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ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

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Patrick J. Cunningham
Acting Director

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March 6, 2009

Attention: E. L. (Ned) Hall
Freeport McMoran Copper & Gold Inc.
Sierrita Operations
6200 W. Duval Mine Road
P.O. Box 527
Green Valley, AZ 85622-0527

Re: Mitigation Order on Consent, Docket No. P-50-06
ADEQ's Response to Freeport's Feasibility Report

Dear Mr. Hall:

The Arizona Department of Environmental Quality ("ADEQ") has completed its review of the Feasibility Study ("FS") submitted by Freeport-McMoRan Sierrita, Inc. ("Freeport") on October 23, 2008. In addition to its review of the FS, ADEQ has considered the verbal comments made by the Community Action Group ("CAG") during its meeting on December 12, 2008; the written comments of CAG member Community Water Company ("CWC") submitted on January 16, 2009 and the written comments of CAG member Nancy Freeman submitted on January 22, 2009 and February 4, 2009.

Summary of Feasibility Study

The FS evaluated five (5) alternative mitigation options to address the sulfate plume pursuant to the Mitigation Order. Each alternative included mitigation response actions relating to source control, plume management and drinking water supply mitigation. The mitigation response actions that were common to all five alternatives ("base case") were as follows:

1. Source Control
   - Freeport plans to pump water from the existing Interceptor Wells (IW) well field and from the Focus Feasibility Study (FFS) well field. Freeport proposes to install the FFS well field east of the IW well field, either on Arizona State Land Department (ASLD) property or to the east of ASLD property.
   - Freeport plans to use water pumped from the IW and FFS well fields ("mitigation water") at the Sierrita Mine during the mine life.
   - After the Sierrita Mine closes, Freeport plans to dispose of mitigation water through in-pit storage at the Sierrita Mine or treatment by reverse osmosis (RO) for use. The existing pit

will act as a hydrologic sink as long as the groundwater level remains lower than the pit, thus preventing mitigation water from discharging to the aquifer.
- Freeport plans to install lined ponds to eliminate discharges from Duval Canal and Amargosa Pond to the Sierrita Tailing Impoundment (STI).
- Freeport plans to pump the reclaim pond to control its location and volume to reduce seepage into the STI.
- Freeport will install a permanent soil cover and stormwater controls at the STI prior to final closure to reduce stormwater infiltration.

2. Plume Management
   - Freeport intends to conduct groundwater monitoring to evaluate mitigation effectiveness and quality of drinking water supplies.

3. Drinking Water Supply – Although Freeport does not anticipate the need to further mitigate the effects of the sulfate plume on drinking water sources, it provides the following options in the event further mitigation is necessary:
   - Well modification
   - Well replacement
   - Connection to an alternative water supply
   - Recommission the Esperanza well field
   - Bottled water

The five alternatives for mitigation of the sulfate plume are as follows:
- Alternative 1 – Source Control and Monitored Natural Attenuation (MNA)
- Alternative 2 – Source Control and Plume Stabilization
- Alternative 3 – Source Control, Plume Stabilization, and Mass Removal
- Alternative 4 – New Tailing Impoundment, Source Control, and Plume Stabilization; and
- Alternative 5 – New Tailing Impoundment, Source Control, Plume Stabilization, and Mass Removal

In Alternatives 1 through 3, Freeport assumed that tailings would be discharged to the STI through the remaining operational life of the Sierrita Mine. In Alternatives 4 and 5, Freeport assumed that the tailings discharge to the STI would cease once a new tailing impoundment ("NTI") was permitted and constructed in and around Demetrie Wash, located to the west of the STI. Freeport included cost estimates over a 50-year time frame to evaluate each alternative. These cost estimates included potential costs associated with treating water once the mine ceases operation in 2043. After evaluation of each alternative, Freeport proposed to implement Alternative 5 (New Tailing Impoundment, Source Control, Plume Stabilization, and Mass Removal).

The following briefly describes the mitigation response actions which are not part of the base case, but are presented by Freeport as specific to one or more of the mitigation alternatives:

- Monitored Natural Attenuation (MNA) allows the down-gradient plume to reduce over time due to mixing with unimpacted regional groundwater flow along the margin of the plume and with unimpacted infiltration in the footprint of the plume. Use of this mitigation response action would require Freeport to conduct groundwater monitoring to track the plume and to evaluate the rate of attenuation. The use of dilution only is not typically used to evaluate the effectiveness of MNA.
- Mass Removal increases the pumping from the leading edges of the plume and from within the plume to expedite sulfate removal from the aquifer. Use of mass removal as a mitigation response action would require Freeport to install additional wells for this specific purpose.
- Freeport proposes to construct a new tailing impoundment by 2016 to eliminate operation of the STI and allow STI to begin draining rather than waiting for the drain-down to begin at the cessation of mining operations in 2043. The construction of a new tailings impoundment is contingent upon Freeport's ability to acquire the land for the tailings impoundment from ASLD and the Bureau of Land Management (BLM), as well as obtaining the appropriate permits and approvals from the Army Corps of Engineers and ADEQ.

Discussion

All parties that have commented on the FS agree with Freeport's choice of Alternative 5 as the best mitigation alternative to address the sulfate plume in Green Valley. ADEQ also concurs with this choice. ADEQ has, however, a number of comments and concerns that should be addressed by Freeport. In the interest of expediting the ultimate mitigation actions, ADEQ prefers that Freeport address the following comments through the Mitigation Plan, which Freeport should submit to ADEQ within sixty (60) days of receipt of this letter.

1. **Due to the contingent nature of Alternative 5, ADEQ requests that Freeport elect a substitute Mitigation Alternative and a description of the circumstances under which the substitute Mitigation Alternative would be implemented.**

Although ADEQ agrees that Alternative 5 is the preferred mitigation alternative, the execution of Alternative 5 is contingent on a number of circumstances outside the control of Freeport or ADEQ. The most critical contingency is Freeport's ability to obtain the necessary land from ASLD for both the new tailings impoundment (NTI) to the west of the STI and expanded interceptor well field to the east of the STI. Freeport anticipates that the process of obtaining the land and the appropriate permits will take eighteen (18) months. The Mitigation Plan should specifically identify a "substitution" mitigation alternative (from the list of mitigation alternatives presented in the FS) to be implemented in the event the contingencies inherent in Alternative 5 are not met. In addition, Freeport should identify with specificity the conditions under which Alternative 5 would be abandoned and the "substitute" mitigation alternative implemented.

Because large portions of Alternative 5 cannot be implemented for at least 18 months, ADEQ strongly suggests that the Mitigation Plan include a schedule for implementation of the remaining mitigation response actions which are not dependent on the construction of the NTI. The investigation, design and permitting of the NTI should be initiated as soon as feasible. In particular,

construction of the extraction wells and associated pipelines for Alternative 5 should be initiated as soon as possible after ADEQ approval of the Mitigation Plan.

2. **Freeport should provide minimum and maximum pumping rates for the IW well field as well as wells used in mass removal and plume stabilization in the Mitigation Plan in order to balance the community's concerns about groundwater pumping with the need to adequately capture and reduce sulfate contamination in the aquifer.**

In the FS, Freeport proposed a substantial increase in groundwater pumping in order to implement the mass removal and plume stabilization goals of Alternative 5. Freeport reported that the increased pumping could result in a draw down of the water table of 15 to 40 feet. Freeport proposed to use the increased volume of this water in its Sierrita Mine production, which was anticipated to sharply increase over the next ten (10) years. Shortly after the FS was published, Freeport revised its pumping projections based on a changed business model which does not anticipate an increase in mine production. The Mitigation Plan should reflect the revised modeling of pumping rates, water table draw down and impact to the anticipated length of mitigation actions, if any, based on the changes to the business assumptions included in the FS.

ADEQ received several comments regarding the impact of increased groundwater pumping on the community and surrounding aquifer, as well as concerns about the long term variations in pumping rates and effect on the effectiveness of the mitigation actions. ADEQ requests that the Mitigation Plan provide a minimum and maximum groundwater pumping rate to capture and reduce sulfate contamination in the aquifer. These flow rates may allow some variation in operation due to administrative and/or business considerations but the Mitigation Plan should identify the minimum pumping rate necessary to adequately capture and reduce sulfate contamination in groundwater. In addition, the Mitigation Plan should identify the maximum pumping rate Freeport may utilize during the term of the Mitigation Plan, taking into consideration the needs of the community and impact on the public water systems affected by increased groundwater pumping. ADEQ understands that in determining the appropriate groundwater pumping rate at any given time during the term of the Mitigation Plan, Freeport will use an adaptive management approach to address changing scientific data or other considerations in order to meet the mitigation objectives for the chosen mitigation alternative. However, the Mitigation Plan should provide that a capture analysis, using the following EPA guidance "A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, Final Project Report, 2008" (EPA/600/R-08/003), be conducted once a year to demonstrate that the mitigation objectives are being met.

While acknowledging that an adaptive management approach will be necessary for the duration of the mitigation actions, ADEQ believes the Mitigation Plan should provide a periodic meetings or reports to keep the CAG informed of changes to the rates of groundwater pumping. This information is especially important to the public water systems (CWC, Green Valley Water District and Farmers Investment Company (FICO)) which rely on the aquifer as a drinking water source. Impacts on the ability of the public water systems to continue to provide safe drinking water due to changes in the groundwater pumping rates should be considered by Freeport in determining whether to implement changes in the groundwater pumping rates. Finally, the Mitigation Plan should discuss

potential measures if draw down due to mitigating the sulfate plume impacts upon a public water system's ability to meet the demands of its customers.

3. Freeport should include more detailed information in the Mitigation Plan regarding how and when Freeport will mitigate impacts to specific drinking water supplies during the course of the mitigation actions.

In the FS, Freeport asserts that it does not anticipate additional plume migration having an adverse effect on drinking water supplies. However, based upon the information presented in the FS, ADEQ is not convinced by Freeport's conclusion that the sulfate plume would not migrate and impact drinking water supply wells. Freeport should include in the Mitigation Plan a list of proposed sentinel wells that would be monitored to provide early warning in the event that the plume migrates towards drinking water supply wells. The Mitigation Plan should also propose a schedule of sampling and provisions for increased sampling if sulfate concentrations are detected exceeding a proposed alert level.

The FS did not address how Freeport intends to mitigate impacts to specific drinking water sources from sulfate plume migration. The Mitigation Plan should include a plan for evaluating mitigation options in the event a drinking water source is impacted by the sulfate plume. The plan should include a collaborative process with the owner of the public water system or private well impacted by the sulfate plume, in order to determine the most effective mitigation option for the specific drinking water source. The evaluation should also provide for ADEQ evaluation of the mitigation option if distribution of water from the public water system is modified.

4. Freeport should include a more thorough description of MNA for any mitigation alternative selected in the Mitigation Plan.

Although MNA is only specifically mentioned as a component of Alternative 1, there appears to be a need for MNA in every mitigation alternative proposed by Freeport. The Mitigation Plan should provide an analysis and discussion of the use of MNA for each of the two alternatives selected by Freeport. In addition, the Mitigation Plan should include a discussion and proposal for groundwater monitoring, measurement of water levels to evaluate the effectiveness of MNA, as well as the performance of other mitigation actions. The results of the monitoring should be incorporated into the capture analysis previously mentioned.

5. Freeport should provide a more detailed discussion and plan in the Mitigation Plan for disposal of impacted water after the Sierrita Mine operations cease.

As part of its source control base case, Freeport plans to dispose of water impacted by mitigation actions through in-pit storage at the Sierrita Mine or treatment by reverse osmosis (RO). Freeport assumes that the mining pit will provide a groundwater sink adequate to contain the impacted water without infiltration to the aquifer. The Mitigation Plan should include any data to support this assumption, as well as a method to reevaluate the water balance calculations for the Sierrita Mine pit

once mine operations cease in order to insure the predicted results as a groundwater sink. In addition, the Mitigation Plan should include a discussion of the use of RO to treat impacted water, including the conditions upon which it would be implemented and possible uses for water treated by RO.

ADEQ looks forward to receipt of the Mitigation Plan in approximately sixty (60) days. In the meantime, if you have any questions or concerns, please contact me at (602) 771-2209.

Sincerely,

Cynthia S. Campbell

Cynthia S. Campbell, Manager
Water Quality Compliance Section

cc: Stuart M. Brown, President
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