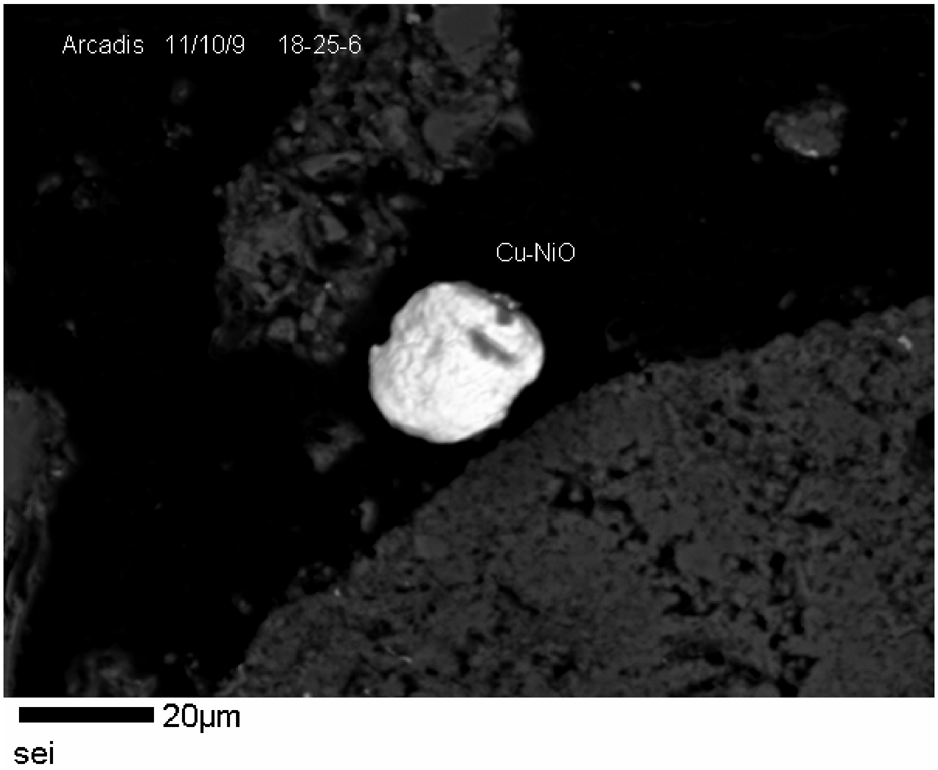
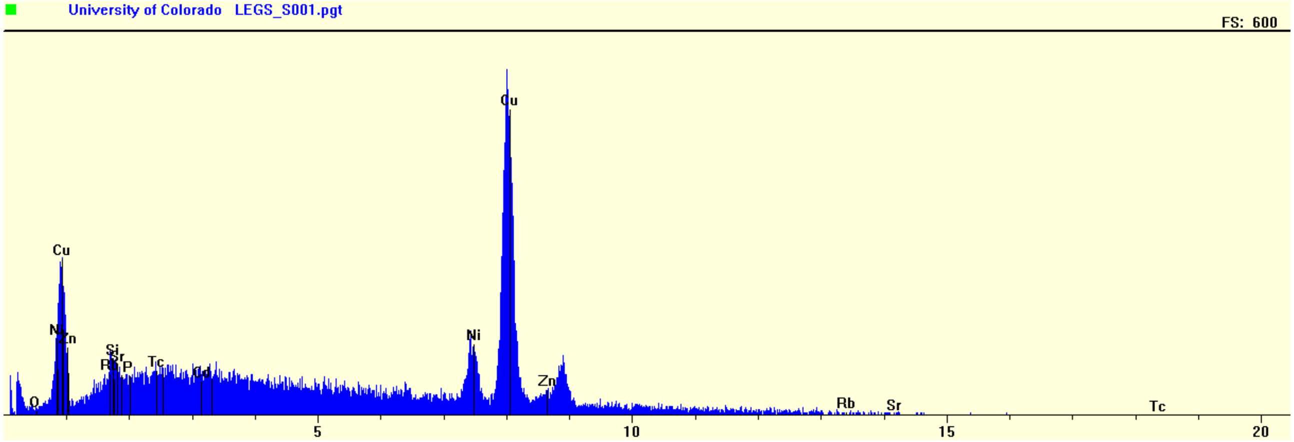


Figure No.
6l

Sample:
FID 18

Description:
Histogram 6



SPECIATION FIGURES

Figure No.
7a

Sample:
FID 20

Description:
Micrograph 1

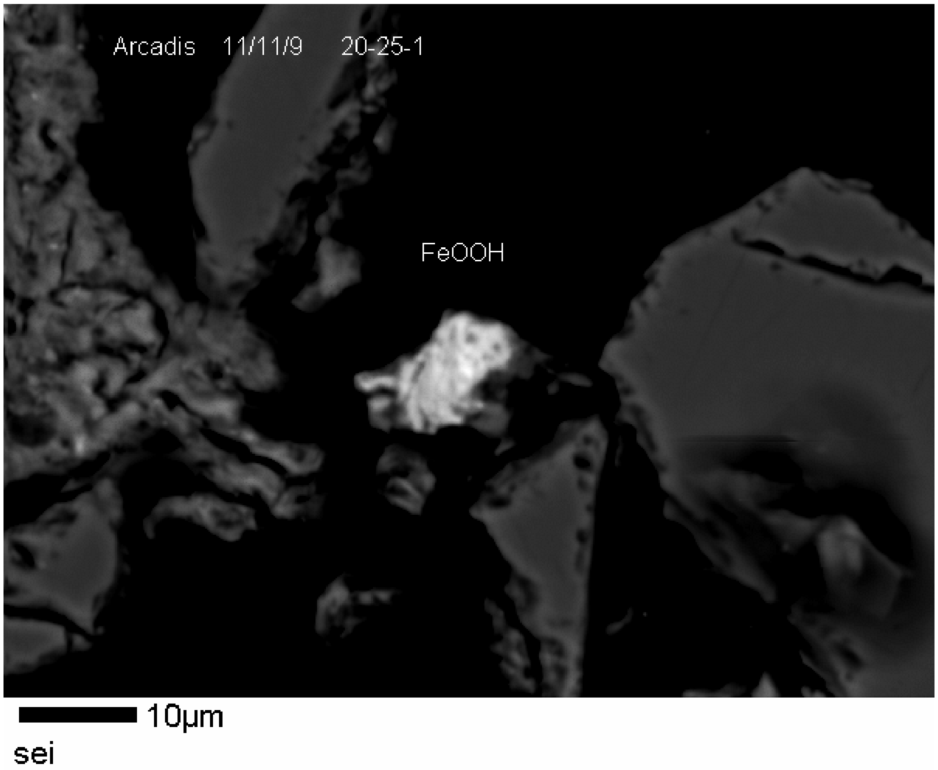
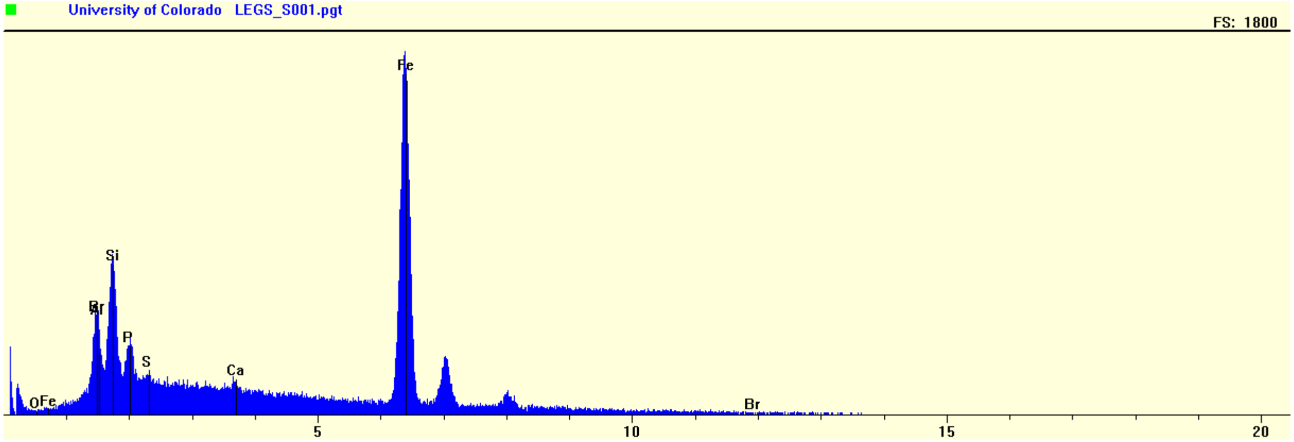


Figure No.
7b

Sample:
FID 20

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
7c

Sample:
FID 20

Description:
Micrograph 2

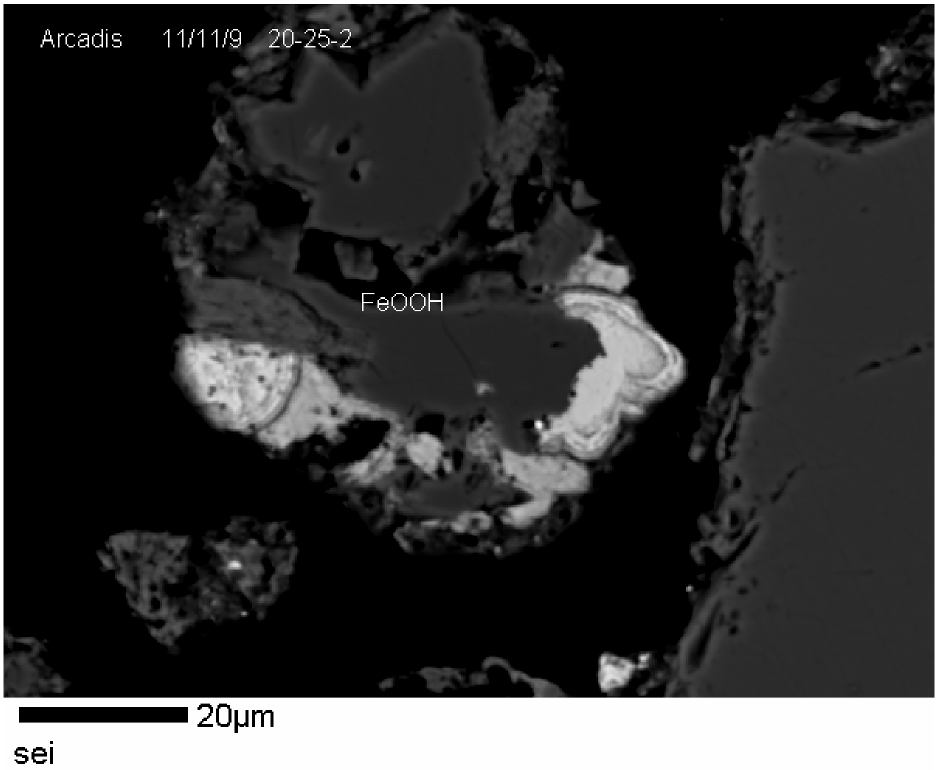
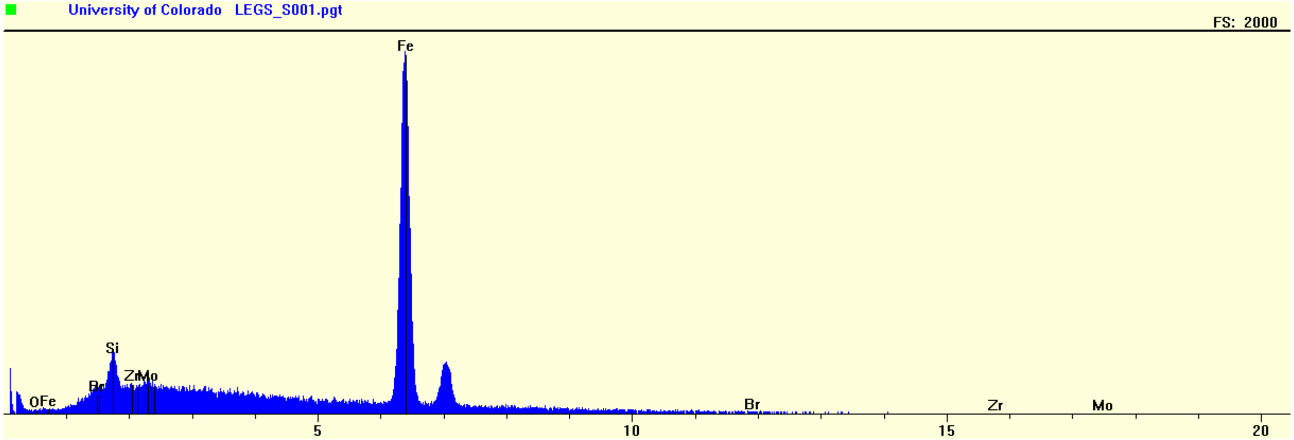


Figure No.
7d

Sample:
FID 20

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
7e

Sample:
FID 20

Description:
Micrograph 3

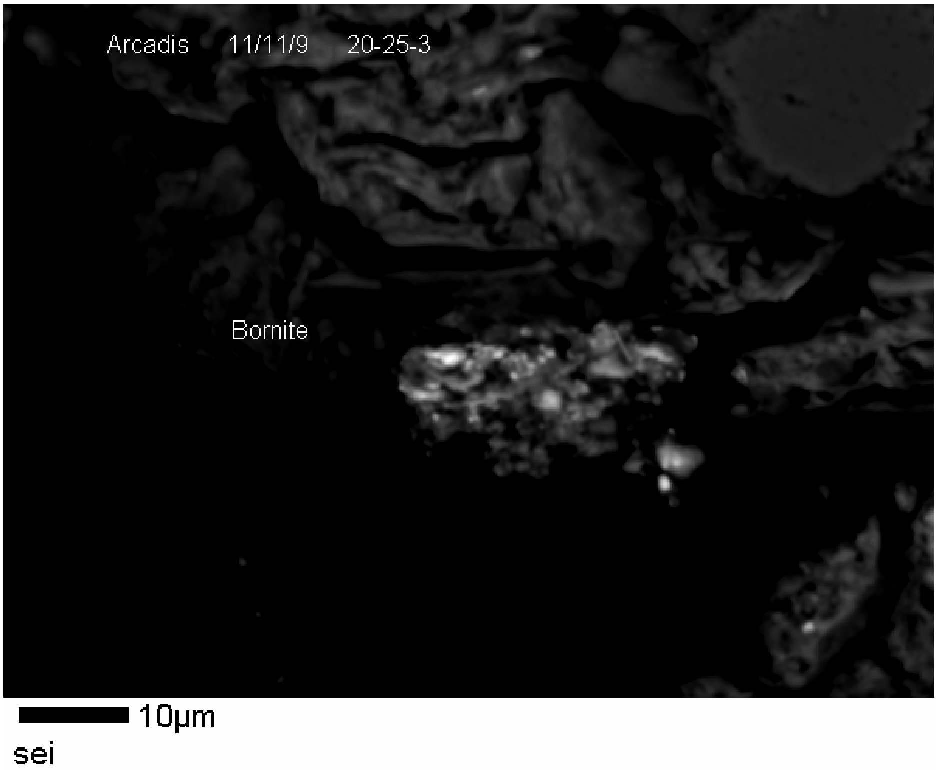
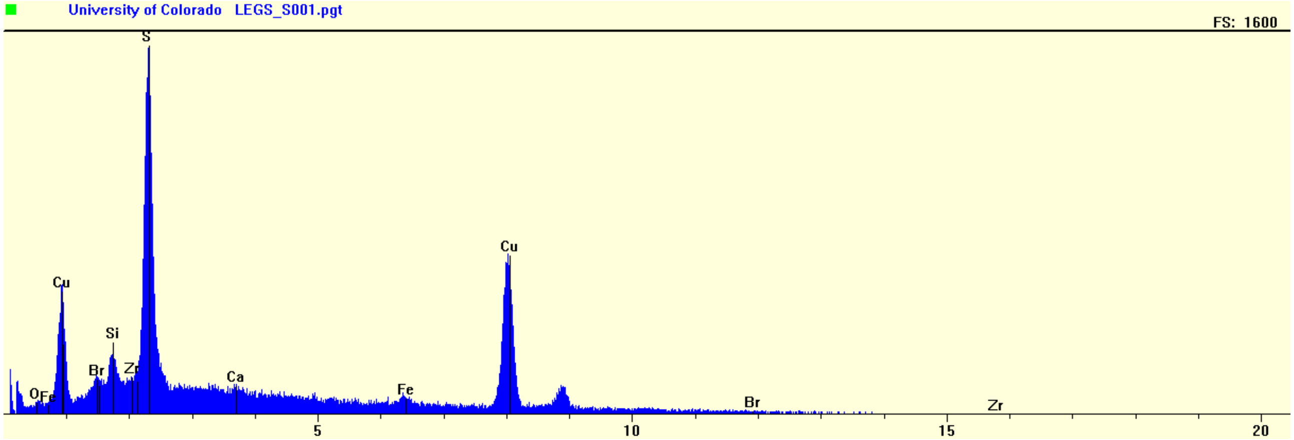


Figure No.
7f

Sample:
FID 20

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
7g

Sample:
FID 20

Description:
Micrograph 4

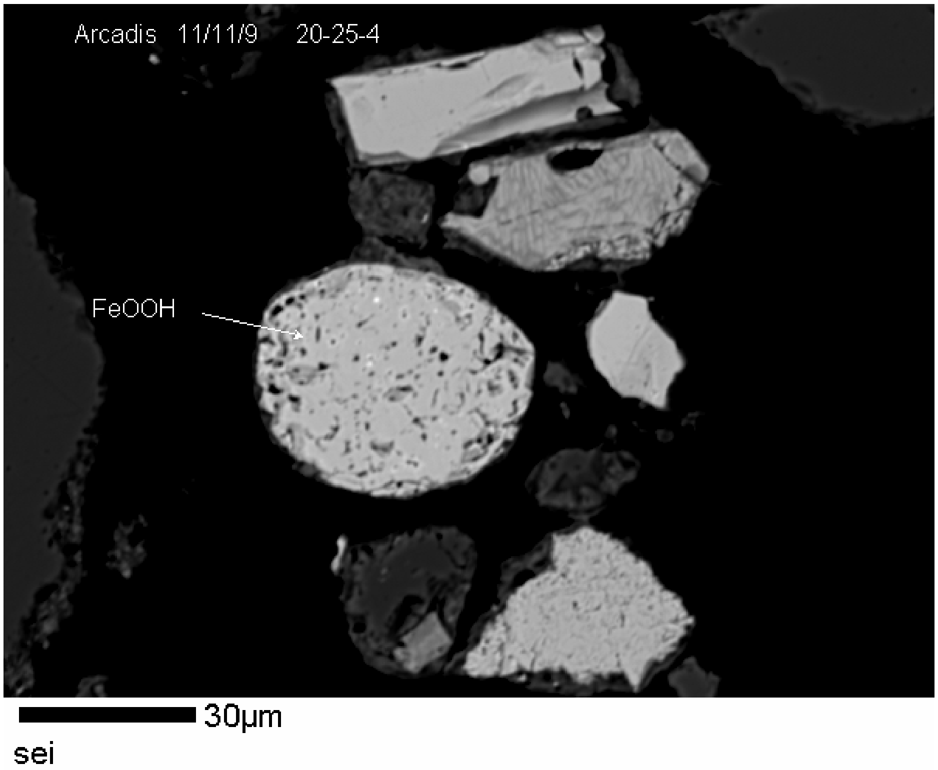
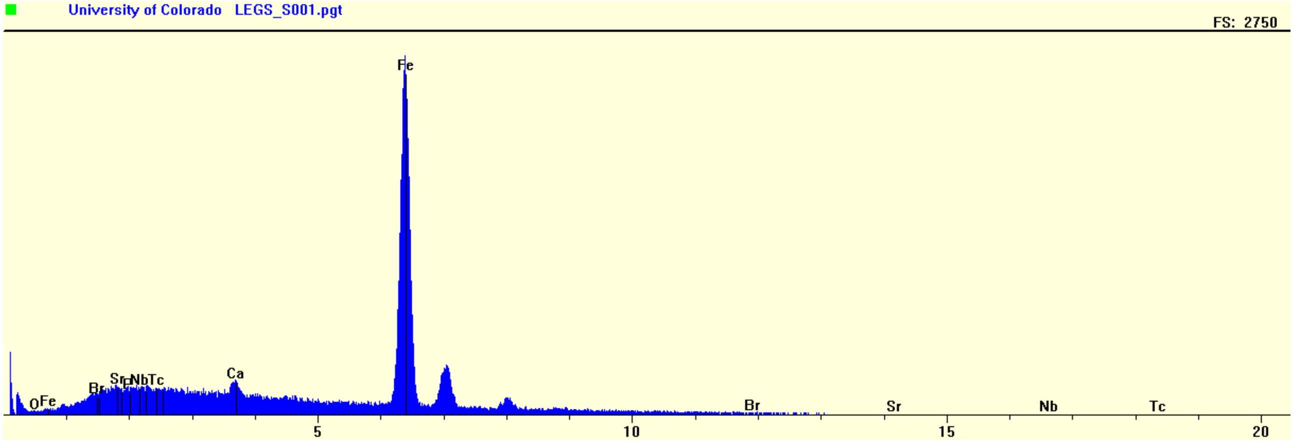


Figure No.
7h

Sample:
FID 20

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
7i

Sample:
FID 20

Description:
Micrograph 5

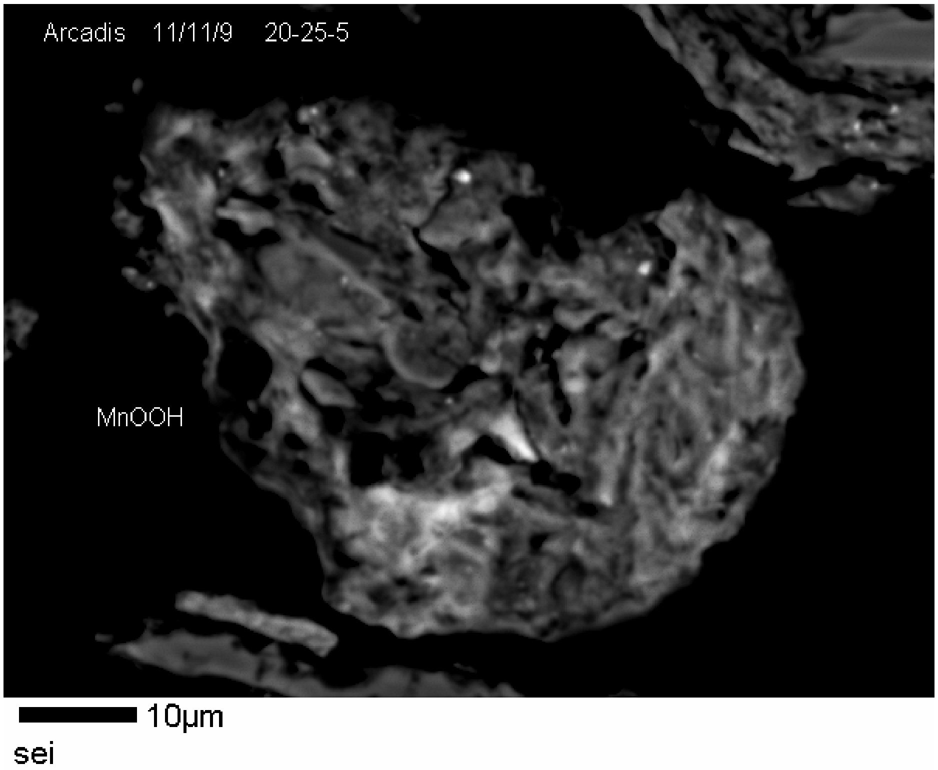
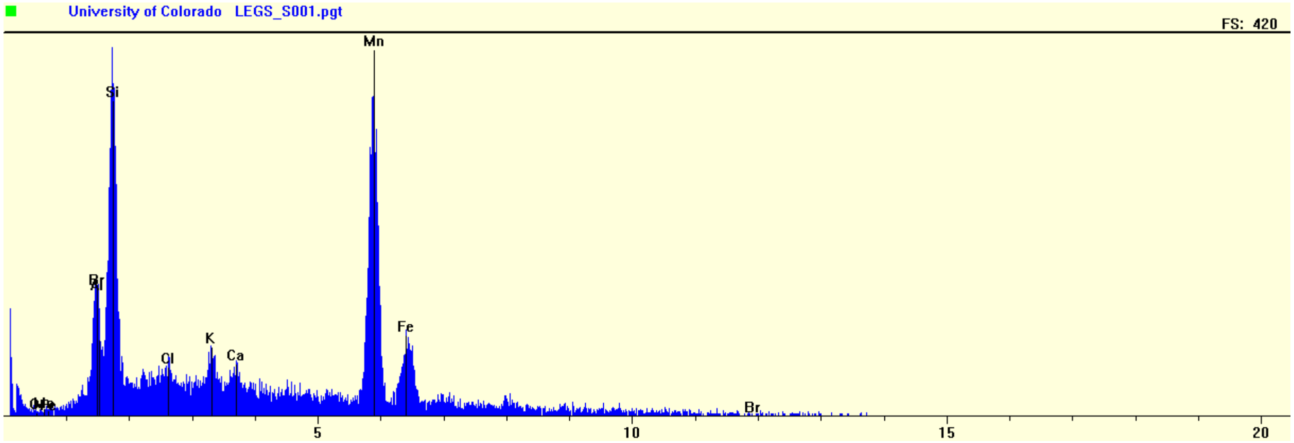


Figure No.
7j

Sample:
FID 20

Description:
Histogram 5



SPECIATION FIGURES

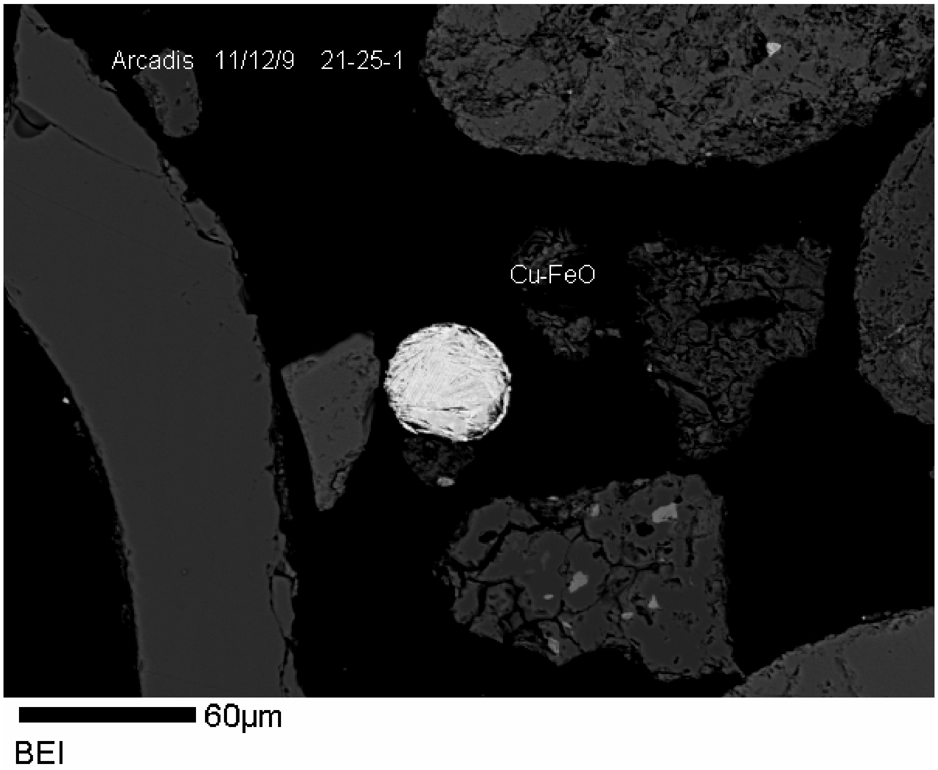
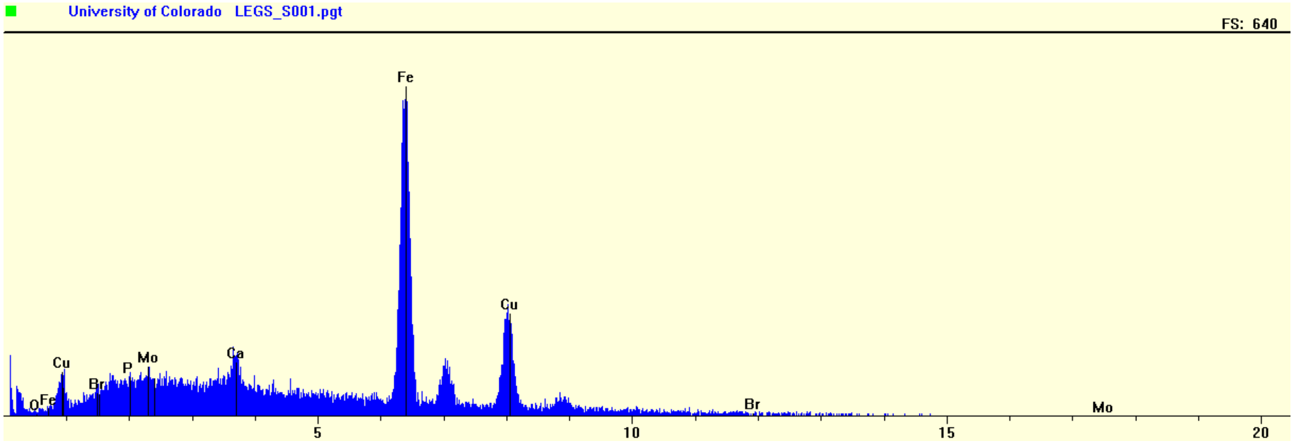
Figure No. **8a**	
Sample: FID 21 **Description:** Micrograph 1	

Figure No. **8b**	
Sample: FID 21 **Description:** Histogram 1	

SPECIATION FIGURES

Figure No.
8c

Sample:
FID 21

Description:
Micrograph 2

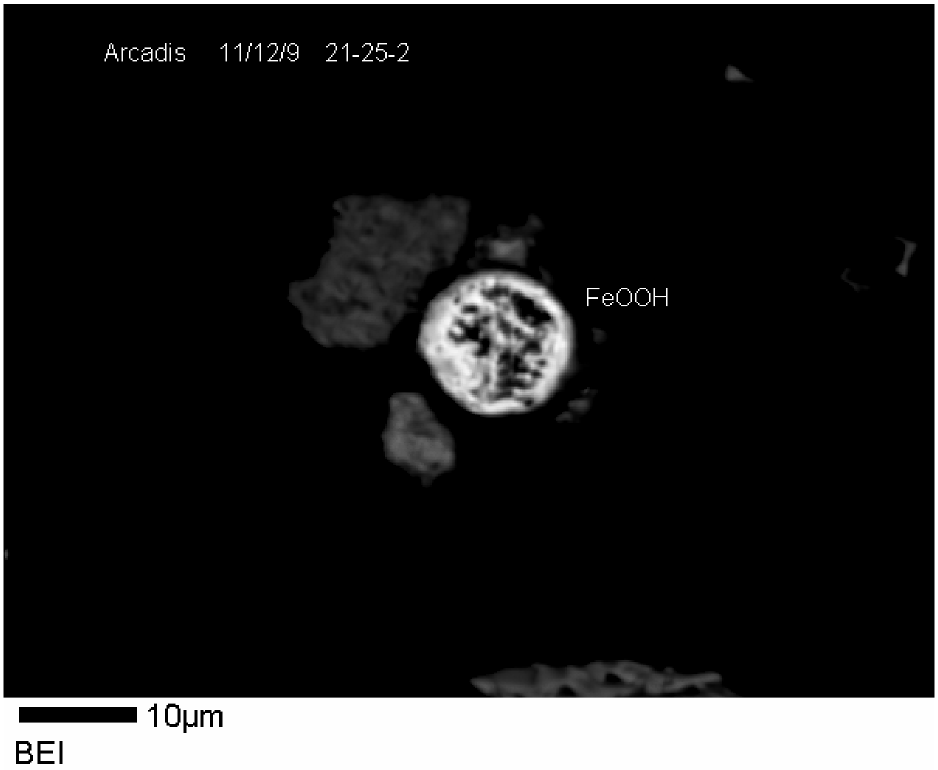
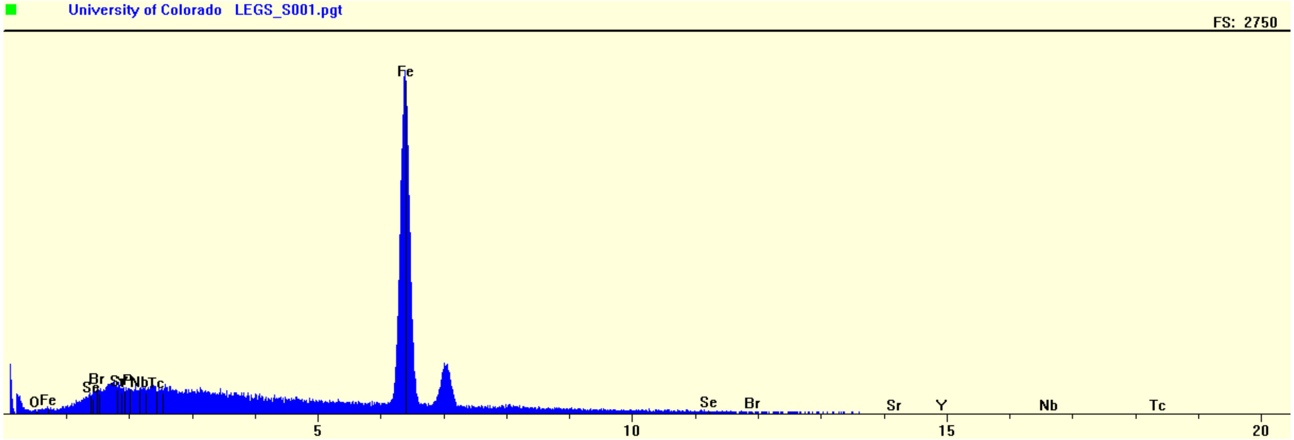


Figure No.
8d

Sample:
FID 21

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
8e

Sample:
FID 21

Description:
Micrograph 3

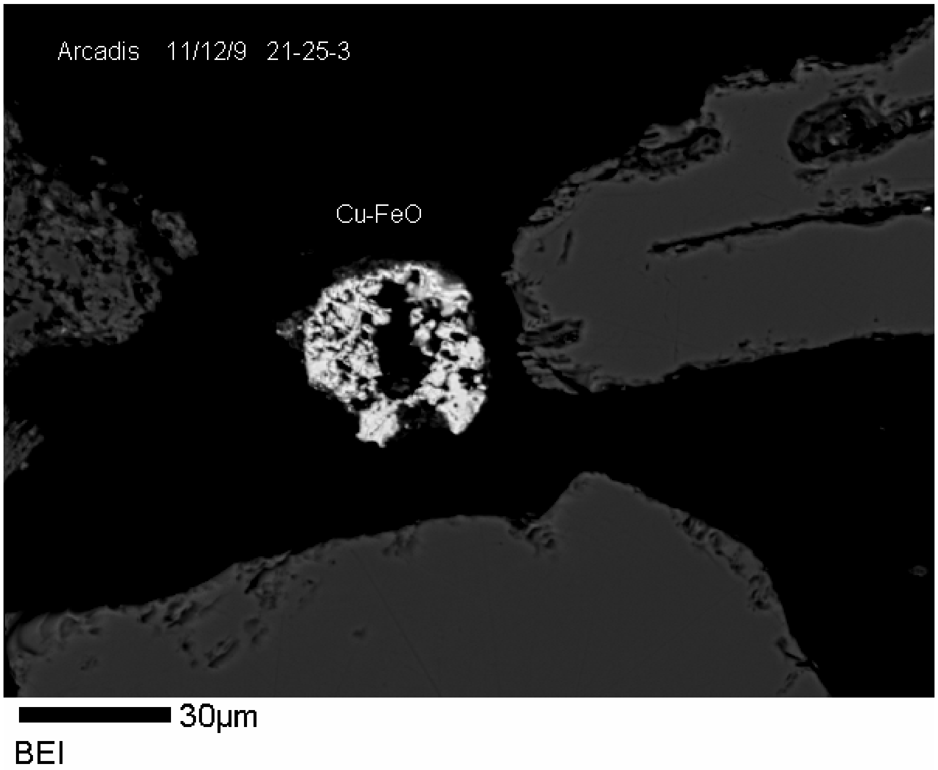
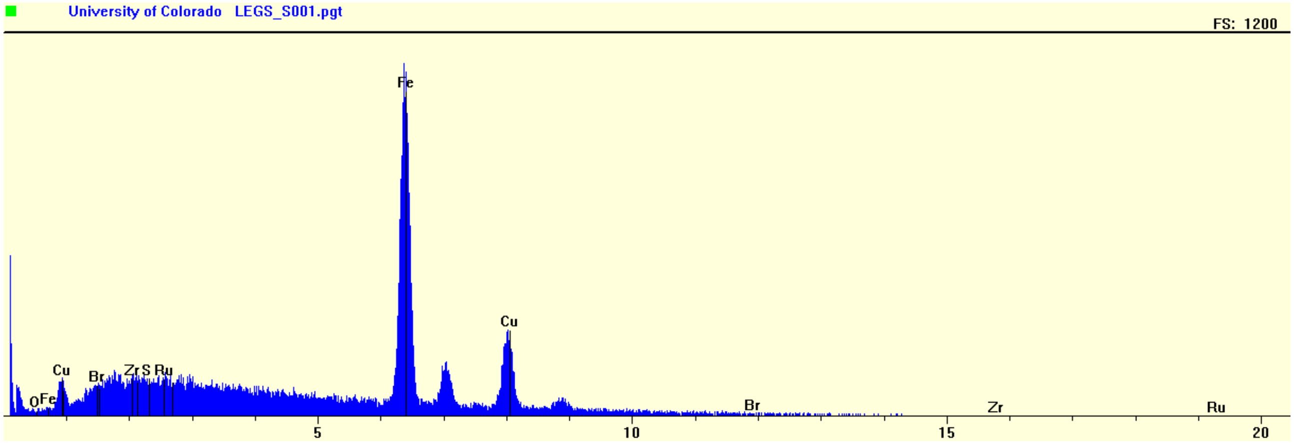


Figure No.
8f

Sample:
FID 21

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
8g

Sample:
FID 21

Description:
Micrograph 4

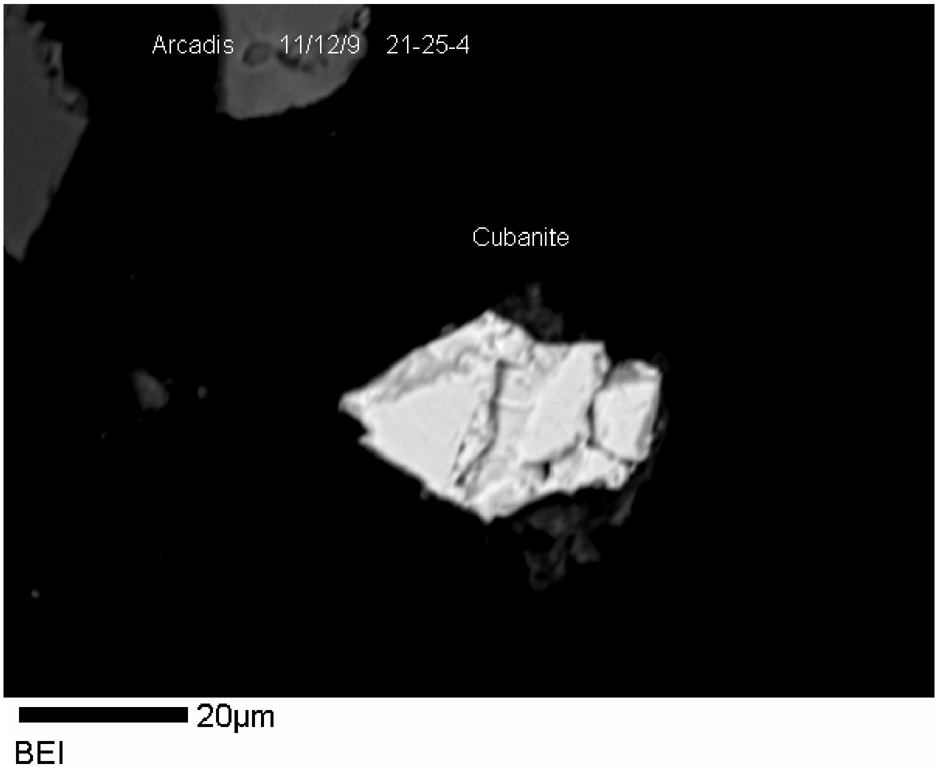
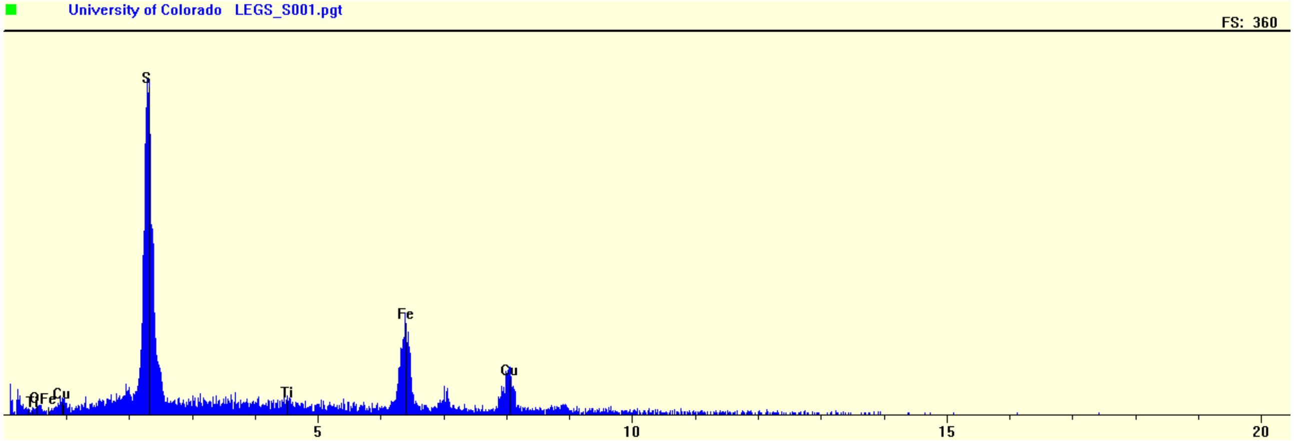


Figure No.
8h

Sample:
FID 21

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
9a

Sample:
FID 26

Description:
Micrograph 1

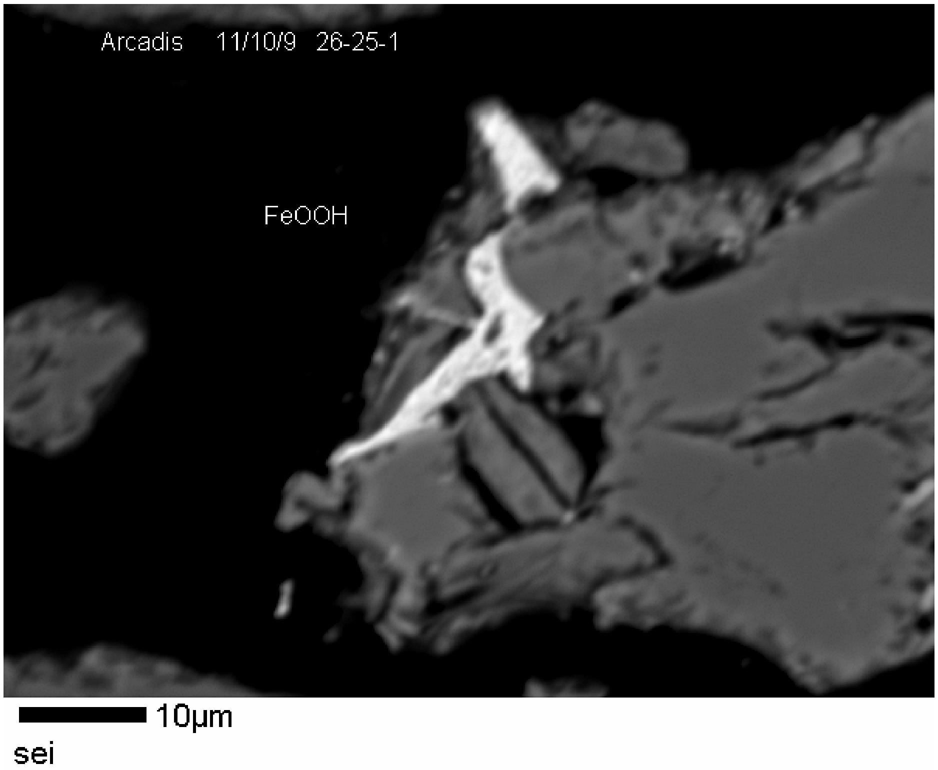
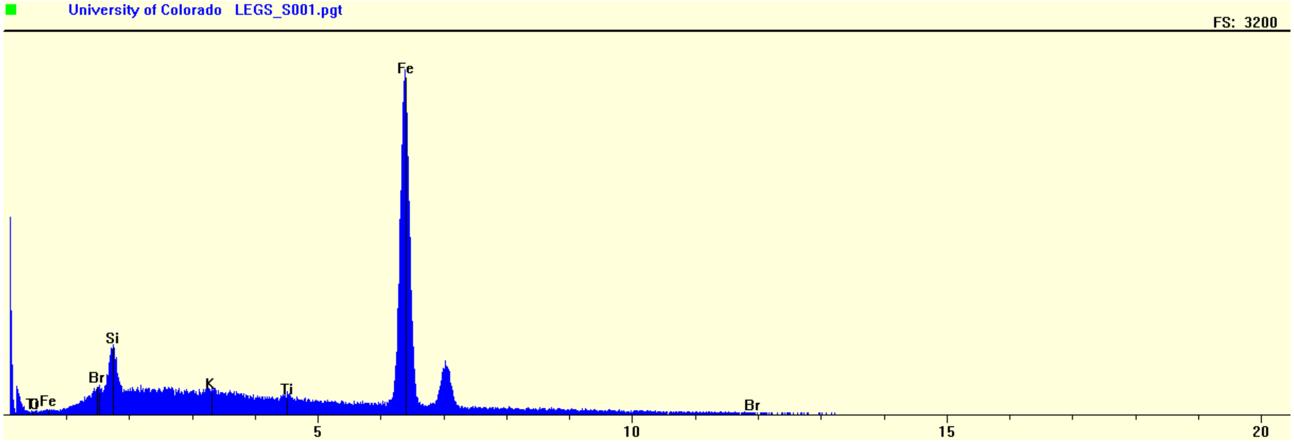


Figure No.
9b

Sample:
FID 26

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
9c

Sample:
FID 26

Description:
Micrograph 2

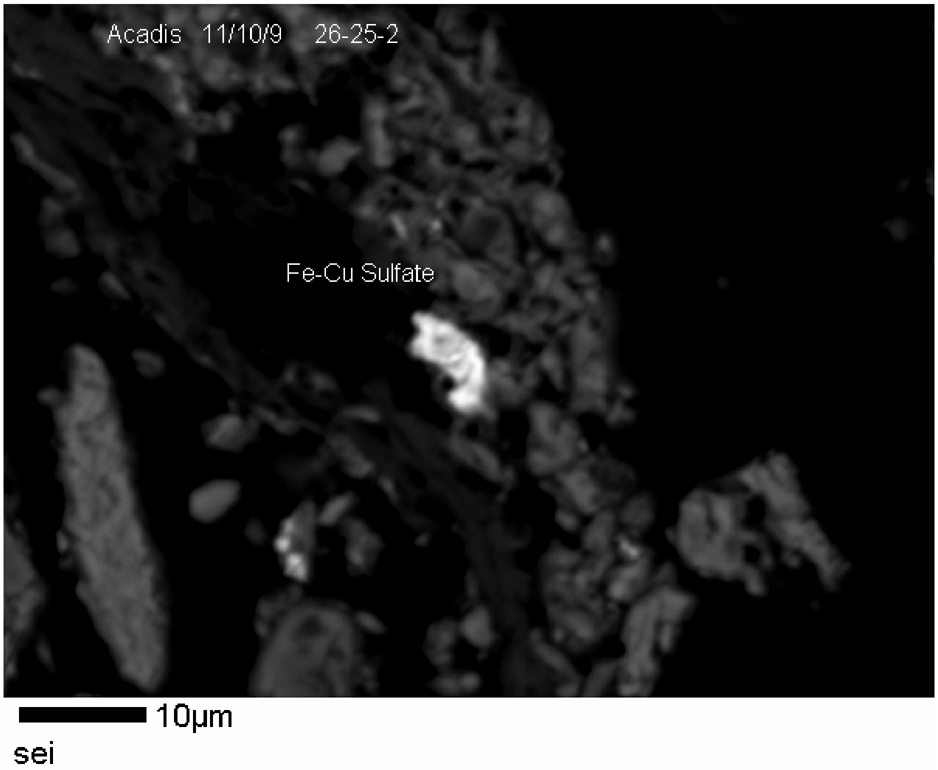


Figure No.
9d

Sample:
FID 26

Description:
Histogram 2

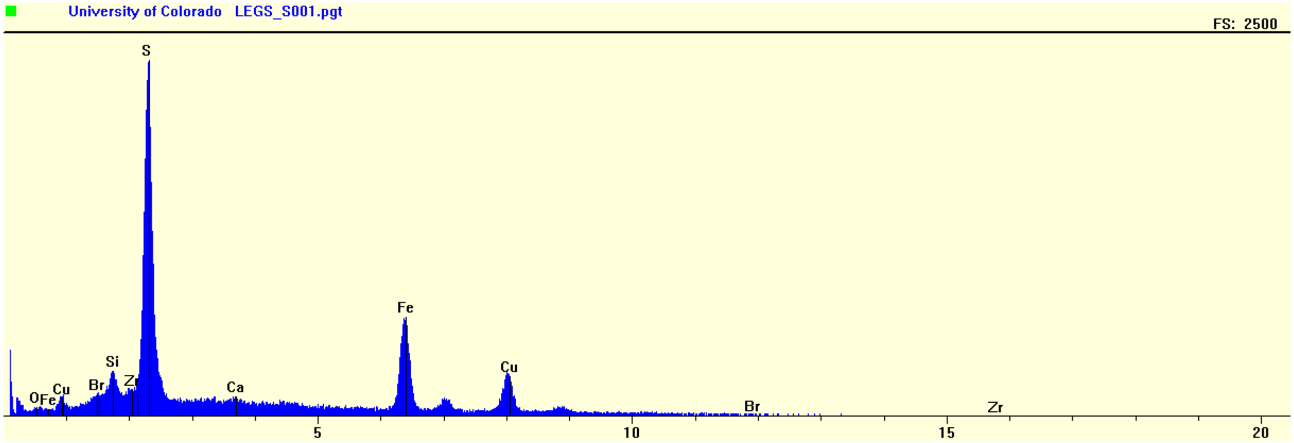


Figure No.
9e

Sample:
FID 26

Description:
Micrograph 3

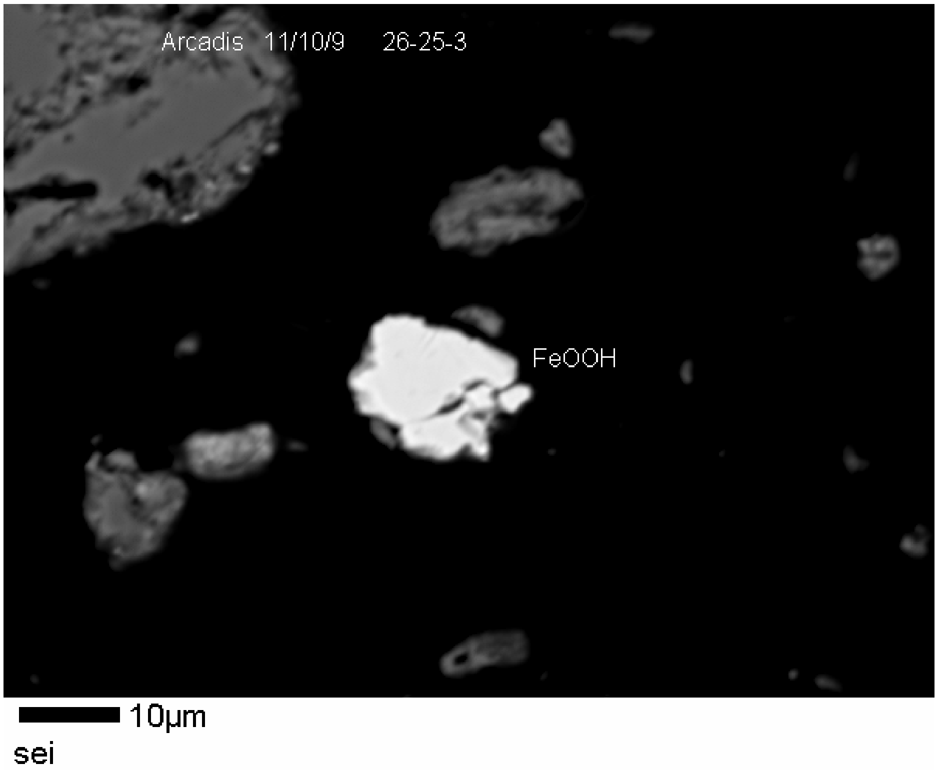


Figure No.
9f

Sample:
FID 26

Description:
Histogram 3

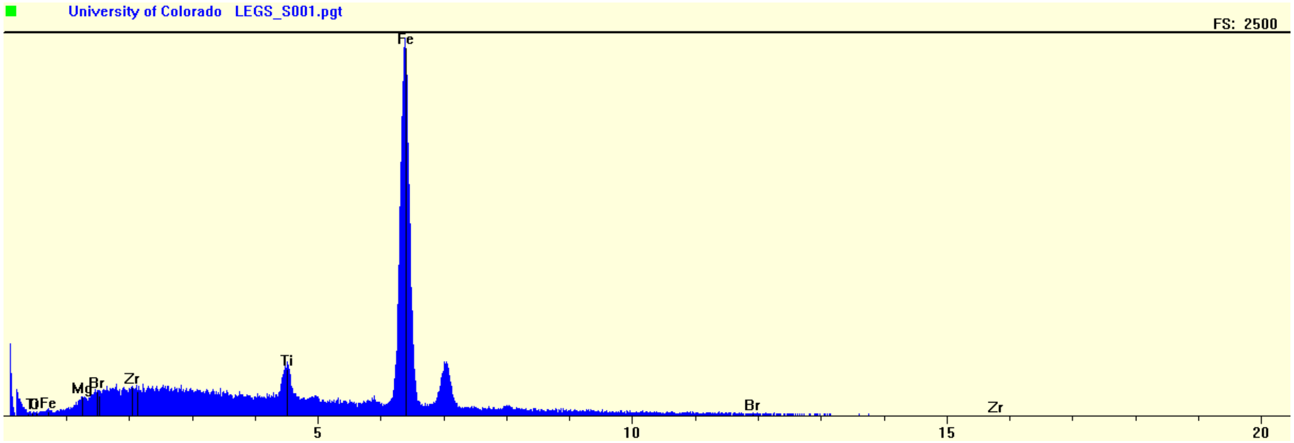


Figure No.
9g

Sample:
FID 26

Description:
Micrograph 4

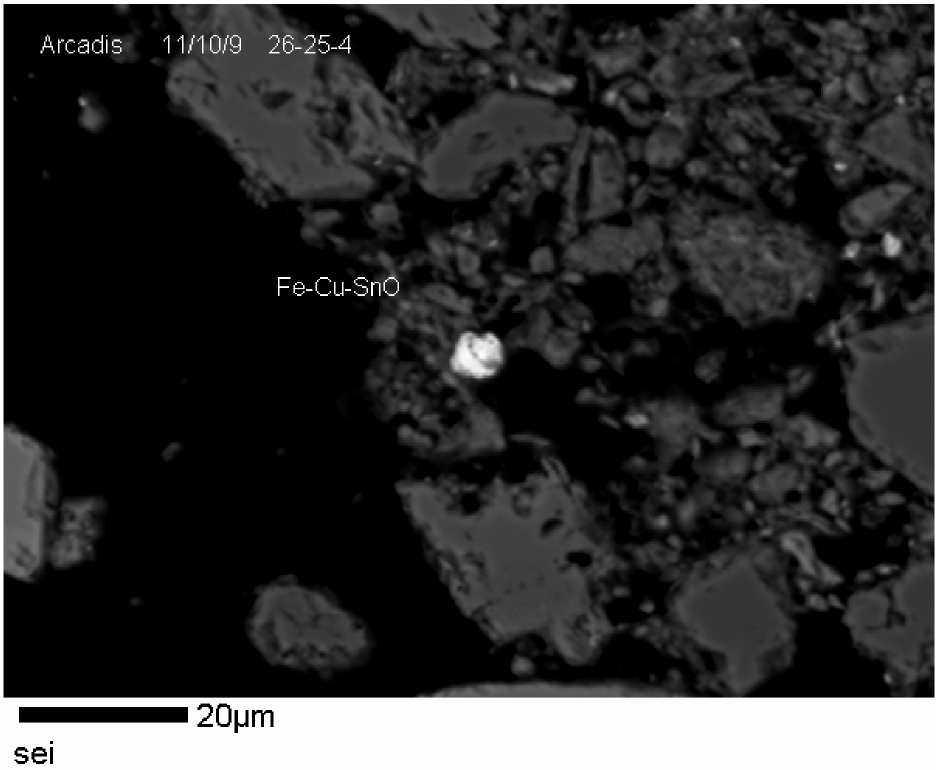
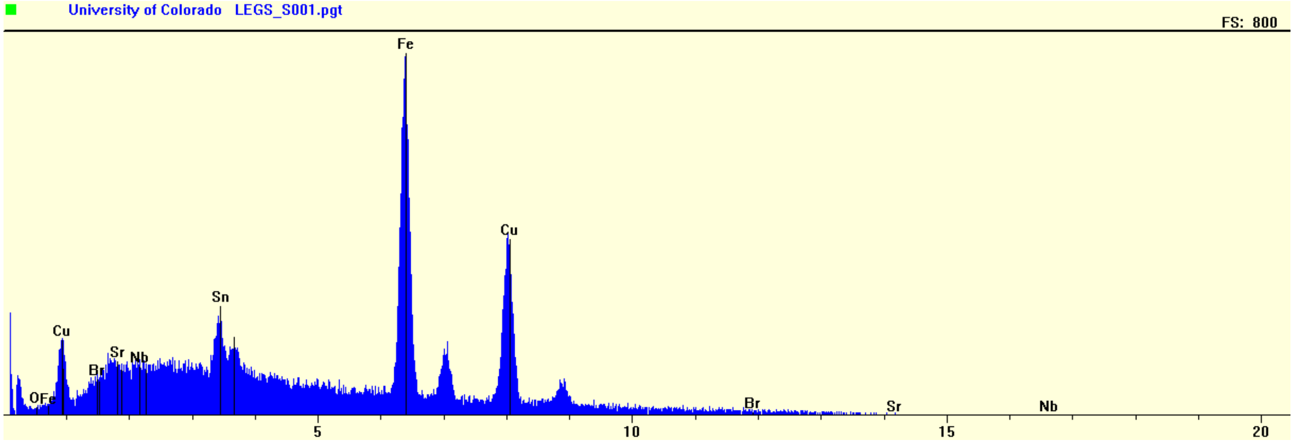


Figure No.
9h

Sample:
FID 26

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
9i

Sample:
FID 26

Description:
Micrograph 5

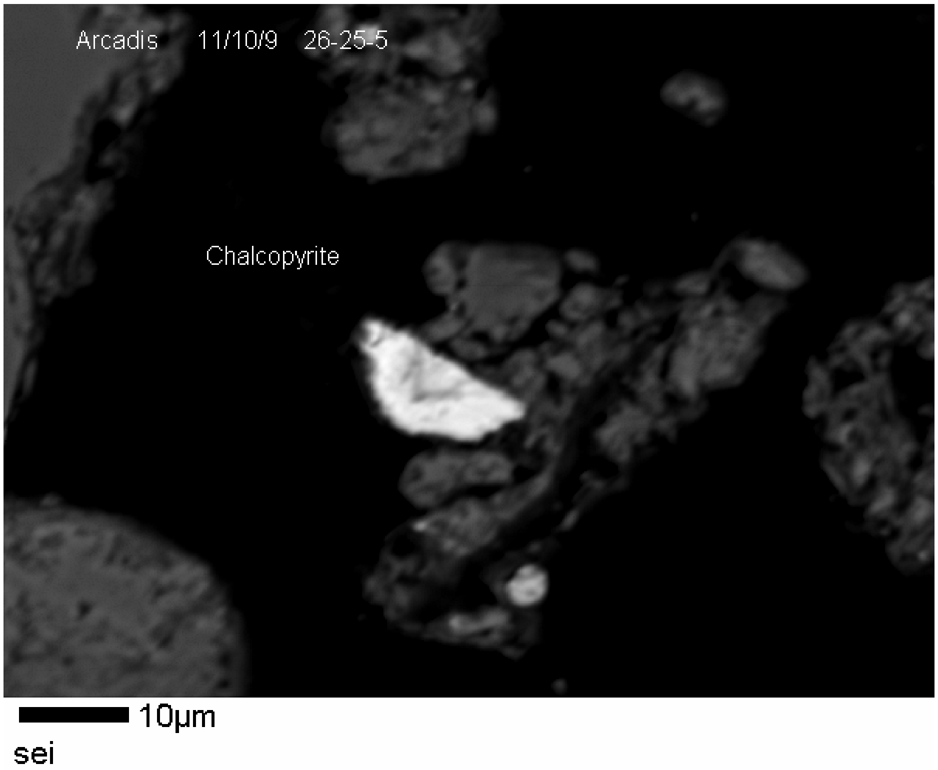
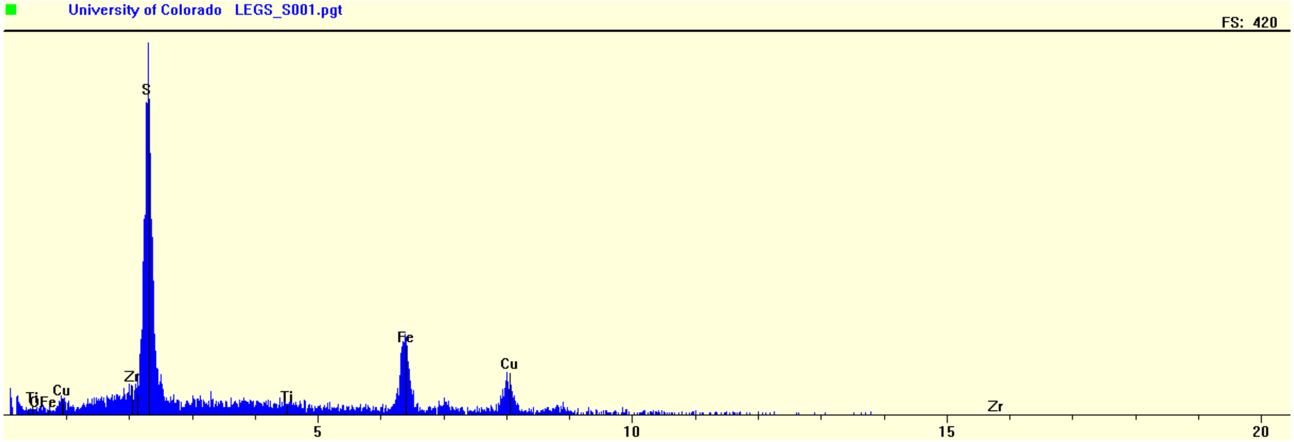


Figure No.
9j

Sample:
FID 26

Description:
Histogram 5



SPECIATION FIGURES

Figure No.
10a

Sample:
FID 27

Description:
Micrograph 1

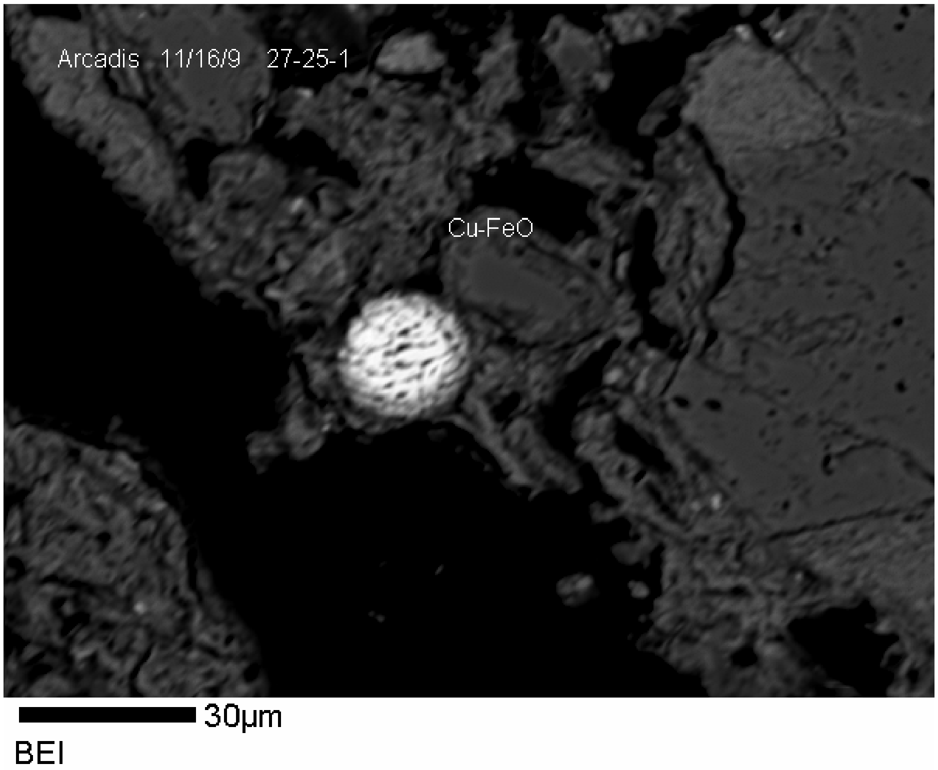
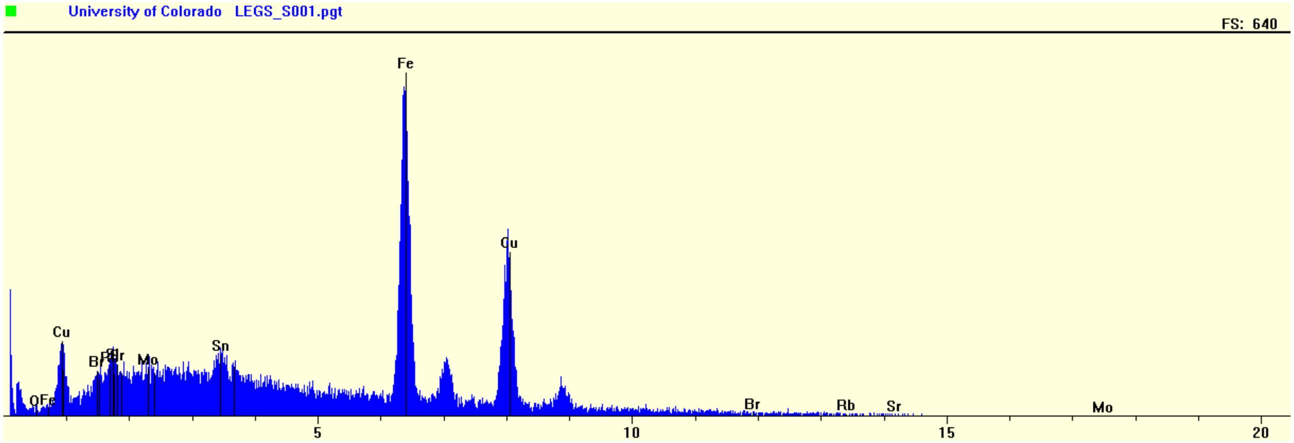


Figure No.
10b

Sample:
FID 27

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
10c

Sample:
FID 27

Description:
Micrograph 2

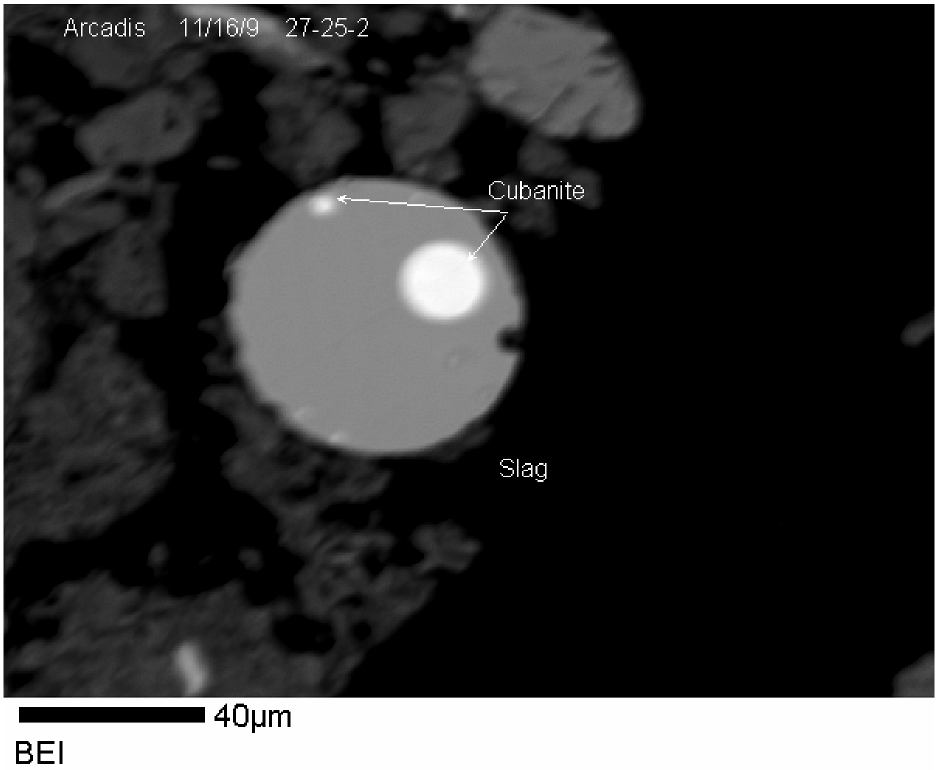
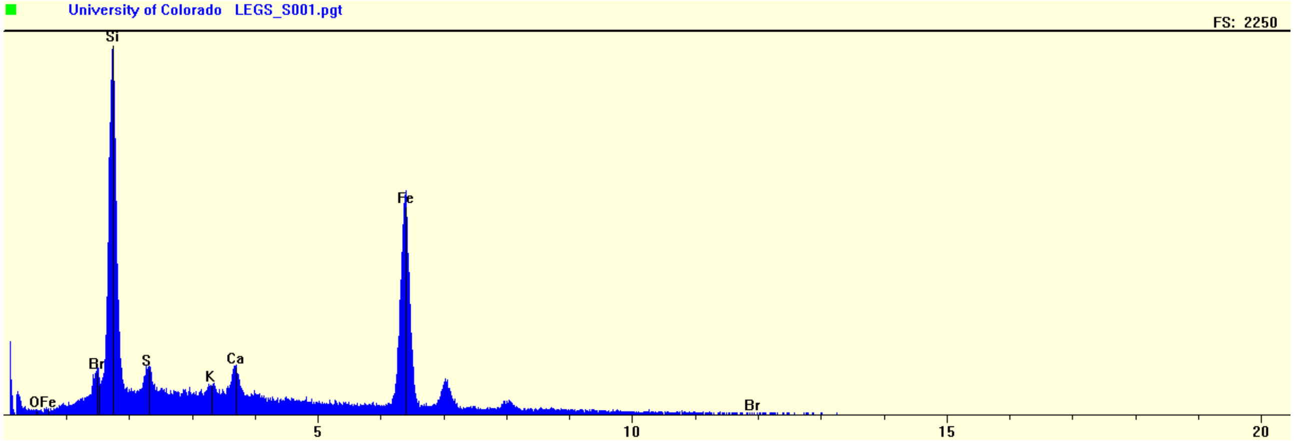


Figure No.
10d

Sample:
FID 27

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
10e

Sample:
FID 27

Description:
Micrograph 3

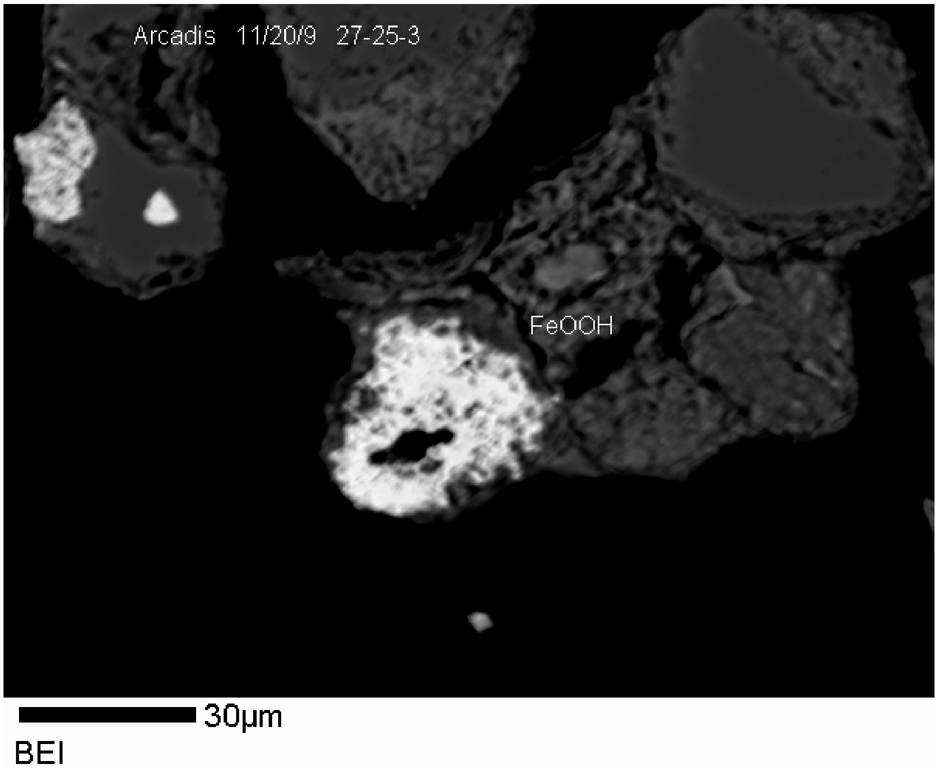
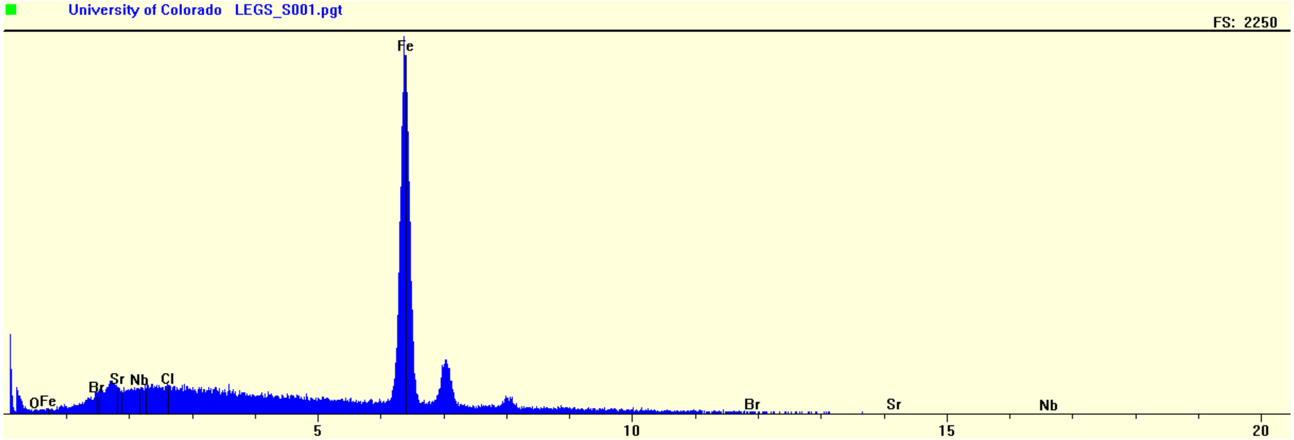


Figure No.
10f

Sample:
FID 27

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
10g

Sample:
FID 27

Description:
Micrograph 4

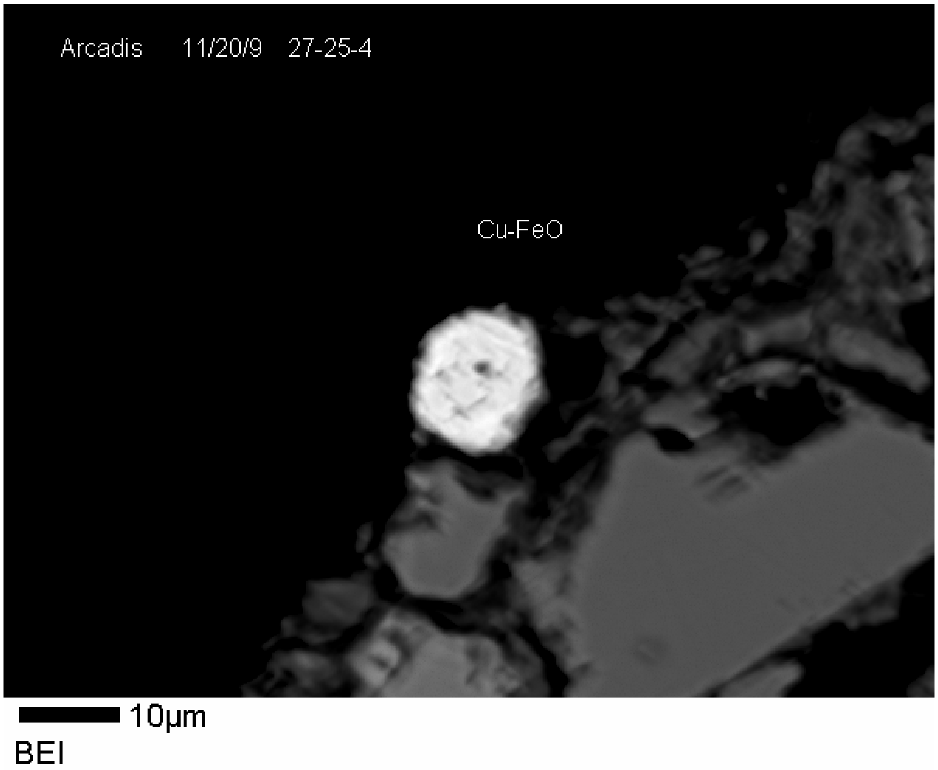
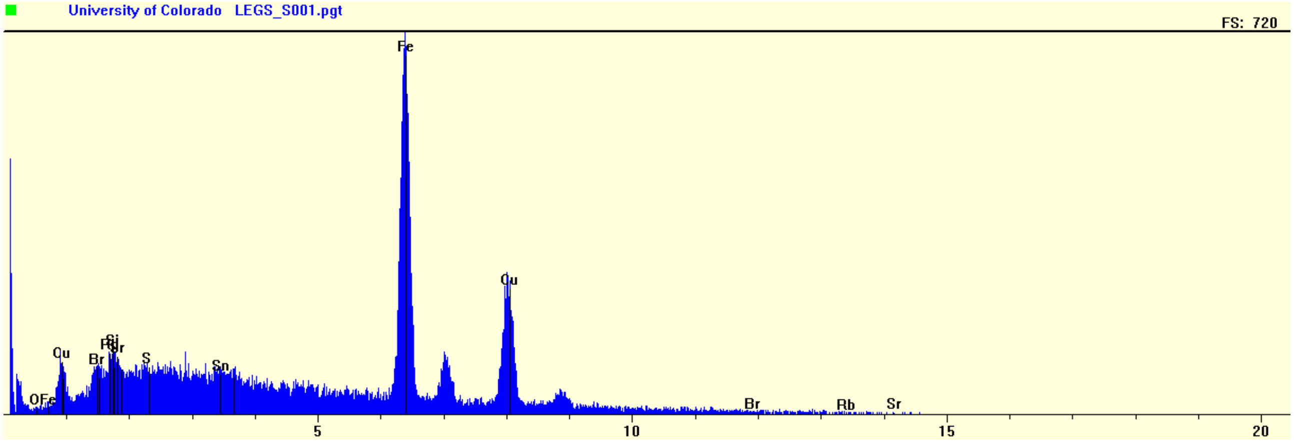


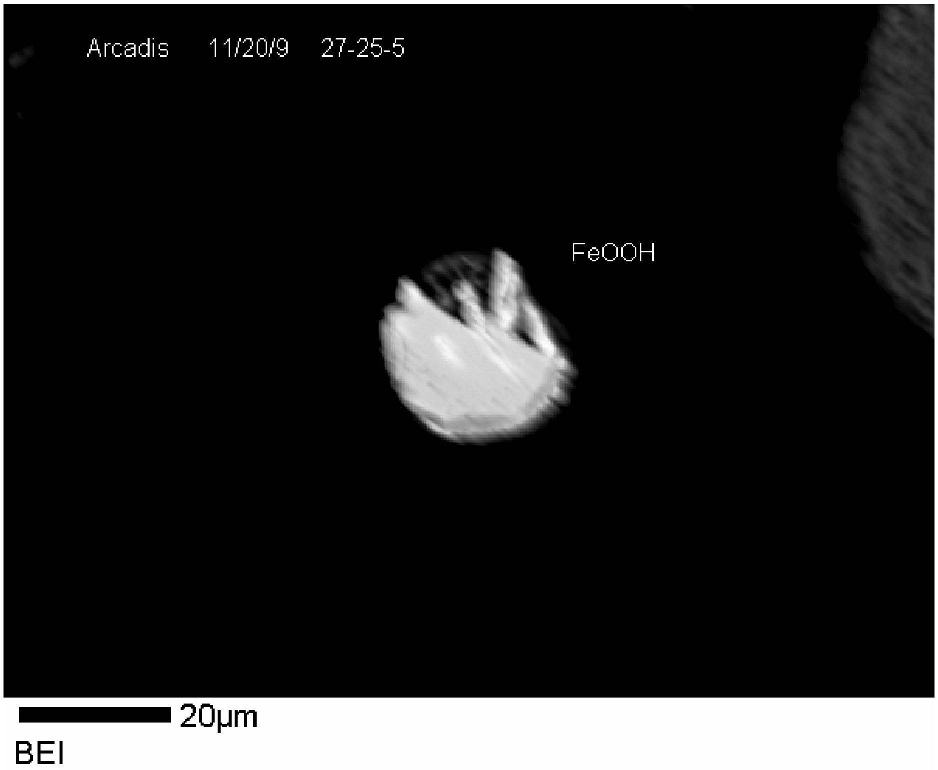
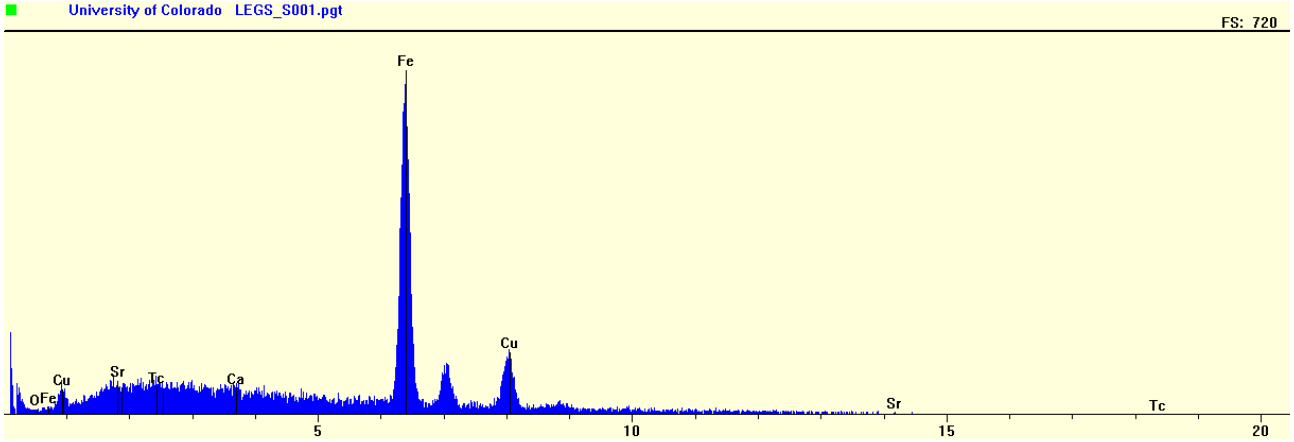
Figure No.
10h

Sample:
FID 27

Description:
Histogram 4



SPECIATION FIGURES

Figure No. **10i** **Sample:** FID 27 **Description:** Micrograph 5	
Figure No. **10j** **Sample:** FID 27 **Description:** Histogram 5	

SPECIATION FIGURES

Figure No.
11a

Sample:
FID 34

Description:
Micrograph 1

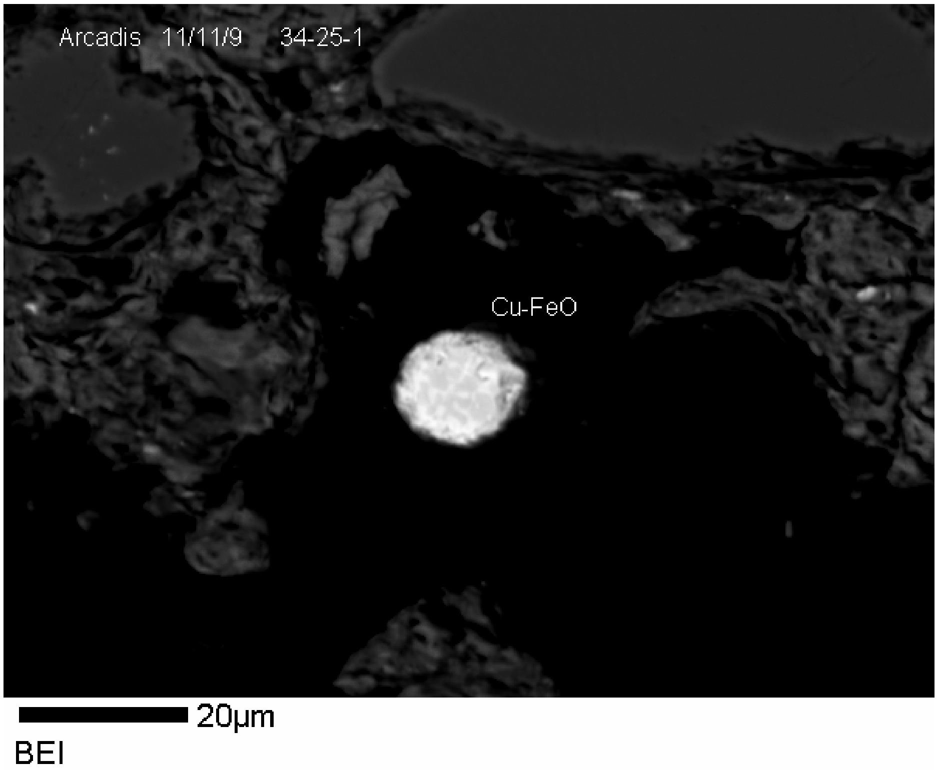
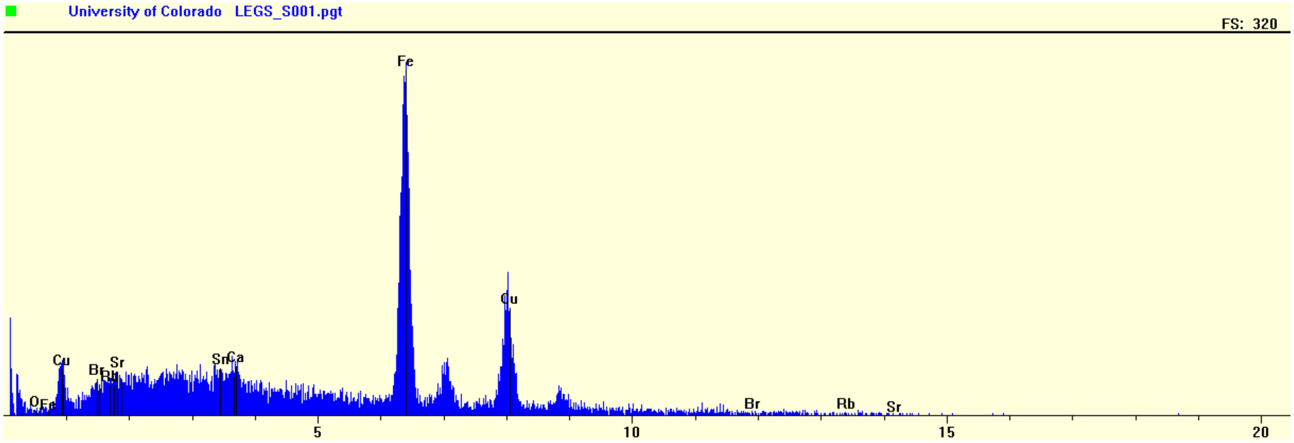


Figure No.
11b

Sample:
FID 34

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
11c

Sample:
FID 34

Description:
Micrograph 2

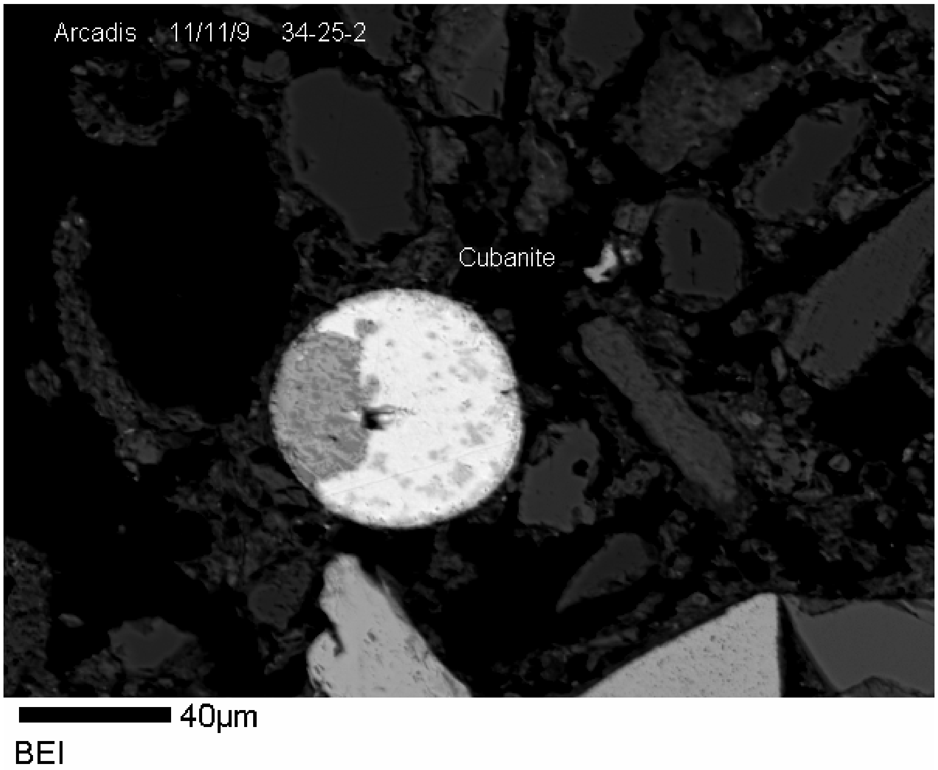
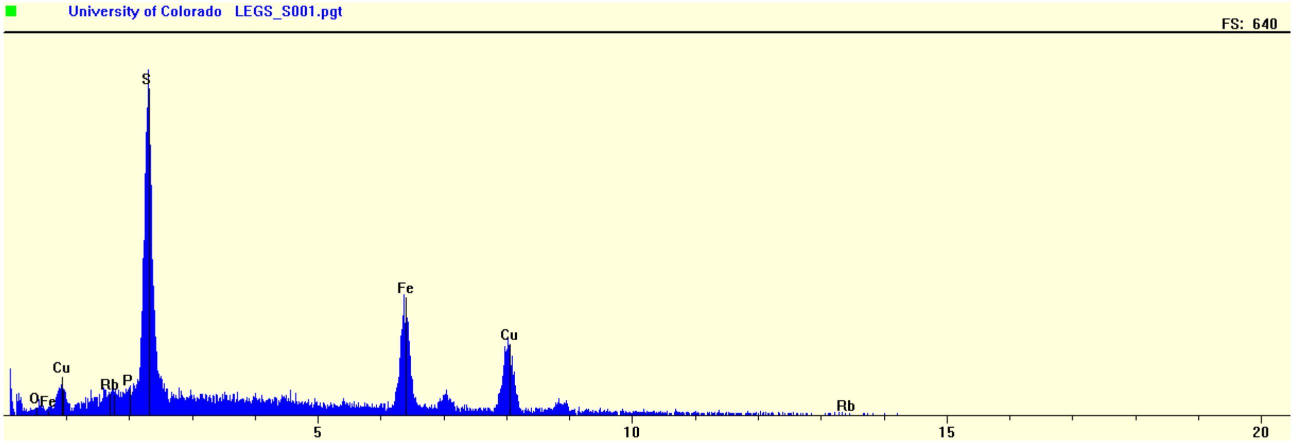


Figure No.
11d

Sample:
FID 34

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
11e

Sample:
FID 34

Description:
Micrograph 3

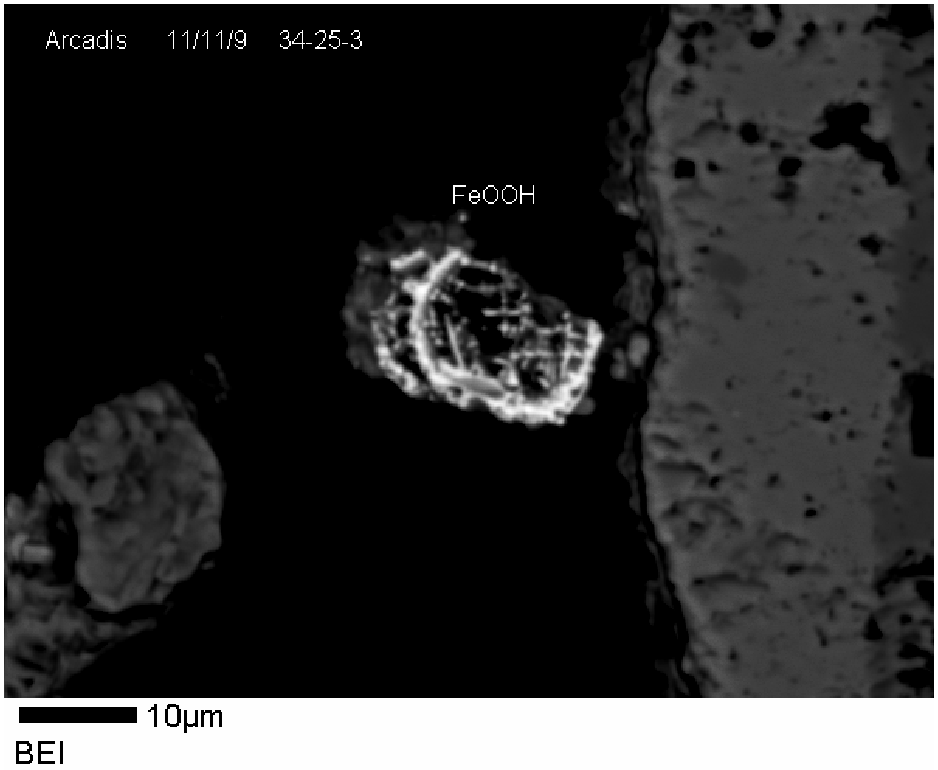
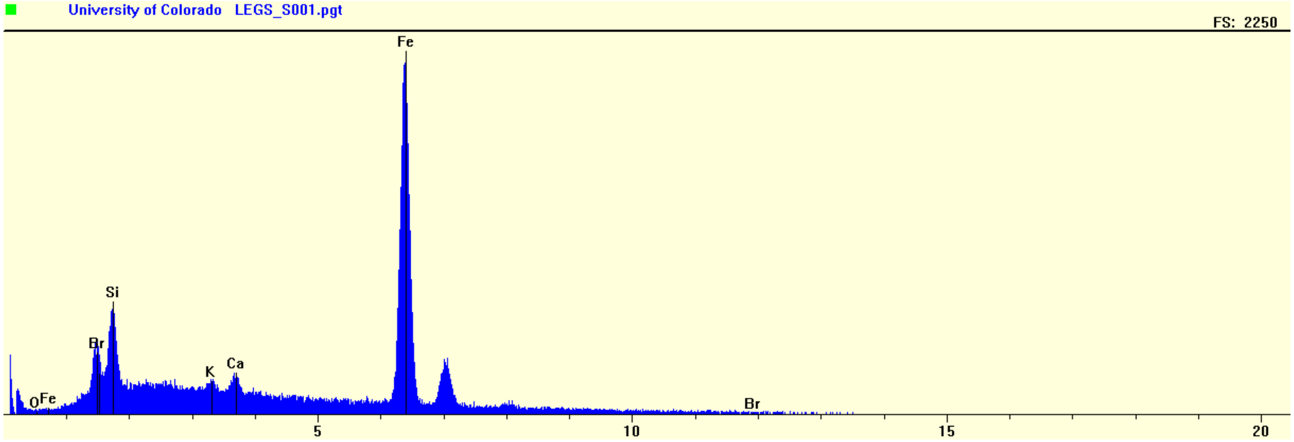


Figure No.
11f

Sample:
FID 34

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
11g

Sample:
FID 34

Description:
Micrograph 4

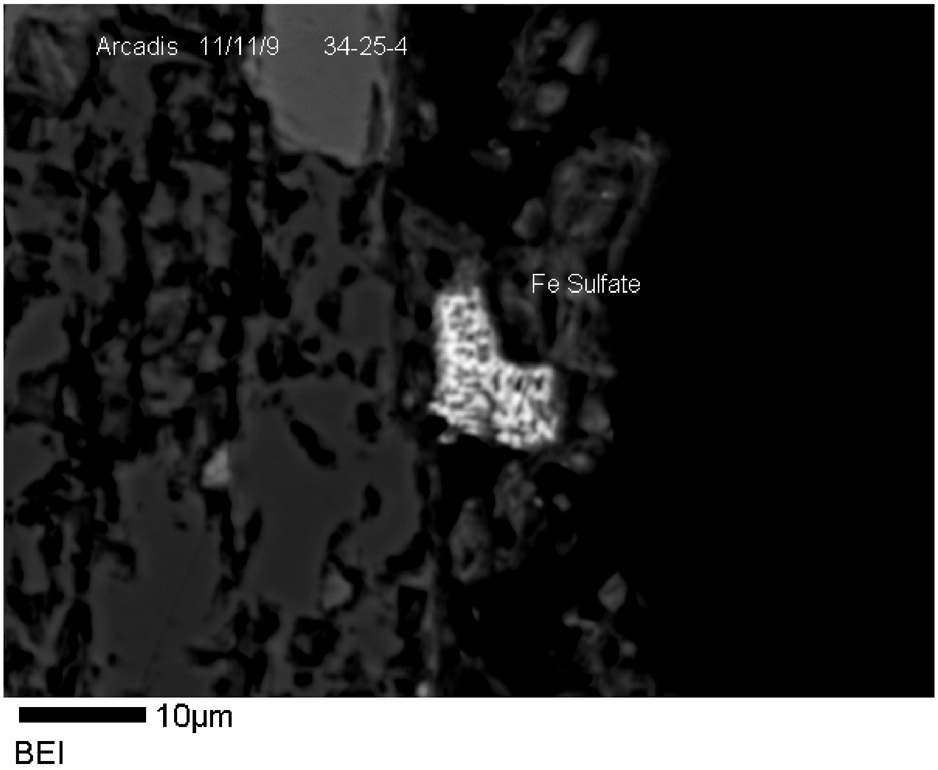
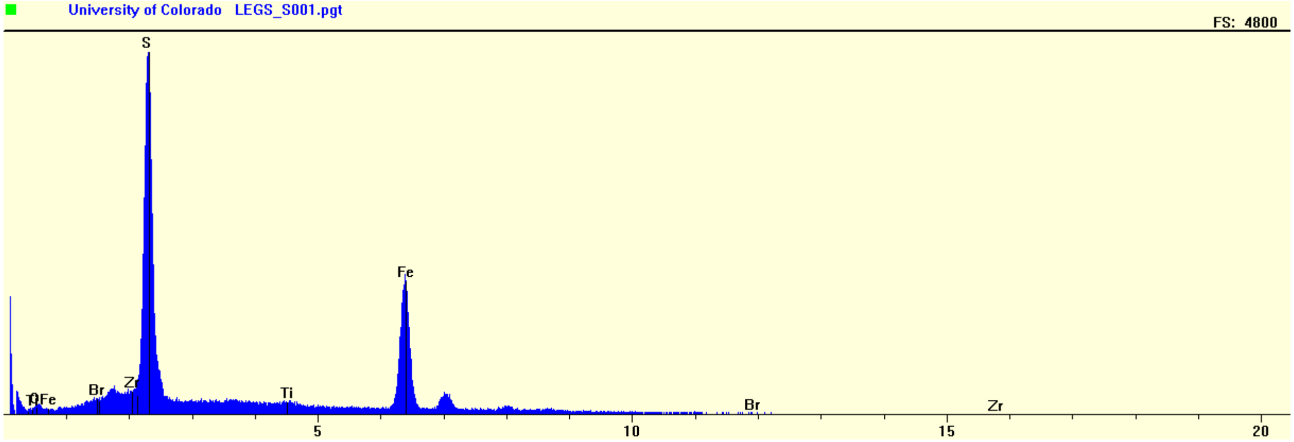


Figure No.
11h

Sample:
FID 34

Description:
Histogram 4



SPECIATION FIGURES

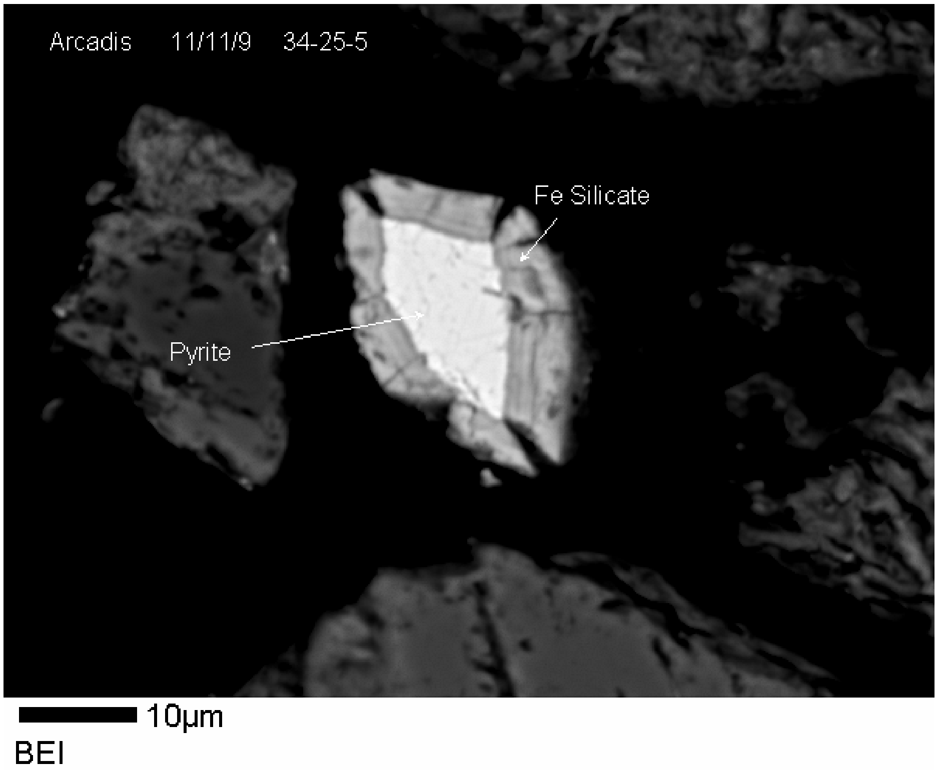
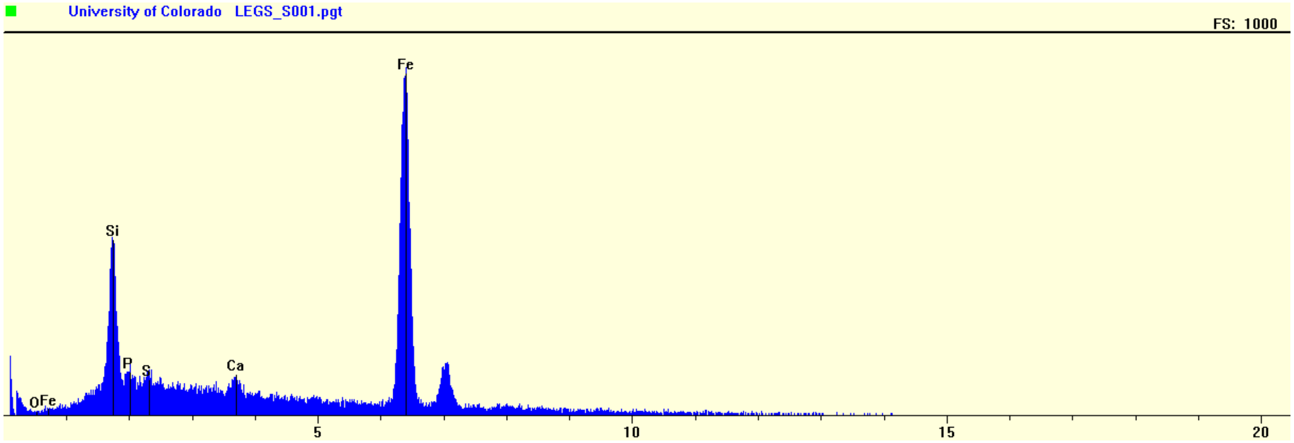
Figure No. **11i**	
Sample: FID 34 **Description:** Micrograph 5	

Figure No. **11j**	
Sample: FID 34 **Description:** Histogram 5	

SPECIATION FIGURES

Figure No.
12a

Sample:
FID 37

Description:
Micrograph 1

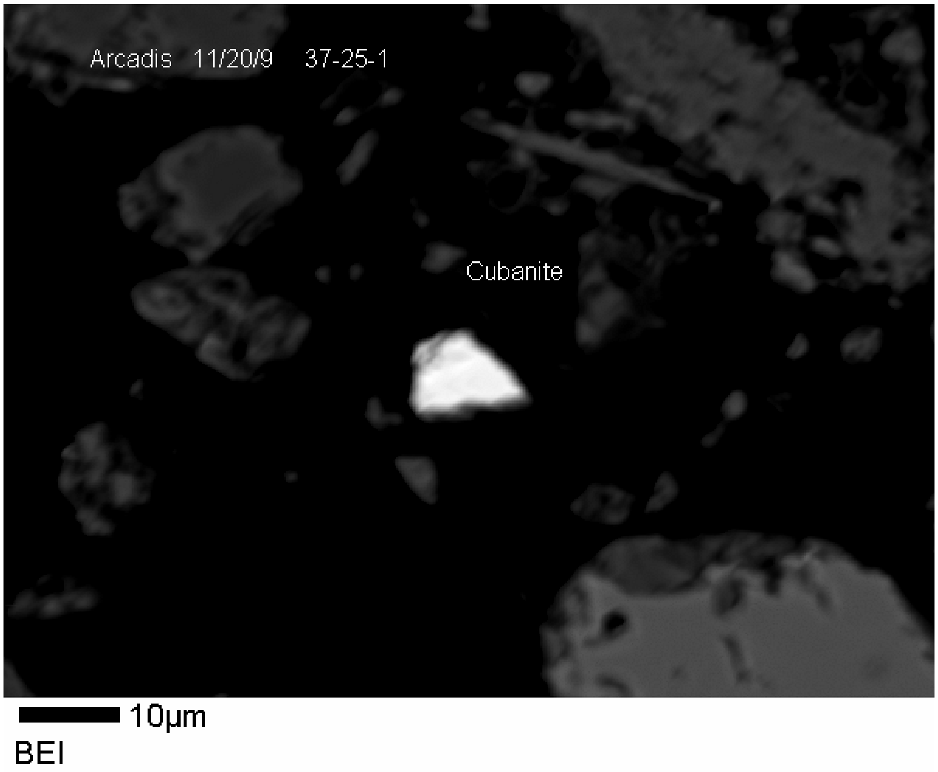
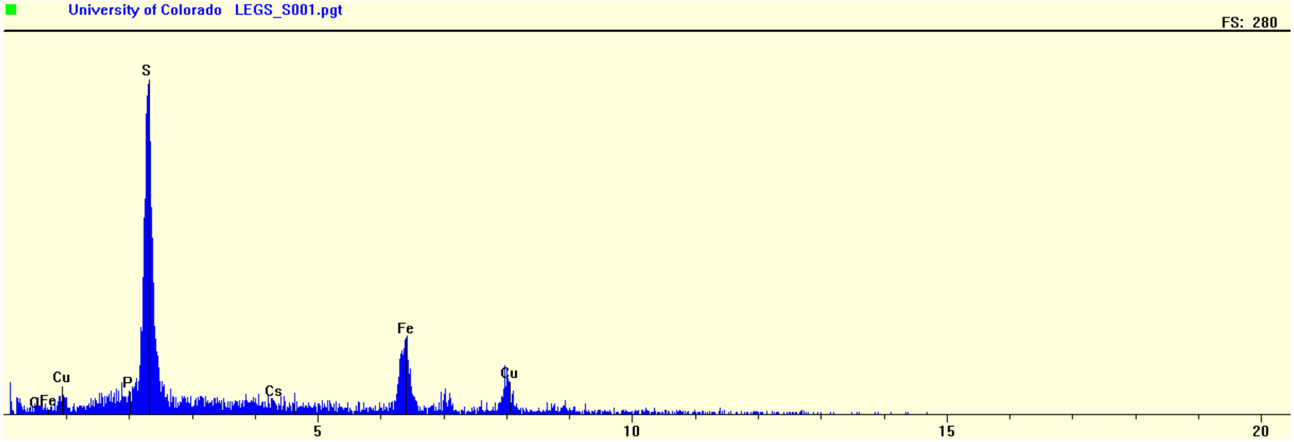


Figure No.
12b

Sample:
FID 37

Description:
Histogram 1



SPECIATION FIGURES

Figure No.
12c

Sample:
FID 37

Description:
Micrograph 2

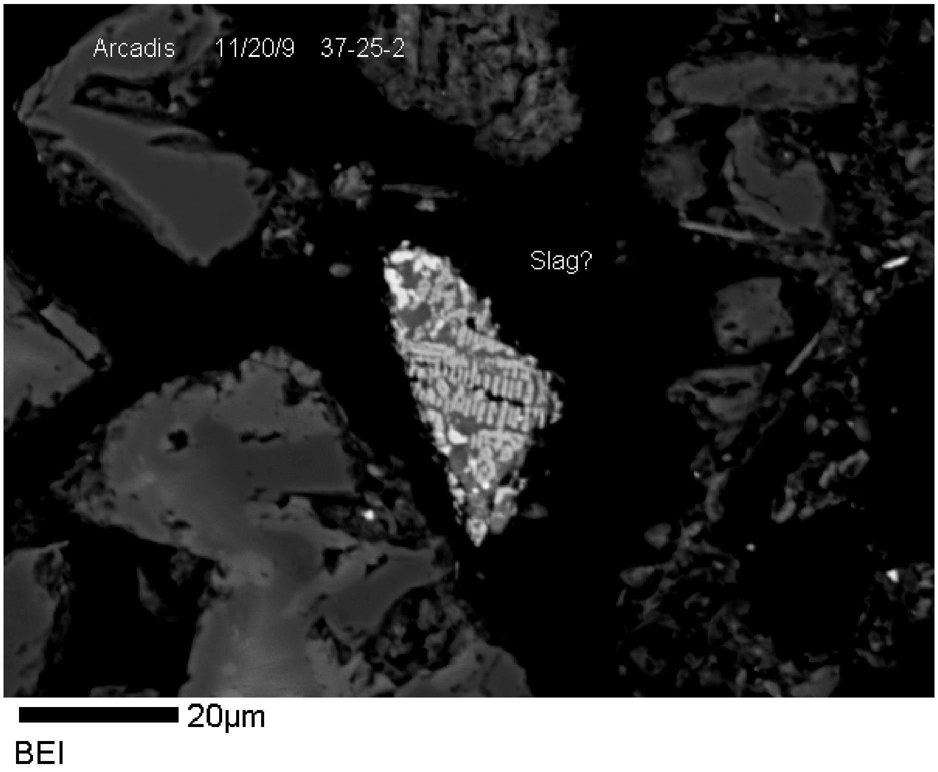
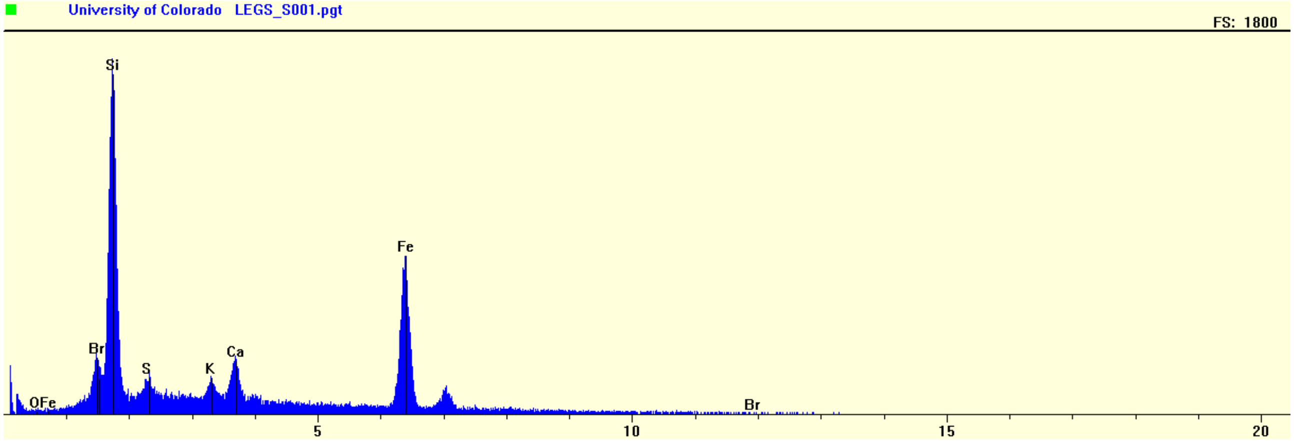


Figure No.
12d

Sample:
FID 37

Description:
Histogram 2



SPECIATION FIGURES

Figure No.
12e

Sample:
FID 37

Description:
Micrograph 3

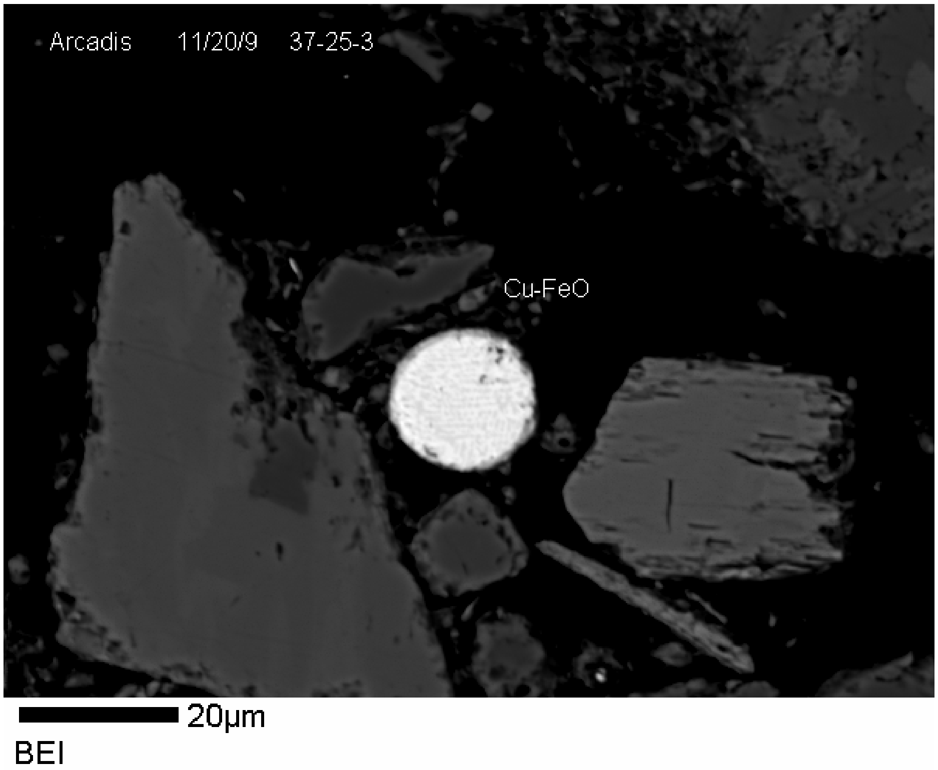
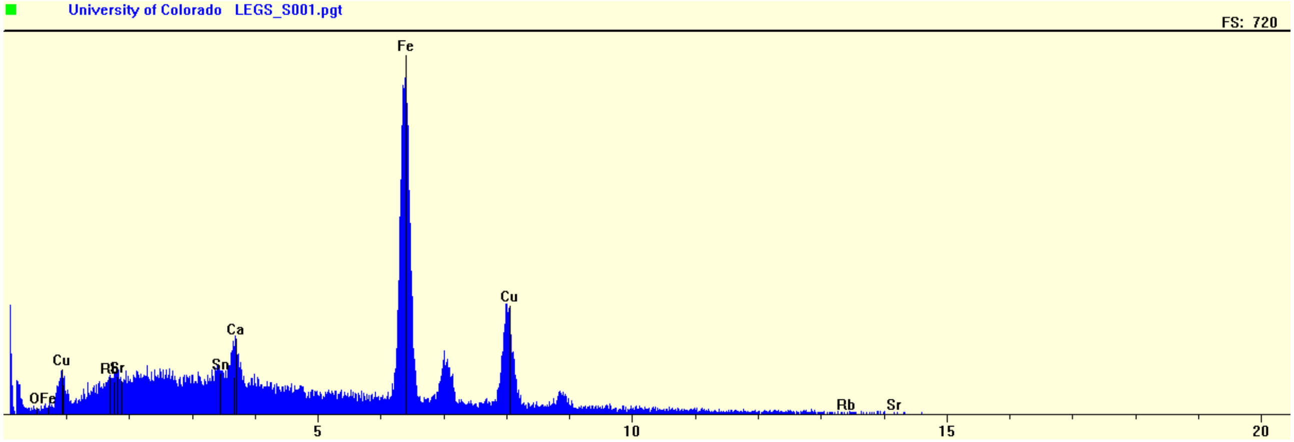


Figure No.
12f

Sample:
FID 37

Description:
Histogram 3



SPECIATION FIGURES

Figure No.
12g

Sample:
FID 37

Description:
Micrograph 4

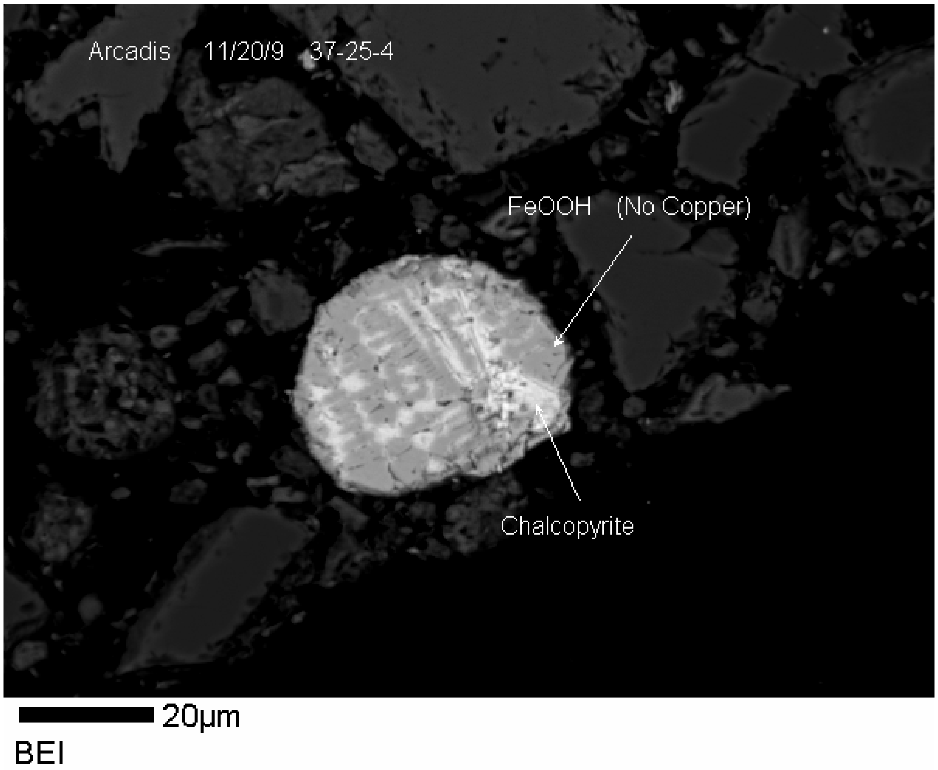
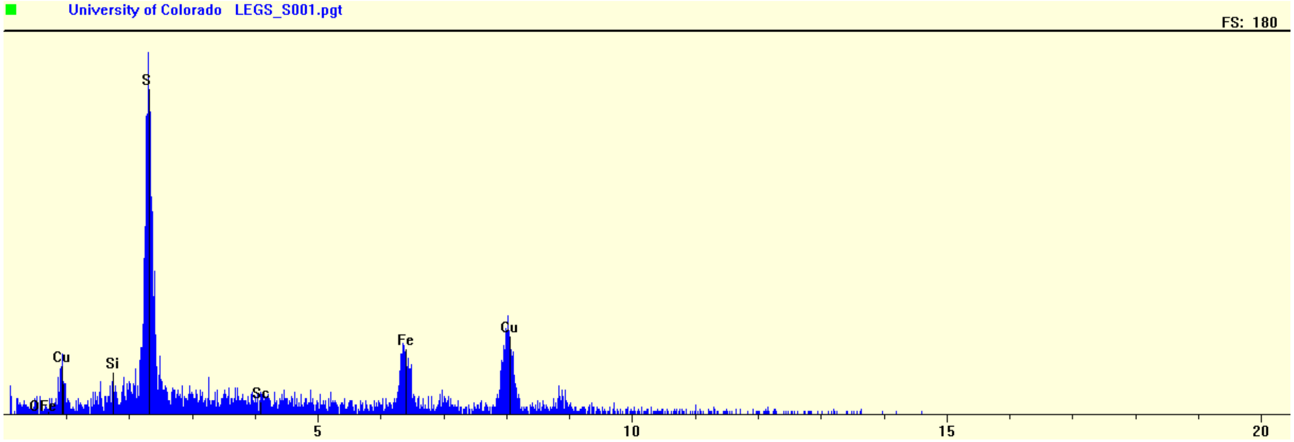


Figure No.
12h

Sample:
FID 37

Description:
Histogram 4



SPECIATION FIGURES

Figure No.
12i

Sample:
FID 37

Description:
Micrograph 5

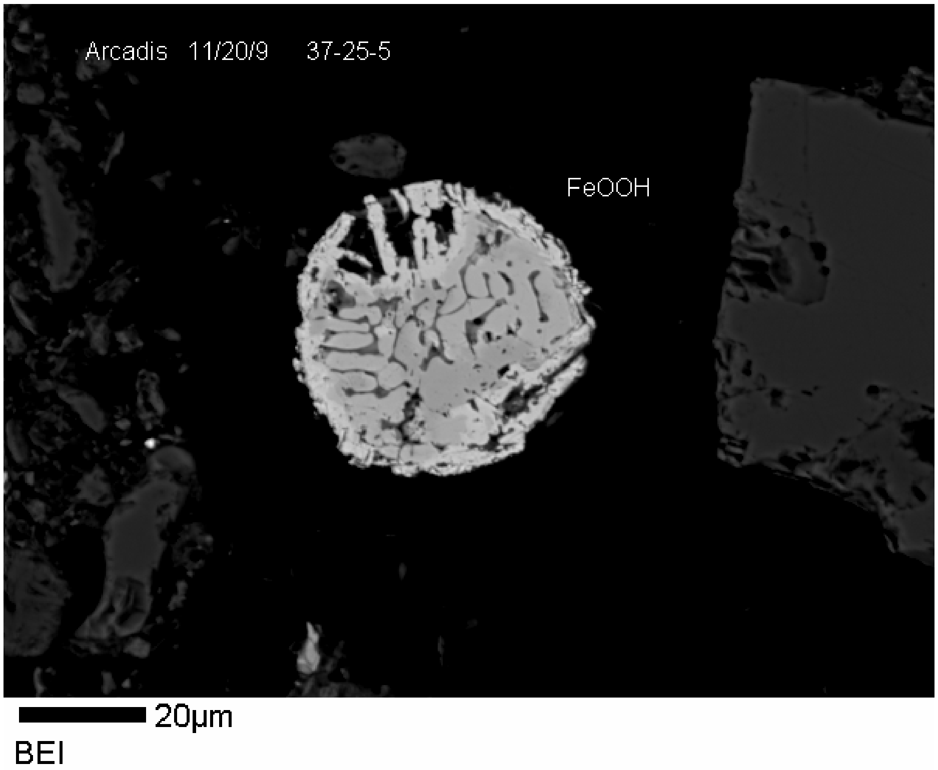
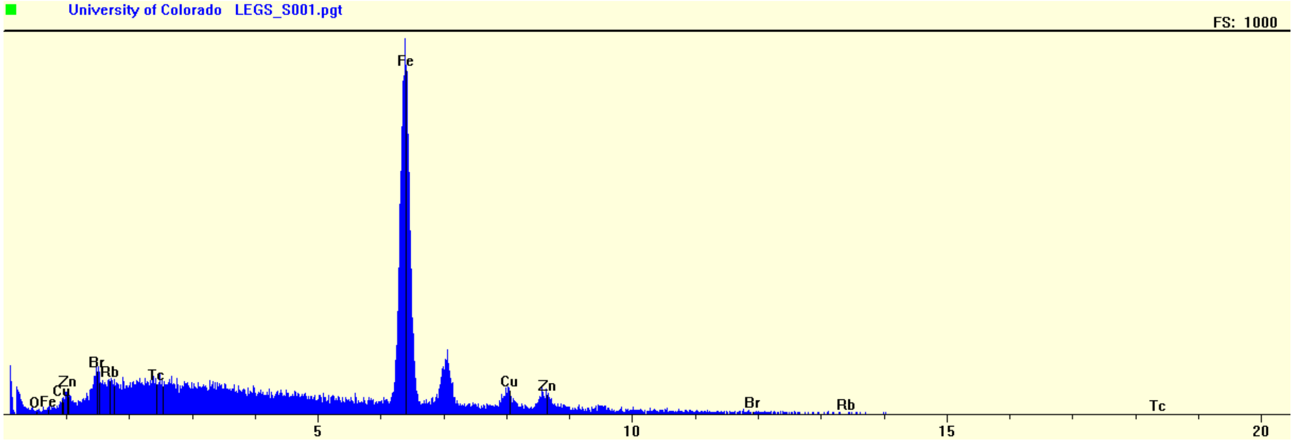


Figure No.
12j

Sample:
FID 37

Description:
Histogram 5



Laboratory of Environment and Geological Sciences, University of Colorado, Boulder

Project Name: Arcadis

Run #: 1 Date: 10/28/2009 Operater: DREXLER

Postion in rack	Sample name	Lab#	Wt. Grams	pH start	Starting time	Stopping time	pH stop
1	8-25 <250um	8-25-A	1.00369	1.575	11:05	12:05	1.602
2	10-25 <250um	10-25-A	1.0083	1.575	11:05	12:05	1.611
3	37-25	37-25-A	1.00242	1.575	11:05	12:05	1.6
4	21-25	21-25-A	1.00856	1.575	11:05	12:05	1.602
5	34-25	34-25-A	1.00633	1.575	11:05	12:05	1.609
6	12-25 <250um	12-25-A	1.00028	1.575	11:05	12:05	1.631
7	17-25	17-25-A	1.00431	1.575	11:05	12:05	1.646
8	27-25	27-25-A	0.99772	1.575	11:05	12:05	1.616
9	26-25	26-25-A	1.00515	1.575	11:05	12:05	1.613
10	18-25	18-25-A	0.99833	1.575	11:05	12:05	1.607

Run #: 2 Date: 10/28/2009 Operater: DREXLER

Postion in rack	Sample name	Lab#	Wt. Grams	pH start	Starting time	Stopping time	pH stop
1	BLANK	BLANK		1.575	12:25	1:25	1.580
2	BLANK SPIKE	BLK SPK		1.575	12:25	1:25	1.6
3	18-25 DUP	18-25-A DUP	1.00387	1.575	12:25	1:25	1.598
4	18-25 SPIKE	18-25-A-SPK	1.00731	1.575	12:25	1:25	1.598
5	6-25 <250um	6-25-A	0.99998	1.575	12:25	1:25	1.609
6	20-25	20-25-A	1.00366	1.575	12:25	1:25	1.606
7							
8							
9							
10							

TABLE 2 . Preliminary Summary Of In Vitro Bioassay Results

NO animal calibration for

Sample	ID	Cu in <250u bulk soil ppb	mass soil (g)	calc Cu #1	Bio Cu (ug/l)	solution amt (l)	% Relative Cu Bioavailability
8-25 <250um		322818.04	1.00369	3.2401E+02	719.0823	0.1	22
10-25 <250um		3825769.7	1.0083	3.8575E+03	25000.29	0.1	65
37-25		887445.89	1.00242	8.8959E+02	4108.522	0.1	46
21-25		271423.73	1.00856	2.7375E+02	1546.129	0.1	56
34-25		973813.18	1.00633	9.7998E+02	4985.396	0.1	51
12-25 <250um		8886898.5	1.00028	8.8894E+03	54123.84	0.1	61
17-25		9864535.2	1.00431	9.9071E+03	70734.16	0.1	71
27-25		632084.26	0.99772	6.3064E+02	2517.077	0.1	40
26-25		161368.98	1.00515	1.6220E+02	594.9847	0.1	37
18-25		340517.21	0.99833	3.3995E+02	1038.681	0.1	31
6-25 <250um		1267410.1	0.99998	1.2674E+03	7463.583	0.1	59
20-25		879580.6	1.00366	8.8280E+02	3323.686	0.1	38
QA/QC							
BLANK					0.00		
BLANK SPIKE					2340		
18-25 DUP		350150.56	1.00387	3.5151E+02	1033.866	0.1	29
18-25 SPIKE (2500 ppb Cu)		11458.293	1.00731	1.1542E+01	3453		

Cu

TABLE 3. Preliminary Summary Of In Vitro Bioassay Results

Sample	ID	Pb in <250u bulk soil ppb	mass soil (g)	calc Pb #1	Bio Pb (ug/l)	solution amt (l)
8-25 <250um		12542	1.00369	1.2588E+01	DL	0.1
10-25 <250um		63976	1.0083	6.4507E+01	288.24	0.1
37-25		26171	1.00242	2.6235E+01	35.48	0.1
21-25		11825	1.00856	1.1927E+01	29.72	0.1
34-25		27346	1.00633	2.7519E+01	109.61	0.1
12-25 <250um		106923	1.00028	1.0695E+02	684.32	0.1
17-25		94089	1.00431	9.4494E+01	596.10	0.1
27-25		39132	0.99772	3.9042E+01	66.18	0.1
26-25		17464	1.00515	1.7553E+01	54.87	0.1
18-25		16216	0.99833	1.6189E+01	12.51	0.1
6-25 <250um		33151	0.99998	3.3151E+01	84.31	0.1
20-25		16464	1.00366	1.6525E+01	65.06	0.1
QA/QC						
BLANK					0	
BLANK SPIKE 2500 ppb					2344	
18-25 DUP		16216	1.00387	1.6279E+01	DL	0.1
18-25 SPIKE (2500 ppb Pb)					2266	

% Relative Pb Bioavailability
ND
45
14
25
40
64
63
17
31
8
25
39
ND

TABLE 4 . Preliminary Summary Of In Vitro Bioassay Results

NO animal calibration for Cd

Sample	**ID**	**Cd in <250u bulk soil ppb**	**mass soil (g)**	**calc Cd #1**	**Bio Cd (ug/l)**	**solution amt (l)**	**% Relative Cd Bioavailability**
8-25 <250um		1337	1.00369	1.3417E+00	DL	0.1	ND
10-25 <250um		2510	1.0083	2.5313E+00	13.50	0.1	53
37-25		776	1.00242	7.7749E-01	DL	0.1	ND
21-25		285	1.00856	2.8733E-01	DL	0.1	ND
34-25		942	1.00633	9.4767E-01	7.80	0.1	82
12-25 <250um		7773	1.00028	7.7749E+00	74.91	0.1	96
17-25		10819	1.00431	1.0866E+01	94.48	0.1	87
27-25		722	0.99772	7.2037E-01	DL	0.1	ND
26-25		481	1.00515	4.8344E-01	DL	0.1	ND
18-25		127	0.99833	1.2708E-01	DL	0.1	ND
6-25 <250um		1402	0.99998	1.4021E+00	7.11	0.1	51
20-25		635	1.00366	6.3780E-01	DL	0.1	ND

QA/QC

Sample	**ID**	**Cd in <250u bulk soil ppb**	**mass soil (g)**	**calc Cd #1**	**Bio Cd (ug/l)**	**solution amt (l)**	**% Relative Cd Bioavailability**
BLANK					0		
BLANK SPIKE					2341		
18-25 DUP		127	1.00387	1.2779E-01	DL	0.1	ND
18-25 SPIKE (2500 ppb Cd)					2290		

TABLE 5 . Preliminary Summary Of In Vitro Bioassay Results

Sample	ID	As in <250u bulk soil ppb	mass soil (g)	calc As #1	Bio As (ug/l)	solution amt (l)	% Relative As Bioavailability
8-25 <250um		4978	1.00369	4.9966E+00	63.82	0.1	ND
10-25 <250um		7080	1.0083	7.1392E+00	65.96	0.1	92
37-25		4197	1.00242	4.2067E+00	39.82	0.1	95
21-25		2455	1.00856	2.4765E+00	50.81	0.1	205
34-25		4715	1.00633	4.7444E+00	50.41	0.1	106
12-25 <250um		8023	1.00028	8.0248E+00	79.43	0.1	99
17-25		11638	1.00431	1.1688E+01	85.64	0.1	73
27-25		5147	0.99772	5.1349E+00	18.83	0.1	37
26-25		2852	1.00515	2.8671E+00	34.15	0.1	119
18-25		2962	0.99833	2.9571E+00	27.24	0.1	92
6-25 <250um		5533	0.99998	5.5327E+00	20.82	0.1	38
20-25		4148	1.00366	4.1631E+00	25.24	0.1	61
QA/QC							
BLANK					1		
BLANK SPIKE 2500 ppb					2497		
18-25 DUP		2962	1.00387	2.9735E+00	21.52	0.1	72
18-25 SPIKE (2500 ppb As					2387		

TABLE 6. Preliminary Summary Of In Vitro Bioassay Results

NO Animal Calibration for Zn

Sample	ID	Zn in <250u bulk soil ppb	mass soil (g)	calc Zn #1	Bio Zn (ug/l)	solution amt (l)		% Relative Zn Bioavailability
8-25 <250um		45209	1.00369	4.5376E+01	DL	0.1	ND	
10-25 <250um		142841	1.0083	1.4403E+02	324.13	0.1		23
37-25		60833	1.00242	6.0980E+01	DL	0.1	ND	
21-25		35656	1.00856	3.5961E+01	7.79	0.1		2
34-25		119292	1.00633	1.2005E+02	234.62	0.1		20
12-25 <250um		424547	1.00028	4.2467E+02	2810.76	0.1		66
17-25		305363	1.00431	3.0668E+02	1588.69	0.1		52
27-25		147976	0.99772	1.4764E+02	55.91	0.1		4
26-25		77749	1.00515	7.8150E+01	59.17	0.1		8
18-25		31360	0.99833	3.1307E+01	DL	0.1	ND	
6-25 <250um		121764	0.99998	1.2176E+02	141.69	0.1		12
20-25		80159	1.00366	8.0452E+01	54.97	0.1		7
QA/QC								
BLANK					0.00			
BLANK SPIKE 2500 ppb					2451			
18-25 DUP		31360	1.00387	3.1481E+01	DL	0.1	ND	
18-25 SPIKE (2500 ppb Zn)					2475			

Standard In Vitro < 250 micron	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
8-25 LT250um	DL	719.08	63.82	DL	DL
10-25 LT250um	324.13	25000.29	65.96	13.50	288.24
37-25	DL	4108.52	39.82	DL	35.48
21-25	7.79	1546.13	50.81	DL	29.72
34-25	234.62	4985.40	50.41	7.80	109.61
12-25 LT250um	2810.76	54123.84	79.43	74.91	684.32
17-25	1588.69	70734.16	85.64	94.48	596.10
27-25	55.91	2517.08	18.83	DL	66.18
26-25	59.17	594.98	34.15	DL	54.87
18-25	DL	1038.68	27.24	DL	12.51
18-25 DUP	DL	1033.87	21.52	DL	DL
6-25 LT250um	141.69	7463.58	20.82	7.11	84.31
20-25	54.97	3323.69	25.24	DL	65.06

BIO QA/QC

18-25	DL	1038.68	27.24	DL	12.51	
18-25 DUP	DL	1033.87	21.52	DL	DL	
RPD	NA	0.46	23.45	NA	NA	
BLANK	0.00	0.00	1	0	0	not dilution corrected
BLANK SPIKE 2500 ppb	2451	2340	2497	2341	2344	
% Recovery	98	94	100	94	94	
18-25	0	1039	27	0	13	
18-25 SPIKE 2500 ppb	2475	3453	2387	2290	2266	
% Recovery	99	97	94	92	90	

3050 < 250 micron

	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
8-25-A	45209	322818	4978	1337	12542
10-25-A	142841	3825770	7080	2510	63976
37-25-A	60833	887446	4197	776	26171
21-25-A	35656	271424	2455	285	11825
34-25-A	119292	973813	4715	942	27346
12-25-A	424547	8886898	8023	7773	106923
17-25-A	305363	9864535	11638	10819	94089
27-25-A	147976	632084	5147	722	39132
26-25-A	77749	161369	2852	481	17464
18-25-A	31360	340517	2962	127	16216
18-25-A DUP	32274	350151	2971	136	12899
18-25-A-SPK	5304	11458	4899	4539	4824
6-25-A	121764	1267410	5533	1402	33151
20-25-A	80159	879581	4148	635	16464

3050 QA/QC

BLANK	-0.27	-0.04	0	0	-1	Not dilution corrected
BLK SPK 5000 ppb	4900	5255	5150	4694	4691	
% Recovery	98	105	103	94	94	

18-25-A	31360	340517	2962	127	16216
18-25-A DUP	32274	350151	2971	136	12899
RPD	2.87	2.79	0.31	6.83	22.78

BLANK	0	0	0	0	-1	Not dilution corrected
BLK SPK 5000 ppb	4846	5150	5004	4631	4597	
% Recovery	97	103	100	93	92	

18-25-A	630	6839	59	3	326	Not digest corrected
18-25-A-SPK 5000 ppb	5304	11458	4899	4539	4824	Not digest corrected
% Recovery	93	92	97	91	90	

	0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
8-25 LT250um all 50x		DL	719.082	63.817	DL	DL
10-25 LT250um		324.129	25000.285	65.960	13.504	288.244
37-25		DL	4108.522	39.824	DL	35.478
21-25		7.787	1546.129	50.806	DL	29.723
34-25		234.624	4985.396	50.408	7.796	109.609
12-25 LT250um		2810.761	54123.835	79.428	74.905	684.316
17-25		1588.688	70734.161	85.641	94.477	596.103
	0	0.000	0.000	0.000	0.000	0.000
	0	DL	DL	DL	DL	DL
27-25		55.913	2517.077	18.827	DL	66.185
26-25		59.172	594.985	34.154	DL	54.868
18-25		DL	1038.681	27.239	DL	12.513
BLANK		DL	DL	0.687	DL	DL
BLANK SPIKE		2450.776	2339.568	2496.696	2341.091	2343.545
18-25 DUP		DL	1033.866	21.523	DL	DL
18-25 SPIKE		2474.603	3452.528	2387.372	2290.081	2266.310
6-25 LT250um		141.694	7463.583	20.816	7.111	84.309
20-25		54.968	3323.686	25.241	DL	65.056

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb	
8-25 LT250um all 50x	-8.452	719.082	63.817	-3.328	-23.638	
10-25 LT250um	324.129	25000.285	65.960	13.504	288.244	
37-25	4.144	4108.522	39.824	-0.599	35.478	
21-25	7.787	1546.129	50.806	-2.395	29.723	
34-25	234.624	4985.396	50.408	7.796	109.609	
12-25 LT250um	2810.761	54123.835	79.428	74.905	684.316	
17-25	1588.688	70734.161	85.641	94.477	596.103	
27-25	55.913	2517.077	18.827	-1.273	66.185	
26-25	59.172	594.985	34.154	-1.231	54.868	
18-25	-14.176	1038.681	27.239	-4.481	12.513	
BLANK	-1.183	-3.670	0.687	-0.098	-0.419	Not dilution corrected
BLANK SPIKE	2450.776	2339.568	2496.696	2341.091	2343.545	
18-25 DUP	-25.635	1033.866	21.523	-3.924	-30.294	
18-25 SPIKE	2474.603	3452.528	2387.372	2290.081	2266.310	
6-25 LT250um	141.694	7463.583	20.816	7.111	84.309	
20-25	54.968	3323.686	25.241	-1.036	65.056	

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
Standard 1	100.000	100.000	100.000	100.000	100.000					
Standard 2	499.994	500.584	499.511	500.219	500.330					
Standard 3	1004.439	1005.122	999.169	1004.763	1025.064					
Blank	0.000	0.000	0.000	0.000	0.000					
stan check	156.215	152.922	153.290	154.914	150.643					
interfer	338.920	442.098	178.772	91.807	52.419					
int	373.008	487.337	199.844	97.478	55.860					
8-25 LT250um all 50x	-0.169	14.382	1.276	-0.067	-0.473					
10-25 LT250um	6.483	500.006	1.319	0.270	5.765					
37-25	0.083	82.170	0.796	-0.012	0.710					
21-25	0.156	30.923	1.016	-0.048	0.594					
34-25	4.692	99.708	1.008	0.156	2.192					
12-25 LT250um	56.215	1082.477	1.589	1.498	13.686					
17-25	31.774	1414.683	1.713	1.890	11.922					
Standard Check 150 ppb	156.684	160.293	150.286	157.080	152.085					
Blank	0.050	-0.025	-0.010	0.012	0.012					
27-25	1.118	50.342	0.377	-0.025	1.324					
26-25	1.183	11.900	0.683	-0.025	1.097					
18-25	-0.284	20.774	0.545	-0.090	0.250					
BLANK	-1.183	-3.670	0.687	-0.098	-0.419					
BLANK SPIKE	49.016	46.791	49.934	46.822	46.871					
18-25 DUP	-0.513	20.677	0.430	-0.078	-0.606					
18-25 SPIKE	49.492	69.051	47.747	45.802	45.326	50.005	48.373	47.317	45.880	45.932
6-25 LT250um	2.834	149.272	0.416	0.142	1.686					
20-25	1.099	66.474	0.505	-0.021	1.301					
Standard Check 150 ppb	152.138	156.343	147.241	152.878	149.039					
Standard Check 150 ppb	154.835	158.940	146.299	152.729	150.400					
Blank	0.082	0.005	0.095	0.011	-0.019					
Interference Check	382.628	511.733	194.365	101.150	57.209					
Machine Detection Limit	0.130	0.051	0.182	0.020	0.049					

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb		Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
Standard 1	100	100	100	100	100						
Standard 2	499.9937	500.5844	499.5114	500.2194	500.3302						
Standard 3	1004.439	1005.122	999.1694	1004.763	1025.064						
Blank	0	0	0	0	0						
stan check	138.2432	142.9177	143.262	144.7798	134.5024	1					
interfer	299.9291	413.1755	167.0769	85.80069	46.80237	2					
int	330.0953	455.4555	186.7698	91.10074	49.87511	3					
8-25 LT250um all 50x	-0.1496	13.44079	1.19284	-0.0622	-0.4221	4					
10-25 LT250um	5.7368	467.2951	1.23289	0.25241	5.14721	5					
37-25	0.07334	76.79481	0.74438	-0.0112	0.63354	6					
21-25	0.13782	28.89961	0.94964	-0.04477	0.53076	7					
34-25	4.15263	93.18498	0.94221	0.14572	1.95731	8					
12-25 LT250um	49.74799	1011.66	1.48463	1.4001	12.21992	9					
17-25	28.11837	1322.134	1.60077	1.76592	10.64469	10					
Standard Check 150 pp	138.6587	149.8068	140.454	146.8041	135.7903	11					
Blank	0.04409	-0.02339	-0.00931	0.01081	0.01059	12					
27-25	0.98961	47.04816	0.3519	-0.02379	1.18187	13					
26-25	1.04729	11.12121	0.6384	-0.023	0.97979	14					
18-25	-0.2509	19.41459	0.50914	-0.08375	0.22344	15					
BLANK	-1.04653	-3.43031	0.6423	-0.09136	-0.37387	16					
BLANK SPIKE	43.37656	43.73024	46.66721	43.75871	41.84901	17					
18-25 DUP	-0.45371	19.32459	0.40229	-0.07334	-0.54097	18					
18-25 SPIKE	43.79829	64.53324	44.62377	42.80525	40.46982	19					
6-25 LT250um	2.50785	139.5062	0.38908	0.13291	1.50551	20					
20-25	0.97288	62.12498	0.47179	-0.01936	1.16171	21					
Standard Check 150 pp	134.6354	146.1149	137.6082	142.8771	133.0704	22					
Standard Check 150 pp	137.0225	148.542	136.7281	142.7376	134.2855	23					
Blank	0.07253	0.00507	0.08895	0.00991	-0.0168	24			0.025		-0.002
Interference Check	338.6092	478.2549	181.6499	94.53259	51.07903	25					
	0.115	0.048	0.170	0.019	0.043						

	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
Standard 1	100	100	100	100	100
Standard 2	499.9937	500.5844	499.5114	500.2194	500.3302
Standard 3	1004.439	1005.122	999.1694	1004.763	1025.064
Blank					
stan check	138.2432	142.9177	143.237	144.7798	134.5044
interfer	299.9291	413.1755	167.0269	85.80069	46.80637
int	330.0953	455.4555	186.6948	91.10074	49.88111
8-25 LT250um all 50x	-0.1496	13.44079	1.09284	-0.0622	-0.4141
10-25 LT250um	5.7368	467.2951	1.10789	0.25241	5.15721
37-25	0.07334	76.79481	0.59438	-0.0112	0.64554
21-25	0.13782	28.89961	0.77464	-0.04477	0.54476
34-25	4.15263	93.18498	0.74221	0.14572	1.97331
12-25 LT250um	49.74799	1011.66	1.25963	1.4001	12.23792
17-25	28.11837	1322.134	1.35077	1.76592	10.66469
Standard Check 150 ppb	138.6587	149.8068	140.179	146.8041	135.8123
Blank	0.04409	-0.02339	-0.30931	0.01081	0.03459
27-25	0.98961	47.04816	0.0269	-0.02379	1.20787
26-25	1.04729	11.12121	0.2884	-0.023	1.00779
18-25	-0.2509	19.41459	0.13414	-0.08375	0.25344
BLANK	-1.04653	-3.43031	0.2423	-0.09136	-0.34187
BLANK SPIKE	43.37656	43.73024	46.24221	43.75871	41.88301
18-25 DUP	-0.45371	19.32459	-0.04771	-0.07334	-0.50497
18-25 SPIKE	43.79829	64.53324	44.14877	42.80525	40.50782
6-25 LT250um	2.50785	139.5062	-0.11092	0.13291	1.54551
20-25	0.97288	62.12498	-0.05321	-0.01936	1.20371
Standard Check 150 ppb	134.6354	146.1149	137.0582	142.8771	133.1144
Standard Check 150 ppb	137.0225	148.542	136.1531	142.7376	134.3315
Blank	0.07253	0.00507	-0.51105	0.00991	0.0312
Interference Check	338.6092	478.2549	181.0249	94.53259	51.12903

Table 1

Laboratory of Environment and Geological Sciences, University of Colorado, Boulder

Project Name: Arcadis

Run #: 1 FOR BIRD W/ GIZARD SOL

Date: 10/28/2009

Operater: Drexler

Postion in rack	Sample name	Lab#	Wt. Grams	pH start	Starting time	Stopping time	pH stop
1	37-25	37-25-B	3.60122	2.602	10:30	11:30	2.971
2	26-25	26-25-B	3.60415	2.602	10:30	11:30	3.776
3	10-25 <2mm	10-25-B	3.59982	2.602	10:30	11:30	3.412
4	08-25 <2mm	08-25-B	3.60222	2.602	10:30	11:30	4.3
5	18-25	18-25-B	3.59918	2.602	10:30	11:30	2.877
6	21-25	21-25-B	3.59892	2.602	10:30	11:30	2.952
7	12-25 <2mm	12-25-B	3.60295	2.602	10:30	11:30	6.006
8	17-25	17-25-B	3.60306	2.602	10:30	11:30	4.781
9	06-25 <2mm	06-25-B	3.59974	2.602	10:30	11:30	3.528
10	34-25	34-25-B	3.60092	2.602	10:30	11:30	3.713

Run #: 2 FOR BIRD

Date: 10/28/2009

Operater: Drexler

Postion in rack	Sample name	Lab#	Wt. Grams	pH start	Starting time	Stopping time	pH stop
1	BLANK	BLANK		2.602	10:30	11:30	2.738
2	BLANK SPIKE	BLK SPK		2.602	10:30	11:30	3.563
3	34-25	34-25-B DUP	3.60388	2.602	10:30	11:30	3.7
4	34-25	34-25-B SPK	3.59949	2.602	10:30	11:30	2.591
5	27-25	27-25-B	3.60295	2.602	10:30	11:30	3.291
6	20-25	20-25-B	3.60009	2.602	10:30	11:30	3.205
7							
8							
9							
10							

TABLE 2 . Preliminary Summary Of In Vitro Bioassay Results

Sample	ID	Cu in <250u bulk soil ppb	mass soil (g)	calc Cu #1	Bio Cu (ug/l)	solution amt (l)	% Relative Cu Bioavailability
37-25		606468.2832	3.60122	2184.0257	27610	0.03	38
26-25		69523.3613	3.60415	250.5726	460	0.03	6
10-25 <2mm		1136938.15	3.59982	4092.7727	34080	0.03	25
08-25 <2mm		449907.0999	3.60222	1620.6644	3280	0.03	6
18-25		367481.4415	3.59918	1322.6319	17560	0.03	40
21-25		139061.2363	3.59892	500.4703	5410	0.03	32
12-25 <2mm		4756993.406	3.60295	17139.2094	100710	0.03	18
17-25		7262104.16	3.60306	26165.7970	223400	0.03	26
06-25 <2mm		560552.2812	3.59974	2017.8425	5380	0.03	8
34-25		370834.2838	3.60092	1335.3446	2340	0.03	5
27-25		346560.987	3.60295	1248.6419	6200	0.03	15
20-25		860146.533	3.60009	3096.6049	16630	0.03	16
AVERAGE							20
BLANK					0.000300006		
BLK SPK 1000 ppb					1010		
34-25-B DUP		366574.1537	3.60388	1321.0893	2070	0.03	5
34-25-B SPK (2500 ppb Cu)		366574.1537	3.59949	1319.4800	4760		

3050	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
37-25-B	48420.27	606468.3	3642.441	542.5549	17464.26
26-25-B	64029.35	69523.36	2672.807	263.6032	358964.6
10-25-B	84299.06	1136938	3254.99	1461.938	20269.89
08-25-B	73938.21	449907.1	4770.638	327.2133	11442.54
18-25-B	30635.27	367481.4	2072.203	113.4522	7639.164
21-25-B	20964.31	139061.2	1630.336	130.2317	6875.585
12-25-B	311579.6	4756993	7121.13	4596.636	74445.02
17-25-B	211067.9	7262104	8636.445	6248.741	63552.91
06-25-B	121532.9	560552.3	5591.573	743.63	27420.72
34-25-B	107143.5	370834.3	5849.856	478.6854	20330.23
34-25-B DUP	104390.3	366574.2	6484.573	692.1727	21256.55
27-25-B	142280.7	346561	5338.284	625.4143	34315.82
20-25-B	86962.51	860146.5	4532.858	438.7998	15433.46

3050 QA/QC

34-25-B	107143.5	370834.3	5849.856	478.6854	20330.23
34-25-B DUP	104390.3	366574.2	6484.573	692.1727	21256.55
RPD	2.603035	1.155433	10.29181	36.46681	4.45486

BLANK	-0.26833	-0.042	0.014402	-0.02335	-1.03006
BLK SPK	4899.699	5255.35	5149.72	4693.757	4690.96
% Recovery	97.99935	105.1078	102.9941	93.8756	93.83979

34-25-B	2160.506	7477.725	117.96	9.6525	409.951
34-25-B SPK	6818.113	13778.68	5000.545	4589.773	5011.12
% Recovery	93.15214	126.0191	97.6517	91.6024	92.02338

BLANK	-0.06373	-0.09347	-0.14636	-0.03331	-0.9795
BLK SPK	4846.305	5149.546	5004.259	4630.957	4597.159
% Recovery	96.92737	102.9928	100.0881	92.61981	91.96277

	OES Cu ppm	MS Cu ppm	
BLANK *	0.00		
Blank-Spike 1 PPM	1.01		
BLANK	0.00		
BLANK B BIO ALL 10X	DL	0.02	
BLANK SPIKE	8.61	9.27	This blank spike appears to be contaminated
34-25B	2.34	3.39	
6-25B	5.38	7.83	
17-25B	223.40	220.99	
12-25B	100.71	92.51	
21-25B	5.41	3.86	
18-25B	17.56	15.54	
STAND 1ppm	0.99	0.00	
8-25B	3.28	3.77	
10-25B	34.08	33.32	
26-25B	0.46	1.22	
37-25B	27.61	26.05	
20-25-B	16.63	16.99	
27-25B	6.20	5.82	
34-25B SPK 2.5 ppm	4.76	5.62	
34-25-DUP	2.07	2.88	

*Standards and blanks prepared with matrix blank.

3050 < 2mm

	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
37-25-B	48420	606468	3642	543	17464
26-25-B	64029	69523	2673	264	358965
10-25-B	84299	1136938	3255	1462	20270
08-25-B	73938	449907	4771	327	11443
18-25-B	30635	367481	2072	113	7639
21-25-B	20964	139061	1630	130	6876
12-25-B	311580	4756993	7121	4597	74445
17-25-B	211068	7262104	8636	6249	63553
06-25-B	121533	560552	5592	744	27421
34-25-B	107143	370834	5850	479	20330
34-25-B DUP	104390	366574	6485	692	21257
27-25-B	142281	346561	5338	625	34316
20-25-B	86963	860147	4533	439	15433

3050 <250 micron

	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
8-25-A	45209	322818	4978	1337	12542
10-25-A	142841	3825770	7080	2510	63976
37-25-A	60833	887446	4197	776	26171
21-25-A	35656	271424	2455	285	11825
34-25-A	119292	973813	4715	942	27346
12-25-A	424547	8886898	8023	7773	106923
17-25-A	305363	9864535	11638	10819	94089
27-25-A	147976	632084	5147	722	39132
26-25-A	77749	161369	2852	481	17464
18-25-A	31360	340517	2962	127	16216
18-25-A DUP	32274	350151	2971	136	12899
18-25-A-SPK	5304	11458	4899	4539	4824
6-25-A	121764	1267410	5533	1402	33151
20-25-A	80159	879581	4148	635	16464

3050 QA/QC

	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb	
34-25-B	107143	370834	5850	479	20330	
34-25-B DUP	104390	366574	6485	692	21257	
RPD	2.60	1.16	10.29	36.47	4.45	
BLANK	-0.27	-0.04	0	0	-1	Not dilution corrected
BLK SPK 5000 ppb	4900	5255	5150	4694	4691	
% Recovery	98	105	103	94	94	
34-25-B	2161	7478	118	10	410	Not digest corrected
34-25-B SPK 5000 ppb	6818	13779	5001	4590	5011	Not digest corrected
% Recovery	93	126	98	92	92	
18-25-A	31360	340517	2962	127	16216	
18-25-A DUP	32274	350151	2971	136	12899	
RPD	2.87	2.79	0.31	6.83	22.78	
BLANK	0	0	0	0	-1	Not dilution corrected
BLK SPK 5000 ppb	4846	5150	5004	4631	4597	
% Recovery	97	103	100	93	92	
18-25-A	630	6839	59	3	326	Not digest corrected
18-25-A-SPK 5000 ppb	5304	11458	4899	4539	4824	Not digest corrected
% Recovery	93	92	97	91	90	

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
37-25-B all 50x 3050	48420.269	606468.283	3642.441	542.555	17464.255
26-25-B	64029.349	69523.361	2672.807	263.603	358964.613
10-25-B	84299.058	1136938.150	3254.990	1461.938	20269.895
08-25-B	73938.213	449907.100	4770.638	327.213	11442.539
18-25-B	30635.267	367481.441	2072.203	113.452	7639.164
21-25-B	20964.312	139061.236	1630.336	130.232	6875.585
12-25-B	311579.606	4756993.406	7121.130	4596.636	74445.023
17-25-B	211067.896	7262104.160	8636.445	6248.741	63552.915
06-25-B	121532.885	560552.281	5591.573	743.630	27420.718
34-25-B	107143.484	370834.284	5849.856	478.685	20330.232
BLANK	DL	DL	DL	DL	DL
BLK SPK	4899.699	5255.350	5149.720	4693.757	4690.960
34-25-B DUP	104390.334	366574.154	6484.573	692.173	21256.549
34-25-B SPK	6818.113	13778.678	5000.545	4589.773	5011.120
27-25-B	142280.672	346560.987	5338.284	625.414	34315.824
20-25-B	86962.513	860146.533	4532.858	438.800	15433.456
8-25-A	45208.863	322818.035	4978.270	1336.806	12542.162
10-25-A	142841.007	3825769.701	7080.398	2510.433	63975.960
37-25-A	60833.077	887445.888	4196.536	775.614	26171.252
21-25-A	35655.942	271423.729	2455.476	284.890	11825.392
34-25-A	119292.497	973813.181	4714.547	941.706	27346.178
12-25-A	424547.097	8886898.492	8022.588	7772.675	106922.977
17-25-A	305362.936	9864535.218	11637.969	10819.071	94088.797
27-25-A	147976.012	632084.259	5146.675	722.020	39131.530
26-25-A	77749.330	161368.981	2852.452	480.964	17463.516
18-25-A	31359.741	340517.213	2962.044	127.293	16216.117
BLANK	DL	DL	DL	DL	DL
BLK SPK	4846.305	5149.546	5004.259	4630.957	4597.159
18-25-A DUP	32273.655	350150.556	2971.196	136.291	12899.247
18-25-A-SPK	5304.407	11458.293	4898.584	4539.135	4823.923
6-25-A	121764.178	1267410.053	5532.839	1402.101	33151.325
20-25-A	80158.649	879580.605	4147.883	635.469	16464.452

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb	digest facto	wt g	
37-25-B all 50x 3050	48420.27	606468.28	3642.441	542.5549	17464.26	49.85343	1.00294	37-25-B
26-25-B	64029.35	69523.361	2672.807	263.6032	358964.6	50.06709	0.99866	26-25-B
10-25-B	84299.06	1136938.1	3254.99	1461.938	20269.89	49.63124	1.00743	10-25-B
08-25-B	73938.21	449907.1	4770.638	327.2133	11442.54	50.0135	0.99973	08-25-B
18-25-B	30635.27	367481.44	2072.203	113.4522	7639.164	50.02301	0.99954	18-25-B
21-25-B	20964.31	139061.24	1630.336	130.2317	6875.585	49.80179	1.00398	21-25-B
12-25-B	311579.6	4756993.4	7121.13	4596.636	74445.02	50.29473	0.99414	12-25-B
17-25-B	211067.9	7262104.2	8636.445	6248.741	63552.91	49.85393	1.00293	17-25-B
06-25-B	121532.9	560552.28	5591.573	743.63	27420.72	49.86288	1.00275	06-25-B
34-25-B	107143.5	370834.28	5849.856	478.6854	20330.23	49.59186	1.00823	34-25-B
BLANK	-0.24617	-0.042	0.01412	-0.02224	-0.93642	Not dilution corrected		
BLK SPK	4899.699	5255.35	5149.72	4693.757	4690.96	0		
34-25-B DUP	104390.3	366574.15	6484.573	692.1727	21256.55	49.989	1.00022	34-25-B DUP
34-25-B SPK	6818.113	13778.678	5000.545	4589.773	5011.12	not digest corrected		
27-25-B	142280.7	346560.99	5338.284	625.4143	34315.82	50.224	0.99554	27-25-B
20-25-B	86962.51	860146.53	4532.858	438.7998	15433.46	49.94306	1.00114	20-25-B
8-25-A	45208.86	322818.04	4978.27	1336.806	12542.16	49.89572	1.00209	8-25-A
10-25-A	142841	3825769.7	7080.398	2510.433	63975.96	49.68055	1.00643	10-25-A
37-25-A	60833.08	887445.89	4196.536	775.6138	26171.25	49.64405	1.00717	37-25-A
21-25-A	35655.94	271423.73	2455.476	284.8901	11825.39	49.77551	1.00451	21-25-A
34-25-A	119292.5	973813.18	4714.547	941.7063	27346.18	49.92611	1.00148	34-25-A
12-25-A	424547.1	8886898.5	8022.588	7772.675	106923	49.91764	1.00165	12-25-A
17-25-A	305362.9	9864535.2	11637.97	10819.07	94088.8	49.69339	1.00617	17-25-A
27-25-A	147976	632084.26	5146.675	722.0205	39131.53	50.01701	0.99966	27-25-A
26-25-A	77749.33	161368.98	2852.452	480.964	17463.52	49.63765	1.0073	26-25-A
18-25-A	31359.74	340517.21	2962.044	127.2929	16216.12	49.79187	1.00418	18-25-A
BLANK	-0.05847	-0.09347	-0.14349	-0.03172	-0.89045	Not dilution corrected		
BLK SPK	4846.305	5149.5455	5004.259	4630.957	4597.159	0		
18-25-A DUP	32273.65	350150.56	2971.196	136.2911	12899.25	49.8778	1.00245	18-25-A DUP
18-25-A-SPK	5304.407	11458.293	4898.584	4539.135	4823.923	Not digest corrected		
6-25-A	121764.2	1267410.1	5532.839	1402.101	33151.32	49.76313	1.00476	6-25-A
20-25-A	80158.65	879580.6	4147.883	635.4693	16464.45	49.91315	1.00174	20-25-A

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WT (g)	SAMPLE ID
1.00209	8-25-A
1.00643	10-25-A
1.00717	37-25-A
1.00451	21-25-A
1.00148	34-25-A
1.00165	12-25-A
1.00617	17-25-A
0.99966	27-25-A
1.0073	26-25-A
1.00418	18-25-A
	BLANK
	BLANK SPK
1.00245	18-25-A DUP
0.99954	18-25-A SPK
1.00476	6-25-A
1.00174	20-25-A

ARCADIS ######## BIRD 3050 note B<2mm

WT (g)	SAMPLE ID
1.00294	37-25-B
0.99866	26-25-B
1.00743	10-25-B
0.99973	08-25-B
0.99954	18-25-B
1.00398	21-25-B
0.99414	12-25-B
1.00293	17-25-B
1.00275	06-25-B
1.00823	34-25-B
	BLANK
	BLANK SPK
1.00022	34-25-B DUP
1.00408	34-25-B SPK
0.99554	27-25-B
1.00114	20-25-B

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb	
37-25-B all 50x 3050	971.253	12165.026	73.063	10.883	350.312	
26-25-B	1278.871	1388.604	53.385	5.265	7169.672	
10-25-B	1698.508	22907.712	65.584	29.456	408.410	
08-25-B	1478.365	8995.713	95.387	6.543	228.789	
18-25-B	612.424	7346.248	41.425	2.268	152.713	
21-25-B	420.955	2792.294	32.737	2.615	138.059	
12-25-B	6195.075	94582.349	141.588	91.394	1480.176	
17-25-B	4233.727	145667.643	173.235	125.341	1274.783	
06-25-B	2437.342	11241.876	112.139	14.914	549.923	
34-25-B	2160.506	7477.725	117.960	9.653	409.951	
Standard Check 150 ppb	142.00082	154.08208	147.36984	145.35943	138.05773	
Blank	0.19622	0.02948	-0.04979	-0.00727	-0.04712	
BLANK	-0.24617	-0.042	0.01412	-0.02224	-0.93642	Not dilution corrected
BLK SPK	4899.699	5255.350	5149.720	4693.757	4690.960	
34-25-B DUP	2088.266	7333.096	129.720	13.847	425.225	
34-25-B SPK	6818.113	13778.678	5000.545	4589.773	5011.120	
27-25-B	2832.922	6900.307	106.290	12.453	683.256	
20-25-B	1741.233	17222.542	90.761	8.786	309.021	
8-25-A	906.067	6469.855	99.774	26.792	251.368	
10-25-A	2875.190	77007.388	142.519	50.532	1287.747	
37-25-A	1225.385	17876.178	84.533	15.624	527.178	
21-25-A	716.335	5452.957	49.331	5.724	237.575	
Standard Check 150 ppb	141.58071	152.29621	145.0091	143.93822	138.96128	
Blank	-0.01711	-0.01031	-0.00167	-0.00937	-0.03378	
34-25-A	2389.381	19505.089	94.431	18.862	547.733	
12-25-A	8504.952	178031.238	160.717	155.710	2141.988	
17-25-A	6144.941	198507.988	234.196	217.717	1893.387	
27-25-A	2958.514	12637.387	102.899	14.436	782.365	
26-25-A	1566.338	3250.940	57.466	9.690	351.820	
18-25-A	629.817	6838.812	59.489	2.557	325.678	
BLANK	-0.05847	-0.09347	-0.14349	-0.03172	-0.89045	Not dilution corrected
BLK SPK	4846.305	5149.546	5004.259	4630.957	4597.159	
18-25-A DUP	647.055	7020.169	59.570	2.733	258.617	
18-25-A-SPK	5304.407	11458.293	4898.584	4539.135	4823.923	
Standard Check 150 ppb	144.71397	156.60075	149.66784	148.20705	142.02166	
Blank	-0.11936	-0.03022	-0.10081	-0.01582	-0.0259	
6-25-A	2446.876	25468.859	111.184	28.176	666.183	
20-25-A	1605.963	17622.222	83.102	12.732	329.862	
Standard Check 150 ppb	141.84379	153.13697	147.57547	145.93005	135.68312	
Blank	0.02497	2.55813	-0.0314	0.00313	-0.03834	

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
Standard 1	100	100	100	100	100					
Standard 2	500.342	500.41226	499.733	500.6682	500.5496					
Standard 3	989.7011	983.31738	994.9584	992.4083	1006.978					
Standard Check 150 ppb	142.9177	153.076	147.077	147.9618	154.8497					
Blank	0	0	0.000	0	0					
Interference Check	377.145	477.056	197.319	100.545	58.246					
37-25-B all 50x 3050	21.173	243.301	1.490	0.229	7.707					
26-25-B	27.879	27.772	1.089	0.111	157.733					
10-25-B	37.027	458.154	1.338	0.619	8.985					
08-25-B	32.228	179.914	1.946	0.137	5.033					
18-25-B	13.351	146.925	0.845	0.048	3.360					
21-25-B	9.177	55.846	0.668	0.055	3.037					
12-25-B	135.053	1891.647	2.888	1.919	32.564					
17-25-B	92.295	2913.353	3.534	2.632	28.045					
06-25-B	53.134	224.838	2.288	0.313	12.098					
34-25-B	47.099	149.555	2.406	0.203	9.019					
Standard Check 150 ppb	154.781	154.082	150.317	152.627	151.864					
Blank	0.214	0.029	-0.051	-0.008	-0.052					
BLANK	-0.268	-0.042	0.014	-0.023	-1.030					
BLK SPK	106.813	105.107	105.054	98.569	103.201					
34-25-B DUP	45.524	146.662	2.646	0.291	9.355					
34-25-B SPK	148.635	275.574	102.011	96.385	110.245	103	129	99	96	101
27-25-B	61.758	138.006	2.168	0.262	15.032					
20-25-B	37.959	344.451	1.852	0.185	6.798					
8-25-A	19.752	129.397	2.035	0.563	5.530					
10-25-A	62.679	1540.148	2.907	1.061	28.330					
37-25-A	26.713	357.524	1.724	0.328	11.598					
21-25-A	15.616	109.059	1.006	0.120	5.227					
Standard Check 150 ppb	154.323	152.296	147.909	151.135	152.857					
Blank	-0.019	-0.010	-0.002	-0.010	-0.037					
34-25-A	52.089	390.102	1.926	0.396	12.050					
12-25-A	185.408	3560.625	3.279	3.270	47.124					
17-25-A	133.960	3970.160	4.778	4.572	41.655					
27-25-A	64.496	252.748	2.099	0.303	17.212					
26-25-A	34.146	65.019	1.172	0.203	7.740					
18-25-A	13.730	136.776	1.214	0.054	7.165					
BLANK	-0.064	-0.093	-0.146	-0.033	-0.979					
BLK SPK	105.649	102.991	102.087	97.250	101.137					
18-25-A DUP	14.106	140.403	1.215	0.057	5.690					
18-25-A-SPK	115.636	229.166	99.931	95.322	106.126					
Standard Check 150 ppb	157.738	156.601	152.661	155.617	156.224					
Blank	-0.130	-0.250	-0.103	-0.017	-0.028					
6-25-A	53.342	508.937	2.268	0.592	14.656					
20-25-A	35.010	351.784	1.695	0.267	7.257					
Standard Check 150 ppb	154.610	150.497	150.527	153.227	149.251					
Blank	0.027	-0.302	-0.032	0.003	-0.042					
						0	0	0	0	0
2000 ppb Cu	1.140	2028.938	0.134	-0.024	-0.967					
5000 ppb Cu	0.870	5124.959	-0.065	-0.027	-0.996					
Standard Check 150 ppb	153.111	146.623	146.925	149.804	145.758					
Standard Check 150 ppb	151.311	145.115	147.323	150.741	145.743					
Blank	-0.049	0.355	0.003	0.001	-0.037					
Interference Check	371.280	462.642	193.785	97.324	53.840					
	410	510	210	105	60					
	0.36032	0.73736086	0.129886	0.024131	0.055791					
	369	459	189	94.5	54					

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb		Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
Standard 1	100	100	100	100	100						
Standard 2	500.342	500.4123	499.733	500.6682	500.5496						
Standard 3	989.7011	983.3174	994.9584	992.4083	1006.978						
Standard Check 150 ppb	142.9177	153.076	144.1936	147.9618	140.7724						
Blank	0	0	0	0	0						
Interference Check	346.0045	477.0565	193.4505	95.75691	52.95051						
37-25-B all 50x 3050	19.42505	243.3005	1.46126	0.21766	7.00624						
26-25-B	25.57742	27.77208	1.06769	0.1053	143.3934						
10-25-B	33.97016	458.1542	1.31167	0.58912	8.1682						
08-25-B	29.5673	179.9143	1.90774	0.13085	4.57578						
18-25-B	12.24847	146.925	0.8285	0.04536	3.05426						
21-25-B	8.4191	55.84588	0.65473	0.0523	2.76118						
12-25-B	123.9015	1891.647	2.83176	1.82788	29.60351						
17-25-B	84.67453	2913.353	3.4647	2.50682	25.49565						
06-25-B	48.74684	224.8375	2.24278	0.29827	10.99845						
34-25-B	43.21011	149.5545	2.3592	0.19305	8.19902						
Standard Check 150 ppb	142.0008	154.0821	147.3698	145.3594	138.0577						
Blank	0.19622	0.02948	-0.04979	-0.00727	-0.04712						
BLANK	-0.24617	-0.042	0.01412	-0.02224	-0.93642						
BLK SPK	97.99398	105.107	102.9944	93.87513	93.81919						
34-25-B DUP	41.76532	146.6619	2.5944	0.27693	8.50449						
34-25-B SPK	136.3623	275.5736	100.0109	91.79545	100.2224						
27-25-B	56.65844	138.0061	2.12579	0.24905	13.66511						
20-25-B	34.82466	344.4508	1.81521	0.17572	6.18042						
8-25-A	18.12134	129.3971	1.99547	0.53584	5.02735						
10-25-A	57.50379	1540.148	2.85037	1.01063	25.75493						
37-25-A	24.5077	357.5236	1.69065	0.31247	10.54356						
21-25-A	14.3267	109.0591	0.98662	0.11447	4.75149						
Standard Check 150 ppb	141.5807	152.2962	145.0091	143.9382	138.9613						
Blank	-0.01711	-0.01031	-0.00167	-0.00937	-0.03378						
34-25-A	47.78762	390.1018	1.88861	0.37724	10.95466						
12-25-A	170.099	3560.625	3.21433	3.1142	42.83976						
17-25-A	122.8988	3970.16	4.68391	4.35433	37.86773						
27-25-A	59.17028	252.7477	2.05797	0.28871	15.64729						
26-25-A	31.32676	65.01879	1.14931	0.19379	7.0364						
18-25-A	12.59633	136.7762	1.18977	0.05113	6.51356						
BLANK	-0.05847	-0.09347	-0.14349	-0.03172	-0.89045						
BLK SPK	96.9261	102.9909	100.0852	92.61914	91.94318						
18-25-A DUP	12.94109	140.4034	1.19139	0.05465	5.17234						
18-25-A-SPK	106.0881	229.1659	97.97168	90.7827	96.47846						
Standard Check 150 ppb	144.714	156.6008	149.6678	148.2071	142.0217						
Blank	0	0	0	0	0	1					
6-25-A	49	509	2	1	13	2					
20-25-A	32	352	2	0	7	3					
						4					
						5					
						6					
						7					
						8					
						9					
						10					
						11					
Standard Check 150 ppb	142	150	148	146	136	12					
Blank	0	-0.30	0	0	0	13		-0.22			
						13					
						13					
						13					
						13					
						13					
						13					
						13					
						13					
2000 ppb Cu	1	2028.94	0	0	-1	13					
5000 ppb Cu	1	5124.96	0	0	-1	13					
Standard Check 150 ppb	140	146.62	144	143	133	13					
Standard Check 150 ppb	139	145.11	144	144	132	13					
Blank	0	0.36	0	0	0	13					
Interference Check	341	462.64	190	93	49	13					
	0.330569	0.737361	0.127339	0.022982	0.050719						

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb		Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
Standard 1	100.000	100.000	100.000	100.000	100.000						
Standard 2	500.342	500.412	499.733	500.668	500.550						
Standard 3	989.7011	983.3174	994.9584	992.4083	1006.978						
Standard Check 150 ppb	142.9177	153.076	144.1936	147.9618	140.7724						
Blank	0	0	0	0	0						
Interference Check	346.0045	477.0565	193.4505	95.75691	52.95051	1					
37-25-B all 50x 3050	19.42505	243.3005	1.46126	0.21766	7.00624	2					
26-25-B	25.57742	27.77208	1.06769	0.1053	143.3934	3					
10-25-B	33.97016	458.1542	1.31167	0.58912	8.1682	4					
08-25-B	29.5673	179.9143	1.90774	0.13085	4.57578	5					
18-25-B	12.24847	146.925	0.8285	0.04536	3.05426	6					
21-25-B	8.4191	55.84588	0.65473	0.0523	2.76118	7					
12-25-B	123.9015	1891.647	2.83176	1.82788	29.60351	8					
17-25-B	84.67453	2913.353	3.4647	2.50682	25.49565	9					
06-25-B	48.74684	224.8375	2.24278	0.29827	10.99845	10					
34-25-B	43.21011	149.5545	2.3592	0.19305	8.19902	11					
Standard Check 150 ppb	142.0008	154.0821	147.3698	145.3594	138.0577	12					
Blank	0.19622	0.02948	-0.04979	-0.00727	-0.04712	13	0.01	0.02	0.04		
BLANK	-0.24617	-0.042	0.01412	-0.02224	-0.93642	13					
BLK SPK	97.99398	105.107	102.9944	93.87513	93.81919	13					
34-25-B DUP	41.76532	146.6619	2.5944	0.27693	8.50449	13					
34-25-B SPK	136.3623	275.5736	100.0109	91.79545	100.2224	13					
27-25-B	56.65844	138.0061	2.12579	0.24905	13.66511	13					
20-25-B	34.82466	344.4508	1.81521	0.17572	6.18042	13					
8-25-A	18.12134	129.3971	1.99547	0.53584	5.02735	13					
10-25-A	57.50379	1540.148	2.85037	1.01063	25.75493	13					
37-25-A	24.5077	357.5236	1.69065	0.31247	10.54356	13					
21-25-A	14.3267	109.0591	0.98662	0.11447	4.75149	13					
Standard Check 150 ppb	141.5807	152.2962	145.0091	143.9382	138.9613	13					
Blank	-0.01711	-0.01031	-0.00167	-0.00937	-0.03378	13					
34-25-A	47.78762	390.1018	1.88861	0.37724	10.95466	13					
12-25-A	170.099	3560.625	3.21433	3.1142	42.83976	13					
17-25-A	122.8988	3970.16	4.68391	4.35433	37.86773	13					
27-25-A	59.17028	252.7477	2.05797	0.28871	15.64729	13					
26-25-A	31.32676	65.01879	1.14931	0.19379	7.0364	13					
18-25-A	12.59633	136.7762	1.18977	0.05113	6.51356	13					
BLANK	-0.05847	-0.09347	-0.14349	-0.03172	-0.89045	13					
BLK SPK	96.9261	102.9909	100.0852	92.61914	91.94318	13					
18-25-A DUP	12.94109	140.4034	1.19139	0.05465	5.17234	13					
18-25-A-SPK	106.0881	229.1659	97.97168	90.7827	96.47846	13					
Standard Check 150 ppb	144.714	156.6008	149.6678	148.2071	142.0217	13					
Blank	-0.11936	-0.03022	-0.10081	-0.01582	-0.0259	13					
6-25-A	48.93751	509.3772	2.22367	0.56351	13.32365	13					
20-25-A	32.11925	352.4444	1.66204	0.25463	6.59724	13					
						13					
						13					
						13					
						13					
						13					
						13					
						13					
						13					
Standard Check 150 ppb	141.8438	153.137	147.5755	145.9301	135.6831	13					
Blank	0.02497	2.55813	-0.0314	0.00313	-0.03834	13					
						13					
						13					
						13					
						13					
						13					
						13					
						13					
						13					
2000 ppb Cu	1.04618	2031.798	0.131	-0.02332	-0.87939	13					
5000 ppb Cu	0.79843	5127.819	-0.06354	-0.02606	-0.90572	13					
Standard Check 150 ppb	140.4691	149.4829	144.0442	142.6708	132.5075	13					
Standard Check 150 ppb	138.8174	147.9747	144.434	143.5626	132.4934	13					
Blank	-0.04489	3.21534	0.00336	0.00099	-0.03334	13					
Interference Check	340.624	465.5023	189.9851	92.68911	48.94535	13					
	0.330569	4.730904	0.127339	0.022982	0.050719						

0	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
Standard 1	100	100	100	100	100					
Standard 2	500.342	500.4123	499.733	500.6682	500.5496					
Standard 3	989.7011	983.3174	994.9584	992.4083	1006.978					
Standard Check 150 ppb	142.9177	153.076	144.1936	147.9618	140.7724					
Blank	0.00	0.00	0.00	0.00	0.00					
Interference Check	345.99	477.04	193.41	95.76	52.95					
37-25-B all 50x 3050	19.41	243.26	1.38	0.22	7.01					
26-25-B	25.55	27.71	0.95	0.11	143.39					
10-25-B	33.93	458.07	1.15	0.59	8.17					
08-25-B	29.52	179.81	1.71	0.13	4.58					
18-25-B	12.19	146.80	0.59	0.05	3.05					
21-25-B	8.35	55.71	0.37	0.05	2.76					
12-25-B	123.82	1891.49	2.51	1.83	29.60					
17-25-B	84.58	2913.17	3.10	2.51	25.50					
06-25-B	48.65	224.64	1.84	0.30	11.00					
34-25-B	43.10	149.33	1.92	0.19	8.20					
Standard Check 150 ppb	141.88	153.84	146.89	145.36	138.06					
Blank	0.07	-0.23	-0.57	-0.01	-0.05					
BLANK	-0.38	-0.30	-0.51	-0.02	-0.94					
BLK SPK	97.86	104.85	102.47	93.88	93.82					
34-25-B DUP	41.64	146.40	2.07	0.28	8.50					
34-25-B SPK	136.23	275.31	99.49	91.80	100.22					
27-25-B	56.53	137.75	1.61	0.25	13.67					
20-25-B	34.69	344.19	1.30	0.18	6.18					
8-25-A	17.99	129.14	1.48	0.54	5.03					
10-25-A	57.37	1539.89	2.33	1.01	25.75					
37-25-A	24.38	357.26	1.17	0.31	10.54					
21-25-A	14.20	108.80	0.47	0.11	4.75					
Standard Check 150 ppb	141.45	152.04	144.49	143.94	138.96					
Blank	-0.15	-0.27	-0.52	-0.01	-0.03					
34-25-A	47.66	389.84	1.37	0.38	10.95					
12-25-A	169.97	3560.36	2.69	3.11	42.84					
17-25-A	122.77	3969.90	4.16	4.35	37.87					
27-25-A	59.04	252.49	1.54	0.29	15.65					
26-25-A	31.20	64.76	0.63	0.19	7.04					
18-25-A	12.47	136.52	0.67	0.05	6.51					
BLANK	-0.19	-0.35	-0.66	-0.03	-0.89					
BLK SPK	96.80	102.73	99.57	92.62	91.94					
18-25-A DUP	12.81	140.14	0.67	0.05	5.17					
18-25-A-SPK	105.96	228.91	97.45	90.78	96.48					
Standard Check 150 ppb	144.58	156.34	149.15	148.21	142.02					
Blank	-0.25	-0.29	-0.62	-0.02	-0.03					
6-25-A	48.81	509.12	1.70	0.56	13.32					
20-25-A	31.99	352.18	1.14	0.25	6.60					
Standard Check 150 ppb	141.71	152.88	147.06	145.93	135.68					
Blank	-0.11	2.30	-0.55	0.00	-0.04					
2000 ppb Cu	0.92	2031.54	-0.39	-0.02	-0.88					
5000 ppb Cu	0.67	5127.56	-0.58	-0.03	-0.91					
Standard Check 150 ppb	140.34	149.22	143.52	142.67	132.51					
Standard Check 150 ppb	138.69	147.71	143.91	143.56	132.49					
Blank	-0.17	2.96	-0.52	0.00	-0.03					
Interference Check	340.49	465.24	189.47	92.69	48.95					

	Zn ppb	Cu ppb	As ppb	Cd ppb	Pb ppb
Standard 1	100.00	100.00	100.00	100.00	100.00
Standard 2	500.34	500.41	499.73	500.67	500.55
Standard 3	989.70	983.32	994.96	992.41	1006.98
Standard Check 150 ppb	142.92	153.08	144.19	147.96	140.77
Blank	0.02	0.19	0.34	0.03	0.06
Interference Check	346.02	477.23	193.75	95.78	53.01
37-25-B all 50x 3050	19.43	243.45	1.72	0.24	7.07
26-25-B	25.57	27.90	1.28	0.13	143.46
10-25-B	33.95	458.27	1.49	0.61	8.23
08-25-B	29.54	180.01	2.04	0.16	4.64
18-25-B	12.21	147.00	0.92	0.07	3.12
21-25-B	8.37	55.90	0.71	0.08	2.82
12-25-B	123.84	1891.68	2.85	1.85	29.67
17-25-B	84.61	2913.37	3.44	2.53	25.56
06-25-B	48.67	224.83	2.18	0.32	11.06
34-25-B	43.12	149.53	2.25	0.22	8.26
Standard Check 150 ppb	141.90	154.03	147.23	145.38	138.12
Blank	0.09	-0.04	-0.23	0.02	0.02
BLANK	-0.35	-0.11	-0.17	0.00	-0.87
BLK SPK	97.89	105.04	102.81	93.90	93.88
34-25-B DUP	41.66	146.59	2.41	0.30	8.57
34-25-B SPK	136.26	275.51	99.83	91.82	100.29
27-25-B	56.55	137.94	1.94	0.27	13.73
20-25-B	34.72	344.38	1.63	0.20	6.24
8-25-A	18.01	129.33	1.81	0.56	5.09
10-25-A	57.40	1540.08	2.67	1.04	25.82
37-25-A	24.40	357.46	1.51	0.34	10.61
21-25-A	14.22	108.99	0.80	0.14	4.81
Standard Check 150 ppb	141.47	152.23	144.82	143.96	139.02
Blank	-0.12	-0.08	-0.19	0.02	0.03
34-25-A	47.68	390.03	1.70	0.40	11.02
12-25-A	169.99	3560.56	3.03	3.14	42.90
17-25-A	122.79	3970.09	4.50	4.38	37.93
27-25-A	59.06	252.68	1.87	0.31	15.71
26-25-A	31.22	64.95	0.96	0.22	7.10
18-25-A	12.49	136.71	1.01	0.08	6.58
BLANK	-0.17	-0.16	-0.33	-0.01	-0.83
BLK SPK	96.82	102.92	99.90	92.64	92.01
18-25-A DUP	12.83	140.34	1.01	0.08	5.24
18-25-A-SPK	105.98	229.10	97.79	90.81	96.54
Standard Check 150 ppb	144.61	156.53	149.48	148.23	142.08
Blank	-0.23	-0.10	-0.29	0.01	0.04
6-25-A	48.83	509.31	2.04	0.59	13.39
20-25-A	32.01	352.38	1.48	0.28	6.66
Standard Check 150 ppb	141.74	153.07	147.39	145.96	135.75
Blank	-0.08	2.49	-0.22	0.03	0.02
2000 ppb Cu	0.94	2031.73	-0.05	0.00	-0.82
5000 ppb Cu	0.69	5127.75	-0.25	0.00	-0.84
Standard Check 150 ppb	140.36	149.42	143.86	142.70	132.57
Standard Check 150 ppb	138.71	147.91	144.25	143.59	132.56
Blank	-0.15	3.15	-0.18	0.03	0.03

Interference Check	340.52	465.43	189.80	92.71	49.01

Appendix H

Photographic Log

Photo No. **1**	
Location: FID 0 **Year:** 2009	

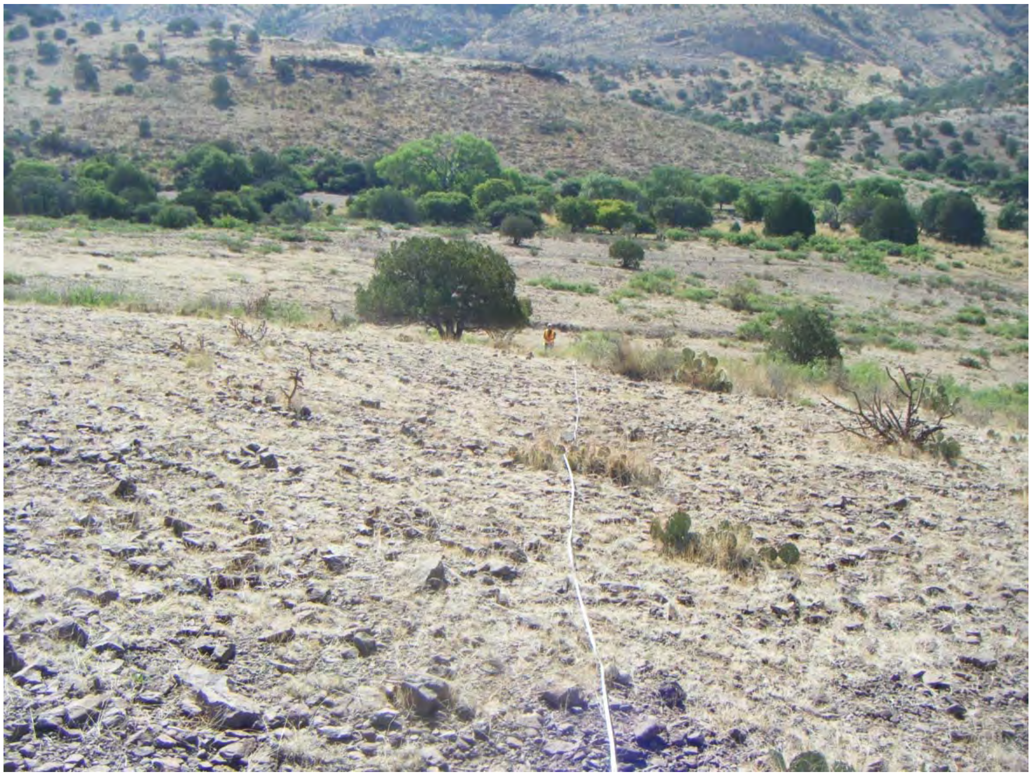
Photo No. **2**	
Location: FID 1 **Year:** 2009	

Photo No.
3

Location:
FID 3

Year:
2009

Photo No.
4

Location:
FID 6

Year:
2009

Photo No.
5

Location:
FID 12

Year:
2009

Photo No.
6

Location:
Near FID 15

Year:
2009

Photo No.
7

Location:
Near FID 16

Year:
2009

Photo No.
8

Location:
FID 20

Year:
2009

Photo No.
9

Location:
FID 27

Year:
2009

Photo No.
10

Location:
FID 30

Year:
2009

Photo No.
11

Location:
FID 32

Year:
2009

Photo No.
12

Location:
FID 34

Year:
2009

Photo No.
13

Location:
FID 37

Year:
2009

Photo No.
14

Location:
FID 39

Year:
2009

Photo No.
1

Location:
ERA 2

Year:
2012

Photo No.
2

Location:
ERA 3

Year:
2012

Photo No.
3

Location:
ERA 4

Year:
2012

Photo No.
4

Location:
ERA 10

Year:
2012

Photo No.
5

Location:
ERA 13

Year:
2012

Photo No.
6

Location:
FID 7

Year:
2012

Photo No. 7	

Location:
FID 8

Year:
2012

Photo No. 8	

Location:
FID 10

Year:
2012

Photo No.
9

Location:
FID 15

Year:
2012

Photo No.
10

Location:
FID 16

Year:
2012

Photo No. 11	
Location: FID 17 **Year:** 2012	

Photo No. 12	
Location: FID 18 **Year:** 2012	

Photo No. **13**	
Location: FID 22 **Year:** 2012	

Photo No. **14**	
Location: FID 28 **Year:** 2012	

Photo No.
15

Location:
FID 37

Year:
2012

Photo No.
16

Location:
FID 101

Year:
2012

Photo No.
17

Location:
FID 102

Year:
2012

Photo No.
18

Location:
FID 105

Year:
2012

Photo No. **19**	

Location:
FID 106

Year:
2012

Photo No.
1

Location:
ERA 2

Year:
2014

Photo No.
2

Location:
ERA 3

Year:
2014

Photo No.
3

Location:
ERA 4

Year:
2014

Photo No.
4

Location:
ERA 13

Year:
2014

Photo No.
5

Location:
ERA 13

Year:
2014

Photo No.
6

Location:
ERA 13

Year:
2014

Photo No.
7

Location:
FID 7

Year:
2014

Photo No.
8

Location:
FID 8

Year:
2014

Photo No. 9

Location:
FID 18

Year:
2014

Photo No. 10

Location:
FID 22

Year:
2014

Photo No. **11**	
Location: FID 28 **Year:** 2014	

Photo No. **12**	
Location: FID 37 **Year:** 2014	

Photo No.
13

Location:
FID 101

Year:
2014

Photo No.
14

Location:
FID 102

Year:
2014

Photo No.
15

Location:
FID 105

Year:
2014

Photo No.
16

Location:
FID 106

Year:
2014

Photo No.
17

Location:
Reference #1

Year:
2014

Photo No.
18

Location:
Reference #4

Year:
2014

ARCADIS

Appendix I

New Mexico Environment
Department Comments on Report
and Chino Response to Comments

Subject: **NMED Informal Comments on Chino White Rain Year 5 Monitoring Report**
Date: **March 16, 2017, updated from February 17, 2017**

Chino responses to NMED informal comments are in bold text below. NMED comments are in regular text as provided in an email received November 2, 2016 from David Mercer, NMED AOC Project Manager.

General Response:

Chino acknowledges NMED's concern of using the White Rain Study results to demonstrate a permanent increase in soil pH from pre-2008 to current levels. In the context of this report, the use of the word "permanence" may have been misleading as neither Chino, nor NMED, have a complete understanding of the future. There are potential atmospheric events or other potential events that could increase or decrease the soil pH outside of the scope of this report. The text will be updated to reflect that the white rain event appeared to add sufficient buffering capacity to the STSIU soils to neutralize any increased acidity as a result of anthropogenic sources (i.e., the Chino smelter), but permanence of higher pH is not possible to predict with certainty. The following points will be included in the report:

- **All acid soils (pH ≤ 5.5) whose pH increased to > 5.1 from the white rain have NNP values which meet the MMD topsoil suitability requirement of "Good" for plant establishment (> -5 kg $CaCO_3$/t), and thus present little risk of acid generation (Fig. 24). These data are variable but the consistently positive NNP values measured since 2009 continue to meet MMD criteria.**
- **White rain increased the pH of acid soils (pH ≤ 5.5) by about 1.2 pH units (on average from 4.8 to 6.0) indicating that the active soil acidity generated by oxidation of SO_2 and metal sulfides has been mostly neutralized (above pH = 5.5, active acidity is essentially gone, Thomas 1996).**
- **Future sources of potential acidity from smelting and windblown tailings have largely been eliminated by shutting down the smelter stack in 2002, decommissioning the historic smelter stacks and reclaiming the historic mineral processing operations in Hurley in 2007, and reclamation of historic tailing ponds (including Lake One) and adjacent areas. The active Tailing Pond 7 is covered under operational discharge and air permits.**
- **Natural pedogenic (soil-forming) processes will continue to function and soil pH is expected to recover to baseline levels for soils of the area (pH = 6.1 to 8.4, NRCS 1983).**
- **Periodic monitoring (e.g., element of the 5 Year Reviews that will be included in the FS) can be used to confirm this assessment.**

Specific Responses:

1. Sampling imprecision due to soil heterogeneity is a complicating factor for year-to-year comparisons of soil characteristics at individual locations. The effects of soil heterogeneity, and related sampling issues, have not been appropriately considered in making conclusions from the monitoring data. Issues with sampling and analysis precision were identified in Section 3.4 of the report and then forgotten or dismissed.
    - Measurement of soil pH appears more precise, relative to the range of values measured, than measurement of the other parameters monitored over time (e.g., see Figure 25a).

    As discussed in previous STSIU reports and in Section 3.4 of this report, there is significant heterogeneity in the STSIU soils. The field duplicates are different soil samples, not laboratory duplicates of the same soil sample. This natural heterogeneity creates variability in the soil

parameter results and uncertainty in their results interpretation but is not unexpected (see AOC QAPP). Chino will include additional discussion and clarification addressing this known heterogeneity and uncertainty in Sections 3.2 and Section 4 where sample results and conclusions are discussed.

- Tests for trend on the "permanence monitoring" data (Table 6) for copper, pCu, net-neutralization potential (NNP), and neutralization potential ratio (NPR) are meaningless due to the poor precision of these measurements relative to the magnitude of changes over time.

As discussed in Section 3.4, field duplicate pH results varied between 0 and 15 percent and field duplicate copper results varied between 0 and 32 percent, well within the AOC QAPP acceptable limits. Additionally, if copper concentrations are on a log scale, similar to pH log scale (and often the scale of statistical analyses on copper), then the variability of copper is only 0 to 6%. Given both copper and pH are well within acceptable limits, and pCu is calculated using these two parameters (with variability of only 0 to 14%), the precision of these measurements is adequate to evaluate trends for pH, copper, and pCu. Section 3.4 also addresses the large variability in ABA and sulfur results. Additional text will be added when discussing the ABA and sulfur trend analyses to highlight the level of uncertainty in these results. The main point is that, despite the variability, in almost every year, almost all the samples meet the MMD criteria of "Good" and acceptable for topsoil suitability where the majority of NNP values are > -5 T $CaCO_3$/Kt (Figure 24). As stated in Section 3.2.2, with only one exception, all acid soils (pH < 5.5) where pH increased to >5.1 by the White Rain have NNP values > the MMD criteria of -5 T $CaCO_3$/Kt required for suitable plant establishment. Despite variability shown in Figure 24, soil NNP values never changed their classification over 6 years of monitoring with respect to acid generation. Also, the variability is in part due to the near-detection levels of sulfide-S, which in itself speaks for a very limited capacity of the soils to generate acid regardless of their NNP.

- The report indicates that copper concentrations increased over time yet no mechanism for this increase was indicated. What is the source of copper to soil during the monitoring period? The changes in reported copper concentrations over time are small relative to precision of repeat samples and analyses, and therefore, the apparent change in copper concentrations in soil appears to be due to sampling and analysis uncertainties/errors (refer to report Figures 13, 15, 25). For this reason, conclusions made regarding temporal trends for copper concentrations, and the related parameter pCu, are questionable.

The State's third bullet indicating that soil copper increased over time appears to be an error. Section 3.2 states that:

> ***"Over the 5-year monitoring period, however, soil copper concentrations for the same "permanence monitoring" dataset changed significantly (repeated measures ANOVA, p< 0.0001) (Table 5, Figure 12). Total copper concentrations were significantly lower in 2011, 2012, 2013, and 2014 than in 2010 (post-hoc comparisons test, p < 0.05)."***

There is no indication that soil concentrations are increasing, outside of normal sample variability, in STSIU soils. Rather the data indicate a decrease, which is likely due to the cessation of smelter activities and erosional processes over time.

2. The mass-balance calculations in Appendix B appear correct and can be relied on for evaluations of the effects of future white-rain (i.e., alkaline-rain) events on existing soil conditions. However, the data and analyses presented in Appendix B do not characterize, or demonstrate, how long the pH increase associated with an alkaline-rain event (i.e., 1.2 pH units) will persist.

   Please see General Response above. The ABA results and the pH monitoring data support that the majority of the STSIU soils have had the anthropogenic acidity neutralized by the white rain, which means, through natural pedogenic processes over time, the soil pH should be able to recover to the background values of pH = 6.1 or greater, depending on the soil type of the location. The pH from non-impacted soils ranges from 6.1 to 7.3 in Luzena soils, 6.6 to 7.3 in Muzzler soil, 7.9 to 8.4 in Plack soils, and 6.1 to 8.4 in Lonti soils (NRCS 1983).

3. The acid-base accounting (ABA) data are valuable to the goals of the study, especially for evaluating the permanence of white-rain effects on soil conditions, but these data were poorly utilized. For example, there is no cross referencing of the ABA results with the copper-mineralogy data presented in Appendix D of the report. When both of these types of data are available, they can (and should) be used together to verify conclusions regarding the mineral forms present in soil and their potential contribution to the soil's acid generation or neutralization potential.

   Chino agrees that the ABA data are an essential component in evaluating the permanence of the white rain effects on the increased soil pH. Chino will include a more detailed discussion in Section 5 of the report regarding the ABA results and their implication related to the ability of soils to maintain the increased pH. A stronger utilization of the ABA results (NNP) in this context are summarized in Chino's General Response above. Chino also agrees it is important to relate the static ABA results for sulfide-S content to the actual mineralogy of the sulfide minerals present, in order to better understand the relative rates of acid generation, depending on whether sulfide-S occurs primarily as pure iron sulfide minerals (e.g., pyrite), or as copper-bearing sulfides (e.g., cubanite). Cross-referencing of ABA results with the copper mineralogy data is actually presented in Section 3.2.3, which provides a discussion of the mineralogic forms of sulfide-S present in copper sulfides and their relative rates of oxidation. For example, Section 3.2.3 describes the pure iron sulfide minerals as being more rapidly oxidized and possibly less abundant in the soils compared to the copper-bearing sulfide minerals. Copper sulfides are expected to be more abundant than iron sulfides for two reasons:

   1. **The smelter was processing copper ore (assuming copper in the ore was present as sulfides), and**
   2. **Iron sulfides are more reactive and tend to weather and become depleted more quickly than copper sulfides in the receiving soils.**

   Section 3.2.3 discusses that sulfide-S measured by ABA could include some iron sulfide minerals (e.g., pyrite) with rapid oxidation rates, in addition to copper-bearing sulfide minerals with slower oxidation rates. Section 3.2.3 further points out that the ABA calculations conservatively assume that all sulfide-S occurs as pyrite; whereas, in reality, the copper species identified in Appendix D have relatively slower oxidation rates than pyrite. This means the ABA analysis that supports neutralization of most active acidity is conservative. For this reason, Chino believes the evidence supports that persistence of the increased pH from the white rain is likely. However, only future

periodic monitoring will bear this out. This uncertainty will be discussed in the revision of the report.

4. The permanence of the change in soil pH depends critically on the soil mineralogy at each of the study's monitoring locations. The discussion of mineralogical data included in Appendix D was over simplified and too general to provide a comprehensive description of the types of mineral/water interactions that could take place over time. For example:
   - The mineralogical data reported in Appendix D do not indicate "passivation" of copper-sulfide mineral forms (potentially acid generating), as stated in the report. Most of the copper sulfide particles were described as "liberated," and therefore, they are exposed to weathering processes. Therefore, conclusions in Appendix B about the permanence of soil neutralization due to "passivation" of sulfides have not been supported by the mineralogical data collected for the study.

   Passivation has been proposed as only one of several possible mechanisms for persistence of the pH increase in soils affected by the White Rain, serving to provide an additional level of protection against net acid generation. Chino recognizes that a large proportion of the copper-bearing sulfides are liberated, and passivation may not be very important, as there is no clear evidence of it in the micrographs. Chino will delete discussion of passivation.

   - In some samples, copper is predominantly present in secondary mineral phases. The copper associated with secondary minerals has the potential for release to plant-available forms under certain soil conditions. For example, when soil pH is low, copper can be released from secondary minerals, such as iron hydroxides, by desorption from the surface or by dissolution. These types of reactions have not been considered in the report's discussion of the potential mineralogical controls on copper availability in soil.

   Chino agrees based on the fact that the entire premise of work conducted under the site-wide and STSIU-specified ecological risk assessments is based on the link between activity of copper in the soil solution and the toxicity of copper to plants, both of which tend to increase with decreasing pH. The ERA and recent reports by Chino (amendment report) have developed empirical relationships demonstrating the associations between total soil copper and pH on cupric ion activity (as expressed by pCu) and subsequent bioavailability of copper to plants. The results show that at any given total soil copper concentration, the cupric ion activity increases (decreasing pCu) with decreasing pH, regardless of the specific mineralogic controls on copper concentration. The effect of increasing pH on reduced copper bioavailability to plants is discussed throughout the report, and Chino believes the specific mineralogic forms of copper as they relate to copper availability are somewhat immaterial given these strong relationships.

5. Further, it appears that the mineral-identification effort was restricted to copper-bearing phases, with no attempt to identify or count other minerals potentially present that can control acid generation and neutralization in soil.
   - It appears that no mineralogical data were collected to confirm the presence of non-copper-bearing minerals — including sulfides and carbonates. Therefore, the available mineral data are insufficient to make conclusions regarding the anticipated rate of future acid generation.

   Although identification of copper-bearing minerals, especially copper sulfides, was a primary focus of the investigation, Chino recognizes that other sulfide minerals such as pyrite (iron sulfide)

could contribute to the acid generating capacity of the soils. The sulfide-sulfur component of ABA testing includes all sulfide minerals and does not distinguish the type of sulfide mineral present. Chino agrees that rates of acid generation vs. rates of acid neutralization are mineralogy dependent and are potentially-critical components in the interpretation of static ABA test results.

The specific mineralogic forms of the acid-generating minerals are primarily those copper-bearing sulfides which persist following ore processing and smelting as described in Section 3.2.3. The nearby Hurley IU investigation of speciation of minerals indicates that the pure iron-bearing sulfides (e.g., pyrite) are present but, as stated above, are likely less abundant relative to the copper-bearing sulfides (e.g., cubanite) in the STSIU soils. Regardless, the relative rates of acid neutralization are still greater than rates of acid generation even if all acid-generating minerals were present as pyrite. The specific mineralogic forms of the acid-neutralizing minerals contributed by the white rain have been identified as calcium-rich oxide, hydroxide, and carbonate minerals (Appendix A), all of which have high rates of acid neutralization relative to rates of acid generation from sulfide minerals.

To demonstrate, a soil with positive NNP values could still potentially generate acid if the rate of acid generation exceeds the rate of acid neutralization. Considering the specific soil mineralogy at the site, the generation of acid can be conservatively described by pyrite oxidation as shown in Appendix A (rather than copper-bearing sulfide oxidation whose rates are slower):

$$2FeS_2(s) + 7O_2(g) + 2H_2O(l) \rightarrow 2Fe^{2+}(aq) + 4SO_4^{2-}(aq) + 4H^+(aq)$$

Again, considering the site-specific mineralogy of minerals introduced into the soil from the white rain (calcite, dolomite, trona, calcium oxide), these minerals will neutralize the acidity (H^+) produced by sulfide mineral oxidation; e.g., for calcite:

$$CaCO_3(s) + 2H^+(aq) = Ca^{2+}(aq) + CO_2(g) + 2H_2O(l)$$

The relative rates of these weathering reactions ultimately determines whether a soil with positive NNP will become net acidic or net alkaline. A compilation of weathering rate data normalized to mineral surface area indicates that calcite dissolves much more rapidly than pyrite (or chalcopyrite) under oxic conditions (Herbert and Kova, 1998). These relative rates suggest that if calcite or other soluble acid-neutralizing minerals are present in sufficient amounts, as demonstrated by the positive NNP values in soils with pH ≥ 5.1 (Figure 24), the acid-neutralizing minerals will dissolve rapidly enough to consume the acidity released from sulfide minerals and thus maintain net alkaline conditions (Herbert and Kovar 1998). Therefore, Chino believes that adequate mineralogic data from both past and current studies have been collected to demonstrate the current sustainability of the pH increase.

- The report authors indicated that the expected future rate of copper sulfide oxidation, and related acid generation, is relatively slow due to the presence of copper sulfides instead of iron sulfide (pyrite). However, chalcopyrite was identified in some soil samples, and it can oxidize to produce acid. In addition, if pyrite, chalcopyrite, or other acid-generating minerals are present, then the stabilities/solubilities of the copper sulfides found are not relevant to discussion of longer-term acid generation.

Chino believes that it is important to consider the specific mineralogy of sulfide minerals in the overall assessment of potential future acid generation rates, which is in agreement with NMED's initial comments in the first bullet of Comment No. 5 above, and Chino will add a discussion of chalcopyrite acid generating properties. Chino also agrees that the stabilities/solubilities of the copper sulfides are somewhat irrelevant to discussion of acid generation, because regardless of the sulfide mineral forms, the rates of acid neutralization will exceed the rates of acid generation (assuming all sulfides are pyrite) and, therefore, no net acid generation will occur as explained in Chino's response to the first bullet of Comment No. 5 above.

6. Certain statements in the report's summary (Section 5) regarding potential future conditions are not supported by the data and analyses presented in the report.
   - Discussion of possible future acid-production is weak because it does not fully utilize available information regarding the mineralogical content and acid-generating potential of soil.

Chino will strengthen the discussion in Section 5 by synthesizing all existing information relating to mineralogical content and acid generating potential of the soils. This will include a discussion of relative rates of acid generation vs. acid neutralization as they relate to site-specific mineralogy, the positive NNP values of soils whose pH increased to >5.1 from the white rain, and the subsequent elimination of the majority of the future sources of acidity, which in combination supports the persistence of the pH changes induced by the white rain.

- In general, statements regarding the expected future soil conditions are speculative (e.g., page 37) because they anticipate future alkaline rain events at a frequency that would maintain higher soil pH over time. Such frequency cannot be determined without characterization of the rate of in situ acid generation by ongoing weathering of minerals in soil.

Chino agrees the frequency of future white rain events cannot be predicted with a high degree of certainty; however, unless the Willcox Playa becomes completely inundated with water and /or unless localized wind patterns were to change dramatically, white rain events are still likely to occur in the future (rain events with elevated calcium and pH have occurred in the region since 2008).

The frequency of atmospheric events has no relation to rates of in situ acid generation by weathering of soil minerals discussed above. Even in the absence of future white rain events, the increased pH shift, which resulted from the 2008 White Rain event, will likely persist as described in Chino's General Comments and response to the first bullet of Comment No. 6 above. However, monitoring periodically, during the 5 year reviews, is recommended to verify persistence because permanence cannot be predicted with certainty.

- Permanence of the pH increase has not been demonstrated beyond the 5-year study period.

Acidic soils whose pH increased by 1.2 units no longer contain significant active acidity or acid generating potential, and the majority of potential future smelter/tailings acidity sources have been eliminated as described in the General Comments above. Therefore, there is no major mechanism such as the smelter to counteract the permanence of the pH increase beyond the 5-year study period. Tailings Pond 7, Chino's current operational pond, produces some windblown tailings which are curtailed via operational controls per best management practices and as

regulated under NMED air and discharge permits. Periodic monitoring (e.g., element of the 5 Year Reviews that will be included in the FS) can be used to confirm this assessment.

7. Only one of the three study objectives, as stated in Section 1.2 of the report, was achieved.
   - The data presented in the report demonstrate that post-rain soil-pH conditions remained higher, on average, than pre-rain for a period of 5 years. This finding meets the first objective of the study.

   Comment noted.

   - The data collected to determine whether the effect of the rain event is permanent were insufficient to meet this objective, as explained in more detail above. The permanence of the pH effect has not been demonstrated.

   Please see Chino's General Response above which addresses NMED's concern on "permanence" of the pH change.

   - The third objective – to evaluate the effects of the rain event on uptake of copper by plants and insects – was addressed, but the data available for evaluation were limited. In addition, confounding factors, such as changes in mine operations over the period of observation (e.g., 1999 to 2010), make interpretation of these data difficult. As a result, the finding of reduced uptake of copper by plants and insect due to increased soil pH, following the rain event, remains uncertain.

   Chino will add a discussion on the uncertainty of these plant and insect results, given the dataset is not large. However, the soil pCu data would predict what was observed in the plants and insects (higher pCu after the white rain leading to lower copper uptake), which lends the results some additional credibility.

   In the Feasibility Study, Chino is evaluating white rain benefits in terms of reducing copper and acidity effects from the mine, in addition to improvements gained from removing the smelter and windblown tailing impacts via interim remedial actions and reclamation. The Feasibility Study will evaluate these changes and then recommend best remedial alternatives for the soil in its current condition. Though both factors likely contributed to soil changes, teasing apart white rain effects from changes in mine operations is not necessary to evaluate the path forward when starting with the soil's current condition.

References

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RECEIVED
SEP 25 REC'D
CHINO MINES COMPANY
ENVIRONMENT, LAND & WATER DEPT

September 18, 2017

Ms. Sherry Burt-Kested, Manager
Environment Services
Freeport-McMoRan Chino Mines Company
P.O. Box 10
Bayard, New Mexico 88023

RE: Request for Revision, Year 5 Report on pH Monitoring to Evaluate the Effect of the White Rain on the Smelter/Tailing Soil Investigation Unit (STSIU) dated April 14, 2017, Chino Administrative Order on Consent

Dear Ms. Burt-Kested:

The New Mexico Environment Department (NMED) has reviewed the above referenced report. While the report addressed many of NMED's previous concerns expressed via informal review and teleconference (11/2/2016 and 03/03/17, respectively), there are still issues that need to be addressed before NMED can consider the report Final. The public comment period closed on June 28, 2017 and concluded without any public feedback or comments.

The following comments provided to FMI-Chino Mines on 11/2/16 during the informal review process have not been addressed in the revised report.

1. Sampling imprecision due to soil heterogeneity is a complicating factor for year-to-year comparisons of soil characteristics at individual locations. The effects of soil heterogeneity, and related sampling issues, have not been appropriately considered in making conclusions from the monitoring data. Issues with sampling and analysis precision were identified in Section 3.4 of the report but were not addressed.

    - Measurement of soil pH appears more precise, relative to the range of values measured, than measurement of the other parameters monitored over time (e.g., see Figure 25a in the report).
    - Tests for trend on the "permanence monitoring" data (Table 6) for copper, pCu, net-neutralization potential (NNP), and neutralization potential ratio (NPR) are unsupported due to the poor precision of these measurements relative to the magnitude of changes over time.

8. Only one of the three study objectives, as stated in Section 1.2 of the report, was achieved.

   - The data presented in the report demonstrate that post-rain soil-pH conditions remained higher, on average, than pre-white rain for a period of five years. This finding meets the first objective of the study.
   - The data collected to determine whether the effect of the rain event is permanent were insufficient to meet this objective. The permanence of the pH effect has not been demonstrated.
   - The third objective – to evaluate the effects of the rain event on uptake of copper by plants and insects – was addressed, but the data available for evaluation were limited. In addition, confounding factors, such as changes in mine operations over the period of observation (e.g., 1999 to 2010), make interpretation of these data difficult. As a result, the finding of reduced uptake of copper by plants and insect due to increased soil pH, following the white rain event, remains uncertain.

Based on previous comments, discussions during the March 3, 2017, conference call, and review of the April 2017 revision of the report, NMED requires that the conclusions of the study be revised before the report is considered final. The following revisions should be incorporated into Section 5 and the Executive Summary of the revised report to eliminate unsupported conclusions and more accurately present the results of the study. The text below is being provided in track changes to show requested edits to Section 5, with comments from NMED as to why the changes are necessary. Please note that NMED considers conclusions made regarding a change in acid neutralizing potential highly uncertain due to the variability of those results over time.

Conclusions and Recommendations

The results show that the white rain increased soil pH initially by approximately 1.2 S.U. on average for locations in the STSIU with low pH (< 5.5); it had little to no effect on higher pH soils. For soils originally with pH > 5.5, some natural buffering capacity may have existed before the white rain, conferring resistance in those soils to pH changes. In contrast, the originally acidic soils (pH < 5.5) had lower buffering capacity, and the white rain resulted in an increased soil pH. ~~this capacity, as shown by their current relatively high acid neutralization potential (ANP).~~ The pH shift was generally sustained through 2014 and future ~~is expected to be~~ persistence is benefitted by the following~~t in the future because~~:

Commented [---1]: Conclusions made regarding a change in acid neutralizing potential are highly uncertain due to the variability of those results over time. Refer to discussion of these data in Section 3.2.2.

Commented [---2]: Change in pH has already been described above, and data do not support "complete neutralization" of active soil acidity.

~~1.~~ ~~White rain increased the pH of acid soils (pH ≤ 5.5) by about 1.2 pH units (on average from 4.8 to 6.0) indicating that the active soil acidity generated by oxidation of SO2 and metal sulfides has been completely neutralized.~~

~~2.~~1. Future sources of potential acidity from smelting and windblown tailings have largely been eliminated by decommissioning the smelter and reclaiming most of the tailing ponds.

~~3.~~2. ~~Almost every~~ Typically, the acid soil (pH ≤ 5.5) whose pH increased to > 5.1 from the white rain had~~ve~~ either positive NNP values or those that ~~which~~ me~~e~~t the MMD topsoil suitability requirement of "Good" for plant establishment (> -5 kg CaCO3/t).~~, and thus present little risk of future acid generation.~~

~~4.~~3.Evaluation of soil mineralogy indicate a proportion of total sulfide occurs as copper sulfides with lower reactivity relative to pyrite~~, and that the overall rate of acid neutralization will be greater than the rate of acid generation~~.

~~5. Natural precipitation has dilute acidity that is expected to continue decreasing over time and will not overcome the neutralization of soil pH by the white rain event.~~

Commented [---3]: This is only relevant for soils with copper sulfides only. No mineralogical data were collected to confirm either the presence or absence of pyrite in soil (based on microscopic identification); therefore, conclusion regarding the anticipated rate of future acid generation are unsupported.

Commented [---4]: This study did not provide data regarding changes in acidity of natural precipitation over time.

~~6.~~4.White rain events of various magnitude will likely occur in the future (one occurred in eastern Washington, eastern Oregon, and parts of Idaho in February 2015). The likelihood of such future events occurring in the project area is not known however.

~~7.~~5.Natural pedogenic (soil-forming) processes will continue to function and soil pH is expected to~~ fully~~ recover to baseline levels for soils of the area (pH = 6.1 to 8.4) at some time in the future.

However, persistence in the future cannot be predicted with certainty, nor the ~~frequency~~likelihood of future white rain events, if any. This study~~ only~~ evaluated persistence of a change in soil pH over a five-year period and the report will be considered during the development of remedies in the Feasibility Study (FS) for the STSIU. It is recommended that ~~F~~future periodic monitoring of soil pH, as a component of the overall STSIU site remedy, be included~~ during the 5 Year Reviews as part of the FS is recommended~~ to confirm~~ this prediction of ongoing~~ persistence of the generally higher soil pH. The frequency of pH monitoring will be determined during the FS process.

As a result of the pH increase, pCu also increased, and the increase was persistent during the study. In contrast to pH, total copper present in shallow soil is not expected to change as a result of the white rain, though other causes of natural attenuation (source reduction or source removal, clean dust deposition, and erosion) may result in decreases in soil copper concentrations over time. Current data suggest that soil copper concentrations decreased over time during the 5-year duration of this study~~, particularly between 2010 and 2011~~. This copper decrease is uncertain due to high variability of copper in the STSIU soils. The apparent decrease in total copper, in addition to increases in pH, increased pCu as well because pCu is calculated from pH and copper concentrations.

Chino assessed the effect of the pH shift from the white rain on plant and wildlife communities by evaluating copper concentrations in tissues of plants and terrestrial invertebrates before and after the white rain event. These data had been collected during other investigations (ARCADIS 2010b, 2014a). In locations showing an improvement (increase) in soil pH, the tissue copper concentrations decreased after the white rain by an estimated 60 percent or more for the plants and up to 40 percent for the insects. Also, plant richness improved after the white rain on the untreated plots associated with an Amendment Study conducted for the STSIU (ARCADIS 2014a).

In conclusion, the white rain event of January 7, 2008 greatly benefitted the STSIU soils by increasing the pH and pCu of the acidic soils, making copper less bioavailable due to the increase in copper adsorption by secondary soil minerals, such as iron hydroxide, at higher pH values. This increase in pCu has led to a decrease in the uptake of copper into living organisms. The ultimate result appears to be reduced toxicity to wildlife and their food sources and improved wildlife and rangeland habitat. Based on MMD guidelines and mineralogical analysis, the potential of STSIU soils to generate acid is consistently low in most areas. Persistence in the future cannot be predicted with certainty, and continued ~~five-year~~ monitoring as part of the STSIU FS and for the site remedy is recommended to confirm the prediction that the pH increase should be sustained.

As NMED (2011) indicated, new information can be used to refine the pCu RAC and selection of remedial alternatives. This report provides new information on the current~~change and persistence of the change in the~~ soil pH and pCu across the STSIU that should be evaluated further in the FS. These results suggest that the nature and extent of depressed pH and elevated copper~~metals~~ has ~~fundamentally~~ changed since the Remedial Investigation and ERA reports approved by NMED (SRK 2008; Newfields 2005, 2008).

Please submit the revised report for NMED review within thirty days of receipt of this letter. If you have any questions, please contact me at (575) 956-1550.

Sincerely,

David W Mercer

David Mercer, Chino AOC Project Manager
Mining Environmental Compliance Section
Ground Water Quality Bureau
New Mexico Environment Department
Silver City Field Office

DWM: dwm

cc: Petra Sanchez, USEPA (via email)
Michelle Hunter, NMED (via email)
Kurt Vollbrecht, NMED (via email)
Joe Fox, NMED (via email)
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Sherry Burt-Kested
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October 9, 2017

Certified Mail #7016075000113392731
Return Receipt Requested

Mr. Bruce Yurdin, Director
New Mexico Environment Department
Water Protection Division
P.O. Box 5469
Santa Fe, New Mexico 87502

Dear Mr. Yurdin:

Re: Year 5 Report on pH Monitoring to Evaluate the Effect of the White Rain on the Smelter Tailing Soils Investigative Unit – Chino AOC

Freeport-McMoRan Chino Mines Company (Chino) received the New Mexico Environment Department (NMED) comment letter dated September 18, 2017 on the *Year 5 Report on pH monitoring to Evaluate the Effect of the White Rain on the Smelter Tailing Soils Investigative Unit (STSIU) under the Chino Administrative Order on Consent (AOC).* Chino submitted the White Rain Report to NMED on April 14, 2017 following an informal review process and two teleconference discussions on November 2, 2016 and March 3, 2017.

Following the last teleconference, Chino updated the informal review process via our responses to the comments provided by NMED and inadvertently omitted providing the updated response to NMED comments and apologizes for this lapse. The responses to comments document was provided by email today to Mr. David Mercer and hopefully will address NMED's concerns.

Please contact Ms. Alicia Voss at (602) 366-8049 with any questions or comments concerning this report.

Sincerely,

Sherry Burt Kested

Sherry Burt-Kested
Manager, Environmental Services

SBK:pp
20171009-002

c: David Mercer, NMED (email)
Joseph Fox, NMED (email)
Petra Sanchez, US EPA (email)
Alicia Voss, FCX (email)

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January 19, 2018

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Return Receipt Requested

Mr. Bruce Yurdin, Director
New Mexico Environment Department
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P.O. Box 5469
Santa Fe, New Mexico 87502

Dear Mr. Yurdin:

Re: Year 5 Report on pH Monitoring to Evaluate the Effect of the White Rain on the Smelter Tailing Soils Investigative Unit – Chino AOC

Freeport-McMoRan Chino Mines Company (Chino) received the New Mexico Environment Department (NMED) comment letter dated November 16, 2017 on the *Year 5 Report on pH Monitoring to Evaluate the Effect of the White Rain on the Smelter Tailing Soils Investigative Unit (STSIU) under the Chino Administrative Order on Consent (AOC)*. Chino requested an additional 30 day extension to review NMED comments in order to respond in a letter dated December 20, 2017. NMED approved the extension request in a letter dated January 9, 2018.

Chino agrees with NMED's general comments that there is considerable uncertainty of the long term effects of the white rain event and that this uncertainty concerning persistence will be addressed by additional monitoring under the STSIU Feasibility Study (FS). Rather than revising the draft report again, Chino will include the draft report and NMED's comments as appendices to the FS and acknowledge that there are differences of opinion on data interpretation.

Please contact Ms. Alicia Voss at (602) 366-8049 with any questions or comments concerning this report.

Sincerely,

Sherry Burt-Kested

Sherry Burt-Kested
Manager, Environmental Services

SBK:pp
20180119-001

c: David Mercer, NMED (email)
Joseph Fox, NMED (email)
Petra Sanchez, US EPA (email)
Alicia Voss, FCX (email)

Addendum to letter dated January 19, 2018 sent to NMED.

Because the Feasibility Study Report preparation can quickly accommodate making the changes suggested by NMED in the letter dated September 18, 2017, the suggested changes were made to the Executive Summary and Conclusions of this version of the Report titled "Year 5 Report on pH Monitoring to Evaluate the Effect of the White Rain on the Smelter/Tailings Soils Investigation Unit". This version is included as part of the FS report.