



Janet Napolitano  
Governor

# ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007  
(602) 771-2300 • www.azdeq.gov



Stephen A. Owens  
Director

May 29, 2008

VRP 08:183

Mr. Ned Hall  
Chief Environmental Engineer  
Freeport-McMoRan Copper & Gold - Sierrita  
Environment, Land & Water Department  
6200 West Duval Mine Road, PO Box 527  
Green Valley, AZ 85622-0527

RE: **Review of *Quality Assurance Project Plan* and *Sampling and Analysis Plan*  
Freeport-McMoRan Sierrita, Inc. Green Valley, Arizona  
VRP Site Code: 100073-03**

Dear Mr. Hall:

The Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP) has reviewed the Freeport-McMoRan Sierrita Mine ***Quality Assurance Project Plan*** (submitted in Volume II as Appendix B of the *Investigation Work Plan*) and Sierrita Mine ***Sampling and Analysis Plan*** (submitted in Volume I as Section 4.0 of the *Investigation Work Plan*). These documents are dated August 11, 2006, and April 2008, respectively.

Please review the comments the VRP has provided. Any requests for additional work shall be submitted to the VRP as a single report titled *Voluntary Remediation Program Sampling and Analysis Plan and Quality Assurance Project Plan Addendum* (VRP SAP/QAPP Addendum).

## General QAPP Comments

1. The VRP acknowledges that the 2006 *Quality Assurance Project Plan* (QAPP) was prepared as a data management plan for the *Aquifer Characterization Plan* contained in the *Work Plan to Characterize and Mitigate Sulfate with Respect to Drinking Water Supplies in the Vicinity of the Phelps Dodge Sierrita Tailing Impoundment, Pima County, Arizona*. The VRP has reviewed this document for quality assurance and quality control (QA/QC) topics which would be applicable, relevant, or related to the VRP investigation(s). By approving the QAPP submittal, the VRP is not approving or amending any requirements of the ADEQ Aquifer Protection Program (APP) and/or the conditions set forth or required by in the 2006 Mitigation Order on Consent Docket No. P-50-06.

Northern Regional Office  
1801 W. Route 66 • Suite 117  
Flagstaff, AZ 86001  
(928) 779-0313

Southern Regional Office  
400 West Congress Street • Suite 433  
Tucson, AZ 85701  
(520) 628-6733

2. The QAPP submittal does not directly address surficial soil sample collection, soil boring sample collection, and soil boring drilling activities, which are the key components to the VRP investigative activities. However, Freeport has adequately addressed these deficiencies in the SAP section of the *VRP Investigation Work Plan*. As such, the VRP respectfully requests the SAP is resubmitted, as written, in the VRP SAP/QAPP Addendum.
3. The QAPP states that Freeport will use Arizona Department of Health Services (ADHS) approved laboratories for sample analysis. The VRP approves of this proposal and requests Freeport include the ADHS laboratory certification number when reporting any analytical data in a submittal to the VRP. In addition, if Freeport has selected laboratories in advance, the VRP would like a list of these laboratories (and certifications) included in the VRP SAP/QAPP Addendum.

#### QAPP Table 2 - Relevant Groundwater Standards

4. The table lists the published Aquifer Water Quality Standard (AWQS) for arsenic as 0.05 milligrams per liter (mg/L). Although this is the correct AWQS for arsenic, ADEQ defaults to the more stringent Environmental Protection Agency (EPA) safe drinking water standard of 0.010 mg/L when known receptors are downgradient of a site.

This table should be revised and submitted in the VRP SAP/QAPP Addendum.

#### QAPP Table 3 - Relevant Soil Standards

5. The table lists trivalent chromium and total chromium, but does not list hexavalent chromium as a "relevant soil standard". The 2007 revisions to A.A.C. Title 18, Chapter 7, Article 2, effective May 5, 2007, eliminated the Soil Remediation Level (SRL) for total chromium. Trivalent and hexavalent chromium now have individually established SRLs, while the Groundwater Protection Level (GPL) for total chromium remains in guidance.

If Freeport chooses to run trivalent and total chromium analyses, please be advised that the resulting calculated hexavalent chromium result will be taken into consideration by the VRP when determining if hexavalent chromium is a contaminant of concern at this site. As such, Freeport should amend Table 3 to show the SRL for hexavalent chromium, as it is a relevant soil standard at this site.

This table should be revised and submitted in the VRP SAP/QAPP Addendum.

#### QAPP - Relevant Surface Water Standards

6. In Section 3.0 of the *Investigation Work Plan*, Freeport proposes to investigate potential historical release(s) in order to determine if potential releases impacted the subsurface, groundwater, or area washes. Freeport must clarify whether the intention of this proposal is to determine if releases to the washes are a potential source to groundwater, or if the intention is to investigate potential environmental impacts on the washes.

If the intention is to investigate environmental impacts on the washes, the Numeric Water Quality Criteria (NWQC) for acute aquatic and wildlife use of an ephemeral surface water body (A&We) is the applicable surface water standard [Ref. A.A.C. Title 18, Chapter 11, Appendix A, Table 2]. Freeport must endeavor to sample the five main washes at this site during overflow events, stormwater run-off events, and/or monsoon events in order to collect surface water samples that can be compared to the NWQC.

A table with the NWQC should be submitted in the VRP SAP/QAPP Addendum.

Please Note: The Santa Cruz River and some of its named tributaries are also governed by the NWQC [Ref. A.A.C. Title 18, Chapter 11, Appendix B]. These surface waters are held to the following numeric standards: Aquatic and Wildlife warm water (A&Ww), Full Body Contact (FBC), Fish Consumption (FC), Agricultural Irrigation (AgI), and Agricultural Livestock Watering (AgL), as applicable. If an investigation of environmental impacts to the washes reveals contamination to be present, additional investigative activities may be warranted to ensure the water quality is preserved for the Santa Cruz River.

#### QAPP Table 4 - QC Sample Summary

7. The VRP concurs with the proposed analytical methods listed in Table 4 of the QAPP. The methods proposed for fixed-based laboratory analyses include, but are not limited to:

- Soil: Total Metals: SW846/6010B/7471A for mercury
- Soil: Anions: 300.0
- Soil: pH: SW-846/9045C
- Soil: Radium-226 by EPA 9315
- Soil: Radium-228 by EPA 9320
- Soil: U-234, U-235, and U-238 by Eichrom ACW03 [SEE COMMENT #8]
- Water: U-234, U-235, and U-238 by Eichrom ACW03 [SEE COMMENT #8]
- Water: Dissolved Metals: EPA 200.7 and 200.8
- Water: Anions: EPA 300.0
- Water: pH: SW-846/9040B
- Water: Gross Alpha & Beta by EPA 900.0
- Water: Radium-226 by EPA 903.0
- Water: Radium-228 by EPA 904.0

Although not listed in the QAPP, the VRP also recommends adding Toxicity Characteristic Leaching Procedure for metals by EPA Methods 1311/6010B/7471A and Synthetic Precipitation Leaching Procedure by EPA Methods 1312/6010B/7471A.

Any deviation from these proposed methods must be thoroughly explained in the QA/QC discussion of any submittal to the VRP.

8. The target uranium isotopes for the VRP groundwater investigation include U-234, U-235, and U-238. Please note ADHS has not approved the use of Eichrom ACW03 as of this time. ADEQ will work with ADHS on getting the method approved, however ADHS may suggest alternative analyses for uranium isotopes at their discretion. Although the VRP will approve

the use of this method for characterization and screening purposes, if Freeport intends to use any of the isotope data to make an case for NFA, Freeport may need to switch analytical methods for ADHS-acceptable compliance/closure data.

9. The VRP concurs with the QC sample collection proposed in Table 4 of the QAPP. The ratio proposed is approximately one field duplicate sample for every twenty samples collected. In addition, matrix spike/matrix spike duplicate samples are proposed for metals and radionuclides at a rate of one sample for every twenty samples analyzed.
10. The VRP approves of the proposed procedures for containers and preservation, chain of custody preparation, and sample packaging and transport. Freeport must report and discuss any variations, including samples exceeding the  $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$  temperature range, in any submittal to the VRP which includes laboratory data.
11. Although rhenium does not have an SRL, GPL, or AWQS, rhenium is known to cause interference for manganese during Inductively Coupled Plasma analysis due to its similar chemical structure. However, laboratories do have the ability to choose different primary wavelengths for identification of a specific metal if they are aware of a known interference. As such, Freeport should notify the laboratory when samples are submitted if they have the potential for the presence of rhenium.

### Appendices

The appendices appear in the bound copy of the QAPP as follows:

- Appendix A: Phelps Dodge QA/QC Plan for Water Monitoring
- Appendix B: BESST Inc. Hydrobooster System
- Appendix D: ADEQ Data Qualifiers (2002) - [referred to below as D<sup>1</sup>]
- Appendix C: URS Field Forms
- Appendix D: ACZ Laboratory QAPP
- Appendix E: ADEQ Data Qualifiers (2000)

The VRP has the following specific comments regarding the appendices:

12. Appendix D<sup>1</sup> (located *before* Appendix C) includes the ADHS-approved Arizona Laboratory Data Qualifiers, Revision 1.0 (March 2002). The Arizona Laboratory Data Qualifiers have been updated twice since this version, with the most recent update published in September 2007. The VRP will require Freeport's laboratory data submittals to conform to ADHS's most recent published revision at the time of report submittal. A copy of the most recent version to date can be found at <http://azdhs.gov/lab/license/tech/azdqrev3.pdf> and should be included in the VRP SAP/QAPP Addendum.
13. As indicated above, the Arizona Data Qualifiers included in Appendix E are outdated and should be removed. In addition, both appendices (D<sup>1</sup> and E) indicate these are ADEQ Laboratory Data Qualifiers. They are ADHS Laboratory Data Qualifiers.

Data Validation

14. Page 56 of the QAPP states, "[d]ata validation is not expected for this project. Data validation would require a thorough review of all the field data and/or the analytical laboratory results to provide data documentation consistent with EPA Level IV requirements. This level of review will not be performed unless there are persistent concerns regarding the quality of field or laboratory data."

This statement is not consistent with the level of data management expected by the VRP. ADEQ's Quality Management Plan (1999) allows for ADEQ, at its discretion, to set the level of data validation which will be required at a site. The VRP requests a minimum of 10% of data packages containing compliance and closure samples to be validated at EPA Level IV by a third party reviewer.

This revision to the proposed data management plan should be included in the VRP SAP/QAPP Addendum.

General SAP Comments

15. The VRP approves the soil sample types, soil sample frequencies, and soil sampling locations, as proposed in the SAP. The VRP may request additional characterization, pending the results of the first phase of sampling at each of the locations.
16. As discussed in the meeting held on May 27, 2008 between Freeport and ADEQ, the VRP is tentatively approving the SAP as written, including the locations where investigative activities are proposed in order to expedite future closure proceedings with the Aquifer Protection Program (APP).

However, after meeting with the APP Unit, the VRP may modify or limit the approved areas of investigation, based on APP requirements. Should such modifications become necessary, the VRP will include these modifications in the forthcoming *Comments on the April 2008 Investigative Work Plan*.

If you have any questions regarding this letter, please do not hesitate to contact me by electronic mail at [jp8@azdeq.gov](mailto:jp8@azdeq.gov) or by telephone at (602) 771-4574.

Respectfully,



Joey Pace, Project Manager/Hydrologist  
Voluntary Remediation Program