Letter 2

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Reston, Virginia 20192

In Reply Refer To:
Mail Stop 423

MEMORANDUM

To: Gerald M. Smith, Field Manager
Bureau of Land Management, Battle Mountain, Field Office

From: James F. Devine
Senior Advisor for Science Applications

Subject: Draft Environmental Impact Statement for the Phoenix Project.

As requested by the Department of the Interior, Bureau of Land Management, in their correspondence of February 9, 2001, the U.S. Geological Survey has reviewed the subject Draft Environmental Impact Statement (EIS) and offers the following comments.

GENERAL COMMENTS:

The subject Draft Environmental Impact Statement (EIS) provides a detailed environmental analysis for the proposed project by the Battle Mountain Gold Company to expand its current mining and mineral processing operations in Copper Canyon south of the town Battle Mountain in Lander County, Nevada. The proposed project involves developing the Phoenix and Reona Pits and expanding the existing mining pits. Mining the ore deposits would be coupled with excavating and processing low-grade gold ore stockpiles associated with previous mining operations. The proposed plan also includes closing and reclaiming the previous copper heap-leach facilities, lining and isolating the previous copper tailings facility, and backfilling three existing open-pit mines. The proposed expansion would result in about 4,295 acres of new disturbance on public and private lands in the Copper Canyon area. The Draft EIS addresses the environmental impacts associated with the proposed mine development action and the No Action alternatives. Some hydrologic concerns that need to be addressed are described under **SPECIFIC COMMENTS**.

Letter 2 Continued

SPECIFIC COMMENTS:

2-1

Page 3.1-5, Chapter 3.0 Affected Environment and Environmental Consequences, 3.1.1.3 General Site Geology, Figure 3.1-2 Regional Geology Cross Sections:

The geologic cross sections (A-A' and B-B') show all geologic units as being horizontal. We suggest that the regional and local dips of the geologic units underlying the project area be shown in the sections so that the relation between the regional geologic structure and the regional hydrogeologic system or regional ground-water flow system can be established.

2-2

Page 3.1-11, Figure 3.1-5 Geologic Cross Section Through the Fortitude Pit:

Geologic section C-C' shows detailed geologic structure underlying the Fortitude Pit as does geologic section D-D' in figure 3.1-6 for the Midas Pit (page 3.1-12), section E-E' in figure 3.1-7 for the Phoenix Pit (page 3.1-14), and section F-F' in figure 3.1-8 for the Reona Pit (page 3.1-15). We suggest showing the local ground -water levels (even if inferred) on each of the geologic sections so that the influence of the local geologic structure (faults, geologic contacts, dip of rock units, and so forth) on the local ground-water flow system can be defined. No where in the report is the relation between the local or regional geology and ground-water flow systems defined. Even the hypothesized relations would be helpful if limited or no information is available.

2-3

Page 3.2-3, 3.2.1.2 Surface Water, Surface Water Flows, Figure 3.2-2 Local Drainage Features:

The map shows that Little Cottonwood Creek is an ephemeral stream, however, table A-1 in Appendix A shows that numerous sites along Little Cottonwood Creek and its two upper tributaries (spring sites 010,014,016,017A, 017B, 018A, 018B) are perennial spring sites. Furthermore, the regional ground-water table elevation contours shown in figure 3.2-9 (page 3.2-25) indicate that Little Cottonwood Creek receives ground-water discharge from the local ground-water system. Perhaps the upper half of Little Cottonwood Creek and its tributaries should be shown as a perennial stream in figure 3.2-2.

2-4

Page 3.2-4, Surface Water Flows, left column, third paragraph:

"Surface water flow monitoring stations (including springs) are shown in figure 3.2-3. Flow monitoring data at these stations are presented in JBR 1996d, 1996g, and Baker Consultants, Inc. 1997a. The flow characteristics of surface water features are discussed in the following . . . ."

The following discussions on springs, streams, ephemeral, intermittent, and perennial streams in the entire study area are based on the above cited references; however, very little information on actual discharge data and dates when the data were collected or measured are presented in the report in support of stated interpretations and conclusions. A table that identifies all spring and stream sites shown in figure 3.2-3 (page 3.2-5) and listed in table A-1 in Appendix A (pages A-1--A-5) and that summarizes the discharge data and when the data were collected should be

Responses to Letter 2

2-1 The EIS provides a summary of the major geologic units and structures in the vicinity of the project. A detailed review of the geology is provided in Appendix B of the Baseline Hydrologic Characterization Report (Baker Consultants, Inc. 1997a), which was incorporated by reference into the EIS. As discussed in Section 3.2 of the EIS, bedrock consists of a structurally complex assemblage, and flow occurs primarily within fractures with major fault zones acting as either barriers or conduits for ground water flow. The existing data suggest that the dip of the individual bedrock is not a major factor in controlling the direction of ground water movement across the project area.

2-2 The geologic cross sections referenced in the comment were intended to illustrate the generalized geologic conditions in the proposed open pits. For detailed ground water elevation data, see Baker Consultants, Inc. 2000a; the results provided in Baker Consultants, Inc. 2000a are summarized in the EIS.

2-3 Flow measurements from the springs listed in the comment are tabulated in Table 3.4B in the Baseline Hydrologic Characterization Report (Baker Consultants, Inc. 1997a). During the low-flow period that typically extends from late summer through fall in this region, all but one of these perennial springs located in the Cottonwood Creek drainage had flows of less than 1 gallon per minute (gpm). Most of these springs actually had flows that were too low to be measured and were noted during field measurement as “trickle” or “damp.” These springs are actually small seeps or wet areas that persist throughout the year in most years (but several of these were reportedly dried up in at least 1 year). One spring (018A) had an estimated flow of 2.5 gpm (10/10/95). For the purposes of the EIS, any spring that had observable flow (or was reported as wet or damp) during August, September, or October in 1995 or 1996 (when the spring flow was monitored) was considered perennial. Stream flow measurements and site observations during the baseline data collection confirm that these isolated springs and seeps do not support perennial flow in Cottonwood Creek (JBR 1996d,g; Baker Consultants, Inc. 1997a).

2-4 Baseline flow data for springs, seeps, and streams used in the EIS evaluation are provided in JBR 1996d,g; Baker Consultants, Inc. 1997a. This information was incorporated by reference into the EIS.

Letter 2 Continued

2-4 included in Appendix A for support of interpretations and conclusion presented in the Surface Water Flows Section of the report.

Page 3.2-8, first paragraph:

"Note: based on the stream flow data and piezometer information provided by the Baker Consultant, Inc. [1997a], it is assumed that portions of the stream that exhibited gains are in direct contact and interconnection with the regional ground water system."

2-5 This statement applies to Willow Creek in Buffalo Valley. Does this relation also apply to the perennial springs and streams in the upland areas of Battle Mountain? The regional ground-water elevation map shown in figure 3.2-9 (page 3.2-25) indicates that the ground-water system in the higher elevations of Battle Mountain and the regional ground-water-flow system in the lower elevations (Buffalo Valley, Lower Reese River Valley) are one and the same. Could there be separate local perched water tables that feed springs and streams in the upper elevations of Battle Mountain? If this is a possibility, then perhaps it should be stated in the report.

Page 3.2-9, Watershed Characteristics, bottom of left column:

2-6 "Other drainages that flow into Buffalo Valley include Cow Canyon, Copper Canyon, Sunshine Canyon, Rocky Canyon, Trenton Canyon, and miscellaneous canyons originating from the Battle Mountain range."

Figure 3.2-3 (page 3.2-5) shows that Cow Canyon is a tributary to Galena Canyon, which drains into the Lower Reese Valley Basin. Please verify this discrepancy.

Page 3.2-13 Surface Water Quality, bottom of left column:

"Samples from the northern part . . .(Little Cottonwood Creek, Duck Creek, Willow Creek, Wildhorse Basin, Rocky Canyon, and Trout Creek) generally had . . . ."

2-7 Here and in many other places in the Surface Water section of the report, references to creeks and canyons seem to be used interchangeably. Also, Cottonwood Creek, Trout Creek, and Wildhorse Basin are referred to as sampling sites in the same sentence, even though Trout Creek and Cottonwood Creek are located in Wildhorse Basin. The use of Wildhorse Basin in reference to water-quality sampling and stream or spring measurements is somewhat ambiguous because the reader may not be sure if Trout Creek or Cottonwood Creek or both are being referred to in the discussion. The use of these names (creeks, canyons, and basins) in the report needs to be tightened up to avoid ambiguity or confusion.

Page 3.2-13, Surface Water Quality, left column, second paragraph:

2-8 "PTI and Exponent characterized surface water quality in the Phoenix study area by compiling analyses of samples collected from the major surface water features in 1995 through 1998 (PTI 1997a,c; Exponent 1999)."

Responses to Letter 2

2-5 In response to the comment, a statement was added in the subsection entitled "Impacts to Streams and Springs" in Section 3.2.2.1 of the Final EIS to explain that perennial springs and seeps located in higher elevation, mountainous areas represent discharge from either the regional ground water system or from more isolated or perched aquifers residing above the regional ground water system.

2-6 The reference to Cow Canyon in the discussion of the Buffalo Valley drainage basin was removed in the Final EIS.

2-7 The terminology used to describe the various drainage features was modified to conform with the nomenclature presented on the U.S. Geological Survey (USGS) 7.5-minute topographic maps of the area.

2-8 In order to keep the EIS document to a reasonable length, technical data and analyses are summarized in the EIS, and the technical documents that provide these details are incorporated by reference into the EIS. The technical details requested by the reviewer are available in the supporting baseline water quality documents (PTI 1997a,e; Exponent 1999).

Letter 2 Continued

2-8 The water quality data for identified water quality sampling sites should be summarized in a similar fashion as suggested for surface water measurement sites in the review comments previously noted above for **Page 3.2-4, Surface Water Flows.** Perhaps, box plots of the water-quality data for all sampling sites could be provided in the report.

2-9 **Page3.2-13, Surface Water Quality, left column, third paragraph:**

"Analytes for which water . . . not reported by PTI (1997a,e) or Exponent (1999), include . . . ."

Is the citation PTI (1997a,e) intended to be the same as PTI (1997a,c), which is cited in the previous paragraph on the same page?

2-10 **Page 3.2-14, Surface Water Quality, Table 3.2-3, Nevada Water Quality Standards:**

The value for arsenic (total) shown in parenthesis in the table is referred to as a Federal primary standard, effective March 23,2001. This arsenic value has been rescinded or placed on hold by the U.S. Environmental Protection Agency.

2-11 **Page 3.2-16, Figure 3.2-6, Total Dissolved Solids Concentrations-with pH for Surface Water:**

The symbols shown in the explanation box in the graph represent the total dissolved-solids concentrations for too many sites in combination. This method of portraying the water-quality data is inadequate for determining if sums, averages, or single concentrations are being displayed in the graph and shows nothing on which values apply to individual sites. This figure conveys little information and should, perhaps, be redesigned so that the water quality for each site is clearly depicted on the graph.

2-12 **Page 3.2-17, Figure 3.2-7 Sum of Cadmium, Copper, Nickel, and Zinc Concentrations with pH for Surface Water:**

This figure has the same problems as figure 3.2-6 (page 3.2-16) described in the above review comments. The figure needs to be revised in the same manner as figure 3.2-6.

2-13 **Page 3.2-25, 3.2.1.3 Ground Water, Water Levels, Figure 3.2.9 Regional Ground Water Elevation Map, June 1996:**

The level of certainty for the water-table contours shown for the upland areas on Battle Mountain and to the west, south, and east of Battle Mountain up gradient from the 20-foot water-level-contour interval appears to be unjustified. The density of well sites shown in figure 3.2-8 (page 3.2-22) are mainly concentrated in the Phoenix Mine Site and do not represent the contoured areas beyond this site. The use of elevations at perennial spring or stream sites may be adequate for projecting water-table contours if it has been shown that these sites are in hydraulic connection with the water table. It is not certain that this has been adequately shown in the report. The solid-pattern water-table contours that are not supported by hard data need to be queried or dashed or, perhaps, some segments need to be deleted. Another alternative to

Responses to Letter 2

2-9 The correct references for this citation are PTI 1997a,e, as stated in the EIS.

2-10 The arsenic value in the parentheses and footnote 8 below Table 3.2-3 were deleted from the Final EIS since the change in the standard was rescinded by the USEPA.

2-11 Figure 3.2-7 was intended to demonstrate the general pattern of poorer water quality in the canyons where the main mineralized deposits exist. Each symbol represents a distinct water analysis. Additional detail is presented in the baseline reports (PTI 1997a,e).

2-12 As in Figure 3.2-7, each symbol represents a distinct water analysis. Additional detail is available in the baseline reports (PTI 1997a,e).

2-13 The regional ground water elevation map presented in Figure 3.2-9 is an interpretation of the ground water elevations that existed in June 1996 (Baker Consultants, Inc. 1997a). The regional ground water surface illustrated in Figure 3.2-9 is based on interpolation between measured water elevation data collected from monitoring wells. This map is intended to illustrate (or interpret) the baseline ground water elevations used for the impact analysis. The future ground water elevations predicted using numerical modeling were then compared with the interpreted baseline conditions (illustrated in Figure 3.2-9) to estimate drawdown or mounding. Different line types (i.e., solid or dashed) are used to signify different contour intervals, as explained in the legend. The use of solid lines vs. dashed lines is not intended to signify different levels of accuracy or certainty, as the comment appears to imply. There is always some level of uncertainty between data points in any regional ground water elevation map. Eliminating some or all of the contours or using different line types (as suggested in the comment) would not improve the accuracy of the map or assist the reader in understanding the interpreted baseline ground water conditions represented in the map.

Letter 2 Continued

2-13 consider would be to delete all contours in figure 3.2-9 and just show arrows that depict the direction of ground-water movement in the project area and the surrounding environment.

Page 3.2-27, Ground-Water Quality:

2-14 "Baseline ground water quality has been characterized by analyzing samples from wells located throughout the Phoenix Project study area (PTI 1997a,c; Exponent 1999) (Figure 3.2-11)."

This section of the report has the same problems described in the previous review comments provided above for **Page 3.2-4 Surface Water Flows and Page 3.2-13 Surface Water Quality.**

Thank you for the opportunity to review and comment on this Draft EIS.

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Responses to Letter 2

2-14 As stated in the responses to comments 2-11 and 2-12, each symbol represents a distinct water analysis. Additional detail is available in the baseline reports (PTI 1997a,e; Exponent 1999).