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## U.S. Department of the Interior



Bureau of Land Management 2015 West Deer Valley Road Phoenix, Arizona 85027

January 1996

K Bagdard Mint?

## CYPRUS BAGDAD COPPER CORPORATION PROPOSED TAILINGS AND WASTE ROCK STORAGE AREAS FINAL ENVIRONMENTAL IMPACT STATEMENT

None



## **Cooperating Agency:**

U.S. Army Corps of Engineers Los Angeles District Regulatory Branch 3636 North Central Avenue, Suite 760 Phoenix, Arizona 85012-1936



## United States Department of the Interior

BUREAU OF LAND MANAGEMENT ARIZONA STATE OFFICE 3707 N. 7TH STREET P.O. BOX 16563 PHOENIX, ARIZONA 85011



IN REPLY REFER TO:

3809(020) AZA 28639 BLM/AZ/PL-95/005

January 11, 1996

Dear Reviewer:

Enclosed is a copy of the Final Environmental Impact Statement (EIS) for the Cyprus Bagdad Copper Corporation proposed tailings and waste rock storage areas.

Two public hearings were held and a 60-day comment period was open to provide opportunity for public comment. The Bureau of Land Management and U. S. Army Corps of Engineers reviewed all comments and responded accordingly. Since all changes which were made to the draft have been determined to be minor, this document was prepared in an "abbreviated" format. This Final EIS contains only the public comments received, the agency response to those comments and an errata section which identifies the specific changes which were made to the draft.

Following a 30-day period of availability, the agencies will publish separate Records of Decision. If you have any questions on this document, please contact the Project Manager, Mary Johnson, of the Phoenix District Office, at (602) 780-8090, ext. 564.

Sincerely,

Denise P. Meridith State Director

Enclosures

## COVER SHEET DRAFT ENVIRONMENTAL IMPACT STATEMENT CYPRUS BAGDAD COPPER CORPORATION TAILINGS AND WASTE ROCK EXPANSION

EIS No.:	BLM/AZ/PL-95/005			
Lead Agency:	U.S. Department of the Interior, Bureau of Land Management			
Cooperating Agency:	U.S. Army Corps of Engineers			
Project Location:	Bagdad, Arizona			
For Further Informat Manager	tionContact: Ms. Mary Johnson, Project	ct		
	Phoenix District Office			
	2015 West Deer Valley Road			

## Date Final Filed with the Environmental Protection Agency: January 22, 1996

## ABSTRACT

Phoenix, Arizona 85027 (602) 780-8090, ext. 564

This abbreviated Final Environmental Impact Statement (EIS) responds to comments received during the public comment period for the Cyprus Bagdad Copper Corporation (Cyprus Bagdad) Draft Environmental Impact Statement (DEIS), which was filed with the U.S. Environmental Protection Agency on August 9, 1995. The Draft analyzed impacts which may occur from the continued copper mining operations at Cyprus Bagdad Copper Corporation's mine in Bagdad, Arizona. Existing facilities include two existing tailings facilities (Mulholland and Mammoth tailings ponds), an open pit, a mill and solvent extraction-electrowinning plant, and waste rock disposal on private lands. Two alternatives were analyzed in detail in the DEIS: the proposed action, and the No Action Alternative. The proposed action includes the development of the Upper Mammoth tailings facility, the expansion of the South waste rock disposal area, and the continued excavation of the open pit. The proposed action would involve approximately 320 acres of public surface lands under the jurisdiction of the Bureau of Land Management (BLM), and would extend the life of the mine to 35 years. Total disturbance associated with the proposed action is estimated at 2,000 acres. The No Action Alternative consists of continued mining operations on private lands for six years, including expanding the existing Mammoth tailings pond, expansion of the open pit, and disposal of waste rock on private lands, followed by closure. No new disturbance would occur on public lands with the No Action Alternative. Since the DEIS was published, BLM has selected the Proposed Action as its Preferred Alternative. All changes to the draft are considered to be minor and are described in detail in the Errata section of this document. All public comments and agency responses are contained in this document also. This document and the DEIS go hand-in-hand and together constitute the Final EIS for this project.

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This abbreviated Final Environmental Impact Statement (EIS) is prepared for Cyprus Bagdad Copper Corporation's (Cyprus Bagdad) proposed tailings and waste rock storage areas at the Bagdad mine in west-central Arizona. No comments (neither written nor verbal) expressed during the public comment period required major changes or revisions in the analysis or conclusions presented in the Draft EIS. The Draft EIS has not been reprinted, and therefore this abbreviated document must be read in conjunction with the Draft EIS that was released for public review on August 17, 1995. The previously distributed Draft EIS and this document go hand-in-hand and together constitute the Final EIS for the Cyprus Bagdad proposed tailings and waste rock storage areas.

The Final EIS presents errata in Section 2, and a record of public comments received on the Draft EIS and responses to comments in Section 3. Minor revisions, as defined in CEQ regulations (40 CFR 1503.4 [c]), made to the Draft EIS include the following:

- selection of the BLM preferred alternative
- a clarification of the fatal flaw analysis which was conducted for alternatives considered but eliminated from further consideration (including tables)
- disclosure of mitigation for loss of desert tortoise habitat on public lands
- additional clarification and information on potential hydrological impacts
- additional figures describing alternative sites, geology of the area, and monitoring wells and proposed point of compliance wells
- revision of the list of permits and/or approvals required for the proposed action
- minor factual clarifications
- typographical corrections

Two alternatives (the proposed action and the No Action Alternative) are described and analyzed in detail in the Draft EIS. Implementation of the proposed action would fulfill the underlying needs. Since the publication of the Draft EIS, the BLM has selected the proposed action as the Preferred Alternative.

This section presents specific clarifications and corrections to the Cyprus Bagdad Proposed Tailings and Waste Rock Storage Areas Draft EIS. These corrections and/or additions were developed in response to comments received during the public comment period, as well as to correct typographical errors. Neither written comments nor verbal comments expressed during the public hearings required major changes or revisions in the project description, alternative identification, analysis, or conclusions presented in the Draft EIS. The Errata contains section headings which corresponds with those sections in the Draft EIS which is not listed below. Figures and tables immediately following the pages referenced in this Errata are in addition to tables and figures contained in the Draft EIS.

## Executive Summary

Page S-2, first paragraph under Alternatives, replace the second sentence with the following text:

Ten candidate tailings sites within a five-mile radius and three candidate waste rock storage sites within a two-mile radius were selected for evaluation based on geologic, hydrologic, and topographic conditions required for construction. One site (the Bagdad Townsite) was a candidate location for both tailings and waste rock storage facilities.

## Section 1.8 - Relationship to Statutes and Regulations

Page 6, under Federal statutes and regulations, replace the fifth listing, with the following:

• Clean Water Act

## Section 2.1 - Existing Facilities

Page 8, paragraph 3, add the following to the end of the paragraph:

Approximately 5 million tons of Kimberly tailings have been relocated to-date to allow continued excavation of the open pit.

Page 12, Figure 4, delete the text "EXISTING SEEPAGE COLLECTION POND - TO BE RELOCATED DOWNSTREAM" from the figure.

## Section 2.2.1 - Mammoth Tailings Expansion - Reclamation and Closure

Page 17, paragraph 4, sentence 1 is replaced with the following:

Annual inspection of all site components will occur in the spring of each year and after rainfall events in excess of one inch in a 24-hour period.

Section 2.3 - Proposed Action

Page 18, add sentence at the beginning of the paragraph immediately following the section heading:

The BLM has selected the proposed action as its Preferred Alternative.

Section 2.3.1 - Upper Mammoth Tailings Facilities - Stormwater Management

The last sentence beginning on page 23 and ending on page 24 is deleted.

Section 2.3.2 - South Waste Rock Disposal Facility - Kimberly Tailings

Page 27, paragraph 3, sentence 3 (beginning with "Approximately 16 to 18..."), add the following to the end of the sentence:

to allow continued excavation of the open pit.

## Section 2.5 - Alternatives Considered But Eliminated From Further Consideration

Page 32, insert the following after the Section 2.5 heading:

A site selection study was conducted to evaluate potential sites for the proposed tailings storage areas (SHB Agra 1993). Candidate tailings facility sites are depicted in Figure A, presented in the Final EIS. A five-mile radius was selected as a distance which would allow for economic copper recovery. This distance provided the opportunity to consider sites with diverse geologic and topographic conditions. Alternatives for the location of waste rock disposal facilities were limited to those within two miles of the open pit. Distances greater than these for the tailings and waste rock sites would not allow for economic copper recovery based on ore type, production type, and current technologies. For example, costs associated with pipe installation, pumping, construction of access roads, and/or truck hauling for sites further than these distances render the project economically infeasible. Candidate waste rock disposal areas were also constrained by existing facilities, including the existing heap leach operations to the west, and the existing waste rock disposal facilities to the north.

Twelve sites in total were identified as potential alternative sites. Ten potential tailings sites were identified, and three potential waste rock disposal area sites were identified. One site (the Bagdad Townsite) was identified as an alternative for both tailings and waste rock disposal. A preliminary screening or fatal flaw analysis was conducted to first assess whether the sites were reasonable based on three basic criteria. These three criteria consisted of 1) project feasibility (or meeting the underlying needs of the project), 2) geotechnical feasibility, and 3) environmental feasibility. These criteria are described below. The screening is summarized in two matrices, shown in Tables A and B, presented in the Final EIS.

<u>Project Feasibility</u>. Alternatives were considered for detailed examination only if they met the underlying needs of the project (40 CFR 1502.13). The need for copper production would not be fulfilled if the alternative did not allow for the economical recovery of copper, thus rendering the alternative infeasible. One preliminary alternative did not meet this criteria -- the Bagdad Townsite. High costs associated







## Section 3.4.2 - Surface Water

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Page 54, add the following text to the beginning of the page:

Bevering Gulch is a minor ephemeral drainage tributary to the historic Copper Creek. The Gulch is currently intercepted by a stormwater percolation pond located behind the relocated Kimberly tailings.

1

Page 54, paragraph 2, replace sentence 5 (beginning with, "Cyprus Bagdad has obtained...") with the following text:

Cyprus Bagdad has obtained a National Pollution Discharge Elimination System stormwater and process wastewater permit for Mammoth Wash (AZ0022268 outfall #006B).

Page 54, paragraph 3, replace the last sentence (beginning with, "More detailed historic information...") with the following text:

Analytical water chemistry results indicate that surface water chemistry of the lower Mammoth Wash watershed is of higher quality than that of the upper Mammoth Wash watershed (EnviroNet 1995).

## Section 3.5.2 - Wildlife - Reptiles and Amphibians

Page 58, first full paragraph, sentence 1, add the language "rosy boa (<u>Lichanura trivirgata</u>)" immediately following the text "sidewinder (<u>Crotalus cerastes</u>)".

Section 3.11.1.2 - Land Use Plans

Page 95, amend the first bullet to read:

• Suitability for Wild and Scenic River designation has been established for segments of Burro and Francis Creeks. These segments have been recommended for Wild and Scenic River designation.

Page 96, Figure 18, replace the last key description ("Wild and Scenic River designation") with the following text:

Recommended for Wild and Scenic River designation

## Section 4.1.1 - Geological Resources

Page 105, paragraph 3, add the following text to the end of the paragraph:

Please refer to page 115 for a discussion on seismic and flood event dam safety scenarios.

## Section 4.1.3 - Water Resources

Page 107, second full paragraph, add the term "submittal package" to the end of the third sentence (beginning with "The potential...") following "the Aquifer Protection Permit".

## Section 4.2.1 - Geological Resources

Page 115, first full paragraph, insert the following sentence after sentence 4 (ending with ...short-term loading".):

In addition, all factors of safety are in excess of 1.3 for stage construction and 1.5 for steady-state seepage cited in the Arizona Department of Environmental Quality Revised Best Available Demonstrated Control Technology guidelines (August 14, 1995).

Page 115, last paragraph, sentence 2 (beginning with "The maximum..."), replace the word "can" with the word "would" and replace the text "magnitude" with the word "magnitude".

## Section 4.2.3 - Water Resources

Page 118, first paragraph under the subheading of "Groundwater", add the following text at the end of the paragraph:

Proposed point of compliance wells are depicted in Figure C, presented in the Final EIS.

Page 118, second paragraph under the subheading of "Groundwater", add the following text to the end of the paragraph:

Due to the presence of the hydrologic sink of the open pit, the qualitative groundwate modeling conducted for pit waters, and the type of waste rock planned for disposal, the potential for the construction of the proposed South waste rock disposal facility to adversely impact groundwater quality or quantity is not expected to be significant.

Page 118, second paragraph under the subheading of "Groundwater", insert the following after sentence 6 (ending with "...continued pit excavation."):

The majority of the acid-generating ore will be removed from the pit during mining operations. Any residual oxidation of sulfide ores left in the pit would produce a small amount of waste when compared to the large volume of water that will be flowing into the pit on an annual basis.

Page 118, second paragraph under the subheading of "Groundwater", replace the term "water budget" in the eigth and ninth sentences with the term "qualitative groundwater model".

Page 119, replace the last sentence in the first paragraph with the following:

A discussion of potential impacts to groundwater, a description of the hydrologic sink, and the qualitative groundwater model are presented in full in the Aquifer Protection Permit application submittal package (Woodward-Clyde Consultants 1995).

Page 119, first paragraph under the subheading "Surface Water", replace sentence 5 (beginning with "Potential adverse impacts..."), with the following text:

Based on the analytical chemistry results of surface water up and downstream of the existing Mammoth tailings facility, construction and operation of the proposed Upper Mammoth tailings facility is not exptect to adversely impact surface water quality.

## Section 4.2.4 - Biological Resources

Page 122, third paragraph under the "Candidate Category 2" subheading, add the following text to the end of the paragraph:

The loss of 320 acres of Category III desert tortoise habitat on public lands would be mitigated by changing the livestock management on 4,000 acres of Category II desert toroise habitat within the Bagdad allotment. Grazing practices would be adjusted by restricting grazing to fall and winter use only. This action would enhance the existing Category II desert tortoise habitat as well as reduce competition between the tortoises and the livestock.

## Section 6.1 - List of Permits

Page 152, replace the list of permits table with the following table:

PERMIT/APPROVAL	AUTHORIZING AGENCY		
Section 404 permit	United States Army Corps of Engineers		
Section 401 Water Quality Certification	Arizona Department of Environmental Quality		
Aquifer Protection Permit or Project Approval	Arizona Department of Environmental Quality		

## Section 9.3 - Agencies Consulted and Contacted

Page 157, add the following agency to agencies contacted during the EIS process:

• Arizona Department of Environmental Quality

## Section 11.0 - Glossary

Page 163, add the following definition for Human Environment between Habitat and Hydrology:

The natural and physical environment and the relationship of people with that environment.

Appendix 1 - Organizations, Groups, and Individuals Who Received A Copy of the Draft EIS

Add the list on the following page to the end of the appendix.

## APPENDIX 1 - REVISED

## ADDITIONAL ORGANIZATIONS, GROUPS, AND INDIVIDUALS WHO RECEIVED A COPY OF THE DRAFT EIS SUBSEQUENT TO THE ORIGINAL MAILING

De Lillo & Sutton Enterprises

Dennis Sundie Dept of Water Resources

Office of Environmental Project Coord

Bob Stewart Plumbers Local 469

Givens Pursley & Huntley Baird Joseph

Agra Earth & Environmental Bansberg Rich

Staff Geologist Cyprus Bagdad Copper Corp Blacet Philip

Bateman Engineering, Inc. Bodnar Bob

People for the West Button Danny

Acting Professor of Law University of California, Davis Doremus Holly

Ecology and Environmental, Inc. Fetzer Mark

Center for Urban Affairs & Policy Research Northwestern University Friesema Paul

Cyprus Bagdad Copper Corp Garfield Mike

## Glustrom Leslie

Wildlife Specialist III Gunn John

Aquatic & Wetlands Consultants Gurnee Grant

Water Division W63 Environmental Protection Agency Hillenbran John

Hayden Library/Govt Documents Arizona State University Jones Kathy

Environmental Coordinator Phelps Dodge Corp Kirwan Edward

Northern AZ Liaison Phelps Dodge Mining Co Ladner Ralph

Project Manager SWCA Lee Tina

Natural Resources Officer Bureau of Indian Affairs McNichols Robert

Landman ASARCO Incorporated Miller Mark

Moody Jane Ellen

SAIC Mozingo Jack

Independence Mining Co Paul Cheryl

## Powers Jim

ASARCO Reichardt Leonard

Southwestern Field Biologists Reichenbacher Lari-Ann

Ecology Group, MSIN K6-84 Battelle Pacific Northwest Laboratory Reid William

Defenders of Wildlife Rodriquez Rina

WMEL Radio Rune Joe

Schleicher Carter

DEL Professional Services Starkey James

Thomas Rachel

Pearson Keith

Whitman & Company Whitman Kathy

Williams John

## 3.1 PUBLIC REVIEW PROCESS

The public comment period for the Draft EIS extended for 60 days from August 17, 1995 to October 16, 1995. Written comments were recieved from a total of six individuals and public agencies. Two public meetings were held on the Draft EIS. Public meetings were held at the following dates and locations:

•	September 27, 1995	Mohave Community College Kingman, Arizona
•	September 28, 1995	Prescott Resort Conference Center Prescott, Arizona

The meetings were attended by a total of approximately 20 people. Native American consultation was conducted concurrently with the scoping process in accordance with BLM procedures.

## **3.2 DEVELOPMENT OF RESPONSES TO PUBLIC COMMENTS**

Responses to the public comments received in writing and at the public meetings are presented in Section 3.3 of this document. All comments were carefully reviewed. If the comment was within the scope of the EIS, the Draft EIS was referred to for clarification. If additional clarification, modification, or information was necessary, the Final EIS was modified as appropriate in Section 2 of this document (Errata).

## 3.3 PUBLIC COMMENTS AND RESPONSES

This section includes copies of all public comments received in response to the Cyprus Bagdad Proposed Tailings and Waste Rock Storage Area Draft EIS. The BLM's responses to substantive comments are provided adjacent to the reproduced comment letters. Eight comment letters were received for the Draft EIS. Two formal comments were stated at the public hearings, voicing support of the proposed action.

OFFICIAL FILE COPY Return to Central Files

Fridax Eges Fachicing AL STE41 **RESPONSE TO COMMENTS** 5 17-95 Engineering / Dratting Stuff 1505 - BLH 2615 W. Deer Lullieg Rel Phonex AZ 25027 Ladies/ Centlemen Quant le pass along a technical comment - that will be you van appar more protossional when puparing displaying drawings In a second BLM publication (See Dris Boarder Coppin Project Aug 95), There are drawings made by About ward - Clyrte Circle Hearts that Say " BCALE IN PERT" alon they meant " SCALE OF FEIT". Say " BCALE IN PERT" alon they meant " SCALE OF FEIT". Albert Decome (non, are mented never to brate seach a mistake When Decome (non, are mented never to brate seach a mistake and nomes cilicage midely the decement it consul the cross of a publiched it is our report (decement Arat make en of bur scales 1-1

Scale "in feet" is the accepted terminology for describing the scale and measure of a drawing or map.

RUREAU OF LAND MANAGEMENT PHOENIX DISTRICT OFFICE

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**RESPONSE TO COMMENTS (CONTINUED)** 

Gorden Chan, 10: USLI - BLM 2013 Beer Volley Pd Plummar AL 85327

Down Mr. Chanies ;

2-1

A resert El : "Aug 1993) defines the term "ENVIRONMENT " & mean " Physical surroundings of conditions that affect the growth or well-being of an organism "("mahaviroddu") Classical difficition: "ALL THE CIRCUMSTANCES AND CONDITIONS THAT AFFECT THE WILLFAM OF AN ORGANISM .

I believe the term "Divisionment" ranks amon the most abused and mis-used of all word; comment, wied of J.S. Correnant; I also believe the CLM definition perpetuate. / provider mis-inderstation

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Thanks be "Listening

2-1 For clarification, the Draft EIS has been modified to include the term "human environment" in the Glossary (Section 11.0). Per Council of Environmental Quality (CEQ) regulations, the human environment is defined as "the natural and physical environment and the relationship of people with that environment."

**RESPONSE TO COMMENTS (CONTINUED)** 

Prof. Manager Bryden Copper that 2013 a iver bally At Photoma, At Eberg

mency

Dear Ms Jehson: I am a quick review of the Aug. 1995 Whalt EIS on mutification of the Bosted Open Pit Aming Plan (ve tendings / write net skiege) needer to extend the mine like from 6 to 35 years I on pleased that BLAI decided to choose the alternative to previde the I on pleased that BLAI decided to choose the alternative to previde the the extended mine life. This extension is a fantastic surre-exemence blessing the extended mine life. This extension is a fantastic surre-exemence blessing the local productions and an important benefit to are Actively in terms of fullocal productions and an important benefit to are Actively in terms of previding basic raw minuted materials at alternative prices, previding basic raw minuted materials at alternative prices, I dow den't minut, i would appreciable year help in previding one on The veo den't minut, i would appreciable year help in previding one on Alter would be the fillowing geostica. How area used to the fillowing geostica. MAJOR<sup>11</sup><sup>22</sup> The fidered action in this case appear to be "inners" (suct major) to me size The fidered action in this case appear to be "inners" (suct major) to me size

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thanks to the key

JB John

J. B. Jacks

3-1 Federal agencies are required to prepare an Environmental Impact Statement (EIS) for major federal actions. A "major" federal action includes: 1) federal actions that either may or are expected to significantly affect the quality of the human environment, or 2) federal actions whose effects on the quality of the human environment may or are expected to be highly controversial. The decision to prepare an EIS in this case was determined through internal scoping by the interdisciplinary team in consideration of anticipated public controversy, the original acreage of public lands involved, and the potential for significant environmental impacts.



**RESPONSE TO COMMENTS (CONTINUED)** 

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor Edward Z. Fox, Director

....

ERP: 95-1240

August 18, 1995

Ms. Mary Johnson, Project Manager Phoenix District Office 2015 West Deer Valley Road Phoenix, Arizona 85027

Draft Environmental Impact Statement, August 1995 RE: Cyprus Bagdad Copper Corporation Tailings and Waste Rock Expansion

#### Dear Ms. Johnson:

We have concluded our review of the referenced report concerning an expansion of the Cyprus Bagdad Mine. This review focuses on surface water quality protection. Thank you for the opportunity to review the referenced document during initial project planning. Since we have not been on site as a part of this review, our comments are limited to those which could be ascertained from the information you provide, our files and other available data sources. Our general comments follow:

- We noted several references to the "72-hour Probable Maximum Flood" and the use of 1 this parameter for designing tailings impoundments. This is a new concept for the the
- Arizona Department of Environmental Quality (ADEQ) Surface Water Section. The 30-day 4-1 Maxim Precipitation Event (MPE) has been used by ADEQ for similar projects. The Environmental Protection Agency (EPA) also uses the MPE in Arizona when issuing NPDES Permits. The Section 404 Permit for this project will contain State 401 Certification conditions from ADEQ requiring this degree of protection for stormwater storage facilities.
- Seepage collection ponds and stormwater retention basins should monitor retention 2. capacity due to sediment buildup and report to the Surface Water Section quarterly. Pond capacity should not fall below 80% of design capacity. 4-2
- Mine dumps are not a discharging facility if they are protected from the run-on of surface 3. waters. Rainfall falling on a level mine dump will not penetrate beyond a few feet into
- the dump. The Du Pont Co. and the U.S.Bureau of Mines have both performed tests on 4-3 the penetration of rainfall into mine dumps and leach piles. Mining magazines have also carried written articles on this subject.

- 4-1 The 72-hour Probable Maximum Flood (PMF) event is estimated from the most severe combination of meteorological and orographic conditions believed to be possible under existing climatic conditions. The 72-hour PMF represents roughly three to five times the 100-year rainfall for inland basin, mountain, and desert regions in the western United States and is a more stringent design criteria used for construction of tailings ponds (please refer to pages 15, 23, and 165 of the Draft EIS).
- 4-2 Seepage collection ponds are continuously monitored in accordance with Cyprus Bagdad's National Pollutant Discharge Elimination System (NPDES) permit. Stormwater retention basins are also monitored regularly as part of Cyprus Bagdad's management practices to maintain stormwater capacity.
- 4-3 Your comment is noted.

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#### **RESPONSE TO COMMENTS (CONTINUED)**

4-4 Section 9.3 of the Draft EIS has been modified to include the Arizona Department of Environmental Quality (ADEQ) in the listing of State and Federal agencies.

\*

- 4. Page five contains a list of State and Federal agencies which were contacted during the preparation of the Draft E.I.S. The Arizona Department of Environmental Quality is not 1isted in the list.
- 5. The Draft E.I.S. is informative and will be used in the permitting of the proposed expansion. More detailed information will be required from Cyprus Bagdad when they apply for a Section 401 State Water Quality Certification for the protection of surface
- waters during the expansion, operation and closure of the Bagdad Mine.

We appreciate the opportunity to provide our comments during initial project planning. If you have any questions, please call me at (602) 207-4502.

Singerely Imer.

<sup>∕</sup> James Matt, P.E. Environmental Engineer Engineering Review & Permits Unit

cc Wayne Palsma ADEQ

4-5 Thank you for your comment.

## Keith Pearson COT Keith Pearson WI CT 10 Fil 1: PO. Box 39267 CITEM CFLAND HOPINX, AZ 85069 FIL COT CITEMA

October 7, 1995

Ms. Mary Johnson, Project Manager Phoenix District Office, Bureau of Land Management 2015 West Deer Valley Road Phoenix, AZ 85027

These comments pertain to the draft environmental impact statement (EIS) on the proposed action of the Cyprus Bagdad Copper Corporation Tailings and Waste Rock Expansion.

My concern focuses on those major portions of the document that are misleading, incomplete, or insufficient regarding compliance with the Council on Environmental Quality (CEQ) Regulations for implementing the procedural provisions of the National Environmental Policy Act (40 CFR 1500).

#### "Purpose and Need"

The statement of purpose on page 2 is misplaced and misleading. It reads that the "purpose of the proposed action is to expand mill tailings and waste rock storage to allow the continuation of existing copper mining operations at Cyprus Bagdad for 35 years." This could be the purpose of the Cyprus Bagdad plan of operation, but to claim it is the purpose of the proposed action relating to the use of federal public lands is erroneous and confusing. Why doesn't your purpose and need statement mention the public lands which are the subject of the draft EIS? Why doesn't it clearly stipulate that the proposed action (as it affects BLM) is to remove 320 acres from public multiple use and transfer it to private mining use?

In this draft EIS BLM should analyze: 1) a range of reasonable alternatives to this proposed action to transfer 320 acres of public land from federal multiple use management to Cyprus Bagdad for mining use; and 2) the various types of environmental impacts that would occur from implementation of the proposed action and the range of reasonable alternatives.

#### ["Alternatives"

5-2

5-1

The second matter -- the discussion of alternatives involves a number of serious inadequacies.

Page 1 of 3

#### **RESPONSE TO COMMENTS (CONTINUED)**

5-1 The concerns stated in your comment letter focus on the accuracy of the purpose and need statement and the description of the proposed action. For clarification, the proposed action does not involve the transfer of public lands to private lands. Any possessory rights that have been transferred were the result of mining claim location and not the submission of a Mine Plan of Operations. The act of locating a mining claim does not constitute a Federal action within the meaning of NEPA and does not require analysis under the law. The transfer of any possessory right to the Cyprus Bagdad is clearly outside the scope of this EIS.

As stated in the Draft EIS, the purpose of the proposed action is to expand tailings and waste rock storage areas to allow the continuation of existing copper mining operations at Cyprus Bagdad for 35 years. As stipulated in the CEQ regulations, the EIS shall state the "underlying purpose and need to which the agency is responding." (40 CFR 1502.13). The BLM is responding to the submittal of the Mine Plan of Operations by Cyprus Bagdad for the use of public lands for mineral resource development. This information is stated in the Draft EIS on page 1.

If your concern of the proposed action is in terms of land use management, the concept of multiple use management does not imply that all possible uses of public land must occur concurrently or simultaneously. While the predominant use is mining for a limited period of time, the land is still regulated as multiple use. Once the land is reclaimed, the land will be managed considering equally all potential uses of the land. The proposed use of the land is in conformance with the Kingman Resource Area Management Plan.

5-2 A range of preliminary alternatives were analyzed during the scoping process. Alternatives were eliminated from detailed consideration due to major engineering, environmental, or economic concerns or if they did not meet the underlying needs of the project. Only reasonable alternatives which met the underlying needs were considered in detail in the Draft EIS, as per 40 CFR 1502.14 (a). A map (Figure A) depicting these alternative sites was added to the Draft EIS in Section 2.5. The Draft EIS has also been modified to include two matrices (Tables A and B) showing the screening procedure for these alternatives.

Federal lands affected by the proposed action are described in the Draft EIS, on pages 6, 18, 93, and depicted in Figures 5 and 17 and in Table 25. For clarification on the proposed action, please refer to the response to comment 5-1.

The CEQ regulations identify the discussion of the alternatives as the "heart" of the environmental impact statement and require any EIS prepared by the BLM to "Rigorously explore and objectively evaluate all reasonable alternatives," and to "Devote substantial treatment to each alternative ... so that reviewers may evaluate their comparative merits" (40CFR 1502.14).

Because this document does not clearly define the proposed action (i.e.: refer to the 320 acres of public lands involved), the identified alternatives, and the subsequent impact analysis, are meaningless. Since the public lands are not clearly the focus of the proposed action, the definition of the alternatives is confused and muddy.

For example, in Section 2.3, pages 18 and 19, the document states: "[a]pproximately 320 acres of federal lands and approximately 1,680 acres of private lands would be disturbed, including approximately 435 acres of previously disturbed areas. The proposed action involves the following major components which require BLM approval: Development of Upper Mammoth tailings facility; Expansion of the existing South waste rock disposal facility."

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This statement appears to have been written by someone who wasn't sure what was being proposed. The statement should clearly point out that implementation of the proposed action would require the <u>transfer</u>, from public multiple use management to private industrial use, of two parcels of real estate consisting of 320 acres of public lands. It should explain to readers that one of the parcels (Upper Mammoth tailings facility) in the proposed action involves 15 acres of public land to be converted for mining use and that the other parcel amounts to 305 acres of public land to be used for expansion of the South waste rock facility.

The statement that "approximately 1,680 acres of private lands would be disturbed, including approximately 435 acres of previously disturbed areas" has no relevance to a proposed action in an EIS that is focused on federal lands.

Since this is a federal draft EIS, the alternatives must address either the use or nonuse (no action) of federal lands. Therefore, the alternatives should provide for a continuum, with the proposed action (320 acres in two parcels) on one end and no action on the other. The continuum logically would include consideration of either: 1) the inclusion of one of the federal parcels instead of both, or 2) changes in the size (amount of acreage) in the parcels.

The considerable verbiage on pages 19 to 32, consisting of general discussions of what the company would do on the 1,250 acres of non-federal lands in the Upper Mammoth tailings facility and the 355 non-federal acres in the South waste rock disposal area is unnecessary, and not germane to the draft EIS. There is absolutely no need for the pages of "economic and social analysis" because at best the economic and social impacts from implementation of the proposed action (converting 320

Page 2 of 3

- 5-3 Previously disturbed and undisturbed acreages are provided to accurately assess environmental impacts which may result from implementation of the proposed action.
- 5-4 The No Action Alternative is described in detail in the Draft EIS. Selection of the No Action Alternative would not allow the use of 320 acres of federal lands, and Cyprus Bagdad would need to continue operations on private lands. With the No Action Alternative, Cyprus Bagdad would continue operations on private lands for six years, followed by closure. The description and analysis of the No Action Alternative to the same level of detail as the proposed action is required by CEQ regulations (40 CFR 1502.14 [b,d]). The CEQ regulations do not limit alternatives by land ownership.
- 5-5 A discussion and analysis of the proposed project components on private lands are provided in the Draft EIS as they are connected actions. According to the CEQ regulations, connected action are "interdependent parts of a larger action and depend on the larger action for their justification" (40 CFR 1508.25 [1][iii]). Socioeconomic analyses are discussed in the Draft EIS as the potential impacts within this aspect of the environment could be significant. The predominant concerns voiced during the scoping process were the potential socioeconomic impacts of the proposed action as well as of the No Action Alternative.

**RESPONSE TO COMMENTS (CONTINUED)** 

acres of land from public multiple use to private industrial use) would be insignificant, indirect, and secondary.

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The brief listing and discussion of the "alternatives considered but eliminated" is deceptive. First, there is no identification of the amount (if any) of federal land in those alternatives. And, if no federal land is involved, why are they identified in a federal EIS? Second, the alternatives appear to be discarded because of potential environmental consequences. If they involve federal (BLM) land, and if there could be environmental consequences from an action, they should be thoroughly analyzed in the draft EIS. That is one of the basic purposes of an EIS.

"Impact analysis"

Although the impact analysis in the document is superficial and misleading, this is section not one of my main concerns. Since the identified alternatives do not focus on federal land use options, the impact analysis is useless.

For example, the impacts of changing the land use from federal multiple use management to private use must be addressed.

The CEQ requires three levels of environmental consequences analysis: significant direct, indirect, and cumulative impacts. Yet the document contains few references to any significant direct impacts on federal lands administered by the BLM from implementation of the proposed action or alternatives. Its main focus seems to be on the indirect and secondary effects that could occur to the mining industry as a result of the selection of the "no action alternative." Further, the cumulative impact section appears to completely ignore any specific reference to the 320 federal acres.

In summary, I do not believe the draft document complies with the regulations issued by the CEQ (43 CFR 1500) regarding the statement of the proposed action, the alternatives, or the impact analysis. These oversights should be corrected before the final EIS is issued. I also am sure you are aware that the CEQ Regulations require public notification, review and comment of new or substantially changed alternatives before the final EIS can be issued.

Please place my name on the mailing list for environmental documents.

Sincerely.

(eith L. Pearson

Page 3 of 3

Please refer to the response to comment 5-2. 5-6

- 5-7 The Draft EIS addresses significant direct impacts which may occur from the proposed action. Many other potential impacts to the environment were also considered but deemed not significant. Cumulative impacts to land use are discussed on page 148 of the Draft EIS.
- 5-8 The Draft and abbreviated Final EIS have been written in accordance with CEO regulations. The purpose and need of the proposed action and alternatives reflects the underlying needs of the proposed action. Altering the statement of purpose of the proposed action would not provide an accurate representation of the proposed action.



### UNITED STATES ENVIRONMENTAL PROTECTION AGENCE 1010 FD0 REGION IX 75 Hawthorne Street 1725 MT 19 21111:11 San Francisco, CA 94105-3901 DUDEAU OF LAND MGT THERE AND ANTERIA

October 13, 1995

Mary Johnson Bureau of Land Management Phoenix District Office 2015 W. Deer Valley Road Phoenix, AZ 85027

#### Dear Ms. Johnson:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the Cyprus Bagdad Copper Corporation Proposed Tailings and Waste Rock Storage Areas, Yavapai County, Arizona. Our comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 CFR 1500-1508, and Section 309 of the Clean Air Act.

The DEIS evaluates alternatives for locating tailings and waste rock storage areas for continued copper mining operations at the Cyprus Bagdad mine. The existing open pit will be expanded and extend the life of the mine for 35 years. The proposed action would involve approximately 320 acres of public lands. Total disturbance associated with the proposed action is approximately 2,000 acres.

We have rated this DEIS as EO-2 -- Environmental Objections-Insufficient Information (see the enclosed "Summary of Rating Definitions and Follow-Up Actions"). Our rating is based on the proposed project's potential impacts to water quality and the need for additional information in the Final Environmental Impact Statement (FEIS) regarding existing surface water and groundwater quality, water quality impacts and mitigation measures, geology and geochemistry, monitoring, alternatives to the proposed action, facility design, and hazardous materials management. Our specific comments are enclosed.

We appreciate the opportunity to review this DEIS. Please send two copies of the FEIS to this office when it is officially

#### SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

#### **Environmental Impact of the Action**

#### LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

#### **EC-Environmental Concerns**

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

#### **EO-Environmental Objections**

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

#### EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of environmental quality, public health or welfare. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommend for referral to the Council on Environmental Quality (CEO).

#### Adequacy of the Impact Statement

Category 1-Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

#### Category 2-Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

#### Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

\*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

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filed with our Washington, D.C., office. If you have any questions, please call Jeanne Geselbracht at (415) 744-1576.

Sincerely, Deanna M. Wieman, Director Office of External Affairs

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enclosures

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Cyprus Bagdad Mine Expansion DEIS EPA Comments -- October, 1995

#### General Comments

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The discussions in the DEIS of direct, indirect, and cumulative impacts are vague. In many cases, impacts are not quantified where quantification would be the appropriate means of expressing the significance or insignificance of the impacts. The DEIS frequently refers the reader to the Aquifer Protection Permit application, the Plan of Operations, and the SHB Agra reports on tailings facilities closure and Tailings site selection study for specific details. However, the relevant information from these referenced documents is not sufficiently summarized in the DEIS. The FEIS should provide additional information, which is specifically addressed below.

The only alternative to the proposed project is the No Action Alternative. Several alternatives were eliminated from further consideration, but they are not discussed in enough detail to determine their environmental impacts relative to each other or their feasibility. More detail needs to be provided in the FEIS regarding other alternatives. A large map of the area with alternate sites and a large map of all features associated with topics discussed in the FEIS would prove useful.

The FEIS should provide additional geologic information, including a map, cross sections and descriptions of units including general hydrogeologic characteristics.

#### Waste Rock Characterization and Disposal

The information in the DEIS is insufficient to determine whether waste rock, tailings, or pit walls would be acid generating. It is unclear from Table 6 whether the samples listed were the only ones tested for acid-generating potential. If this is the case, 24 samples are insufficient to represent the volume of rock that would be excavated under the proposed plan, and a significantly greater number of samples should be collected and tested. In addition, Table 6 indicates uncertainties regarding the acidgenerating potential of several of the samples tested. However, it does not appear that any kinetic testing was conducted for these samples. For samples which indicate uncertainties based on static testing, we recommend that appropriate kinetic testing be conducted to obtain better prediction of acid-generating potential.

EPA believes that BLM oversight and enforcement of a sound waste rock characterization and disposal plan are critical to ensuring protection of water quality at sites with high acid-generating potential. Based on the results of static tests, it appears that

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#### **RESPONSE TO COMMENTS (CONTINUED)**

- 6-1 The Draft EIS provides an analysis of direct, indirect, and cumulative impacts. These impacts are quantified for most disciplines. In some cases, however, quantification is not available or necessary (such as impacts to visual or recreational resources), and a qualified impact analysis is conducted.
- The BLM appreciates the comments from the U.S. Environmental Protection 6-2 Agency (EPA) concerning the hydrology-related issues of this Draft EIS. In compliance with CEO regulations, including reducing paperwork (40CFR 1500.4 [b, f, j]), incorporation by reference (40 CFR 1502.21), page limits (40 CFR 1502.7), discussing only briefly issues other than significant ones (40 CFR 1500.4 [c]) and in an effort to write the EIS in plain language in accordance with 40 CFR 1500.4 (d), the Draft EIS contains the results of a detailed analysis documented in the Aquifer Protection Permit (APP) application, the Mine Plan of Operations, and supporting data. The Draft EIS has been modified to include brief summaries of pertinent information requested by the EPA. The BLM feels, however, that it is impractical to include specific technical information contained in the six volume APP submittal package. As per CEQ regulations (40 CFR 1502.2[b]), impacts are discussed in the Draft EIS in proportion to their significance. The EPA may wish to contact Mr. Mike Woods (Aquifer Protection Permits Officer) of the ADEO at (602) 207-4585 and request a copy of the APP submittal package for Hydrologic Areas 1 and 6 at Cyprus Bagdad. The BLM will not approve the proposed action until all of the necessary environmental approvals and/or permits listed in Section 6.1 of the Draft EIS, as modified, are obtained. Specific comments on the Draft EIS by the EPA are addressed below.
- 6-3 Several alternatives were eliminated from detailed consideration due to major engineering (topographical or stability constraints) significant environmental impacts or economic constraints. Only reasonable alternatives which met the underlying needs were considered in detail in the Draft EIS, as per 40 CFR 1502.14 (a). The Draft EIS has been modified to include a map (Figure A) depicting the alternative sites, as requested. In addition, the Draft EIS has also been modified to include two matrices (Tables A and B) showing the screening procedure which was used in evaluating alternatives. Please refer to the response to comment 6-2.
- 6-4 A geologic map (Figure B) of the mine has been added to the Draft EIS (Section 3.2), with a description of map units, as requested by the EPA. These additions will complement the geologic map of the pit already provided in the Draft EIS (Figure 10), and geologic characteristics provided in Table 5 of the Draft EIS.
- 6-5 Groundwater flow in the area of the open pit, including the area of the South Waste Rock Disposal Facility, is currently toward the pit bottom (page 50 of the Draft EIS). ADEQ concurs with Cyprus Bagdad and the BLM that the pit acts as a hydrologic sink drawing water from all directions from the hydrologic area around the open pit (page 50 of the Draft EIS). In addition, all stormwater from the South Waste Rock Disposal Facility will report to the open pit (page 27 of the Draft EIS). A qualitative groundwater model of the pit area was conducted to

<sup>\*</sup> denotes a correction or addition made to the Draft EIS



Cyprus Bagdad Mine Expansion DEIS <u>EPA Comments -- October, 1995</u>

such a plan is appropriate for the proposed project. The plan should specifically prescribe and discuss the frequency and type of rock sampling (e.g., how many samples per million tons for each geologic unit); testing methods to be used; criteria for determining when different methods are appropriate; the different assumptions used in predicting acid generation for pit walls, waste rock piles, and tailings; and requirements for reporting test results.

Waste rock with acid-generating potential should be admixed with an appropriate amount of neutralizing rock within the waste rock pile in order to isolate/neutralize it. The plan should describe how the appropriate mixing ratio of neutralizing rock to acidgenerating rock would be determined for proper

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isolation/neutralization of acid-generating rock. The plan should also discuss how acid-generating waste rock would be placed/isolated within the waste rock piles to avoid contact with meteoric water and surface water. Specifications for capping, covering, recontouring, and revegetating the waste rock pile, the Upper Mammoth tailings impoundment, and the Kimberly tailings should be included. The waste rock characterization and disposal plan should be included as an appendix to the FEIS. At the very least, a summary of the plan should be included in the FEIS.

The FEIS should provide the results of the additional static and kinetic sampling and testing that we recommend be conducted prior to BLM's approval of the Plan of Operation. The FEIS should indicate the volume of each rock type to be excavated or moved (including the Kimberly tailings) and the percent of potentially acid-generating rock in each geologic unit; identify where each unit will be disposed of; and provide a geologic map and cross sections depicting this information.

Characterization of seepage from existing site facilities may be useful in predicting potential impacts from the proposed facilities. The FEIS should identify the chemistry of seepage from existing waste rock piles and tailings impoundments, including the Kimberly tailings, for the purpose of providing baseline water quality information for both surface water and groundwater and predicting potential impacts to water quality in streams as well as in the open pit.

The DEIS (p. 52) states that the "low potential for acid mine drainage is illustrated by the overall water quality of the pit waters, which has relatively low concentrations of metals and sulfate in a highly mineralized area." Groundwater sampling for the purpose of characterizing future pit water acid potential is inappropriate here because groundwater collected in wells prior to entering the pit is relatively anoxic. Therefore, the "low

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#### **RESPONSE TO COMMENTS (CONTINUED)**

6-5 analyze water budgets and to estimate water levels in the pit at closure (page 118

- (con't) of the Draft EIS). Results indicate that pit waters would not raise above 2,000 feet mean sea level (page 119 of the Draft EIS). Due to the presence of the hydrologic sink, the water budget analysis, and the type of waste rock planned for disposal, construction of the South Waste Rock Disposal Facility has a low potential to impact the quality of the pit waters. This information has been added to the Draft EIS (Section 4.2.3). Because of the consistency of the results from the acid-generation testing conducted on waste rock and the presence of the hydrologic sink, the testing is deemed adequate to provide the characteristics of the waste rock.
- 6-6 Because of the analysis described in comment 6-5 and the waste rock closure plan in place, an additional waste rock characterization and disposal plan will not be required. The closure plan addresses capping of tailings and revegetation plans as well. The estimated volume of each rock type is provided in the Draft EIS in Table 2.
- Characterization of seepage from the existing Mammoth tailings pond provides 6-7 the most accurate prediction of tailings seepage water chemistry. According to the APP, there are no measured constituents detected in the pumpback water (recovered seepage) at concentrations in excess of AWOS (Annotated Checklist and Technical Summary in Support of the Aquifer Protection Permit Application for Mammoth Tailings Facilities (HA-1), EnviroNet, 1995, page 19). Samples from groundwater monitoring wells in the lower Gila formation in the lower Mammoth Wash area indicate that only two constituents, arsenic and fluoride, are consistently measured above AWQS (EnviroNet 1995, page 48). The arsenic concentrations are one to two orders of magnitude higher than the measured concentrations of arsenic found in the tailings upstream. Therefore, these two exceedences are most likely a result of a geochemical influence of the lower Gila formation on the groundwater of the area. In addition, analytical water chemistry results indicate that surface water chemistry of the lower Mammoth Wash watershed is of higher quality than that of the upper Mammoth Wash watershed (EnviroNet 1995, page 51). This information has been added to the Draft EIS (Section 3.4.1). Based on these results, seepage from proposed Upper Mammoth tailings is not expected to adversely affect surface or groundwaters. Seepage from the Kimberly tailings currently mix with waters from the pit walls before discharging into the open pit. Water quality predictions for open pit waters is discussed in the response to comment 6-5.
- 6-8 The BLM does not require pit water chemistry modeling due to the demonstrated presence of the hydrologic sink and the results of the qualitative groundwater model. The majority of the acid-generating ore will be removed from the pit during mining operations. Any residual oxidation of sulfide ores left in the pit would produce a small amount of waste when compared to the large volume of water that will be flowing into the pit on an annual basis. Please refer to page 50 of the Draft EIS and the response to comment 6-5.

#### Cyprus Bagdad Mine Expansion DEIS EPA Comments -- October, 1995

potential for acid mine drainage" is not demonstrated here. Static and possibly kinetic testing should be conducted to determine acid potential for pit walls. Modeling appears to be appropriate for general pit water chemistry (e.g., metals, con't) sulfate, total dissolved solids) as well as acid-generating potential.

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The FEIS should also project water quality of seepage from tailings and waste rock under non-acid conditions for 6-9 contaminants such as sulfates, metals, total dissolved solids which may be released.

The FEIS should describe the chemical nature of the Kimberly tailings and discuss why they are being moved. The FEIS should identify any permits (e.g., Clean Water Act \$404) that have been 6-10 obtained for relocating the Kimberly tailings and indicate how \_much material has already been relocated. The FEIS should include a description of Bevering Gulch (e.g., length, flow rate, 6-11 other watershed information).

The goal of underdrains is to separate water from the waste rock. The FEIS should specify capacity, durability, service life 6-12 and construction methods for the underdrains. The acid producing material should be in areas designated to specifically avoid water quality impacts.

The DEIS (p. 49) states that the proposed South waste rock disposal facility would be located almost entirely on Barkerville cobbly sandy loam soils. According to Table 7, these soils have rapid runoff and moderately rapid runoff. The FEIS should discuss the implications of this on surface water and groundwater. The runoff from various storm events should be quantified.

Furthermore, the FEIS should expand on the waste rock foundation permeability characteristics, particularly in light of the fact that the area contains exploration drill holes. Additional

information on the geology of the Gila Conglomerate is needed in 6-14 the FEIS. In addition, more detail including placement standards, permeability, and general characteristics about the two foot thick "cap" of Gila Conglomerate should be provided.

#### Upper Mammoth Tailings Impoundment

According to the DEIS (p. 24), a comprehensive evaluation of the hydrologic characteristics of the Mammoth and upper Mammoth areas 6-15 was conducted. This included groundwater chemistry, flow behavior, and the potential for solute transport. However, none of this information is provided in the DEIS. This information is

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#### **RESPONSE TO COMMENTS (CONTINUED)**

- Please refer to the response to comment 6-5 for a discussion of potential impacts 6-9 to water quality from waste rock seepage of pit waters. Water quality of tailings water seepage is discussed in the response to comment 6-7.
- Page 27 of the Draft EIS discusses the chemical nature of the Kimberly tailings 6-10 and the fact that the reclamation of the tailings can be achieved by relocation and capping with waste rock. The Kimberly tailings would be moved to allow the excavation of the open pit in that area. This information has been added to the Draft EIS (Section 2.3.2), as well as the amount of Kimberly tailings that have been relocated to-date (Section 2.1). The Kimberly tailings will become part of the South waste rock disposal facility; no additional NPDES discharge points will be necessary. An air permit was obtained by Cyprus Bagdad for conveyor operations to transport the Kimberly tailings on private lands. However, these conveyor operations have now ceased. A Section 404 permit application is currently being reviewed by the U.S. Army Corps of Engineers for future disposal into jurisdictional waters in Bevering Gulch. This permit is identified on page 152 of the Draft EIS.
- 6-11 Bevering Gulch is a minor ephemeral drainage tributary to the historic Copper 🜟 Creek. The Gulch is currently intercepted by a stormwater percolation pond behind the relocated Kimberly tailings. This information has been added to the Draft EIS in Section 3.4.2.
- 6-12 The goal of the underdrains is to facilitate transport of stormwater runoff underneath the waste rock facility to the open pit. The underdrain system will be constructed by placing clean basalt material on specified locations within the facility footprint to promote proper drainage (please refer to Figure 8 in the Draft EIS). Drainage channels will be constructed in this fashion with the waste rock placed on top. The stormwater capacity for the facility exceeds the 100-year, 24hour storm event.
- Potential impacts to surface and groundwater quality from runoff from the South 6-13 Waste Rock Disposal Facility are discussed on pages 50 and 118 of the Draft EIS. For further clarification, please refer to the response to comment 6-5.
- 6-14 Additional information on the permeability characteristics of the South Waste Rock Disposal Facility foundation is not necessary due to the presence of the hydrologic sink of the open pit discussed in the response to comment 6-5. Geologic characteristics of the Gila Conglomerate can be found in Table 5 in the Draft EIS. Additional detail regarding the Gila Conglomerate as a cap for the South Waste Rock Disposal Facility is not required as revegetation trials using this material have been ongoing since 1977. These studies have found the Gila Conglomerate to be very amenable to revegetation (see page 15 of the Draft EIS).
- 6-15 Additional information on groundwater and surface water chemistry and the 🜟 potential for solute transport of the tailings has been added to the Draft EIS in Sections 3.4.1 and 3.4.2. This information is discussed in the response to comment 6-7.



#### **RESPONSE TO COMMENTS (CONTINUED)**

Cyprus Bagdad Wine Expansion DEIS EPA Comments -- October, 1995

6-15 especially important because it is used to develop operational and post-closure monitoring of groundwater quality in addition to con't) control technologies for the structure. This information should be provided in order to assess potential environmental effects.

The FEIS should provide additional information in Figure 4 regarding relocation of the existing seepage collection pond, including location and design parameters. The FEIS should also provide figures and schematics showing seepage controls, storm water dams, and drainage paths for the tailings impoundments.

The FEIS should indicate the factor of safety for the tailings impoundment and discuss the assumptions used in determining this. The FEIS should indicate the safety of the structure with respect to erosion, piping, relative compaction thresholds and foundation failure.

6-18 The FEIS should define "major" rainfall as it is used on page 17 regarding frequency of facility inspections.

6-19 The DEIS (p.23)states that storm water runoff contact with the tailings would be minimized. The FEIS should define "minimized" by listing the exposed area (i.e., acreage) and estimate quantity of runoff that has contacted this area for a given storm event.

#### Surface Water

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In several places, the DEIS states that surface water quality in the area will not be affected by the expanded operations, but no data are presented to justify this assertion. The Poplars below the Mulholland seepage control dam and the water surfacing 100 yards below the Mammoth seepage control dam suggest that there are releases of liquids from the impoundments. Elevated copper levels in a discharge from the Mammoth seepage control dam on August 23, 1989, suggest that the surface water quality at the site has been affected. Data from the current operations provide an indication of the potential effects of the proposed expanded operations. The DEIS provides no information regarding the impacts of the current Mammoth tailings pond on Mammoth Wash or Mulholland tailings pond on Mulholland Wash and subsequently Burro Creek. In light of the fact that seepage occurs from both tailings ponds, information on the chemistry of these discharges should be provided. In addition, the FEIS should discuss how conditions and/or operations would be changed to prevent future contaminated seepage.

6-21 The DEIS refers to Cyprus' National Pollutant Discharge Elimination System (NPDES) permit as a stormwater permit (p. 54 and p. 152). NPDES permit No. AZ0022268 is not just for

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- 6-16 The existing Mammoth tailings facility seepage collection pond is not proposed for relocation downstream. Figure 4 of the Draft EIS has been modified in Section 2.1 to delete the text indicating relocation. The schematics and figures available in the Draft EIS are deemed adequate to analyze impacts. Stormwater dams for the tailings impoundments are depicted on Figures 3 and 4. For more detail, additional schematics and figures can be found in the Mine Plan of Operations and the APP submittal package.
- 6-17 Factors of safety for the tailings impoundments and assumptions are provided on page 105 and 115 of the Draft EIS. Stability analyses include 17 separate cases, each producing a unique factor of safety for each condition. No one factor of safety would accurately represent the level of analysis performed. In all 17 cases, the factors of safety are greater than 1.25 for short-term loading. In addition, the factors of safety for all cases are in excess of 1.3 for stage construction and 1.5 for long-term steady state seepage, cited in the Arizona Department of Environmental Quality Revised Best Available Demonstrated Control Technology guidelines (August 14, 1995). This information has been added to the Draft EIS.
- 6-18 Section 2.2.1 of the Draft EIS has been modified to indicate that inspections of all site components will occur after storm events in excess of one inch in a 24-hour period.
- 6-19 In order to prevent confusion over the term "minimized", the last sentence beginning on page 23 and ending on page 24 of the Draft EIS has been deleted (Section 2.3.1).
- 6-20 Water chemistry of the tailings water seepage and the existing and potential impacts from the tailings facilities is described in the response to comments 6-7. As stated on page 50 and 54 of the Draft EIS, the natural mineralization of the bedrock in the region results in naturally elevated levels of sulfate, total dissolved solids, and total metals concentrations.

## (b)

Cyprus Bagdad Mine Expansion DEIS <u>EPA Comments -- October, 1995</u>

stormwater. This permit allows discharges of contaminated stormwater (i.e., it does not meet water quality standards) and process waste water according to its limitations. The historical information on surface water quality mentioned would be in the permit application, but not in the permit itself. Furthermore, clean stormwater is usually handled with a "general permit." Cyprus Bagdad holds the following general permits for storm water: AZR00A457, AZR00A462, AZR00A768, and AZR00A769. The FEIS should describe which discharges these permits address, as well as their relationship to the proposed expansion. The relevant

as their relationship to the proposed expansion. The relationship historical data should be summarized here and/or provided in an appendix to the FEIS rather than simply referencing a permit application. Also, the appropriate general permit(s) for stormwater should be substituted where the Storm Water Pollution Prevention Plan (SWPPP) is listed. The SWPPP is a requirement of the general permit(s).

The FEIS should discuss the potential impacts that stormwater from the waste rock pile could have on pit water quality in the long term after the mine is closed.

5-22

6-23

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6-21

:on't)

DEIS (p. 6) typo: The Clean Water Act was last amended in 1987.

#### Monitoring

Other than referring to the Aquifer Protection Permit, the DEIS provides almost no discussion regarding groundwater or surface water monitoring. The FEIS should discuss necessary monitoring at the existing and proposed facilities. A description of the locations of all monitoring wells, vadose zone monitoring devices, and points of compliance should be provided. Monitoring frequencies and parameters should be specified, and water quality standards and beneficial uses should be identified.

#### Clean Water Act \$404

The proposed project will affect 6.69 acres of jurisdictional waters of the U.S. Although the DEIS indicates that a mitigation and monitoring plan is required for the §404 permit, mitigation measures for these losses are not identified. The FEIS should discuss the mitigation measures that would be taken to mitigate impacts. This discussion should include: (a) acreage and habitat type of waters of the U.S. that would be created or restored; (b) water sources to maintain the mitigation area; (c) the revegetation plans including the numbers and age of each species to be planted; (d) maintenance and monitoring plans, including performance standards to determine mitigation success; (e) the size and location of mitigation zones; and (f) contingency plans that would be enacted if the original plan

5

#### **RESPONSE TO COMMENTS (CONTINUED)**

- 6-21 The list of permits on page 152 of the Draft EIS has been modified to properly reflect those permits applicable to the proposed action (Section 6.1). The NPDES permit AZ0022268, discussed in page 54 of the Draft EIS, is identified in the Final EIS as a stormwater and process wastewater permit, as requested by the EPA. Cyprus Bagdad also submitted a group stormwater permit application for the entire facility in 1994. A Stormwater Drainage Report, which provides stormwater operating procedures, was also submitted to EPA in 1994. This stormwater permit is still under negotiation. All other NPDES permitted discharge points are outside the scope of this EIS. As no pertinent quantitative historical information is available, the Draft EIS has been modified to delete the reference to the stormwater permit application (Section 3.4.2). Potential impacts to pit water quality following closure is discussed in the response to comment 6-5.
- 6-22 The text on page 6 of the Draft EIS has been modified for clarification to read **\*** "the Clean Water Act" (Section 1.8).
- 6-23 The Draft EIS has been modified to include a map (Figure C) depicting the existing and proposed locations of monitoring wells and points of compliance. The points of compliance will be monitored quarterly using the AWQS, in accordance with the APP.

6-24 A mitigation and monitoring plan will be required by the U.S. Army Corps of Engineers as part of the Section 404 permit. This plan will include a detailed description of appropriate mitigation and monitoring. The EPA shall have the opportunity to review and comment on the proposed Section 404 action as well as the mitigation and monitoring plan during the permitting process. The BLM will not approve the proposed action until all applicable permits and/or approvals listed in Section 6.1 of the Draft EIS, as modified, are obtained.

#### Cyprus Bardad Nine Expansion DEIS EPA Comments -- October, 1995

- 6-24
- fails. Mitigation should be implemented in advance of the impacts to avoid habitat losses before the area is successfully
- (con't) revegetated.

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6-28

#### Groundwater

The location and construction details of monitoring wells referred to in the DEIS are not specified, and the results of monitoring are not provided. Therefore, the groundwater's physical and chemical characteristics under the existing Mammoth tailing pond cannot be assessed by the reader. The FEIS should include this information.

The DEIS (p. 118) refers to the low potential for water infiltrating from the tailings pond to affect groundwater. This conclusion was based on the low permeability of the tailings, the low permeability of the bedrock and the high evaporation potential. The validity of these properties has not been provided, as no site-wide geologic map or tailings permeability data have been provided in the DEIS. The FEIS should include these.

Continued dewatering for the next 35 years will occur as the pit bottom is lowered by approximately 1000 more feet. The FEIS should specify the projected pit dewatering rate, as well as water needs for mining and milling processes, dust suppression and other activities. The FEIS should estimate the increased volume of water that would be pumped from the pit and indicate whether it would be used to offset water pumped from the Big Sandy well field. The FEIS should also describe potential impacts to groundwater and surface water resources from dewatering activities.

After dewatering ceases, the pit will fill with groundwater and stormwater runoff from the South Waste Rock Dump and Kimberly tailings. The filling of the pit after closure is not addressed in the DEIS. The final depth of water in the pit was based on a water budget calculations rather than on modeling. In addition, the water chemistry and general chemistry are not provided. The FEIS should describe projected pit water quality and discuss the potential effects of pit water on groundwater and downgradient surface waters, as well as on wildlife that uses the pit water. The DEIS refers to the Aquifer Protection Permit application which is not provided or summarized. A detailed summary of the relevant information from the permit application should be provided in the FEIS so that these impacts can be assessed.

- 6-25 Please refer to the responses to comments 6-7, 6-15, and 6-23.
- 6-26 The validity of the low potential for water infiltrating from tailings water to affect groundwater is provided from the existing Mammoth tailings facility. Please refer to the response to comment 6-7.
- 6-27 Pit water chemistry and water budget is discussed in the response to comment 6-5. Page 118 of the Draft EIS discusses potential ground and surface water impacts from dewatering. A detailed discussion of the impacts of pit dewatering is also presented in the APP submittal package. Impacts to the Big Sandy wellfield are discussed on page 119 of the Draft EIS.

6-28 Please refer to the responses to comments 6-5, 6-8, and 6-27.

6



#### **RESPONSE TO COMMENTS (CONTINUED)**

Cyprus Bagdad Mine Expansion DEIS EPA Comments -- October, 1995

#### Geologic Conditions

6-29

6-30

The DEIS (p. 40) refers to the geologic hazard as being "very low" but provides no information other then a personal communication. The FEIS should expand on this issue.

The DEIS (p. 40) also mentions that earthquakes are now "minor and infrequent" when compared to Tertiary geologic period. The FEIS should define "minor and infrequent" in addition to other terms such as "a region of very low earthquake activity" and "No earthquakes with ground motions that could be considered damaging to properly designed buildings are known to have occurred in this area".

The FEIS should indicate the maximum probable and maximum credible earthquakes and maximum expected horizontal acceleration expected for the region. Also indicate whether the proposed tailings pond and waste rock pile have been designed for such forces.

### Hazardous Materials and Waste Management

The FEIS should discuss the Oil Pollution Prevention regulations (40 CFR 112) and necessary amendments to Cyprus' Spill Prevention Control and Countermeasures plan due to the expansion.

The FEIS should describe how cruds and grunges from mine processes will be managed.

6-29 The maximum earthquake which would occur in the region is 6.5 on the Richter scale. The probability of this scenario is about one chance in 100 in 1,000 years. Based on the earthquake potential of the region, the possibility of occurrence of an earthquake large enough to cause failure of the proposed tailings facilities is extremely remote. This discussion is presented on page 115 of the Draft EIS.

6-30 Oil is not a hazardous material in Arizona. Cruds and grunges are undefined wastes and therefore can not be addressed.

7



October 16, 1995

Ms. Mary Johnson Project Planner Phoenix District Office 2015 West Deer Valley Road Phoenix, Arizona 85027

Re: Draft Environmental Impact Statement for Proposed Tailings and Waste Rock Storage Areas for Cyprus Bagdad Copper Corporation; BIS No. BLM/AZ/PL-95/005

Dear Ms. Johnson:

The Arizona Game and Fish Department (Department) has reviewed the above-referenced Draft Environmental Impact Statement (DEIS) for the proposed tailings and waste rock expansion of the Cyprus Bagdad copper mine located near Bagdad, Arizona. We offer the following comments.

The Department previously provided information from our Heritage Data Management System on the known occurrence of Endangered, Threatened or other special status species in the project vicinity. This information has been incorporated into the DEIS.

The DEIS is a thorough and well-prepared document that addresses many wildlife and other issues identified during the scoping process. If the proposed action is chosen, approximately 320 acres of federal land will be affected. About 15 acres will be disturbed to allow for the expansion of the Mammoth Tailings Facility and 305 acres will be affected by the South Waste Rock Disposal Facility.

As stated on page 122, the proposed action will cause adverse impacts to lowland leopard frogs using the existing Mammoth retention pond. We believe there is the potential for new retention ponds to provide habitat for leopard frogs and other aquatic wildlife. The Department would appreciate the opportunity to evaluate a potential lowland leopard frog salvage operation, and discuss design factors of the retention pond that would favor aquatic wildlife.

Additionally, 2000 acres of desert tortoise habitat will be adversely affected. The DEIS mentions compensation for the loss of 320 acres of desert tortoise habitat on federal lands, however this mitigation is not described in any detail. We recommend the Final EIS describe the mitigation for loss of desert tortoise habitat. Additionally, all construction personnel should be advised of the

#### RESPONSE TO COMMENTS (CONTINUED)

7-1 Thank you for your comments. At the Arizona Game and Fish Department's (AGFD) request, AGFD nongame branch personnel Mike Shredl and Pat Collins are currently involved in developing a lowland leopard frog salvage strategy in cooperation with Cyprus Bagdad and the BLM, Kingman Resource Area.

\*

7-2 The BLM cannot require desert tortoise mitigation for land use activities that occur on non-federal lands. The loss of 320 acres of Category III Sonoran desert tortoise habitat on public lands will be mitigated by changing the livestock management on 4,000 acres of Category II Sonoran desert tortoise habitat within the Bagdad allotment. Grazing practices will be adjusted by restricting grazing to fall and winter use only. This action will enhance the existing Category II Sonoran desert tortoise habitat and reduce competition between the tortoise and livestock. The Draft EIS has been modified to include this information in Section 4.2.4, as requested. A grazing decision has been issued by the BLM Kingman Resource Area Manager which adjusts the season of use on this 4,000 acres of habitat. The BLM will require the use of the AGFD "Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects" during construction of project components.

\* denotes a correction or addition made to the Draft EIS

7-2

7-1

Ms. Mary Johnson October 16, 1995 2

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7-5

7-2 Department's tortoise handling guidelines as an additional (con't) mitigation measure.

Although the rosy boa (<u>Lichanura trivirgata</u>) is listed with other special status species in Table 8, it does not appear under the Reptiles and Amphibians section on Page 58 as a reptile associated with Arizona Upland habitat. The Bagdad area is well-known rosy boa habitat and should be documented as such.

The DEIS indicates that 6.69 acres of jurisdictional waters of the U.S. will be lost as a result of the proposed action, but there will be no impacts to water flows or water quality in Francis Creek, Burro Creek, or the Big Sandy River. The Department would appreciate the opportunity to review the Section 404 permit and mitigation plans associated with this portion of the project. As a result of past cooperative agreements between Cyprus Bagdad Copper Corporation and the Department, Coor's Lake has become an important fishery and recreational site. Possible mitigation for impacts to jurisdictional waters could include further enhancement of this lake.

The proposed action will have detrimental impacts to wildlife as described in the EIS. Other than the closure plan and mitigation for the loss desert tortoise habitat, no other mitigation is presented for the temporal loss of wildlife habitat. We recommend the final EIS more fully describe mitigation plans for potential impacts to wildlife resources.

Thank you for the opportunity to comment on this DEIS. If you have any questions or concerns, please contact our Regional Habitat Program Manager, Robert Posey, at 502-692-7700, or myself at the address and phone number listed on the letterhead.

Sincerely,

Rom Christfuson

Ron Christofferson Project Evaluation Coordinator Habitat Branch

RAC:ESG:eg

cc: Steve Ferrell, Regional Supervisor, Kingman Region Terry Johnson, Branch Chief, Nongame Branch Cindy Lester, Army Corps of Engineers, Arizona Field Office

AGFD# 08-14-95(07)

- 7-3 Section 3.5.2 of the Draft EIS has been modified to include the rosy boa in the **\*** Reptiles and Amphibians section, as requested.
- 7-4 A mitigation and monitoring plan will be required by the U.S. Army Corps of Engineers as part of the Section 404 permit. The Arizona Game and Fish Department shall have the opportunity to review and comment on the Section 404 action as well as the mitigation and monitoring plan during the permitting process.
- 7-5 Your recommendation is noted.



LECET LD 200

UT OT 13 M # 13

DUREAU OF LAND MGT

PUCTON, ADIZONA

Rachel Thomas Box 4637 Huachuca City, Az 85616 520-456-1008

October 7, 1997

Mr. Ken Drew Kingman Resource Area Manager Phoenix District Office, BLM 2015 West Deer Valley Road Phoenix, Az 85027

ALCOLD STATE

Dear Mr. Drew:

Reference the Cyprus Baddad Copper Corporation Proposed Tailings and Waste Rock Storeage Areas.

I recommend approval of the action that will allow the continuation of copper mining operations at Cyprus Bagdad for 35 years, rather than for only 6 years.

For concerns about the state of the land at the completion of the project, I suggest you contact Tommie Martin, P.O. Box 147. Payson, Az 85547, Phone/Message/Fax 520-474-6858.

Ms. Martin can provide you with a method to convert the mine tailings into better animal habitat than it is in now and at a very minimal cost. She will provide you with information on the method and the success. She also has had positive experience bringing all parties with concerns on the environment together working successfully toward the overall goal of a better environment.

Please keep me informed on your reaction and actions on this matter.

Thank You.

8-1

Rachel Thomas

RECEIVED PD0 L55 CCT 18 AN IO: 19 DUREAU OF LAND MGT FHOENX, ARIZONA **RESPONSE TO COMMENTS (CONCLUDED)** 

8-1 Thank you for your comment.

## TABLE A

## PRELIMINARY ALTERNATIVES FATAL FLAW ANALYSIS SUMMARY<sup>1,2</sup>

Alternative	Project Feasibility	Geotechnical	Environmental
		Feasibility	Feasibility
TAILINGS SITES			
1) Bagdad Townsite <sup>3</sup>	Х		0
2) Boulder Site		Х	0
3) Copper Ridge Site		Х	
4) Cowboy Site		Х	0
5) Hillside Site		Х	0
6) Lawler Site		Х	0
7) Lower Mammoth			
Site		Ο	Х
8) Expanded Mulholland			
Site		Х	0
9) Existing Mammoth			
Site			
10) Upper Mammoth			
Site			
WASTE ROCK			
SITES			
1) Bagdad Townsite	X		
2) Sanders Mesa Site		Х	
3) South Waste Rock Site			
1			

<sup>1</sup>X eliminating factor

O factor contributing to elimination

 $^2$  Summary descriptions of these factors for each site are presented in Table B.

 $^{3}$  The Bagdad Townsite was considered as a location for both tailings and waste rock disposal areas.

## TABLE B

## PRELIMINARY ALTERNATIVES FATAL FLAW ANALYSIS SUMMARY DESCRIPTION

Alternative	<b>Project Feasibility</b>	Geotechnical	Environmental
		Feasibility	Feasibility
TAILINGS SITES			
1) Bagdad Townsite	high costs associated with town relocation and construction of town infrastruture		socioeconomic concerns associated with relocating the town of Bagdad
2) Boulder Site		landslide and high erosion potential	concerns with potential impacts to Boulder Creek from rerouting the Creek
3) Copper Ridge Site		numerous mine shafts; high erosion potential; inadequate storage capacity	
4) Cowboy Site		mine shafts; inadequate storage capacity	concerns with the shallow ground-water at the site
5) Hillside Site		landslide potential; numerous mine shafts; inadequate storage capacity	potential impacts to Coors Lake
6) Lawler Site		fault zone; high erosion potential	potential impacts to Coors Lake; concerns with the shallow ground-water at the site
7) Lower Mammoth Site		potential for landslide in some areas	potential impacts to adjacent Burro Creek
8) Expanded Mulholland Site		inadequate storage capacity; low storage efficiency; engineering constraints due to proximity of mill	stormwater storage reserves would be depleted
9) Existing Mammoth Site			
10) Upper Mammoth Site			
WASTE ROCK			
1) Bagdad Townsite	high costs associated with town relocation and construction of town infrastruture		socioeconomic concerns associated with relocating the town of Bagdad
2) Sanders Mesa Site		high landslide potential	
3) South Waste Rock Site			

with the demolition and reconstruction of the town of Bagdad and associated infrastructure were prohibitive. As this alternative was economically infeasible, the need for copper production would not be met.

<u>Geotechnical Feasibility</u>. Alternatives were also screened based on geotechnical feasibility. Geotechnical and engineering factors were considered for constructability, safe engineering, and operation of the facility. These factors include consideration of tectonic hazards (fault zones), surficial geologic processes (high erosion, weathering, slumping, landsliding, or active debris flows), geotechnical site factors (adequate support foundation), and geometric elements (storage capacity, efficiency, pumping requirements). Seven preliminary alternatives did not possess the required geotechnical factors to safely and adequately construct and operate the facility (Agra 1993). A summary of geotechnical factors for each site is described in Table B (presented in the Final EIS).

Environmental Feasibility. Environmental objections were voiced by numerous agencies for only one alternative -- the Lower Mammoth site. The preliminary siting at Lower Mammoth, adjacent to Burro Creek, was considered environmentally objectionable by these agencies. This alternative was therefore not considered further. Environmental concerns of other preliminary alternatives are also shown in Table B (presented in the Final EIS). The alternative, however, was not ruled out based on these environmental concerns alone.

A narrative description of each site is provided in the following paragraphs.

Section 2.5.1 - Tailings Facility Sites

Page 32, delete the first two paragraphs in the section.

## Section 2.5.2 - Waste Rock Disposal Facility Sites

Page 37, delete the first paragraph in the section.

### Section 3.2 - Geological Resources

Page 39, paragraph 2, insert the following text after the first sentence:

The geology of the Bagdad mine area is shown in Figure B, presented in the Final EIS.

### Section 3.4.1 - Groundwater

Page 49, insert the following text at the end of the page:

Existing monitoring wells are depicted in Figure C, presented in the Final EIS.

Page 50, paragraph 2, insert the following text after sentence 3 (ending with "...and metals concentrations."):

There are no measured constituents detected in the pumpback water (recovered seepage) at concentrations in excess of Arizona Water Quality Standards (EnviroNet 1995). Background samples from groundwater wells in the lower Gila formation of the lower Mammoth Wash area indicate that only two constituents, arsenic and fluoride, are consistently measured above Arizona Water Quality Standards (EnviroNet 1995). The arsenic concentrations in these well samples are one to two orders of magnitude higher than the measured concentrations of arsenic found in the tailings upstream. Therefore, these two exceedences are most likely a result of a geochemical influence of the lower Gila formation on the groundwater of the area.

Page 52, paragraph 1, sentence 7 (beginning with "The overall quality..."), replace the term "Aquifer" with the word "Arizona".



