MARCH 8, 1999, CORRESPONDENCE FROM BHP COPPER TO ADEQ.

BHP

WATER PERMITS
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Mr
Ari
Water Permits Section-Mining Unit
3033 North Central Avenue
Phoenix, Arizona 85012

Subject: BHP Copper's Florence Project
Aquifer Protection Permit (APP) No. 101704

Dear Mr. Olsen:

As you will recall, BHP Copper submitted to your office on September 15, 1998 a report concerning the need to modify the Alert Levels (ALs) and Aquifer Quality Limits (AQLs) listed in Part IV of APP Permit No. 101704 (the "Permit"). The report contained an update on the use of the co-precipitation (Lucas) Method to establish a sufficient baseline for calculating alpha ALs and AQLs. It also contained proposed methods to modify the ALs and AQLs in order to reduce the number of Level I exceedances that result from natural variations of groundwater quality.

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significant requirements and events regarding the development and modification of ALs and AQLs. Part II includes specific recommendations relating to the modification of ALs and AQLs. Part III lists apparent typographical errors found in the Permit.

PART I BACKGROUND

Design Features

Consistent with the requirements of Arizona Revised Statutes (ARS) 49-243.B, the proposed Florence in-situ mining facility has been designed to protect groundwater and to meet or exceed the standards

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"Subject: BHP Copper's Florence Project Aquifer Protection Permit (APP) No. 101704"

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In accordance with an agreement made between the Water Permits Section-Mining Unit (WPS-MU) and BHP during a May 9, 1998 meeting, BHP collected an additional round of samples from each of the point-of-compli
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Level I Data Evaluation and Responses

AL exceedances reported to date are listed in Table 1 by quarter, by well and by analyte. Results of verification samples, as well as current and proposed ALs, are also shown for each listed well. Of the 620 analyte values resulting from the five quarterly sampling events completed to date, 26 exceedances were reported. Nine of the 31 wells were reported to have had at least one exceedance. Most of the exceedances are quite small in magnitude and none represent a threat to the AWQS. The exceedances are limited to magnesium, sulfate, and total dissolved solids (TDS).

BHP has evaluated the exceedances in context of the ARS Section 49-243.K.7, which provides that the ADEQ director shall consider and may prescribe, "Alert levels which, when exceeded, may require adjustments of permit conditions or appropriate actions as are required by the contingency plans." BHP has also responded to the exceedances in accordance with Section II.F.4 of the Permit that requires BHP to collect verification samples and to take other prescribed actions.

Analysis of the quarterly and verification sampling data was conducted to determine the cause and potential correction of each exceedance. Possible causes that were evaluated ranged from errors in laboratory analysis and the statistical methods used to calculate ALs and AQLs to the potential release of contaminants. The inability to identify errors in the calculation of ALs and AQLs led to the review of the alternative approaches and to the proposed methods that are discussed in this letter.

Release of contaminants as a possible cause for the exceedances was determined to be highly unlikely because the pattern of exceedances is not consistent with the typical behavior expected during a release. Release-related exceedances that could possibly threaten the AWQS would be much larger and much more persistent than the small and transient exceedances experienced to date. Several of the wells showing exceedances are either up gradient or side gradient to the field-test operations. Just as importantly, release-related exceedances are highly improbable because construction of the facility has not yet begun and, as previously noted, no leachate was lost during the limited leachate injection and recovery test. The rate of flow in the area would preclude any excursion from reaching the monitor wells in the very limited time of the actual injection test.

It should be noted that the Level I analytes (fluoride, magnesium, sulfate and TDS) were selected because of their relationship to the acidic leachate used for in-situ copper mining. Because dilute sulfuric acid is

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used as the leaching agent, any exceedance caused by the release of leachate would be associated with large sulfate and TDS increases. Also, there would be large increases in magnesium and fluoride concentrations assuming that those elements were present in the leached host rock. There would also be marked decreases in pH and marked increases of conductivity (both listed field parameters) associated with the large increases in sulfate and TDS concentrations. None of the described effects has been observed.

Communication between aquifers was determined to be the most likely cause for exceedances observed at wells M14-GL and O49-GL. Possible avenues of communication include open holes and defects in well seals and/or casings. A defect in the casing of one well was detected and corrected. Two open core holes (one near each well) were located and sealed. After giving the aquifers some time to equilibrate, tests will be conducted (scheduled during the next 60 days) to determine whether the actions described above have corrected the problems. If it is determined that the actions have not produced the desired results, BHP will take further action as needed.

Exceedances observed at the other seven wells appear to be the result of natural variations in water quality or, more specifically, the result of setting ALs for certain wells so low that exceedances can be triggered by natural variations that would otherwise be considered insignificant. BHP recognizes that

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human health or the environment.

Deletion of the 5 percent false positive requirement is further justified based on other permit restrictions that provide for earlier indications of threatening releases than can possibly be achieved by a groundwater monitoring system. For example, all impoundments and storage units are required to be equipped with