



**FREEPORT-McMoRAN
COPPER & GOLD**

Sierrita Operations
Environment, Land & Water Department
6200 West Duval Mine Road
PO Box 527
Green Valley, Arizona 85622-0527

February 2, 2012

Via Certified Mail # 7011 1150 0000 0283 5699
Return Receipt Requested

Ms. Danielle Taber
Project Manager
Voluntary Remediation Program
Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007

**Re: Voluntary Remediation Program – Soil and
Sediment Characterization Report
Freeport-McMoRan Sierrita Inc.,
Green Valley, AZ VRP Site Code: 100073-03**

Dear Ms. Taber:

This letter is in response to your October 7, 2011 letter to Freeport-McMoRan Sierrita Inc., wherein ADEQ requested additional information from Freeport-McMoRan Sierrita Inc. ("Sierrita") regarding the VRP Soil and Sediment Characterization Report submitted to ADEQ on April 5, 2011.

Below are Sierrita's responses to ADEQ's comments provided in said letter. For context, ADEQ's comments are repeated in italics, followed by Sierrita's responses.

Comment No. 1a: No response required

Comment No. 1b: No response required

Comment No. 1c: *Based on the characterization work completed to date, does Sierrita plan to update the geologic cross-sections provided in the Voluntary Remediation Program (VRP) Investigation Work Plan (Work Plan)? The VRP suggests that these be provided with the subsequent site-wide groundwater characterization report.*

Sierrita Response:

Sierrita will provide updated geologic cross-sections maps along with the Site-Wide Groundwater Characterization Report

Comment No. 2. *Page I-I, Section 1,0 - "... submitted an application to enter into the VRP on June 16, 2007." Please note that our records and Sierrita's Work Plan state that the application was submitted on June 19, 2007.*

Sierrita Response:

Sierrita acknowledges that the application was in submitted on June 19, 2007.

Comment No. 3. *Page I-I, Section 1.0 - Please note that the Addendum to Sampling & Analysis Plan (SAP) & Quality Assurance Project Plan (QAPP) Voluntary Remediation Program was not received by ADEQ until November 20, 2008.*

Sierrita Response:

Sierrita acknowledges that the Addendum was submitted on November 20, 2008.

Comment No. 4: No response required

Comment No.5. Page 2-4 through 2-5, Section 2.5 - "Sample Analyses" -The VRP requests that analytical method numbers are provided within the text of this section.

Sierrita Response:

The analytical method numbers will be added to the text in Section 2.5 Sample Analyses of the Soil and Sediment Characterization Report

Comment No.5a. Since ACZ is certified by ADHS to analyze Uranium by EPA Method 200.8, please clarify as to why Sierrita chose to have Uranium analyzed by EPA Method 6020, a parameter that is not specifically covered by ACZ's EPA 6020 certification (see Table 1).

Sierrita Response:

Sierrita chose the lab method for the analysis of soil samples based on the fact that ADHS certification program identifies EPA Method 200.8 to be used **on drinking water only**, and ADHS does not have a certification process for uranium analysis of soil/solid samples. Based on information received from ADHS and ACZ when the samples were collected, the ideal method for testing uranium in soil was EPA Method 6020, even though uranium was not included in the metals listed on said method.

Sierrita contacted ADHS to confirm the rationale used to make that determination is still accurate, and obtained confirmation from Ms. Prabha Acharya, Manager of Technical Resources at ADHS (see copy of e-mail – Attachment A).

Comment No.5b. ALS Laboratory Group (formerly Paragon Laboratories): Please note that ALS received their certifications for total and isotopic Radium from ADHS after the soil and groundwater characterization work was completed (see Table 2). This does impact the usability of the data collected and analyzed prior to 1/15/2009 in a No Further Action determination.

Sierrita Response:

An e-mail from Ms. Joey Pace to Mr. Ned Hall dated November 10, 2008 (Attachment B) documents the approval to use Paragon Laboratories in Fort Collins, Colorado for radiochemistry analysis of samples collected per the VRP Work Plan. As explained by Ms. Pace in the e-mail, Sierrita had been holding some samples while Paragon Laboratories obtained ADHS certification for the above mentioned analyses, and the samples were nearing the end of their holding times. Given that Paragon Laboratories were close to obtaining such certification, ADEQ allowed Sierrita to send the samples to them, as long as: 1) the lab successfully obtained ADHS certification, and 2) the data did not appear to be skewed out of the norm with the next three quarters of data.

Paragon Laboratories obtained their certification on January 15, 2009 so the first condition was met. At this point the ground water data does not appear to be skewed, and Sierrita will address this last condition in the site-wide ground water characterization report.

Comment No. 6: No response required

Comment No.7. Page 2-16, Section 2.10.2 - "... from soil borings at 3 judgmental (JS) sample locations" The Work Plan text stated that the above referenced samples were designated as "soil samples" however; the corresponding figure (Figure 4-3) displayed the proposed sample locations as "Judgmental soil samples". As shown above, the Report states in text (and figures) that the samples were "judgmental soil samples. Please provide clarification and correct as appropriate.

Sierrita Response:

The Work Plan (Section 4.1.4) should have stated that the "soil samples" were "judgmental soil samples (JS)." The judgmental soil samples are correctly referenced on Work Plan Figure 4-3 and in the Soil and Sediment Characterization Report.

Comment No.8. Page 2-19 through 2-20, Section 2.11.3 - "Judgmental samples were also collected from boring EM-JS-01 at depth intervals of 0 to 1 and 1 to 3 fl bgs. This location was sampled based on previous soil sampling results (HGC 2008) where concentrations of arsenic, molybdenum, and antimony were detected above their respective nr-SRLs." "One judgmental soil boring (EM-JS-01) was added in the Former Esperanza Mill subarea based on field observation of surface soil staining." The VRP requests clarification as to why the sample location EM-JS-01 was added.

Sierrita Response:

EM-JS-01 was added based on field observations of visual soil staining and discoloration. The soil boring log will be revised to indicate visual surface soil staining and discoloration.

Upon further review of the paragraph cited in the ADEQ comment, Sierrita recognizes that the location of boring EM-JS-01 was not based on the HGC (2008) soil sample results as stated because HGC samples EM-T-3 and EM-17 were located approximately 200 feet east of EM-JS-01. The statement that EM-JS-01 was sited based on the HGC (2008) data will be deleted.

Considering the above revisions, the Soil and Sediment Characterization Report on page 2-19 (Section 2.11.3, 4th paragraph) will be revised to read as follows. "Judgmental soil samples were also collected from boring EM-JS-01 at depth intervals of 0 to 1 and 1 to 3 ft bgs. Boring EM-JS-01 was added to the soil characterization program based on field observations of visual surface soil staining and discoloration."

Comment No.9. Page 2-20 , Section 2.11.4 .1 - "Ten random soil borings in the Former Esperanza Mill subarea were advanced to the underlying granodiorite bedrock." Please note that Section 2.11.3 states that nine random soil borings were utilized to characterize the Former Esperanza Mill. Please clarify and correct as appropriate.

Sierrita Response:

The sentence in Section 2.11.4.1 (page 2-20) of the Soil and Sediment Characterization Report will be revised to read "...nine random and one judgmental soil borings were advanced to the underlying bedrock."

Comment No.10. Page 2-23. Section 2. 12.3 - "...from 11 soil borings at judgmental (JS) sample locations." The Work Plan text stated that the above referenced samples were designated as "soil samples" however; the corresponding figure (Figure 4-4) displayed the proposed sample locations as "judgmental soil samples". As shown above, the Report states in text (and figures) that the samples were "judgmental soil samples". Please provide clarification and correct as appropriate.

Sierrita Response:

The Work Plan (Section 4.1.7) should have stated that the "soil samples" were "judgmental soil samples (JS)." The judgmental soil samples are correctly referenced on Work Plan Figure 4-4 and in the Soil and Sediment Characterization Report.

Comment No.11. Page 2-26, Section 2.13.3 - "8 sediment samples (including 4 duplicates) from soil borings at 2 sediment (SD) locations". The Work Plan text stated that the above referenced samples were designated as "judgmental sediment samples" however; the corresponding figure (Figure 4-4) displayed the proposed sample locations as "sediment samples". As shown above, the Report states in text (and figures) that the samples were "sediment samples". Please provide clarification and correct as appropriate.

Sierrita Response:

The Work Plan (Section 4.1.8) should have stated that the "judgmental sediment samples" were "sediment samples (SD)." The sediment soil samples are correctly referenced on Work Plan Figure 4-4 and in the Soil and Sediment Characterization Report.

Comment No.12 . Page 2-34, Section 2.15.3 - *"Both soil borings were advanced to 20 ft bgs. The sample depth intervals ranged from 0 to 1 to 15 to 17ft b."* Was bedrock encountered in the two judgmental soil borings within the Former Rhenium Ponds Subarea? If so, please provide what depths and what type.

Sierrita Response:

Bedrock was not encountered in the soil borings in the Rhenium Ponds (see boring logs RP-JS-01 and RP-JS-02). These borings were drilled and sampled to supplement the soil data reported in the Supplement to the Aquifer Protection Permit (MWH 2005) from a 12-foot deep test pit. The former ponds were reported to be 10 to 12 feet deep (MW 1999). The VRP borings were drilled to a depth of 20 feet to ensure that soils within and below the former Rhenium Ponds were sampled and analyzed.

Comment No.13. Page 2-34, Section 2.15.4.2 - *"In addition, one composite soil sample was collected in 2005".*
The data related to the composite soil sample is not contained within the Report's table nor figures. Please provide clarification and correct as appropriate.

Sierrita Response:

Table 2-9 of the Soil and Sediment Characterization Report will be revised to include the data from the 2005 sample at the Rhenium Ponds.

Comment No.14. Page 3-1, Section 3.3 - "Field Duplicate Sample Evaluation"

The VRP understands that 12 duplicate samples were collected out of 200 soil and sediment samples during the 2008 characterization. This total number is in line with the Work Plan and QAPP requirement of one duplicate sample for every 20 regular field samples. However, it has been noted by the VRP that a majority of the field duplicates were collected within the same subarea and within a two day period in August. Ideally, the field duplicates should have been collected regularly, such as one field duplicate for every 20 regular field samples throughout the field characterization activities that occurred from June through November.

Sierrita Response:

Sierrita acknowledges ADEQ's comment.

The VRP also noted that the Relative Percent Difference (RPD) calculated for each field duplicate was not properly evaluated. The Report text states "Results of the RPD calculations for sediment and judgmental soil samples are plotted in Figure 3-1 for each of the COI metals as well as an overall average RPD for each matrix. In general, the sediment (23.0%) and soil (23.1%) had similar RPDs and are considered acceptable." Averaging RPDs together to determine a matrix specific RPD is not a suitable way to evaluate the precision and accuracy of field and laboratory activities. Preferably, the regular field sample should have been evaluated based upon the calculated RPD for each detected analyte and the acceptance criteria established either in the QAPP or regulatory guidance.

For example:

Sample pair OD-JS-03-01-03 and OD-JS-03-01 -03D

Acceptance Criteria

Per QAPP Table 7, a RPD limit was not specified for metals analysis, therefore the evaluation defaults to regulatory guidance.

For inorganics in soil:

- $\pm 35\%$ RPD for sample values greater than 5 times the Reporting Limit (RL); or

- the absolute value of the difference between the sample and duplicate should be less than the RL for sample values that are less than 5 times the RL.

The VRP noticed that most of the field duplicates pairs were not properly evaluated during the data verification/validation process contained in Appendix C. One Appendix C report (L71473) states "The field duplicate pairs OD-JS-03-1-3/ OD-JS-03-1-3D ... met the applicable evaluation criteria. Data qualification was not required." However, you can see from Table 4 that data qualification was/is required. Other field duplicate pairs either have a similar statement or were not evaluated at all.

The VRP requests that the field duplicate evaluation be re-performed according to the information provided here and applicable guidance documents. The data should then be modified to contain the data qualifiers.

Sierrita Response:

As per your voice mail of January 17, 2012, Sierrita understands that ADEQ's reference to the "QAPP Table 7" is a typographical error and should have been stated as "QAPP Table 6."

RPDs were correctly calculated for all field duplicate samples collected during the investigation and are listed in Table 3-1 of the Soil and Sediment Characterization Report. Figure 3-1 was an attempt to graphically summarize the RPD calculation results. To avoid confusion, Figure 3-1 will be deleted from the report. Table 3-1 will be retained as a summary of the RPD calculation results. In addition, the summary RPD statistics at the bottom of Table 3-1 will also be deleted.

Sierrita used guidance, USEPA Part IV - Inorganic Data Validation Functional Guidelines (November 2008), in effect when the duplicate soil data were evaluated. The RPD evaluation criteria specified for soils and sediments in USEPA (2008) and used in the RPD evaluation presented in the Soil and Sediment Characterization Report are different than those noted by ADEQ in their comment. The RPD qualification criteria (USEPA 2008) used in the report are shown in the table below.

Sample Results	Non-Aqueous Field Duplicate Sample Results			
	Both Duplicates $\geq 5 \times \text{QL}$		One of Both Duplicates $< 5 \times \text{QL}$	
	RPD $\leq 50\%$	RPD $> 50\%$	Absolute Difference $\leq 4 \times \text{QL}$	Absolute Difference $> 4 \times \text{QL}$
Detects	Acceptable	J Flag	Acceptable	J Flag
Non-detects	Acceptable	UJ Flag	Acceptable	UJ Flag

Sierrita will correct the flagging deficiency noted by the ADEQ for arsenic and cobalt for sample pair OD-JS-03-01-03/ OD-JS-03-01-03D using the ADEQ's recommended RPD qualification criteria. Sierrita will also review the flags assigned to the other duplicate sample pairs analyzed using the qualification criteria suggested by ADEQ in their comment, correct any identified flagging issues, and update, as necessary, the data verification and validation reports provided in Appendix C of the Soil and Sediment Characterization Report. Please note, 16 percent of the field duplicate data are currently qualified using the USEPA (2008) guidance. Re-qualification of the field duplicate data using the ADEQs qualification criteria will result in 23 percent of the data being qualified.

Please note the following:

Per US EPA Region 9, data collected for site characterization should have 80 percent of the data evaluated at Tier 1, 10 percent at Tier 2, and 10 percent at Tier 3. A site that is pursuing a No Further Action should have 100 percent of the data evaluated at Tier 2 (US EPA, 2001).

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To date, Sierrita appears to have evaluated 100% of their data at Tier 1 and 10% at Tier 3. Even though the Sierrita's data evaluation appears to be in line with what was outlined in the ADEQ approved QAPP, there is a potential impact to the usability of the data in a No Further Action determination.

Sierrita Response:

The ADEQ-approved QAPP for the project specifies that 100 percent of the data packages will be verified and that a full validation of 10 percent of the data packages will be performed. Data verification and validation reported in the Soil and Sediment Characterization Report met the approved requirements specified in the QAPP. Sierrita will address the potential data usability issue noted by the ADEQ when the risk assessment is performed.

Comment No.15. Tables - Table 2-6: the arsenic value for EM-U25-05-05.5 is missing.

Sierrita Response:

Table 2-6 of the Soil and Sediment Characterization Report will be revised to include the arsenic result (8.6 mg/kg) for sample EM-U25-05-05.5.

Sierrita will revise the Soil and Sediment Characterization Report including all the corrections stated above, and will submit the revised report if the corrections are acceptable to ADEQ and no further modifications are required.

If you need additional information please do not hesitate to contact me at (520) 393-2696 or Mr. Stuart Brown at (602) 448-0972.

Sincerely,



Martha G. Mottley
Chief Environmental Engineer
Freeport-McMoRan Sierrita Inc.

MGM:ms
Attachments (2)
20120202_002

xc: Tom DiDomizio, Arizona Department of Environmental Quality
John Broderick, Sierrita
Lana Fretz, Sierrita
Stuart Brown, Freeport-McMoRan Copper & Gold Inc.
Ned Hall, Freeport-McMoRan Copper & Gold Inc.

ATTACHMENT A

Mottley, Martha

From: Hilshorst, Aaron
Sent: Monday, December 05, 2011 3:35 PM
To: Mottley, Martha
Subject: Fw: Uranium testing in soil

Martha,

Here's what I received from ADHS regarding uranium sampling methods.

Aaron

From: Prabha Acharya [mailto:Prabha.Acharya@azdhs.gov]
Sent: Monday, December 05, 2011 09:41 AM
To: Hilshorst, Aaron
Cc: Steve Baker <Steve.Baker@azdhs.gov>; Isaac Robert <Isaac.Robert@azdhs.gov>; Prabha Acharya <Prabha.Acharya@azdhs.gov>; Alicia Mayfield <Alicia.Mayfield@azdhs.gov>
Subject: Uranium testing in soil

Aaron,

This is the summary of our phone conversation on Friday, December 02, 2011:

- ADHS lab licensure rules do not have a method listed to do compliance testing of uranium in soil;
- EPA 200.8 which is in our rules is for the testing of uranium in drinking water; it cannot be used for the compliance testing of soil samples;
- Uranium is not a target compound of EPA method 6020 and therefore, the results by that method must be qualified;
- Method 6020 would be a preferable method to test for uranium in soil matrix; if ADEQ is interested, ADHS could do director approval to include that method for compliance testing of uranium;
- Danielle Taber of ADEQ was not available when I tried to contact her.

Hope this helps.

Prabha Acharya
Manager, Technical Resources
Arizona DHS
Lab Licensure
Tel: 480 284 6869/602 364 0720

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ATTACHMENT B

Hall, E. L. (Ned)

From: Joey A. Pace [Pace.Joey@azdeq.gov]
Sent: Monday, November 10, 2008 2:22 PM
To: Hall, E. L. (Ned)
Cc: Jennifer Barr
Subject: File Notes: Sierrita Radio-chem Question

Hi Ned:

For the file, I would like to summarize our discussion first. Below that are the results of my discussion with the ADEQ QA Officer.

Summary:

On Monday, November 10, 2008, Ned Hall of Freeport-Sierrita Operations called regarding the Freeport Sierrita Mine VRP Site. Ned has been aiding Paragon Laboratories in Fort Collins, Colorado in their process to obtain licensure from the Arizona Department of Health Services (ADHS) for radiochemistry analysis. The lab has scheduled its audit with ADHS, which precedes granting of the license. This audit will occur and be reported upon in 50-60 days.

Freeport has been holding radio-chem samples for the past five months, while they wait for Paragon to be ADHS-approved. These samples will go out of hold soon if they are not submitted to a laboratory w/in <30 days. Historically, Freeport-Sierrita Operations used both ACZ Labs in Steamboat Springs, Colorado and Energy Labs in Caspar, Wyoming. However, after Freeport conducted some audits, it was determined that neither of these labs met Freeport's QA/QC standards. As such, Ned called to question whether or not he should submit the samples to Paragon with the knowledge that they will soon be ADHS-approved. He also inquired about other ADHS-approved labs for radio-chem.

I questioned if these samples would be used to make an argument for no further sampling for radio-chem. Ned indicated that these samples were the first round of four quarterly sampling events. Additionally, more sampling may be required if the four rounds of data prove to exceed remediation levels.

I informed Ned that he could run a search for other ADHS-approved radio-chem laboratories at the following ADHS link: <https://app.azdhs.gov/BFS/LABS/ELBIS/ArizonaCertifiedLabs/LabSearchContentPage.aspx>

However, we both noted that Paragon would be Freeport's contract lab for radio-chem in the future. And therefore it might be better to send these samples to the Paragon for consistency.

QA Officer Comments:

The purpose of the ADHS certification is to show a lab can meet our State's QA/QC standards. Therefore, it is always recommended to use an ADHS-approved lab, even for characterization samples, and it is required for closure and confirmation samples. This being said, ADEQ could make a site-specific exception for these samples, as long as these two criteria are met: 1) The lab successfully obtains their ADHS certification 2) The data does not appear to be skewed out of the norm with the next three quarters of data (meaning it is neither the highest nor lowest of concentrations when compared with the next three rounds).

11/19/2008

If the lab fails to obtain certification, ADEQ will dismiss the data as non-compliant and consider it only as characterization data. If the data results appear to be outliers to subsequent data, ADEQ will require no less than one additional compliance round of sampling.

Please be advised that using another ADHS-approved lab for this round of sampling would be acceptable as well.

Joey Pace, Project Manager/Hydrologist
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