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

December 11, 2009

John F. Ruhs, Manager
Ely District Office
Bureau of Land Management
HC33 Box 33500
Ely, NV 89301

Subject: Final Environmental Impact Statement for the Bald Mountain Mine North Operations Area Project, White Pine County, Nevada [CEQ # 20090383]

Dear Mr. Ruhs:

The U.S. Environmental Protection Agency (EPA) has reviewed the above referenced document. Our review and comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) NEPA Implementation Regulations at 40 CFR 1500-1508, and our NEPA review authority under Section 309 of the Clean Air Act.

The proposed project would expand and combine the existing Bald Mountain and Mooney Basin gold mines into one project area to be administered under one Plan of Operation called North Operations Area. Based on the limited geochemical characterization in the Final EIS, it appears that waste rock from several pits could generate leachate with high concentrations of metals and metalloids, and degrade water quality if the leachate should reach groundwater or surface waters, or if pit lakes would form. Such significant impacts must be avoided in order to provide adequate protection for the environment. However, the Final EIS does not contain sufficient information to confirm whether the project is designed to fully protect the environment. Therefore, EPA continues to have objections to the preferred alternative.

We recommend the Record of Decision (ROD) include an Adaptive Waste Rock Management Plan and a Water Monitoring and Mitigation Plan so that better characterization and understanding of site geochemistry and water fate and transport will lead to an adaptive approach to waste rock and water management as new information is discovered through monitoring and analysis throughout the mine life. The ROD should commit to implementing these plans in a manner that fully protects resources. This will necessitate frequent evaluation of new information and possibly adapting new controls to changed conditions, as well as keeping financial assurances up to date. We also recommend the ROD not be signed prior to receipt by the applicant of a jurisdictional determination by the U.S. Army Corps of Engineers. Our detailed comments are enclosed.

We appreciate the opportunity to review this Final EIS, and would like to continue working with you to ensure protection of water resources in the project area. We also request a copy of the Record of Decision when it becomes available. If you have any questions, please call me at (415) 972-3843, or have your staff contact Jeanne Geselbracht at (415) 972-3853.

Sincerely,

/ S /

Enrique Manzanilla, Director
Communities and Ecosystems Division

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Enclosure: EPA's Detailed Comments

Cc: David Gaskin, Nevada Division of Environmental Protection
Kristine Hansen, U.S. Army Corps of Engineers, Reno

Bald Mountain Mine North Operations Area Final EIS
EPA Comments – December, 2009

Geochemical Characterization

EPA's comments on the Draft EIS were based on our review of that document as well as the *Baseline Geochemical Assessment for the Proposed Bald Mountain Mine North Operations Area Expansion* (Schafer, 2008). We raised several geochemistry issues including mineralogic analysis, kinetic testing, short-term leach testing and contaminants of concern, and acid-base accounting. In response, we received the *Draft Addendum Baseline Geochemical Assessment for the Proposed Bald Mountain Mine North Operations Area Expansion* (Schafer, 2009) and a December 8, 2009 memorandum from Bill Schafer to Derek Huebner, Barrick Bald Mountain Mine, entitled *Summary of Humidity Cell Tests at Bald Mountain.* Based on our review of these documents, however, we do not believe our issues regarding geochemistry at the mine have been sufficiently addressed.

<u>*Mineralogic Analysis*</u>: The original baseline geochemistry report (Schafer, 2008) contained insufficient information on two issues: the mineralogic basis for acid neutralizing potential; and the availability, or "liberation," of acid-generating and acid-neutralizing minerals. The report stated that the acid-generating minerals are encased in silica and are therefore not available for reaction. However, no evidence was presented to support this statement. In our Draft EIS comment letter, we recommended that the specifics of the mineralogy and the availability of acid-generating and acid-neutralizing minerals be presented to help evaluate the ability of the mined material to produce and neutralize acid and to leach contaminants. In particular, the percent of calcite, dolomite, and siderite should be determined in samples from all waste rock and pit locations (or geochemical test units).

A new section entitled Bald Mountain Mineralogy (Section 2.7) is included in Schafer (2009). However, no new mineralogy analyses were conducted. Instead, the mineralogy basis for acid neutralizing potential was estimated by developing a surrogate based on whole rock chemistry of the samples. Schafer (2009) assumes that a good relationship between whole rock calcium and magnesium and acid neutralizing potential (ANP) indicates that the neutralizing potential is caused by calcite and dolomite. The revised report shows good correlation between ANP and these elements, but they have no primary information on the composition of acid-neutralizing minerals. Schafer (2009) notes that for the more highly altered rocks, total calcium and magnesium from whole rock analysis generally overestimated the measured ANP, and that the relationship also did not work well for most of the Cambrian section and the Pogonip Formation, especially at low ANP levels. Therefore, it is still unclear whether more effective calcite or less effective epidote or other minerals are responsible for the observed acid-neutralizing potential.

Further, Schafer (2009) presented no further information on the availability of acid-generating or acid-neutralizing minerals, including no solid evidence on the presence or effectiveness of silica coatings on pyrite. Schafer (2009, Section 2.5) only notes that the low reactivity of the Saga samples is attributed to encapsulation by silica, which is "known to be pervasive" in the area. In the brief discussion section (3.0), Schafer notes, "The mineralogy of Saga and Bida samples should be evaluated to more fully understand the potential reactivity of different sulfur forms and the degree of silica encapsulation of sulfides."

Kinetic Testing: In our Draft EIS comment letter, we recommended that longer (up to one year or longer) kinetic tests be run on the full range of rock types and neutralizing potential to acid potential (NP:AP) ratios in the project area, and all major contaminants of concern should be measured.

Six humidity cell tests have been conducted for up to 60 weeks. Sulfur percentages were only measured on four of the new samples, and they ranged from 0.41 to 2.32. Only a low percentage of total sulfur has leached out of these samples and pH is continuing to decrease in a number of the longer term kinetic tests, indicating that equilibrium still has not been reached.

Schafer (2009) states that all samples were identified as acid-generating, with negative net neutralizing potential (NNP) values, and were "worst case" examples of Bald Mountain rock types. However, using NP:AP ratios, three of the six have NP:AP ratios are 1:1 or nearly 1:1, which would put them in BLM's uncertain category.

> **Recommendation:** We recommend the current kinetic tests keep running for a longer period of time to allow equilibrium to be reached. We also continue to recommend that additional long term kinetic tests be run, especially for the Top and Saga pits, for samples with NP:AP ratios less than 3:1, based on BLM's geochemical testing guidance.

Short-Term Leaching Tests and Contaminants of Concern: The results from the whole rock analysis and Meteoric Water Mobility Procedure (MWMP) tests show that contaminants such as mercury, arsenic, and antimony can easily leach under neutral pH conditions, and that metals such as copper, zinc, and lead can be mobile and at high concentrations in certain areas. The leach tests demonstrate that not all pits and waste materials have similar contaminant leaching potential (e.g., Saga, Top, and Bida pits have high contaminant leaching potential), and different handling procedures may be necessary for different areas. In our Draft EIS comments, we recommended additional information in the Final EIS, including more information on mercury leaching and releases; a map showing the location of pits and waste rock facilities (indicating areas with higher contaminant leaching potential) and intermittent streams and areas with shallow groundwater; and an evaluation of relationships between acid-base accounting, sulfide, or other measurements made easily in the field and leachate concentrations. We also requested that all leachate data be made available electronically.

Additional MWMP tests were run on an unspecified number of samples, and results are shown in graphs and in an appendix. The new data reconfirm that high concentrations of arsenic, antimony, mercury will readily leach from the mined materials under neutral pH conditions. One supplemental MWMP sample had antimony concentrations over 7 times higher than any previously examined (approximately 1,500 µg/L). Three of the supplemental samples leached mercury concentrations of approximately 100 µg/L, or 50 times higher than the drinking water standard. No comparison of leachate concentrations and percent total sulfur or NP:AP was conducted as part of the supplemental information, so we do not know if there is a simple field measurement that could be used to estimate the potential of areas to generate high concentrations of metalloids, mercury, and other contaminants. Plots of NP:AP (or just NP) versus percent sulfur and arsenic may be helpful for determining if acid-base accounting (ABA) results can be used to estimate the presence of arsenic or other contaminants.

> **Recommendation:** We recommend Barrick continue conducting MWMP and try to find simple, reliable field measurements to characterize rock types with contaminated leachate potential. The results from these tests should be incorporated with the ABA testing results to make waste rock management decisions. If results exceed Maximum Contaminant Levels (MCL), that unit should be specially handled as reactive rock in accordance with the waste rock management plan.

Acid-Base Accounting Tests: A new section is included in the supplemental report (Schafer, 2009) that compares Sobek and Net Carbonate Value (NCV) static results. Five samples were selected for a comparison of NCV and Sobek methods: two from the Saga pit, two from the Top pit, and one from the Numbers pit. Five samples are not enough to statistically analyze the results; therefore, there are still too many unknowns about the relationship between the quick NCV method and ABA testing.

> **Recommendation:** At least 30 samples should be run using NCV and more conventional ABA methods to provide a better understanding of this relationship.

Waste Rock Management

The Final EIS (p. 3-33) states that the waste rock would not leach waters that are high in acidity or metals content. However, as discussed above, the Final EIS and reference documents do not provide sufficient information regarding waste rock geochemistry to support this conclusion. In addition, some information in the Final EIS appears to contradict it. The waste rock dumps must be properly designed to prevent generation of leachate, but it is not completely clear how this will be accomplished without sufficient waste rock characterization.

> **Recommendation:** EPA recommends the ROD include an Adaptive Waste Rock Management Plan (AWRMP) for the proposed project. The plan should be developed so better characterization and understanding of site geochemistry will lead to an adaptive approach to waste management as new information is

discovered through monitoring and analysis throughout the mine life. The AWRMP should include the following:

- Provide a map showing the locations of pits and waste rock dumps (indicating areas with higher contaminant leaching potential), intermittent streams, and areas with shallow groundwater.
- Provide a map and cross-sections depicting the locations of static and kinetic test samples.
- Describe and discuss the extent to which samples are representative of the pits and proposed pit expansion areas.
- Identify appropriate, reliable, and representative sampling and analytical protocols that will be used for the life of the mine and during closure and post-closure. For example, the plan should specify the method used to calculate neutralization potential. A number of split samples should be subjected to both the Sobek (modified for NP calculation) and NCV tests to determine if application of the conversion factor between a more conventional ABA method and NCV results is valid.
- Provide definitions for potentially acid generating, neutralizing, and neutral material and specify action levels to trigger special handling and/or controls for each type of material.
- Describe and commit to procedures for disposal and special handling of waste rock and other controls that may be needed to fully protect water quality (e.g., specify how and where waste rock from these pits would be disposed, specify the acid neutralization potential the surrounding waste rock would need to meet for this purpose, and clarify whether sufficient neutralizing material would be available when it would be needed for this purpose). Individual plans should be specifically developed for waste rock from those pits with higher potential for acid generation and metals leaching.
- Describe how waste rock facilities would be designed to ensure against leaching of contaminants that are mobile under *non-acidic* conditions.
- Describe protocols for selecting waste rock to be backfilled into pits, including pits that may be excavated below the water table.
- Predict, based on the block model, what percentage of waste rock will be potentially acid generating each year of mine life.
- Discuss commitments for post-operation surveillance to ensure that neutralization and/or stabilization of mining waste sites has been effective.
- Describe the mitigation actions that would be taken should destabilization or contamination be detected, and identify who would be responsible for these actions.

Recommendation: The AWRMP should also include a commitment for preparation of an annual report of all sampling and analysis conducted each year. The annual report should discuss whether the block model predictions were accurate and describe whether and how the plan should be revised to accommodate different conditions than those previously predicted. The annual report should also compare NCV with conventional ABA testing for a representative number of samples each year, especially from pits with the highest acid generation potential. We are also looking into the ABA method used by SVL lab and may make a recommendation about the type of ABA testing to be used. We also recommend that all data be made available in electronic format (Excel or Access) for easier review.

We remain concerned that a six-inch cover of growth medium on waste rock dumps may not be an adequate thickness for cover. Because the geochemistry of the proposed waste rock dumps is still not well characterized, we believe meteoric water should be precluded from infiltrating waste rock dumps and leach pads to the extent possible.

Recommendation: We recommend the ROD and AWRMP include provisions to study whether additional growth medium will be needed to effectively preclude meteoric water from infiltrating waste rock dumps, how much would be needed, and potential sources.

Water Quality and Quantity Monitoring

According to the Final EIS (3-34), impacts to groundwater quality as a result of the proposed action are not anticipated, based on no detected impacts under the current operations. Schafer (2008) also notes that seepage or flow has not been observed from the existing waste rock dumps since inception of operations in the early 1980's. However, data are insufficient to support this conclusion because efforts have not been made to detect and monitor waste rock seepage beyond that of visual observations. EPA believes a more rigorous monitoring program is needed to track fate and transport of fluids from mine facilities.

Recommendation: In addition to the proposed eight monitoring wells depicted on figure 2-12, EPA recommends monitoring wells be installed in the following areas:

- Waste Rock Disposal Areas (RDA): EPA recommends additional groundwater quality monitoring wells below the downstream toes of five RDAs, including the East Sage RDA, Rat West RDA, North 3 RDA, and North 2 RDAs, and the northern extension of the South Water Canyon RDA.

- Process areas: Monitoring of process facilities should be conducted at five additional locations. We recommend installing one well below the reclaimed west side heap leach pad; two wells to the west and downgradient of the west side heap leach complex; one well to the south of the west side heap leach complex, and one well immediately to the south of the proposed Moony process area.

- Pit lakes: Groundwater elevation monitoring should be conducted to determine the potential for pit lakes after mine closure for the Top, Saga, East Bida, 2/3 and Rat pits.

Recommendation: The ROD should include a Water Monitoring and Management Plan for all groundwater and surface water at the site. This plan should include the following:

- Provide a map depicting all monitoring sites, including monitoring wells, piezometers, sedimentation basins, seeps, springs, as well as surface water diversion structures, all intermittent and ephemeral streams, and areas of shallow groundwater overlaid on a mine facilities map.
- Describe all monitoring facilities.
- Identify appropriate, reliable, and representative sampling and analytical protocols that will be used for the life of the mine and during closure and post-closure.
- Provide and evaluate all water monitoring data for the entire mine area to distinguish baseline conditions versus any water quality and quantity impacts from mining thus far, and conduct a trend analysis.
- Describe how monitoring information will be fed into the AWRMP for decision-making purposes.
- Describe mitigation measures that would be implemented if water quality is degraded. If seeps approach MCLs, they should be controlled and collected and kept away from stormwater and shallow groundwater.

The Final EIS (p. 2-52) states the period needed to manage draindown solutions from heap leach pads will be up to 20 years. It will be important to determine the maximum requirements for the purpose of determining long-term treatment; corresponding operations, maintenance, and monitoring requirements; and appropriate bonding.

Recommendation: The ROD and Water Monitoring and Management Plan should include requirements for monitoring and treatment as necessary as long as draindown solution or leachate is discharged, and assume this is required for up to 20 years for the purposes of closure planning and bond determination.

Based on the limited groundwater information available for the project area, we continue to be concerned that some pits, including the Top and Sage Flat pits, may be excavated to levels below the water table, resulting in post-closure pit lakes. While the Sage Flat Pit would be backfilled under Alternative A, it is unclear from the Final EIS whether it would be backfilled to above the potentiometric surface, precluding pit lake formation. It does not appear that the Top Pit would be partially backfilled under Alternative A.

Recommendation: EPA recommends the ROD require preclusion of the formation of any pit lake if it would cause an adverse ecological risk or degradation of adjacent groundwater. A commitment should be made to evaluate alternatives to pit lake formation such as backfilling with appropriate waste rock or revising excavation depths to elevations above the water table. The AWRMP should also identify waste rock specifications (e.g., geochemistry, amount, depth, cap/cover) for pit backfilling and justify such specifications.

Stormwater Controls

Based on a May 2005 aerial photo, EPA notes what appears to be evidence of a high suspended sediment stormwater discharge from the haul road around the south side of the original Moody Heap facility. If it has not been done already, stormwater BMPs across the site should be improved so that, in addition to diversion structures, other BMPs such as settling basins are included. Settling basins would hold and prevent/minimize highly turbid water discharges.

Recommendation: EPA recommends that stormwater best management practices across the site be upgraded to include additional stormwater settling basins and other appropriate controls, where needed, with emphasis on haul roads.

Clean Water Act Section 404

The Final EIS (p. 3-3) indicates there may be no waters of the U.S. in the project area, but it appears that the U.S. Army Corps of Engineers has not yet approved a jurisdictional determination for the project area. If it is determined that there are jurisdictional waters within the project area, a Clean Water Act (CWA) Section 404 permit will be necessary for any discharges of dredged or fill material into these waters, and EPA will review the project for compliance with *Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials* (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the CWA. Any permitted discharge into waters must be the Least Environmentally Damaging Practicable Alternative available to achieve the project purpose.

Recommendation: We recommend the ROD not be signed prior to receipt by the applicant of a jurisdictional determination by the U.S. Army Corps of Engineers. If, under the proposed project, dredged or fill material would be discharged into waters of the U.S., the ROD should discuss how those discharges will be avoided and demonstrate the project's compliance with the 404(b)(1) Guidelines. In addition, the ROD should identify and commit to any required mitigation for impacts to waters of the U.S.