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Governor

# ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

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Henry R. Darwin  
Director

January 24, 2014

**Environmental Services  
Freeport-McMoRan Corporation**

**JAN 29 2014**

Mr. Stuart Brown  
Freeport-McMoRan Copper & Gold  
333 North Central Avenue  
Phoenix, AZ 85004

Re: Review of Draft *Feasibility Study for Drinking Water Supplies That May Be Affected By Sulfate In The Future* (FS), Mitigation Order on Consent Docket No. P-121-07, Cochise County, Arizona, dated July 30, 2013, prepared by Clear Creek Associates, P.L.C.

Dear Mr. Brown:

The Arizona Department of Environmental Quality has completed its review of the FS. The FS was submitted as a requirement of the Mitigation Order on Consent (No. P-121-07) and used criteria outlined in Arizona Revised Statutes (A.R.S.) § 49-286(A) and (B). Based upon their review, ADEQ has the following comments.

## General Comments

1. The FS shall be revised to state for all alternatives that Freeport-McMoRan Copper & Gold, Inc. (FMC) would review, at least once a year, Arizona Department of Water Resources (ADWR) records for domestic wells that may be drilled. If new wells are discovered, FMC would offer to sample the wells for sulfate and if impacted by sulfate over 250 mg/l offer them one of the domestic well mitigation options. This is especially important for areas east of the Black Gap Fault in the Undifferentiated Bisbee Group bedrock aquifer as the FS only focuses on the alluvial aquifer.
2. The FS states that MNA is the proposed option for all three sub-options for Alternative 1. However, what is proposed does not meet the usual definition of MNA. The FS states based upon contaminant transport modeling, that the sulfate plume will migrate approximately 6,500 feet down-gradient over the next 100 years. In EPA Guidance "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" Directive Number 9200.4-17P, dated April 21, 1999, MNA may be selected if the following four issues are shown:

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- a. “Demonstration of active contaminant removal from ground water & dissolved plume stability;
- b. Determination of the mechanism and rate of attenuation;
- c. Determination of the long-term capacity for attenuation and stability of immobilized contaminants; and
- d. Design of performance monitoring program, including defining triggers for assessing MNA failure, and establishing a contingency plan.”

The proposed alternative does not meet any of the above mentioned criteria and definition of MNA. Therefore, the FS shall be revised and use alternative language to describe Alternative 1, such as long term migration and plume tracking or another similar term.

3. In evaluating potential options for Alternatives 2 through 4, injection of treated water into the aquifer was rejected as a potential option for these alternatives because “hydraulic barrier using injection wells has uncertain long-term effectiveness and no currently identified need”. This is based on the evaluation rationale presented on the third page of Table 1 Mitigation Actions, Control Technologies, and Process Options Evaluated for Development of Mitigation Alternatives. The Groundwater Section has concerns that the FS stated that injection of water into the aquifer was presented as being not a long-term effective way to dispose of treated water. There are numerous examples of injection of water into the aquifer as being highly effective over the long term. However, it is not necessary to revise the FS to include an analysis of groundwater injection.

### **Specific Comments**

4. Page 2 – Section 1.2 – Previous Mitigation Order Work – The last sentence on this page states that the Aquifer Characterization Report (ACR) was approved in October 2011. The paragraph shall include the statement the ACR was approved with the condition that the reclamation of the North and South Tailings Impoundment would be discussed in the FS.
5. Page 10 – Section 2.1 – Site History – The second paragraph of this section describes the reclamation that took place at the North and South Tailings Impoundment. The FS shall provide a figure or figures that document the reclamation.
6. Page 16 – Section 2.3 – Distribution of Sulfate in Groundwater – The first sentence on this page states:

*“Water quality monitoring data support the interpretation that expansion of the plume is halted in the upgradient eastern portion of the plume near the Bisbee Junction/Airport area and in the northern and southern margins of the plume.”*

ADEQ does not agree with this assessment. As was stated in the ACR and discussed by ADEQ and FMC, due to the extreme heterogeneity of the Undifferentiated Bisbee Group bedrock aquifer, the sulfate plume has not and will not be defined in the bedrock aquifer.

The FS shall be modified to reflect that due to the complex heterogeneity and fracture system in the Undifferentiated Bisbee Group bedrock aquifer, additional characterization did not take place.

As stated in General Comment #1, ADWR records shall be reviewed at least once a year and if a new domestic well has been drilled FMC should offer to sample the new well. If impacted by sulfate greater than 250 mg/l FMC would offer one of the mitigation options for domestic wells.

7. Page 19 – Section 3 – Identification and screening of Potentially Applicable Mitigation Actions, Control Technologies, and Process Options – The second, third and fourth sentences of the third paragraph state:

*“Plume management actions could include groundwater monitoring to track the migration of the plume quality of drinking water supplies so that mitigation actions can be taken if needed, or the operation of an engineered wellfield to control the plume and reduce its extent by extracting groundwater. Pumping groundwater to control or reduce the extent of the plume is not one of the specific mitigation measures that ADEQ can impose under ARS § 49-286.A.1 to 3, but would fall under the type of mitigation measure that could be imposed by “mutual agreement” of ADEQ and CQB under ARS § 49-286.A.4. The inclusion of these measures in the FS for evaluation and comparison with other options is not intended to indicate that CQB would agree that they should be part of a Mitigation Plan for purposes of ARS § 49-286.A.4.”*

ADEQ does not agree with the statement that a mitigation option would only be imposed by “mutual agreement” based upon Arizona Revised Statute (A.R.S.) § 49-286(B). The fourth sentence of the third paragraph should be removed.

8. Page 22 – Section 3.2 – Mitigation Actions – See Comment #2 above.
9. Page 28 – Section 3.3.1.2 Well Replacement – Public Drinking Water Supply – The FS shall state in the first paragraph on this page that Naco Water Company (NWC) implemented a well replacement approach by drilling a deeper replacement well for production well NWC-4 after NWC-4 was impacted by sulfate above 250 mg/l.
10. Page 41 – Section 3.4.2 Monitored Natural Attenuation – See Comment #2.
11. Page 53 – Section 3.4.4.2 Groundwater Barriers – Hydraulic Barrier Using Injection Wells – See Comment #3

12. Page 66 – Section 4.1.1 Alternative 1 – Monitored Natural Attenuation and Enhanced Groundwater Monitoring with Contingent Drinking Water Supply Mitigation – See Comment #1.

13. Page 68 – Section 4.1.1 Alternative 1 – Monitored Natural Attenuation and Enhanced Groundwater Monitoring with Contingent Drinking Water Supply Mitigation – The last sentence of this section states:

*“For example, while not specifically called out as one of the alternatives, CQB could decide that, based on monitoring results or other changes in circumstance, CQB might wish to implement Alternative 3 as a contingent action rather than RO treatment or providing a replacement water supply as a contingent action.”*

This is not acceptable and this language shall be revised to state if the AWC or NWC well fields are impacted or about to be impacted by sulfate, FMC would implement the agreed upon mitigation action of providing an alternative water supply or wellhead treatment using RO.

14. Page 85 – Section 5.1.4 Groundwater Flow and Transport Model Predictive Simulations – The first paragraph in this section states that pumping stresses were assumed to remain constant for the next 100 years because of no significant growth in the residential, industrial or agricultural water demand in the Bisbee-Naco area. The FS shall provide a discussion of the documentation of this assumption. For example, the FS may include details of discussions that FMC had with the Town of Bisbee, Town of Naco, AWC and NWC on projected growth in the Bisbee-Naco area.

15. Page 86 – Section 5.2 Cost Analysis Methodology – The second paragraph in this section describes a discount rate of 7.8 percent and an escalation rate of 2.4 percent to calculate the present value estimates. The FS should documentation to support these rates.

16. Page 89 – Section 5.3.1 Alternative 1 – Monitored Natural Attenuation and Expanded Groundwater Monitoring with Contingent Drinking Water Supply Mitigation – See Comments #1 and #2.

17. Page 122 Section 5.4.2.2 Conservation of Groundwater Resources – Potential Water Level Declines Due to the Mitigation Alternatives – The FS discusses the potential water level declines that could happen if Alternatives 2 through 4 are implemented. Depending upon the alternatives with a potential maximum water level decline of 22 feet, the water level declines could be mitigated by injecting treated water back into the aquifer at the periphery of the sulfate plume. That would mitigate the water level decline that would be observed at the AWC, NWC and in the Mexico well fields. While the

ADEQ disagrees with the FS, the FS does not need to be revised to evaluate groundwater injection.

18. Page 129 Recommended Mitigation Alternative – Recommended Alternative – The FS proposes Alternative 1 with the third sub-option which is to find an alternative water supply for any AWC and/or NWC production wells that are impacted by sulfate above 250 mg/l. If an alternate water supply is infeasible, the second sub-option would be employed, adding RO treatment to the impacted public supply wells. FMC shall include language and timeframes in the FS indicating the alternate water supply will be further investigated under the Mitigation Plan.

Within thirty (30) calendar days from the receipt of this letter, shall provide a response to ADEQ's comments. If you have any questions regarding this letter, or wish to schedule a meeting for further discussion, please contact me at (602) 771-2209.

Sincerely,



Mindi Cross, Manager  
Water Quality Compliance Section  
Arizona Department of Environmental Quality

