

Underground Injection Control Program

AREA PERMIT

**Class III In-Situ Production of Copper
Permit No. AZ396000001**

**BHP Florence Project
14605 East Hunt Highway
Florence, Arizona 85322**

Issued to:

**BHP Copper
7400 North Oracle Road
Tucson, AZ 85704**

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PART I. AUTHORIZATION TO INJECT

Pursuant to the Underground Injection Control regulations of the U.S. Environmental Protection Agency codified at Title 40 of the Code of Federal Regulations, Parts 124, 144, 146, 147, and 148,

BHP Copper
7400 North Oracle Road
Tucson AZ, 85704

is hereby authorized to engage in underground injection of an acidic solution for the purpose of copper production at the Florence In-Situ Project. The mine site is located in Township 4 South, Range 9 East, Sections 27, 28, 33, and 34 in Pinal County, Arizona.

Injection is authorized into the copper oxide formation upon the express condition that the permittee meet the restrictions set forth herein.

All conditions set forth herein refer to Title 40 Parts 124, 144, 146, 147 and 148 of the Code of Federal Regulations and are regulations that are in effect on the date that this permit is effective.

This permit consists of 32 pages and includes all items listed in the Table of Contents. Further, it is based upon representations made by the permittee and on other information contained in the administrative record. It is the responsibility of the permittee to read and understand all provisions of this permit.

This permit and the authorization to inject are issued for a period of up to the life of the project unless terminated under the conditions set forth in Part III, Section C of this permit.

Issued this 1st day of May, 1997

This permit shall become effective 1 June 1997

Alexis Strauss
Alexis Strauss, Acting Director
Water Division, EPA Region 9

PART II. SPECIFIC PERMIT CONDITIONS

A. AREA PERMIT

Pursuant to 40 CFR 144.33, this permit is issued on an area basis. The requirements for construction, operation, monitoring, recordkeeping, reporting, and plugging and abandonment apply to all wells authorized by this permit. The permittee is authorized to:

1. Construct injection and recovery wells within the mine area which is located in Township 4 South, Range 9 East, Sections 27, 28, 33, and 34 in Pinal County, Arizona and is delineated in Appendix A, Figure 1.
2. Inject fluids defined at Part II, Section E.4 of this permit for the purposes of copper production and zone restoration at depths greater than 40 feet below the top of the copper oxide formation as depicted in Appendix A, Figure 2. The permittee may inject at depths less than 40 feet from the top of the copper oxide formation only if the permittee has received written approval from the Director to expand the injection interval.

B. AQUIFER EXEMPTION

1. Exempted Zone Pursuant to 40 CFR 144.7 and 146.4, the aquifer exemption shall be defined by the following lateral and vertical boundaries:

(a) Lateral Aquifer Exemption Boundary In the plan view, the lateral aquifer exemption boundary is 500 feet beyond the mine area. The lateral aquifer exemption boundary and the mine area are delineated in Appendix A, Figure 1.

(b) Vertical Aquifer Exemption Boundaries The upper aquifer exemption boundary is defined as 200 feet above the oxide zone, or the base of the Middle Fine-Grained Unit (MFGU), whichever is further below ground surface. The lower aquifer exemption boundary is defined by the base of the reactive interval amenable to copper leach solutions. This encompasses the oxide zone, which contains an economical amount of copper, and copper in the sulfide zone that is leachable. The vertical aquifer exemption boundaries are depicted in Appendix A, Figure 2.

2. No Migration into or between Underground Sources of Drinking Water (USDWs)

Pursuant to 40 CFR 144 and 146 and the conditions established herein, during the approximate 15-year mine life, the permittee shall ensure that there is no migration of injection fluids, process by-products, or formation fluids beyond the exempted zone defined at Part II, Section B.1 and Appendix A of this permit.

3. Adequate Protection of USDWs Pursuant to 40 CFR Parts 141, 144.12, and 146.10(d), within 90 days after mining a zone and prior to plugging and abandoning the wells in a zone, the permittee shall adequately protect USDWs by restoring the exempted zone to primary maximum contaminant levels (MCLs) as described at the Restoration and Plugging & Abandonment (Part II, Section I) section of this permit.

C. WELL CONSTRUCTION

1. Well Casing and Drilling The well schematic details submitted with the application are hereby incorporated into this permit as Appendix B, and shall be binding on the permittee. All new Class III wells shall be cased and cemented to prevent the migration of fluids into or between underground sources of drinking water. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. The following specifications apply to all injection wells:

Surface Casing - The surface borehole will be drilled to a minimum 12-1/4-inch diameter and to a depth of about 20 feet. The surface casing will be low carbon steel manufactured in accordance with ASTM Specification 153-89A (1989) Grade A (or better) steel. This casing will have an 8-5/8 or 9-5/8-inch outside diameter and a minimum 0.188-inch wall thickness.

Casing String - The casing strings for the injection/recovery wells shall be designed so that they resist corrosion, not fail in tension, and not collapse or burst. Because of the chemical environment in which the casing will be exposed, fiberglass reinforced plastic (FRP), polyvinyl chloride (PVC), or other corrosive resistant casing will be used to complete the injection/recovery wells. If FRP casing is used, it will be made from an aromatic amine epoxy resin which provides chemical resistance for sulfuric leach solutions that measure in the pH 0.6 range. FRP casing will be threaded and coupled with an American Petroleum Institution (API) 8 round long thread to provide adequate joint and tensile strength. PVC casing will be flush threaded and manufactured with an ASTM F480 thread design. Because of the varying depth of the oxide zone across the mine area, different grades, weights, and sizes of casing will be used. For each well, the casing string shall always be designed for the three main forces applied, the internal pressure (burst), the external pressure (collapse), and the axial loading (compression and tension).

The injection/recovery well borehole will be drilled to a minimum diameter to provide an appropriate annular space to facilitate casing installation and cementing operations. Depending on the type and size of casing utilized, this

diameter will range from 7-7/8-inch to about 10-5/8-inches.

2. Cementing

If FRP casing is utilized, the primary cement job will be performed by pumping the cement slurry down the casing and up the annulus. An acid-resistant, sulfate-resistant cement slurry shall be installed in the injection/recovery well annulus from the bottom of the casing to land surface.

If PVC casing is utilized to complete a unit well, cement will be placed in the well annulus by one of the following 2 methods:

a. A tremie pipe will be maintained at a level below the top of the cement slurry during installation. Because of the relatively low collapse rating of PVC casing, cementing will be conducted in specific stage intervals if necessary to satisfy the well construction parameters as outlined previously. The PVC casing string will always be completely filled with water during cementing by the tremie method, or water will be used as the displacement fluid if cementing occurs through packers, to act as a balancing force against the hydrostatic head exerted by the cement column.

b. The annulus will be cemented by drilling the hole to a depth of 40 feet into the ore zone and installing a casing fitted with centralizers. Cement is measured and pumped down the center of the casing and followed with a rubber plug. The fluid pumped behind the plug is either a non-setting cement or a drill fluid of equal density, thereby equalizing internal and external pressure. Once the annular cement sets, the drilling fluid or non-setting cement is removed. A temporary steel protective casing is installed and the plug is drilled and the hole advanced through the ore. Perforated casing is then installed along with a pump as appropriate.

The cement shall be Type V unless the permittee submits the following information to the Director regarding a Type V substitute:

- a. the results of an immersion test for resistance to pregnant leach solution on equivalent mass samples of Type V cement and any proposed substitute cement,
- b. a comparison of the percentage weight change between samples,
- c. an acceptable substitute will experience little visual change, a weight increase or decrease within 5 % to 8 % and no significant change in compressive strength,

d. upon completion of this demonstration, a substitute cement that meets these criteria may be substituted for Type V cement for well construction.

3. Annular Conductivity Devices If the permittee relies on a monitoring program to demonstrate mechanical integrity under 40 CFR 146.8(a)(2) and permit condition E.2.a.iii, each injection and recovery well shall be equipped with an annular conductivity device to detect vertical channels adjacent to the well bore. The annular conductivity devices shall be placed as close to the Middle Fine Grained Unit (MFGU) as possible and shall never be more than 20 feet above the MFGU.
4. Injection Interval The permittee shall only inject fluids at depths greater than 40 feet below the top of the copper oxide formation unless the permittee has received written approval from the Director to expand the injection interval. To ensure that the injection interval is at least 40 feet below the top of the copper oxide formation, the permittee shall case and cement all injection wells in a manner described at C.1 and C.2 from ground surface to at least 40 feet below the top of the copper oxide formation. The permittee will develop the injection interval for each well by drilling into the oxide zone, beyond the bottom of the casing and cementing.
5. Proposed Changes and Workovers The permittee shall give advance notice to the Director, as soon as possible, of any planned physical alterations or additions to the permitted injection wells. Any changes in well construction will require prior approval by EPA and will be treated as a minor modification under 40 CFR 144.41. Following a well workover, a demonstration of mechanical integrity shall be performed prior to resuming injection activities, in accordance with Part II, Section E.2 of this permit.

D. CORRECTIVE ACTION (COREHOLE ABANDONMENT)

Prior to injecting into any well, all coreholes within 500 feet of any injection or recovery well shall be abandoned according to the Well and Corehole Abandonment Plan (Appendix C).

E. WELL OPERATION

1. Operations Plan The Operations Plan submitted with the application is hereby incorporated into this permit as Appendix D, and shall be binding on the permittee.

2. Mechanical Integrity Pursuant to 40 CFR 144.51(q), all injection and recovery wells shall maintain mechanical integrity at all times. Pursuant to 40 CFR 146.8, all injection and recovery wells shall demonstrate mechanical integrity, Parts I and II, by the following methods and schedule:

(a) Methods for Demonstrating Mechanical Integrity

Part I: Mechanical Integrity Pursuant to 40 CFR 146.8(a)(1), the permittee shall demonstrate Part I of the mechanical integrity requirement by one of the following methods:

(i) A packer will be installed immediately above the proposed injection interval, the wellbore will be completely filled with water, and a hydraulic pressure equal to or above the calculated allowable wellhead injection pressure will be applied. This test shall be for a minimum of thirty (30) minutes. A well passes the mechanical integrity test if there is less than a five (5) percent decrease/increase in pressure over the thirty (30) minute period.

(ii) An alternative method, provided that the alternative method has been approved under 40 CFR 146.8(d).

Part II: Mechanical Integrity Pursuant to 40 CFR 146.8(a)(2), the permittee shall demonstrate Part II of the mechanical integrity requirement by the following methods:

(ii) Maintenance of cementing records to demonstrate complete filling of the annulus between the borehole wall and well casing with cement, and

(iii) A monitoring program, as defined at Section F of this permit, designed to verify the absence of significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore.

or, instead of (ii) and (iii), above.

(iv) An alternative method, provided that the alternative method is a method listed in 40 CFR 146.8(c)(1), or is a method that has been approved by the Director as providing results equivalent to any of the methods listed in 40 CFR 146.8(c)(1).

(b) Schedule for Demonstrations of Mechanical Integrity

- (i) A demonstration of mechanical integrity shall be made subsequent to the installation of a new well and no less frequently than once every 5 years unless abandonment or closure occurs prior to that time. Mechanical integrity shall also be demonstrated any time that a workover is conducted, the construction of the well is modified or when loss of mechanical integrity becomes evident during operation.
 - (ii) Results of the mechanical integrity tests shall be submitted to the Director in the quarterly reports.
- (c) Loss of Mechanical Integrity If (1), a well fails to demonstrate mechanical integrity during a test, or (2), a loss of mechanical integrity becomes evident during operation, or (3), a significant change in the injection pressure occurs during normal operating conditions, the permittee shall notify the Director in accordance with Part II, Section G of this permit. Furthermore, for new wells, injection shall not commence, and for operating wells, injection shall be terminated and not resume, until the permittee has taken necessary actions to restore integrity to the well and has demonstrated that the well has integrity as defined at (a), above.

3. Injection Pressure Limitation

- (a) Injection wells shall be operated at pressures less than the fracturing pressure of the bedrock ore zone. Based on field test data at the Florence Project site, a fracture gradient of 0.65 psi/ft of depth, measured from ground surface to the top of the injection interval, will be used to establish maximum hydraulic pressure that may be exerted on the injection zone. The maximum wellhead pressure will vary accordingly, dependent on the depth interval receiving the injection fluid, but in no event will it exceed the calculated pressure that can be safely applied. In no case shall injection cause the movement of injectate or formation fluids into an underground source of drinking water.
- (b) The injection pressure limitations in paragraph (a) may be increased by the Director based on the results of a valid step-rate injection test in the respective proposed injection zone(s). The Director will determine any allowable increase based upon the step-rate test results and other parameters reflecting actual injection operations.

- (c) Any approval granted by the Director for the increased pressure limitations as stated in paragraph (b) shall be made part of this permit by minor modification without further opportunity for public comment.

4. Injection Fluid Limitation

- (a) The permittee shall not inject any hazardous wastes as defined by 40 CFR 261, at any time during the operation of the facility.
- (b) Prior to mining a zone, fresh water may be injected to assess the hydraulics of the injection and recovery patterns.
- (c) During mining, the injectate shall consist of a dilute sulfuric acid solution with a pH of approximately 2. The average total organic concentration of the injectate over each quarter of sampling shall not exceed 10 mg/L as detailed under the injectate monitoring program at Part II, Section F of this permit. The forecast composition of the injectate as submitted with the application is hereby incorporated into this permit and shall be binding on the permittee. The forecast composition of the injectate is provided in Appendix D.
- (d) During closure, fresh water may be injected to restore the zone to federal drinking water standards. The permittee may also adjust the pH with sodium carbonate or other neutralizing agents to aid in the precipitation of soluble metals.
- (e) The injection of any fluids other than those described in paragraphs (b), (c), and (d), above, shall be reported to the Director thirty (30) days prior to the injection of the substance. Written approval by the Director is required for change of injection fluids.
- (f) The permittee shall ensure that the Level 1 and Level 2 ground water monitoring program defined at Part II, Section F of this permit includes all constituents which exist in the injectate. If the Director approves a modification to the injectate as provided at (e), above, the permittee shall ensure that any additional constituents are added to the ground water monitoring program as either Level 1 or Level 2 parameters.

F. MONITORING PROGRAM

1. Water Quality Monitoring Wells The thirty-one (31) Point of Compliance (POC) wells which have been established by the Arizona Department of Environmental Quality (ADEQ) under permit #101704 shall serve as water quality monitoring wells for the federal Underground Injection Control (UIC) permit established herein. The POC wells are depicted in Appendix A, Figure 3 and described in Table A-1.

2. Level 1 and Level 2 Parameters, Alert Levels (ALs), and Aquifer Quality Limits (AQLs)

(a) Level 1 Parameters

Level 1 analytes include constituents of the in-situ mining fluids that are most likely to provide an early indication of groundwater impacts associated with the operation of the SX/EW plant and in-situ mine. During mining, Level 1 analytes shown in Table 1, below, shall be sampled at least quarterly from each POC well.

(b) Level 2 Parameters

Level 2 analytes include conservative constituents of the in-situ mining fluids for which primary MCLs pursuant to 40 CFR 141 have been established and other relatively conservative constituents which are likely to appear in greater concentrations in leachate-impacted groundwater than in non-impacted groundwater. Level 2 analytes shown in Table 2, below, shall be sampled at least once every two years from each POC well.

(c) Alert Levels (ALs)

Unless another method is approved by the Director, ALs shall be established as the upper prediction interval for each Level 1 and Level 2 analyte with the exception of the field parameters which will not be assigned ALs. ALs shall be established as both the upper and lower prediction intervals for laboratory determinations of pH.

Prediction intervals and verification resampling strategies will be chosen to maximize detection of contaminants while keeping the sitewide false positive rate at approximately 5 percent. The purpose of the verification resampling is not to overcome laboratory QA/QC problems, but to allow for the statistical probability that some outliers will occur even if the analyses are well within laboratory control.

(d) Aquifer Quality Limits (AQLs) Federal AQLs shall be established for parameters with primary maximum contaminant levels (MCLs) pursuant to 40 CFR 141.

i. If the calculated AL is less than the MCL, then the AQL shall be set equal to the MCL.

ii. If the calculated AL is greater than the MCL, then the AQL shall be set equal to the AL.

Table 1: Water Quality Parameters - Level 1		
Parameter (mg/L unless noted)	AQL	AL
Fluoride	TBD	TBD
Magnesium	NA	TBD
Sulfate	NA	TBD
Total Dissolved Solids	NA	TBD
pH, units	NA	TBD
Specific Conductance, micromhos/cm	NA	NA
Temperature, deg F or deg C	NA	NA

Note: The permittee shall utilize the applicable analytical methods described in Table I of 40 CFR 136.3, or in Appendix III of 40 CFR 261, or in certain circumstances, other methods that have been approved by the EPA Administrator.

AQL - Aquifer Quality Limit (as defined at II.F.2.d)

AL - Alert Level

TBD - To be determined and approved by the Director for all 31 POC wells prior to the commencement of injection.

NA - Not applicable. Shall be measured and reported but no contingency level shall be established.

Table 2: Water Quality Parameters - Level 2		
Parameter	AQL	AL
Common Ions (mg/L unless noted)		
pH (field), units	NA	NA
Specific conductance (field), micromhos/cm	NA	NA
Temperature (field), deg F or deg C	NA	NA
pH (lab), units	NA	TBD
Bicarbonate	NA	NA
Calcium	NA	NA
Carbonate	NA	NA
Chloride	NA	NA
Fluoride	TBD	TBD
Magnesium	NA	TBD
Nitrate-N	TBD	TBD
Nitrite-N	TBD	TBD
Potassium	NA	NA
Sodium	NA	NA
Sulfate	NA	TBD
Total dissolved solids	NA	TBD
Cation/Anion balance	NA	NA
Formation-Related Metals (mg/L)		
Aluminum	NA	TBD
Antimony	TBD	TBD
Arsenic	TBD	TBD

Table 2: Water Quality Parameters - Level 2		
Barium	TBD	NA
Beryllium	TBD	NA
Cadmium	TBD	NA
Chromium (Total)	TBD	NA
Cobalt	NA	NA
Copper	TBD	TBD
Iron	NA	NA
Lead	TBD	NA
Manganese	NA	TBD
Mercury (inorganic)	TBD	TBD
Nickel	NA	TBD
Selenium	TBD	NA
Thallium	TBD	NA
Zinc	NA	TBD
Formation-Related Radiochemicals (pCi/L)		
Gross Alpha ¹	TBD	TBD
Gross Beta	TBD	TBD
Radium 226 Radium 228	TBD	TBD
Radon	NA	TBD
Uranium	NA	TBD
Process-Related Organics² (mg/L)		
Total Organic	NA	TBD
Benzene	TBD	TBD
Ethylbenzene	TBD	TBD

Table 2: Water Quality Parameters - Level 2		
Toluene	TBD	TBD
Total Xylene	TBD	TBD

Note: The permittee shall utilize the applicable analytical methods described in Table I of 40 CFR 136.3, or in Appendix III of 40 CFR 261, or in certain circumstances, other methods that have been approved by the EPA Administrator.

AQL - Aquifer Quality Limit (as defined at II.F.2.d)

AL - Alert Level

TBD -To be determined and approved by the Director for all 31 POC wells prior to the commencement of injection.

NA -Not applicable: Shall be measured and reported but no contingency level shall be established.

¹ Gross alpha excludes radon and uranium.

² Any organic not listed above shall be so listed if a MCL has been established for that organic and if the organic is detected in the injectate.

3. Baseline Data and Statistical Methods Prior to the commencement of injection, the permittee shall:

(a) Collect baseline water quality samples for all Level 1 and Level 2 parameters such that accepted statistical methods can be applied to assign ALs and AQLs at all POC wells. For Process-Related Organics (Level 2), 2 months of data collection with nondetectable organic levels will be sufficient for background characterization.

(b) Submit to the Director mean baseline concentrations, standard deviations, Alert Levels (ALs), federal Aquifer Quality Limits (AQLs), and a statistical approach which:

- i. establishes a means of verifying whether or not USDWs are endangered during mining, closure, and post-closure, and
- ii. establishes specific points at which contingency plans are activated.

(c) Receive written approval from the Director for the baseline data, action levels, and statistical approach defined at (b), above.

4. Water Quality Monitoring Schedule All thirty-one (31) POC wells shall comply with the following monitoring schedule for the approximate 15-year mine life and the 30-year post-closure period:

<p style="text-align: center;">Table 3</p> <p style="text-align: center;">Monitoring Schedule for 31 POC Wells during</p> <p style="text-align: center;">Mine Life and Post-Closure Period</p>		
Time Period	Water Quality Parameters	Sampling Frequency
Mine Life	Level 1	At least once per quarter
	Level 2	At least once every 2 years
Post-Closure	Level 1	At least once per quarter for the first two years after closure and then annually thereafter
	Level 2	At least once every 2 years
<p>Note: Level 1 and Level 2 Water Quality Parameters are defined at Part II, Section F.2 in Table 1 and Table 2, respectively.</p>		

5. Hydraulic Control Monitoring Wells External monitoring of the in-situ mining process around the perimeter of each mine block shall be conducted to verify hydraulic control. Hydraulic control of the oxide zone around the perimeter of the mine block shall be performed using four, approximately equally spaced observation wells. Mine block hydraulic monitoring will entail using the nearest perimeter recovery well to each observation well for head comparison and for verifying that the head gradient is inward, that is, from the observation well towards the mine block. Monitoring will be accomplished using pressure transducers placed in both the observation wells and recovery wells from which average daily head measurements will be recorded.

6. Annular Conductivity If the permittee relies on a monitoring program to demonstrate mechanical integrity under 40 CFR 146.8(a)(2) and permit condition E.2.a.iii, the permittee shall measure annular conductivity at the following frequency:

- (a) Prior to injection and recovery to obtain baseline data, and
- (b) At least once per quarter during the life of the well.

7. First Zone Demonstration of Hydraulic Control To verify hydraulic control and the adequacy of the monitoring program defined at Section F and Appendix D (Operations Plan), in the first zone that is mined, the permittee shall continuously monitor electrical conductivity and head in the zone's outermost injection/recovery wells. This first zone must be large enough in scale to access the adequacy of using 4 pairs of wells to monitor hydraulic control. The demonstration shall be conducted for at least 90 days and the results shall be submitted with the first quarterly report.

8. Injectate Monitoring The permittee shall comply with the following injectate monitoring requirements:

- (a) At least once per month, the permittee shall measure the concentration of total organics, benzene, toluene, ethylbenzene, xylenes (total), naphthalene, and octane in the injectate using applicable analytical methods described in Table I of 40 CFR 136.3, or in Appendix III of 40 CFR 261, or in certain circumstances, other methods that have been approved by the EPA Administrator.
- (b) The average total organic concentration of the injectate over each quarter of sampling shall not exceed 10 mg/L.
- (c) The permittee shall modify the list of constituents required under the injectate monitoring program defined at (a), above, if the permittee has received written approval from the Director for a change in the injectate, as detailed at Part II, Section

E of this permit, and the list described at (a), above, does not include all organic constituents which are present or could be present in the raffinate pond.

9. Shaft Conductivity Monitoring If an injection or recovery well is operating within 500 feet of a mining shaft, the permittee shall demonstrate that mining fluids are not migrating beyond the aquifer exemption boundary by measuring the conductivity of water in the shaft at a depth that is within the Lower Basin Fill Unit (LBFU). The shaft conductivity measurements shall be conducted at least once per month and the results shall be included in the quarterly reports.

G. RECORDKEEPING AND REPORTING

1. Recordkeeping

(a) The permittee shall retain records concerning:

(i) The nature and composition of all injected fluids until three (3) years after the well has been plugged and abandoned.

(ii) All monitoring information, including all calibration and maintenance records and all recordings for continuous monitoring instrumentation and copies of all reports required by this permit for a period of at least five (5) years from the date of the sample, measurement or report throughout the operating life of the well.

(b) The permittee shall continue to retain such records after the retention period specified in paragraphs (a) (i) and (a) (ii) unless it delivers the records to the Director or obtains written approval from the Director to discard the records.

(c) The permittee shall maintain copies (or originals) of all pertinent observation records available for inspection at the facility.

2. Reporting of Results

The permittee shall submit short and accurate quarterly reports to the Director containing the following information:

(a) A map showing the current mine status.

- (b) A table and graph showing daily cumulative injection flows and extraction flows in each active mine block over the reporting period.
- (c) A table and graphs comparing daily average head in the four observation wells surrounding each active mine block with that of the four adjacent extraction wells.
- (d) A table showing POC monitoring well analytical results and alert levels (ALs) along with a summary narrative.
- (e) Results of monthly analyses of organics in the injectate.
- (f) Results of monitoring required by 40 CFR 146.33(b)(1) whenever the injection fluid is modified to the extent that previously reported analyses are incorrect or incomplete.
- (g) Results of mechanical integrity tests conducted during the reporting period.
- (h) Results of annular conductivity monitoring.
- (i) A summary of the well and corehole plugging and abandonments conducted during the reporting period.
- (j) A summary of closure operations conducted during the reporting period.

Quarterly reports shall be submitted by the dates listed below:

<u>Reporting Period</u>	<u>Report Due</u>
Jan, Feb, Mar	Apr 28
Apr, May, June	Jul 28
July, Aug, Sept	Oct 28
Oct, Nov, Dec	Jan 28

Copies of the monitoring results and all other reports required by this permit shall be submitted to the following address:

U.S. Environmental Protection Agency, Region 9
 Ground Water Office (WTR-9)
 75 Hawthorne St.
 San Francisco, CA 94105-3901

H. CONTINGENCY PLANS

1. Loss of Hydraulic Control

(a) The permittee shall initiate the following actions within 24 hours of becoming aware that the volume of fluids injected into an active mine block during a 24-hour period exceeds the amount of fluid recovered during the same 24-hour period:

1. adjust the flow rate for the recovery and/or injection wells,
2. inspect the injection and recovery lines, pumps, flow meters, totalizers, pressure gages, pressure transducers and other associated instruments and facilities,
3. initiate pressure testing of wells if the loss of fluids cannot be determined to be caused by a surface facility failure, and
4. repair system as necessary.

(b) The permittee shall initiate the following actions within 24 hours of becoming aware of the loss of hydraulic control within an active mine block for more than 48-consecutive hours. A loss of hydraulic control occurs when the amount of fluid injected during a 48-hour period exceeds the amount of fluid recovered during the same 48-hour period. Loss of hydraulic control is also indicated by a flat or outward gradient observed in any pair of observation wells over a 48-hour period. The permittee shall:

1. cease injection in the affected area,
2. operate recovery wells until the amount of fluid injected in excess of the amount recovered during the 72-hour period is recovered,
3. verify proper operation of all facilities within the mining block, and
4. perform any necessary repairs.

(c) In the next quarterly report, describe the causes and impacts of the loss of hydraulic control and the actions that were taken to correct the event.

2. Water Quality Exceedances at POC Wells The following contingency plans shall be followed after the verification of an AL or AQL exceedance in a POC well during the

approximate 15-year mine life, or after the verification of an AQL exceedance in a POC well during the 30-year Post-Closure period:

(a) Alert Level (AL) Exceedance during Mine Life

1. An AL exceedance will be declared if the initial sample and the verification resample(s) exceed the upper prediction limit calculated from the ambient water quality data.
2. The permittee shall notify the Director within five (5) days of becoming aware of the exceedance of an AL.
3. Within thirty (30) days of receiving the laboratory results verifying that an AL has been exceeded, the permittee shall do the following:
 - (a) Submit a written report to EPA providing an evaluation of the cause, impacts, or mitigation of the discharge responsible for the AL exceedance, or
 - (b) Submit a written report to EPA which demonstrates that the AL exceedance resulted from an error(s) in sampling, analysis, or statistical evaluation.
4. Upon review of the report documenting the AL exceedance, the Director may require additional monitoring and/or action beyond those specified in this permit.

(b) Aquifer Quality Limit (AQL) Exceedance during Mine Life or Post-Closure period

1. The permittee shall notify the Director within five (5) days of becoming aware of an exceedance of a federal AQL as defined at Part II, Section F of this permit.
2. A verification sample shall be collected within five (5) days of becoming aware that an AQL has been exceeded.
3. Within five (5) days of receiving the results of verification sampling from the laboratory, the permittee shall notify the Director of the results, regardless of whether the results are positive or negative.
4. If the results of verification sampling indicate that an AQL has not been exceeded, the permittee shall assume that no exceedance has occurred and no further action is required until the next scheduled monitoring round.

5. Within thirty (30) days of receiving the laboratory results verifying that an AQL has been exceeded, the permittee shall do the following:

(a) Submit a written report to EPA providing an evaluation of the cause, impacts, or mitigation of the discharge responsible for the AQL exceedance, or

(b) Submit a written report to EPA which demonstrates that the AQL exceedance resulted from an error(s) in sampling, analysis, or statistical evaluation.

6. Upon review of the report documenting the AQL exceedance, the Director may require additional monitoring and/or action beyond those specified in this permit.

I. RESTORATION and PLUGGING & ABANDONMENT

Pursuant to 40 CFR Parts 146.10 and 144.12, the permittee shall comply with the following aquifer cleanup, ground water monitoring, and plugging and abandonment activities to ensure adequate protection of USDWs:

1. Closure

(a) **Constituents with primary MCLs:** Within 90 days after mining a zone, the permittee shall commence restoration activities for that zone. Each zone shall be restored to concentrations which are less than or equal to primary maximum contaminant levels (MCLs) defined at 40 CFR 141, or pre-mining background concentrations. The permittee shall follow the procedure detailed at (c), below.

(b) **Constituents without primary MCLs:** In addition to constituents with primary MCLs, the permittee shall ensure that constituents which do not have primary MCLs do not impact USDWs in a way that could adversely affect the health of persons.

(c) **Closure and Plugging & Abandonment Procedure:** The permittee will commence closure operations based on the economic recovery of copper from each in-situ zone. During closure operations, the permittee will cease injection of raffinate, and initiate a rinsing program consisting of injection/recovery and recovery. At all times during initial zone rinsing, the permittee shall maintain inward hydraulic gradients (hydraulic control) of the zone. The permittee will monitor the rinsing progress by analyzing water recovered from well-field headers for sulfate concentration. When levels of sulfate in the headers have reached approximately 750 parts per million, the permittee will sample header discharges for all Level 2 constituents defined at Part II, Section F

of this permit. If results of the Level 2 sampling show that one or more compounds are above primary MCLs and the pre-mining background concentrations, rinsing operations will continue until all compounds are below primary MCLs or the pre-mining background concentrations. The sulfate concentration at or below which all primary MCLs or pre-mining background concentrations are met will serve as an indication for acceptable closure for that zone.

The permittee will sample all wells in the zone undergoing closure to determine if the sulfate concentrations are less than or greater than the zone's indicator sulfate concentration. The permittee shall continue rinsing each well until such time that the sulfate concentration in the well is less than the indicator concentration for that zone.

When all individual well concentrations within the zone are below the zone's indicator sulfate concentration, hydraulic control for these wells will be discontinued for 90 days. At the end of the 90-day period, the headers will be re-sampled and if sulfate concentrations remain below the zone's indicator sulfate concentration, the permittee may cease all rinsing and monitoring activities for the wells in that zone. The permittee will document the results of the closure operation in the subsequent monitoring report. The permittee will commence cementing the wells per the Well and Corehole Abandonment Plan (Appendix C) if no objection has been received from EPA within 30 days after filing of the report.

2. Post-Closure: 30-year Monitoring at POC wells: To ensure that the restoration required at (1), above, accomplished the objective of returning all mining zones to primary MCLs (or pre-mining background concentrations) and thereby providing adequate protection to surrounding USDWs, the permittee shall comply with the 30-year Post-Closure monitoring program and the AQL exceedance contingency plan established at Part II, Section F and Section H.2.b of this permit.

J. POST AUDITS

The permittee shall verify that the pollutant fate and transport are behaving as predicted. During the third (3), fifth (5), and fifteenth (15) years after the commencement of mining, the permittee shall conduct a post audit of the computer modeling which predicted the fate and transport of pollutants discharged by the Florence Project. For each audit, the permittee shall submit a report to EPA describing the post audit as well as any changes in the conceptual model, any model redesign, and any changes in predicted post-closure conditions.

K. DURATION OF PERMIT

The duration of this Class III permit shall include the approximate 15-year mining life and the 30-year post-closure monitoring period. The Director shall review this permit at least once every 5 years to determine whether it should be modified, revoked and reissued, terminated, or a minor modification made as provided in §§ 144.39, 144.40, and 144.41.

If the Director delegates the Class III-portion of the Underground Injection Control (UIC) program to the Arizona Department of Environmental Quality (ADEQ), this permit shall stay in effect under the authority of the United States Environmental Protection Agency, unless otherwise revoked or terminated.

L. FINANCIAL RESPONSIBILITY

1. Demonstration of Financial Responsibility The permittee is required to maintain financial responsibility and resources to meet the restoration and plugging and abandonment requirements established at Part II, Section I of this permit and described in the Well and Corehole Abandonment Plan (APPENDIX C) and the Closure and Post-Closure Plan (APPENDIX F).

(a) The permittee shall maintain a bond rating within the four highest categories of Standard and Poor's (AAA, AA, A, or BB) or Moody's (Aaa, Aa, A, or Baa). If the most recent bond rating does not fall within the four highest categories, then the permittee shall post a financial instrument such as a bond, letter of credit, or a trust fund to guarantee closure.

(b) The permittee must provide proof to the EPA of its bond rating or renewal every year by March 31.

2. Insolvency of Financial Institution The permittee must submit an instrument of financial responsibility acceptable to the Director within sixty (60) days after either of the following events occur:

(a) The institution issuing the bond or financial instrument files for bankruptcy; or

(b) The authority of the trustee institution to act as trustee, or the authority of the institution issuing the financial instrument is suspended or revoked.

PART III. GENERAL PERMIT CONDITIONS

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection well construction in accordance with the conditions of this permit. The permittee, authorized by this permit, shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 141 or may otherwise adversely affect the health of persons. Furthermore, any underground injection activity not specifically authorized in this permit is prohibited. Compliance with this permit during its term constitutes compliance for purposes of enforcement with Part C of the Safe Drinking Water Act (SDWA). Such compliance does not constitute a defense to any action brought under Section 1431 of the SDWA, or any other common or statutory law other than Part C of the SDWA. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Nothing in this permit shall be construed to relieve the permittee of any duties under applicable regulations.

B. PERMIT ACTIONS

1. Modification, Revocation, Reissuance and Termination The Director may, for cause or upon request from the permittee, modify, revoke and reissue, or terminate this permit in accordance with 40 CFR 124.5, 144.12, 144.39, and 144.40. Also, the permit is subject to minor modifications for cause as specified in 40 CFR 144.41. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes, or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition. The Director may also modify, revoke and reissue, or terminate this permit in accordance with any amendments to the SDWA if the amendments have applicability to this permit.

2. Transfer of Permits This permit is not transferable to any person except after notice is provided to the Director and the permittee complies with the requirements of 40 CFR 144.38. The Director may require modification of revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

C. TERMINATION OF PERMIT

The Director may terminate this permit during its term for the following causes:

1. Noncompliance by the permittee with any condition of the permit;
2. The permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the permittee's misrepresentation of any relevant facts at any time; or
3. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination;

(a) The Director shall follow the applicable procedures in 40 CFR 124 in terminating any permit under this section.

D. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

E. CONFIDENTIALITY

In accordance with 40 CFR 2 and 144.5, any information submitted to EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice.

F. GENERAL DUTIES AND REQUIREMENTS

1. Duty to Comply The permittee shall comply with all applicable UIC Program regulations and conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit issued in accordance with 40 CFR 144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. Such noncompliance may also be grounds for enforcement action under the Resource Conservation and Recovery Act (RCRA).
2. Penalties for Violations of Permit Conditions Any person who violates a permit

requirement is subject to civil penalties, fines, and other enforcement action under the SDWA and may be subject to such actions pursuant to RCRA. Any person who willfully violates permit conditions may be subject to criminal prosecution.

3. Need to Halt or Reduce Activity not a Defense It shall not be a defense, for the permittee in an enforcement action, that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. Duty to Mitigate The permittee shall take all reasonable steps to minimize and correct any adverse impact on the environment resulting from noncompliance with this permit.

5. Proper Operation and Maintenance The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this permit.

6. Property Rights This permit does not convey any property rights of any sort, or any exclusive privilege.

7. Duty to Provide Information The permittee shall furnish to the Director, within a time specified, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

8. Inspection and Entry The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

- (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
- (b) Have access to and copy, at reasonable times, any records that are kept under the conditions of this permit;
- (c) Inspect and photograph at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- (d) Sample or monitor at reasonable times, for the purposes of assuring permit

compliance or as otherwise authorized by the SDWA, any substances or parameters at any location.

9. Monitoring and Records

- (a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
- (b) The permittee shall retain records of all monitoring information, including the following:
 - (i) Calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of the Director at any time; and
 - (ii) The nature and composition of all injected fluids until three years after the completion of any plugging and abandonment procedures.
- (c) Records of monitoring information shall include:
 - (i) The date, exact place, and time of sampling or measurements;
 - (ii) The individual(s) who performed the sampling or measurements;
 - (iii) The date(s) analyses were performed;
 - (iv) The individual(s) who performed the analyses;
 - (v) The analytical techniques or methods used; and
 - (vi) The results of such analyses.

10. Signatory Requirements All reports or other information requested by the Director shall be signed and certified by a responsible corporate officer or duly authorized representative according to 40 CFR 144.32.

11. Reporting Requirements

- (a) Planned Changes The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility.

(b) Anticipated Noncompliance The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(c) Transfers This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

(d) Compliance Schedules Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than thirty (30) days following each schedule date.

(e) Twenty-four Hour Reporting.

(i) The permittee shall report to the Director any noncompliance which may endanger health or the environment. Information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which must be reported orally within 24 hours:

(A) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water.

(B) Any noncompliance with a permit condition, or malfunction of the injection system, which may cause fluid migration into or between underground sources of drinking water.

(ii) A written submission shall also be provided within five (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

(f) Other Noncompliance The permittee shall report all other instances of noncompliance not otherwise reported at the time monitoring reports are submitted. The reports shall contain the information listed in Part III, Section E.10.(c)(ii) of this permit.

(g) Other Information Where the permittee becomes aware that it failed to submit all relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the permittee shall submit such facts or information within two (2) weeks of the time such information becomes known.

12. Plugging and Abandonment Report At the time of the next quarterly report following plugging and abandonment activities, the owner or operator shall submit a plugging and abandonment report to the Director. The report shall be certified as accurate by the person who performed the plugging operation. Such report shall consist of either:

(a) A statement that the wells were plugged in accordance with the plan previously submitted to the Director; or

(b) Where actual pluggings differed from the plan previously submitted, and updated version of the plan on the form supplied by the regional administrator, specifying the differences.

13. Prohibition of Unauthorized Injection Any underground injection, except as authorized by this permit, is prohibited. The construction of any well required to have a permit is prohibited until the permit has been issued.

**Appendices
to the
Underground Injection Control Permit**

APPENDIX A - Site Diagrams

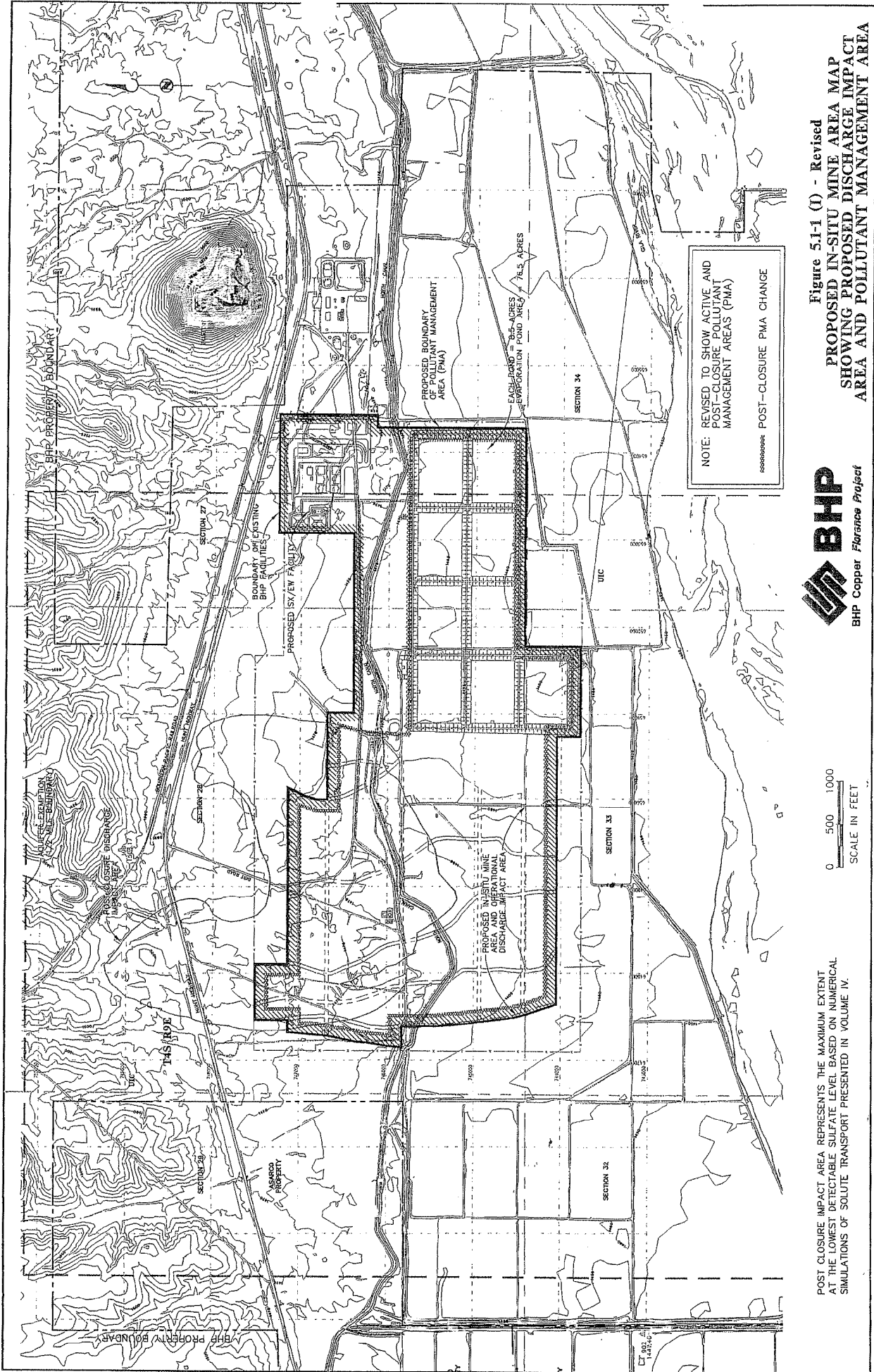


Figure 5.1-1 (1) - Revised
PROPOSED IN-SITU MINE AREA MAP
SHOWING PROPOSED DISCHARGE IMPACT
AREA AND POLLUTANT MANAGEMENT AREA

NOTE: REVISED TO SHOW ACTIVE AND POST-CLOSURE POLLUTANT MANAGEMENT AREAS (PMA)

----- POST-CLOSURE PMA CHANGE

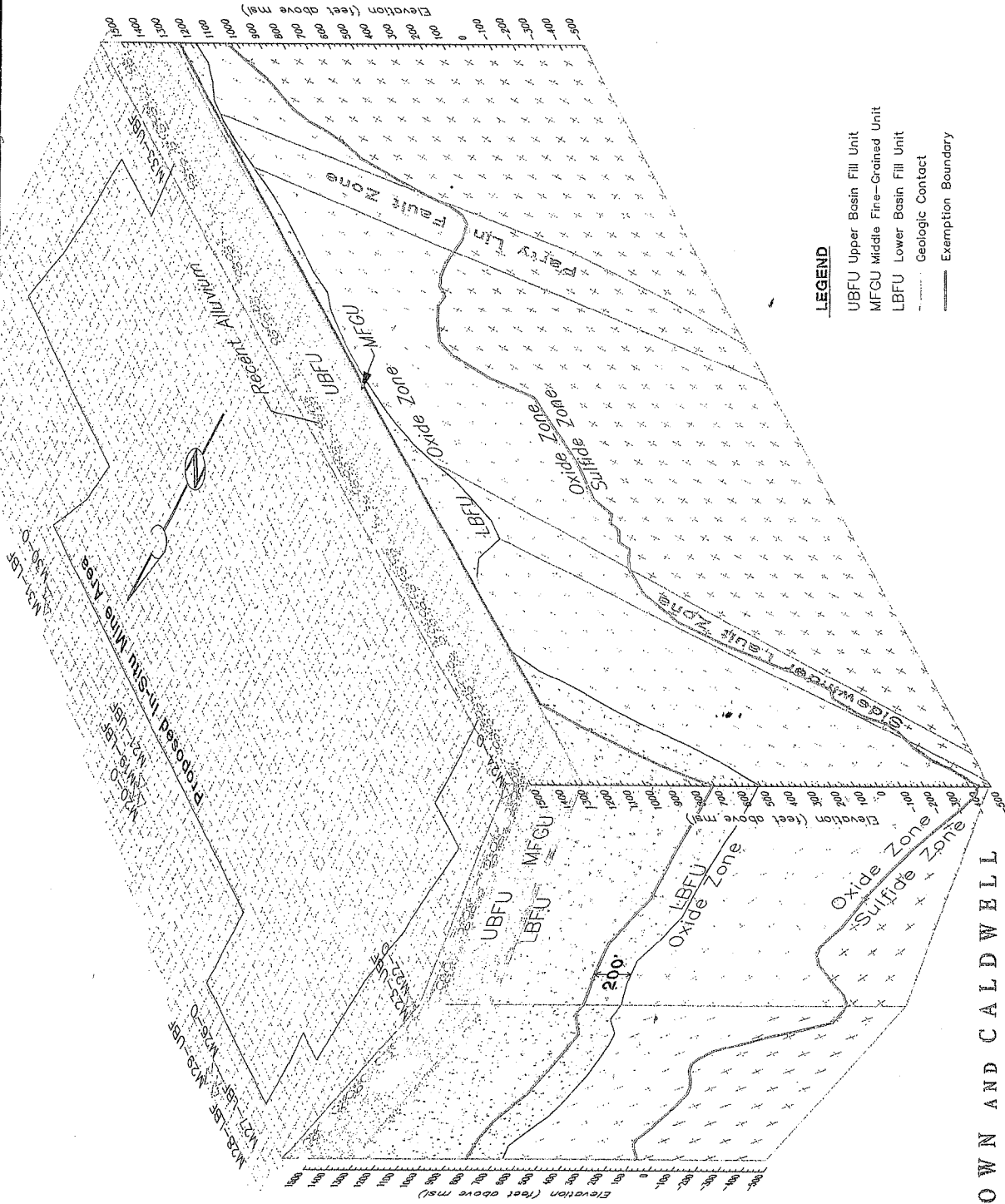
0 500 1000
SCALE IN FEET

POST CLOSURE IMPACT AREA REPRESENTS THE MAXIMUM EXTENT AT THE LOWEST DETECTABLE SULFATE LEVEL BASED ON NUMERICAL SIMULATIONS OF SOLUTE TRANSPORT PRESENTED IN VOLUME IV.

REVISION NUMBER: 1

REVISED 10-9-96

**ISOMETRIC VIEW OF
EXEMPTION BOUNDARY**



LEGEND

- UBFU Upper Basin Fill Unit
- MFGU Middle Fire-Grained Unit
- LBFU Lower Basin Fill Unit
- Geologic Contact
- Exemption Boundary

BROWN AND CALDWELL

The specific schedule for closure will be optimized as leaching occurs over the life of the mine. It is to Magma's advantage to minimize closure time at the end of the mine's life.

7.1.2 Eliminate Risk of Both Surface Water and Groundwater Impacts From Process Fluid Retention Systems

Closure of the plant facilities and tank farms will result in the handling and safe disposition of all solutions in the plant facilities, and the emptying of tanks and process solution ponds. These solutions will either be shipped to other Magma sites for further processing or neutralized and placed in the Evaporation/Tailings Ponds. All tanks and ponds will be flushed with fresh water upon closure, and those wash fluids neutralized and sent to the Evaporation/Tailings Ponds. This will eliminate the potential of any transport to surface or groundwater.

7.1.3 Dismantle Ancillary Surface Facilities

Tanks, electrowinning equipment, and other processing units will be dismantled or stored empty after closure. Pipelines will be cut after cleaning, and the pipe either shipped to another site or disposed of in an off-site land fill. Concrete structures will be demolished to ground level for all facilities no longer useable for post-closure purposes, the demolition material will be tested for hazardous constituents, and, if deemed hazardous, disposed of off-site in accordance with state and federal regulations. Those areas will then be graded and revegetated with plants suitable for the post-closure use.

The closure objective is to remove all facilities not useable for a post-closure purpose. Magma will consider the use of the larger buildings of the complex as industrial facilities and warehouses.

7.1.4 Assure Proper Disposal of Unused Process Reagents

Unused laboratory chemicals and those materials resident in the warehouse will be packaged in accordance with Department of Transportation (DOT) regulations and either sold or shipped to another Magma site for use. Those other plant reagents and electrowinning reagents will be packaged and sent to another Magma site for use. Transportation off-site will be in accordance with DOT regulations. Any chemicals, oils, or fluids not sold or reusable at another Magma site will be disposed of in accordance with applicable state and federal regulations. The closure goal is to have all chemicals removed off-site and disposed of in a manner that meets all applicable codes and regulations.

7.1.5 Select Alternate Land Use and Prepare Site

The closure goal is to return all lands disturbed during the leaching operation south of the North Side Canal, except those upon which the Evaporation/Tailings Ponds lies, to a state where agriculture could resume. Those lands north of the canal will be returned to a state where alternate uses such as homesite or commercial business can operate.

Magma will restrict the use of the evaporation/tailings pond site to prevent damage to the waste cover materials. This restriction will be in the form of fencing and deed limitation should the land be transferred from Magma's control.

7.2 CONCEPTUAL CLOSURE DESIGN

7.2.1 Closure of the Pregnant Leach Solution (PLS) and Raffinate Impoundments

The PLS and Raffinate Impoundments will be utilized until all solutions are processed through the SX/EW plant. It is estimated that the impoundments (ponds) will be needed not more than 1 year after active leaching ceases. At that time, the ponds will be drained and the solutions either shipped to another Magma operation for processing, or sent to the neutralization circuit, neutralized, and disposed of in the Evaporation/Tailings Ponds.

The wash solutions will be neutralized as needed and then disposed of in the Evaporation/Tailings Pond. The pond liners will be washed, removed, and then sold, used at another Magma operation, or disposed of in an off-site landfill. The area will be monitored for any spill materials and those materials will be disposed of according to federal and state regulations. Only non-hazardous materials or sediments will be disposed of in the Evaporation/Tailings Pond. Berm material for the PLS and Raffinate Ponds will be removed and used for covering the Evaporation/Tailings Pond. The area will then be graded and revegetated.

7.2.2 Evaporation/Tailings Pond

The Evaporation/Tailings Pond neutralization circuit will be cleaned and any remaining solids will be disposed of in the Evaporation/Tailings Pond. This pond is expected to be in use for up to 2 years after acid injection has been completed. All tanks, pumps, and related equipment will be removed and either sold or sent to another Magma operation. Once the ponds have dried, a soil capping layer will be placed on top of the tailings. The capping material will come from the borrowed material used to construct the SX/EW tank farm sump, PLS and Raffinate Pond berms, and local borrowed material. The covered surface will be revegetated.

7.2.3 SX/EW Plant, Piping, and Other Process Facilities

Once processing of copper has ceased, the processing equipment will be removed and either stored on-site or shipped to another Magma site or sold. The area will be inspected and checked for any hazardous materials. Hazardous materials will be disposed of in accordance with applicable federal and state regulations. Piping will be removed from the plant, in-situ, and tank farm areas and either shipped to another Magma site or sold. Non-hazardous materials will be disposed of in an off-site landfill. The buildings may serve post-closure use as commercial or warehouse facilities.

7.2.4 In-Situ Well Closure

Injection wells will be operated until the point at which copper recovery becomes uneconomical.

Once active leaching has ceased, no acid will be added. The production recovery wells will be operated for a period of time until 4 to 10 pore volumes are taken from the wells. Fresh water will be injected at the injection wells at a reduced rate over normal operations. In all cases, all fluid will be advanced into the process stream for reuse.

Water will be injected or infiltrated and monitored until the sulfate in the retrieval well reaches 750 ppm. As indicated in Table 4.3-1(I), at a residual solution content of 750 mg/L sulfate, no levels of hazardous components will be at levels that exceed AWQS. Three consecutive weekly samples of sulfate at levels of less than 750 ppm will indicate that particular set of wells are ready to be closed. Notification of closure will be made to the Environmental Protection Agency (EPA) and the Arizona Department of Environmental Quality (ADEQ).

7.2.5 Well Abandonment

Well abandonment will be in compliance with the Arizona Department of Water Resources (ADWR) and the Underground Injection Control (UIC) procedures as listed in the well Abandonment Protocol previously reviewed by EPA and ADEQ, and included as Appendix E in Volume V. Well abandonment records will be maintained for at least 3 years after completion of abandonment.

7.2.6 Office Buildings, Maintenance Shops, and Warehouse

Magma will remove any hazardous materials from shops, offices, storage areas, and the warehouse. Those materials will be either sold or disposed of in accordance with applicable federal and state regulations.

The offices and other remaining buildings may be sold or used for other Magma purposes on a long-term basis.

7.2.7 All Other Areas

All other areas will be inspected, sampled as needed, and materials disposed of in accordance with applicable state and federal regulations.

7.3 GROUNDWATER QUALITY MONITORING PROGRAM

7.3.1 Groundwater Monitoring

During the closure and post-closure periods, groundwater monitoring at non-hazardous POC wells will be conducted in essentially the same manner as described in Section 5.3 for operational monitoring. As more information is acquired during operational monitoring, however, it may become apparent that the groundwater monitoring program should be modified to increase its effectiveness. Groundwater monitoring is expected to improve the overall understanding of several issues including the adequacy of indicator parameters, groundwater gradient and direction, and spatial and temporal behavior of water quality variables. Proposed changes will be carefully reviewed by Magma and submitted to ADEQ for approval prior to implementation.

At least 1 year prior to the start of the post-closure period, non-hazardous POC wells will be installed at the downgradient limit of the post-closure DIA (see Figure 5.1-1[I]). The wells will be sampled monthly for 1 year (or quarterly for 2 or 3 years) to obtain baseline data for calculating compliance levels for non-hazardous constituents. Quarterly monitoring of the non-hazardous POC wells will be conducted throughout the post-closure period.

The primary purpose for monitoring non-hazardous POC wells is to ensure that the aquifer is not degraded due to the absence of hydraulic controls during post-closure. Sulfate and total dissolved solids are the 2 main constituents of concern. The list of proposed water quality variables to be measured at the non-hazardous POC wells is presented in Table 7.3-1. Proposed changes to the list will be carefully reviewed by Magma and submitted to ADEQ for approval prior to implementation.

Water Quality Variables	AQL (mg/L)	Analytical Method
Sulfate	TBD	EPA 300
Total Dissolved Solids	TBD	EPA 160.1
pH	NA	EPA 150.1
Specific Conductance	NA	EPA 120.1
Temperature	NA	NA

NA - Not applicable.
 TBD - To be determined.
 AQL - Aquifer Quality Limits.

7.4 CLOSURE/POST-CLOSURE SCHEDULE

7.4.1 Production Well Field Closure to be Performed on a Block-by-Block Basis

As leaching advances through the ore zone, closure will be accomplished on a block-by-block basis. Generally, each well set will be in service until the copper in the area becomes uneconomical to continue treating. Well closure procedures will begin immediately after cessation of active leaching. Well closure is an integral part of process optimization and Best Available Demonstrated Control Technology (BADCT). Closure solutions contain valuable copper and acid, and will partially offset the closure cost. The closure solutions emanating from these wells is needed as part of the process water make-up.

7.4.2 Estimated Time of Extended Pumping After Cessation of Production

It is presently estimated that after the last active leaching occurs, those wells not yet closed will be pumped for 12 to 18 months at a reduced rate.

7.4.3 Construction Timetable for Closing Remaining Wells and Dismantling Surface Facilities

Closure of the balance of the facility will begin immediately after leaching ceases. The balance of the copper in the circuit will be processed, shipped to another Magma site, or treated for disposal in the Evaporation/Tailings Pond. All remaining wells will be closed within 6 months after the residual sulfate reaches 750 ppm and plant equipment will be cleaned. The cleaned equipment may be stored on-site for an extended period until needed at other Magma sites or sold.

7.4.4 Stated Period of Post-Closure Monitoring, Surveillance, and Maintenance

Post-closure monitoring and surveillance is expected to take 30 years.

7.5 CLOSURE/POST-CLOSURE COST ESTIMATE

7.5.1 Methodology Applied

On-site crews can begin clean-up of the facility during the last 2 months of the operation. Processing of the balance of the plant solutions will take about 4 weeks. The plant can be readied for sale or removal during that time. The cost of the removal of the plant, tank farm, and piping will be off-set by the value of the remaining plant. Much of the plant is composed of stainless steel. The remaining reagents can be used at other Magma sites.

The pumping costs associated with closure of the in-situ wells is low. Each remaining production well, estimated at 150 at this time, will be fitted with a 7.5 horsepower pump. It is estimated that 150 such wells will remain in operation for up to 18 months.

The combined pumping cost for the 18 months is \$231,000, assuming 60 percent pump efficiency, 50 percent operational time, and \$0.07 per kwhr.

Pumped solutions will be directed to the neutralization circuit. The cost of delivered lime is estimated at \$70 per ton. It is estimated that during the final 18 months of closure, the in-place acid concentration of the residual solution will be 2 g/l as sulfuric acid. Assuming a pumping rate of 1,000 gallons per minute, and acid tenor of 2 g/l, then approximately 6,600 tons of lime will be required for a total cost of \$462,000.

Labor required for pumping assumes 2 men, who will also do the monitor well sampling, area clean up, PLS, raffinate liner removal, and solution disposal. The annual cost of each employee is estimated at \$40,000.

Closure of the PLS and Raffinate Ponds will require an earth moving contractor. The covering of the Evaporation/Tailings Pond is estimated to take 170,000 yards at a cost of \$1.50 per yard.

Closure of the existing 150 wells is estimated at \$2,000 each.

Grading and re-seeding can be done by the 2 men mentioned earlier. The estimated cost of seeding the 100-acre Evaporation/Tailings Pond, 25 acres of the plant, and the in-situ left to be reseeded, is \$93,800 at \$750 per acre.

The number of monitor wells is assumed to be 20 at closure. The analytical cost for the post-closure period is estimated at \$100,000 per year.

7.5.2 Summary of Estimated Post-Closure and Care Costs

Summary of the estimated closure costs:

Plant site removal (costs offset by scrap value)	\$0
Labor	\$240,000
Power (well pumping cost, office, and misc.)	\$300,000
Neutralization (lime, maintenance, etcetera)	\$500,000
Well closure	\$300,000
Grading, seeding, etcetera	\$100,000
Monitoring (first year only)	<u>\$100,000</u>
Total	\$1,540,000

Ongoing closure as defined in Appendix C shows that Magma has incorporated an estimate of \$0.035 per pound produced on an annual basis for ongoing closure.

Summary of estimated post-closure costs:

Post-closure costs include caretaking and environmental monitoring. Security surveillance is estimated at \$40,000 per annum. Sampling and monitoring costs are estimated at \$100,000 per annum for at cumulative post-closure in year 3 to 30 of \$3.8 million.

Appendix D contains a statement by the Chief Financial Officer of Magma Copper Company, that Magma is capable of these closure and post-closure costs. The CFO assurance can be used in eliminating the need for a closure bond by ADEQ in compliance with A.R.S. §§ R-18-9-108-B.8.a. and R-18-9-108.B.8.c.iii.

APPENDIX G - Programmatic Agreement on Historical Preservation



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street

San Francisco, CA 94105-3901

Mail Code: W-6-3

August 30, 1995

Mr. John Kline
Environmental Project Manager
Magma Copper Company
14605 East Hunt Highway
Florence, AZ 85232

RE: MAGMA FLORENCE IN SITU COPPER MINE PROJECT

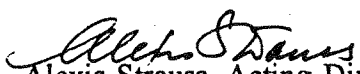
Dear Mr. Kline:

It is with great pleasure that the U.S. Environmental Protection Agency (EPA) presents the final Programmatic Agreement (PA) among the EPA, the Arizona State Historic Preservation Officer, and the Advisory Council on Historic Preservation regarding the Magma Florence In Situ Copper Mine Project. Enclosed please find the final PA and a return envelope. The PA signatories will be as follows: Hopi Tribe, Gila River Indian Community, Magma Copper Company, Arizona State Historic Preservation Officer, Advisory Council on Historic Preservation, and EPA.

Upon your final review and signature, please return the signed PA to our office within 14 working days to expedite the process. Following the completion of the last signature to the agreement, a copy of the document will be mailed to your office.

It has been a gratifying experience working with Magma in developing a PA designed for the preservation of historic sites. If you have any questions please call Jose L. Gutierrez of my staff at (415) 744-1829.

Sincerely,


Alexis Strauss, Acting Director
Water Management Division

Enclosure (2)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

Mail Code: W-6-3
February 22, 1996

John Kline
BHP Copper Company
14605 East Hunt Highway
Florence, AZ 85232

John:

Per your request, I'm sending a copy of the signature pages for the Programmatic Agreement (PA). We have not received the Hopi Tribe's signature but they did not voice any objections in January when we informed them of our intentions to forward the PA to the Advisory Council. I'll send you a copy of the Hopi's signed PA when we receive it.

If you have any questions give me a call at (415) 744-1829.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jose L. Gutierrez".

Jose L. Gutierrez
Environmental Engineer

Enclosure

August 30, 1995

PROGRAMMATIC AGREEMENT
AMONG
THE ENVIRONMENTAL PROTECTION AGENCY,
THE ARIZONA STATE HISTORIC PRESERVATION OFFICER,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
THE MAGMA FLORENCE IN SITU COPPER MINE PROJECT

WHEREAS, Magma Copper Company ("Magma") proposes to develop and operate the Florence In Situ Copper Mine Project ("Florence Project"), which will include underground injection wells near Florence, Arizona; and

WHEREAS, Magma will apply for a permit or permits from the Environmental Protection Agency ("EPA") to construct underground injection wells in accordance with 40 C.F.R. Parts 144 and 146, the granting of which permit(s) constitutes a Federal Undertaking pursuant to 16 U.S.C. § 470w; and

WHEREAS, the EPA has determined that the construction of underground injection wells may have an effect on historic properties, *i.e.*, properties included in or eligible for inclusion in the National Register of Historic Places ("National Register"), and has consulted with the Arizona State Historic Preservation Officer ("SHPO") and the Advisory Council on Historic Preservation ("Council"), pursuant to the regulations in 36 C.F.R. Part 800 implementing Section 106 of the National Historic Preservation Act, 16 U.S.C. 470 *et seq.* ("Section 106"); and

WHEREAS, development of underground injection wells for the Florence Project will take place in phases over several years; and

WHEREAS, Magma has participated in the consultation and has been invited to concur in this Programmatic Agreement ("Agreement"); and

WHEREAS, representatives of the Ak Chin Indian Community, the Gila River Indian Community, the Salt River Indian Community, and the Tohono O'odham Nation have been offered the opportunity to participate in the consultation and to concur in this Agreement, and said Native American Tribes have designated the Gila River Indian Community as their representative for purposes of such consultation and concurrence; and

WHEREAS, representatives of the Hopi Tribe have been offered the opportunity to participate in the consultation and to concur in this Agreement; and

WHEREAS, the public has been informed and afforded opportunity for involvement in the development of the elements underlying this Agreement;

NOW, THEREFORE, the signatories to this Agreement agree that the Undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the Undertaking on historic properties and to satisfy all Section 106 responsibilities for all individual aspects of the Undertaking.

STIPULATIONS

The EPA shall ensure the following measures are carried out.

I. APPLICABILITY OF AGREEMENT

A. The purpose of this Agreement is to establish an understanding among the EPA, the SHPO, the Council, and Magma as to how the consultation process under Section 106 will be implemented with regard to the Undertaking.

B. This Agreement applies to all Magma activities involving the EPA Undertaking, which will consist of granting underground injection well permit(s) to wells for purposes of in situ copper mining. The area of potential effects of the Undertaking shall be defined as the Magma Florence Mine Cultural Resources Review Area ("MFMCR") as described in Appendix A. The parties agree that Figure 1 may be amended from time to time as may be necessary to include additional areas not currently identified as within the area of potential effects. Should it become necessary for Magma to request an expansion or amendment to the permit area, the EPA shall notify the other parties to this agreement of such request prior to EPA approval.

C. Magma proposes to conduct mineral mining and related activities pursuant to such permit. The construction of in situ mining wells and related ground-disturbing activities is expected to occur in phases. While an initial inventory of cultural resources has been conducted for the entire MFMCR, subsequent selection and implementation of treatment plans may occur in phases.

II. HISTORIC PROPERTY IDENTIFICATION AND EVALUATION OF POTENTIAL EFFECTS

A. The EPA has determined that Magma, in consultation with the SHPO and Native American Tribes, has completed a historic properties inventory of the MFMCR. This inventory included (i) inquiries regarding any traditional cultural properties within the MFMCR and (ii) a field survey of the MFMCR conducted by qualified archaeologists. Based on the field survey, the EPA has reason to believe that the MFMCR includes cultural properties that are eligible for inclusion in the National Register.

B. For the purposes of the above inventory and any subsequent archeological surveys, the EPA, in consultation with the SHPO, shall ensure that (i) determinations of eligibility for inclusion in the National Register are made for any cultural properties, according to 36 C.F.R. § 60.4 and 36 C.F.R. § 800.4(c) and (ii) the effects of the Undertaking on all historic properties are assessed according to 36 C.F.R. §§ 800.5 and 800.9.

1. The EPA shall submit to the SHPO for concurrence EPA's determinations of eligibility of cultural properties for inclusion in the National Register and of effects of the Undertaking on any historic properties. The SHPO shall respond to EPA's determinations within thirty days of receipt.

2. If the EPA and the SHPO cannot reach agreement on the eligibility of any cultural property, EPA shall obtain a determination from the Keeper of the National Register. The Keeper's determination shall be final. Magma shall be kept informed in a timely manner of the progress of the request for a determination.

C. If the EPA and the SHPO agree that at a particular area of the MFMCRRA (i) no historic properties are found or (ii) there will be no effect on any historic properties, the EPA shall provide clearance to proceed with activities in that area, subject to issuance of a permit under 40 C.F.R. Parts 144 and 146 and to the monitoring provisions of the Treatment Plan (see Stipulation III.D.5).

D. Any disputes between the EPA and the SHPO concerning whether there will be adverse effects on historic properties shall be resolved in accordance with the procedures in 36 C.F.R. § 800.5 and, in the event 36 C.F.R. § 800.5 is inapplicable, with Stipulation VI.

III. PREPARATION OF A TREATMENT PLAN

A. The EPA, in cooperation with the other parties to this Agreement, shall ensure that Magma develops and implements an overall treatment plan ("Umbrella Treatment Plan") for the mitigation of anticipated effects on historic properties that will result from the construction and operation of the underground injection control wells and any related uses and activities.

B. In the event that Magma plans to construct in situ wells sequentially, Magma shall have the option of developing, in addition to the Umbrella Treatment Plan, location and property specific Data Recovery Plans for individual phases, geographic areas, or, if necessary, archeological sites for development. Such data recovery plans will be considered Supplements to the Treatment Plan ("Supplemental Data Recovery Plans").

C. The Treatment Plan and any Supplemental Data Recovery Plans shall be consistent with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 Fed.Reg. 44716-44742) and the Council's handbook Treatment of Archeological Properties. A Treatment Plan shall specify, at a minimum:

1. The historic properties to be affected by the project as a whole and the nature of those effects;

2. A Research Design that will contain the research questions and goals that are applicable to the Project area as a whole and that will be addressed through data recovery, along with an explanation of their relevance and importance;

3. Fieldwork and analytical methods and strategies applicable to the Project area as a whole, along with an explanation of their relevance to the research questions. Such treatment methods will be developed for each type of historic property identified that may be affected by the Florence Project;

4. Proposed procedures for dealing with discovery situations;

5. Methods to be used in data management and dissemination of data;

6. Methods and procedures for the recovery, analysis, treatment, and disposition of human remains, associated grave goods, and objects of cultural patrimony that reflect any concerns and/or conditions identified as a result of consultations between the EPA and affected Native American groups; and

7. The proposed disposition of recovered materials and records.

D. Where data recovery is determined by the EPA and SHPO to be the preferred treatment option for an eligible property or properties, the Treatment Plan or Supplemental Data Recovery Plan shall specify, at a minimum:

1. The historic properties to be affected by the specified phase of the Project and the nature of those effects;

2. The research questions identified in the Treatment Plan that will be appropriate for the specified Project segment and that will be addressed through data recovery, along with any additional research questions compatible with the Treatment Plan and an explanation of their relevance to the overall research goals as established in the Treatment Plan;

3. The specified fieldwork and analytic strategies identified in the Treatment Plan, as well as any other strategies that will be employed in the specific Project segment;

4. A proposed schedule for the submission of progress, summary, and any other reports to the SHPO;

5. Provisions for monitoring, including quarterly monitoring reports to be submitted by Magma to the EPA and SHPO; and

6. Qualifications of consultants employed to undertake the implementation of data recovery.

E. The Treatment Plan shall include provisions for monitoring, including quarterly monitoring reports to be submitted by Magma to the EPA and the SHPO.

F. If Magma encounters human remains, funerary objects, or cultural items as defined in the Arizona Revised Statutes 41-865, the EPA, in consultation with the Arizona State Museum, shall ensure that they are treated according to (i) the applicable State law and (ii) the Burial Consultation Agreement, A.R.S. § 41-865, Case No. 94-24. If objections are raised regarding the treatment of such human remains, funerary objects, or cultural items as defined by the applicable statute, the EPA shall engage in consultation in accordance with Stipulation VI to resolve the objections.

IV. REVIEW AND APPROVAL OF THE TREATMENT PLAN AND DATA RECOVERY PLAN(S)

A. The EPA shall ensure that Magma submits a proposed Treatment Plan and any Supplemental Data Recovery Plans to the SHPO, the Gila River Indian Community, the Hopi Tribe, and the Council for a concurrent thirty day review and comment period ("reviewing parties"). The term "day" shall mean a calendar day throughout this Agreement. Magma may elect to submit for simultaneous review a Treatment Plan and Supplemental Data Recovery Plan(s) applicable to a given phase, geographic area, or, if necessary, archeological site. If any reviewing party fails to submit comments within thirty days of receipt of the proposed Treatment Plan and any Supplemental Data Recovery Plans, the EPA shall assume that party's concurrence.

B. If any reviewing party objects to the Treatment Plan and any Supplemental Data Recovery Plans, it shall notify the EPA and the SHPO within the thirty day review period. The objection must be specifically identified and the reasons for the objection documented. The EPA, the SHPO, and the objecting party shall engage in consultation to resolve the objection. If the objection cannot be resolved, the EPA shall consult with the Council in accordance with Stipulation VI.

C. The EPA will apprise Magma as to the status of the consultation process. Upon completion of the review and comment process, consideration by the EPA of any SHPO, the Gila River Indian Community, the Hopi Tribe, or Council comments, and any subsequent revisions in the Treatment Plan and any Supplemental Data Recovery Plans, the EPA shall provide clearance to Magma to proceed with implementation of the Treatment Plan and any Supplemental Data Recovery Plans.

D. Subject to the requirements of 40 C.F.R. Parts 144 and 146, Magma shall have from EPA clearance to begin construction of wells and related activities in those portions of the MFMCRRA that contain historic properties when (i) the applicable treatment specified in the approved Treatment Plan and any Supplemental Data Recovery Plans is completed for the area where construction and related activities are to occur, (ii) Magma has notified the EPA and the SHPO of such completion, and (iii) the SHPO has had fifteen days from receipt to review a preliminary field report.

E. Any proposed substantial alterations to the Treatment Plan and any Supplemental Data Recovery Plan shall require the written approval of the EPA and the SHPO. The EPA will coordinate the review and approval of such alterations in accordance with the procedure set forth in subsections A-D above of this Stipulation.

V. CHANGES IN INJECTION WELL CONSTRUCTION AREA

A. If Magma decides to construct injection wells in previously unidentified areas, the EPA shall ensure that, with respect to any area of potential effects not previously inventoried, Magma conducts an inventory in a manner consistent with the prior project area survey and the standards identified in Stipulation II. Magma shall submit a report of the results to the EPA. The EPA shall submit the report with any EPA comments to the SHPO for review and comment. Where historic properties may be affected within such previously unidentified injection well area, and where expedited review is desirable, Magma may submit the survey report and a specific data recovery plan for potential historic properties to the EPA for simultaneous review of inventory results, determinations of eligibility, and treatment measures. The data recovery plan for historic properties within the previously unidentified area shall be consistent with the project Treatment Plan and, once accepted, will be considered a supplement to the project-wide Treatment Plan.

B. The reviewing parties shall have thirty calendar days after receipt to review the documents, the determinations of eligibility, and the Supplemental Data Recovery Plan and provide, in the case of the SHPO, written comments to the EPA. If the SHPO fails to submit comments within thirty calendar days, the EPA shall assume the SHPO's concurrence with the recommendations for eligibility and treatment. If the reviewing parties agree on the recommendations for eligibility and treatment, the EPA shall provide Magma with notification to proceed with the Supplemental Data Recovery Plan. If any of the reviewing parties objects to any element of the documentation, the EPA shall attempt to resolve the objection in accordance with Stipulation VI.

C. Where no historic properties will be affected within a previously unidentified area, Magma shall submit the survey report to the EPA. The EPA shall submit the survey and any EPA comments to the SHPO for review of the inventory results. The SHPO shall provide comments to the EPA on the adequacy of the document(s) within thirty days of receipt. If the SHPO fails to comment within thirty days, the EPA shall assume concurrence. If the EPA and the SHPO agree to the adequacy of the documentation, Magma shall be authorized

to proceed with construction or use of the previously unidentified area, subject to any requirements of 40 C.F.R. Parts 144 and 146. If any of the reviewing parties objects to any element of the documentation, the EPA shall attempt to resolve the objection in accordance with Stipulation VI.

VI. DISPUTE RESOLUTION

A. Unless otherwise specified in this Agreement, should any party to this Agreement object within thirty calendar days to any action pursuant to this Agreement, the EPA shall consult with the objecting party to resolve the objection. If the EPA determines that the objection cannot be resolved, the EPA shall forward to the Council all documentation relevant to the dispute. Within thirty calendar days after the receipt of all pertinent documentation, the Council shall either:

1. Provide the EPA with recommendations, which the EPA shall take into account in reaching a final decision regarding the subject of the dispute; or

2. Notify the EPA that it will comment within an additional thirty calendar days in accordance with 36 C.F.R. § 800.6(b). Any Council comments provided in response to such an objection shall be taken into account by the EPA in accordance with 36 C.F.R. § 800.6(c)(2), with reference to the subject of the dispute.

B. Any recommendation or comment provided by the Council will be understood to pertain only to the subject of the dispute. The responsibility of the EPA to carry out all actions under this Agreement that are not the subject of the dispute shall remain unchanged.

C. At any time during implementation of the measures stipulated in this Agreement, should an objection to any such measure or its manner of interpretation be raised by a member of the public, the EPA shall take the objection into account and consult, as needed, with the objecting party, SHPO, or the Council to resolve the objection.

VII. AMENDMENT

Any party to the Agreement may request that it be amended, whereupon the parties to this Agreement shall consult to consider such amendment in accordance with 36 C.F.R. § 800.13.

VIII. TERMINATION

Any party to this Agreement may terminate it by providing thirty days written notice to the other parties, provided that the parties will consult during the period prior to the termination to seek agreement on amendments or other actions that would avoid termination. In the event of termination, the EPA will comply with 36 C.F.R. §§ 800.4 through 800.6 with regard to individual undertakings covered by this Agreement.

IX. EXECUTION

A. Execution and implementation of this Agreement evidences that the EPA has afforded the Council a reasonable opportunity to comment on the Undertaking and its effects on historic properties and that the EPA has satisfied Section 106 responsibilities for all individual actions of this specific Undertaking.

B. In the event that the terms of this Agreement are not carried out, the EPA shall comply with 36 C.F.R. §§ 800.4 through 800.6, with regard to individual actions covered by this Agreement.

C. This Agreement shall become effective on the date of the last signature below and shall remain effective, unless earlier terminated as provided in Stipulation VIII until the complete development of the Florence Project.

ENVIRONMENTAL PROTECTION AGENCY

By: Karen Strauss Date: 9/20/95
Dr. Alexis Strauss

Title: Acting Division Director, Water Management Division

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: Richard D. Bush Date: 1-14-96

Title: Executive Director

ARIZONA STATE HISTORIC PRESERVATION OFFICER

By: James W. Gramer Date: 9/25/95

Title: AZSHPO

CONCURRING PARTIES:

MAGMA COPPER COMPANY

By: _____ Date: _____

Title: _____

IX. EXECUTION

A. Execution and implementation of this Agreement evidences that the EPA has afforded the Council a reasonable opportunity to comment on the Undertaking and its effects on historic properties and that the EPA has satisfied Section 106 responsibilities for all individual actions of this specific Undertaking.

B. In the event that the terms of this Agreement are not carried out, the EPA shall comply with 36 C.F.R. §§ 800.4 through 800.6, with regard to individual actions covered by this Agreement.

C. This Agreement shall become effective on the date of the last signature below and shall remain effective, unless earlier terminated as provided in Stipulation VIII until the complete development of the Florence Project.

ENVIRONMENTAL PROTECTION AGENCY

By: _____ Date: _____

Title: _____

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: _____ Date: _____

Title: _____

ARIZONA STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: _____

Title: _____

CONCURRING PARTIES:

MAGMA COPPER COMPANY

By: John J. Kline Date: Sept. 7, 1995

Title: ENVIRONMENTAL PROJECT MANAGER

GILA RIVER INDIAN COMMUNITY

By: Cecil F. Colman

Date: January 29, 1996

Title: ht. govern

HOPI TRIBE

By: _____

Date: _____

Title: _____

APPENDIX A

Magma Florence Mine Cultural Resource Review Area

The Magma Florence Mine Cultural Resources Review Area (MFMCRA) shall consist of all property within the boundaries depicted on the attached Figure 1. The parties agree that Figure 1 may be amended from time to time as may be necessary to include any additional property where Magma intends to place underground injection control wells to be permitted by the EPA.

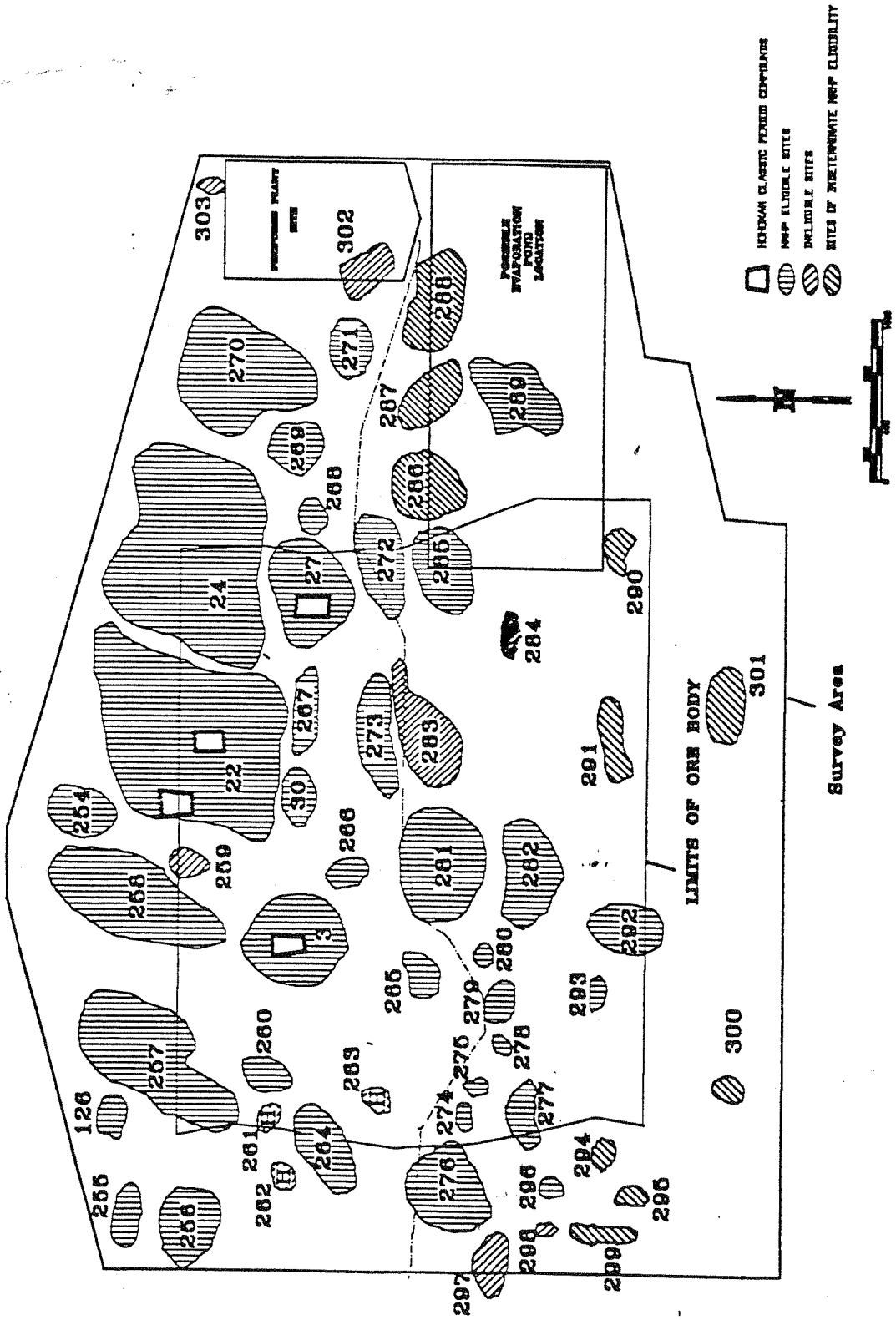


Figure 1. Distribution of archaeological sites in the Magma Florence project area.

APPENDIX H - Wildlife Monitoring Plan

BHP copper **Florence Project** **Wildlife Monitoring Plan**

BHP Copper recognizes the need to protect threatened and endangered species, and area wildlife. The plan is divided into three components. These are described below:

Prevention of Access

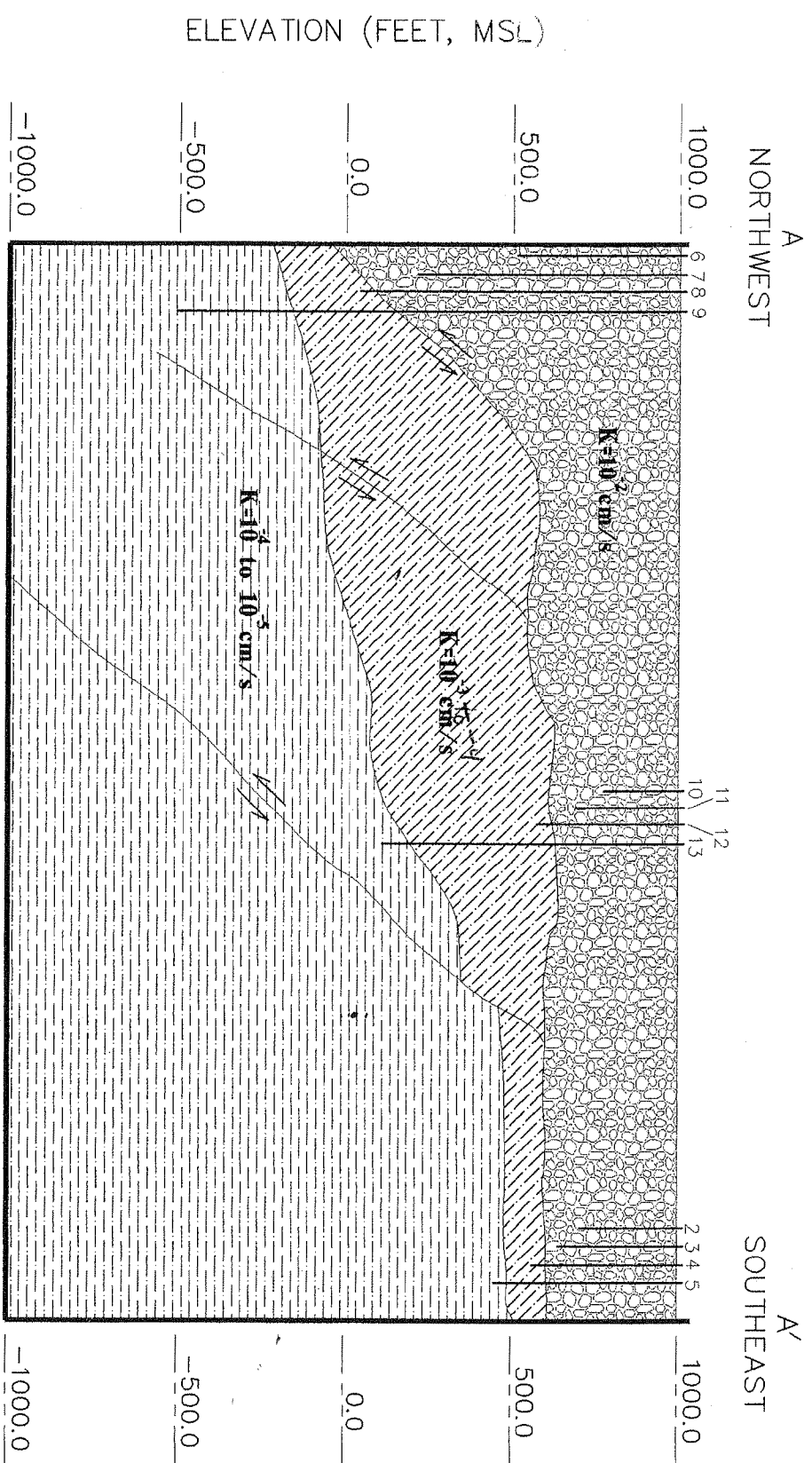
The mine, plant, and impoundment areas will be fenced and gated so to prevent entry by area wildlife. The plant and impoundment area fences will extend 14 inches below ground surface in order to prevent access by burrowing animals. Locally, Desert Sonoran Tortoise have been sighted in Section 28 of Range 9 East and consequently the fencing will meet the criteria to prevent access by the tortoise.

Tortoise Handling Plan

A tortoise handling plan has been recommended by Arizona Game and Fish and will be implemented as written. Contractors and employees will be given initial and periodic instruction on the procedure to be used if a tortoise is encountered. Only trained site personnel will be allowed to interact with the tortoise.

Migratory Bird Observation Plan

BHP will conduct daily inspections of the impoundments and will record any bird landings or bird mortality. Although there is sufficient non-process waters in the area such as the CAP canal and irrigation water and canals to attract birds, and BHP knows of no bird mortality on impoundments like the ones designed for the Florence mine, personnel will nevertheless be trained to monitor for birds on the ponds. Any landings will be recorded in the daily log and reported quarterly with the quarterly monitoring report to EPA. Any bird mortality will be reported immediately to Arizona Game and Fish and EPA. Game and Fish will instruct the operators as to the action required to remove the bird from the pond. Bird mortality will be reported to EPA as part of the quarterly monitoring report. BHP will develop a more comprehensive plan in conjunction with EPA should bird mortality occur regularly.



CROSS SECTION A-A'
 HORIZ SCALE: 1" = 1000'
 VERT SCALE: 1" = 500'

NOTE:
 FOR PLAN VIEW ORIENTATION, SEE FIGURE 1

- LEGEND
- QUARTZ MONZONITE
 - OXIDE ZONE
 - ALLUVIUM BASIN-FILL DEPOSITS AND GLA CONGENERATE
 - FAULT-ARROWS SHOWING RELATIVE MOVEMENT
 - $K=10^{-2}$ cm/s
 - $K=10^{-4}$ to 10^{-5} cm/s

Figure 2

HYDROGEOLOGY AND STRUCTURE

BROWN AND CALDWELL

MAGMA
 MAGMA COPPER COMPANY
 Florence, Arizona