GREAT BASIN RESOURCE WATCH

Working with Communities to Protect Their Land Air and Water

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October, 30, 2012

Thomas Gray
Division of Environmental Protection
Bureau of Mining Regulation and Reclamation
901 South Stewart Street, Room 4001
Carson City, Nevada 90701-5249

RE: Mt Hope Project, Water Pollution Control Permit NEV2008106

Dear Mr. Gray,

Great Basin Resource Watch (GBRW) has reviewed the permit, fact sheet, and various background materials related to the Mt. Hope Project, and has a number of concerns regarding this permit. There are two aspects which stand out as part of the monitoring plan; the number of monitoring wells does not seem sufficient, and many of the proposed monitoring wells are not located along anticipated flow paths. Much of the hydrological analysis of the monitoring plan contained in these comments was extracted from a technical memorandum by Myers prepared for GBRW.[1]

Basis for Critique of Monitoring Plan

A basic concept underlying the preparation of a groundwater monitoring plan is that a conceptual model for contaminant flow from a potential source be established. This means estimating the flow paths in the vicinity of the mine. The application includes maps which show pre-mine groundwater contours and one that shows general flow paths among the three nearby basins. There are no detailed flow paths prepared or presented for the area near the pit where the waste facilities will be although they can be discerned from the contour map. The conceptual model must also consider potential dispersion of contaminants along the flow path; this was not presented in the studies prepared for this application. At a mine for which dewatering may change the groundwater contours, the flow paths may change. Although the fact sheet notes the pit lake will be terminal, meaning that it will capture flow, it does not address the contaminants flowing toward the pit; the applicant does not apparently rely on this capture to avoid monitoring for contaminants. NDEP should require the applicant to determine a "discharge influence area" so that it is known from where leakage from waste facilities would be able to move downgradient and not toward the pit; such an analysis would depend on time because the capture zone may change. This information would make the selection of monitoring well locations more efficient; it does not make sense to monitor an area that will be quickly drawndown so as to be dry or from which the contaminants will be drawn toward the pit or dewatering wells.

The general groundwater flow paths near the proposed mine is away from the mine toward the three nearby valleys because of the mine's location near the intersection of the topographic divides among

the valleys; Figure 1 shows that the crest of the groundwater divide is just north of the pit and that the flow direction under the PAG waste rock dump and the low-grade-ore stockpile (east of the pit) is to the east. The groundwater crest lies just northeast of the proposed tailings impoundment, so the flow across the tailings impoundment is to the southwest (Figure 2). The following consideration of the monitoring well locations relies on flow paths as described here.

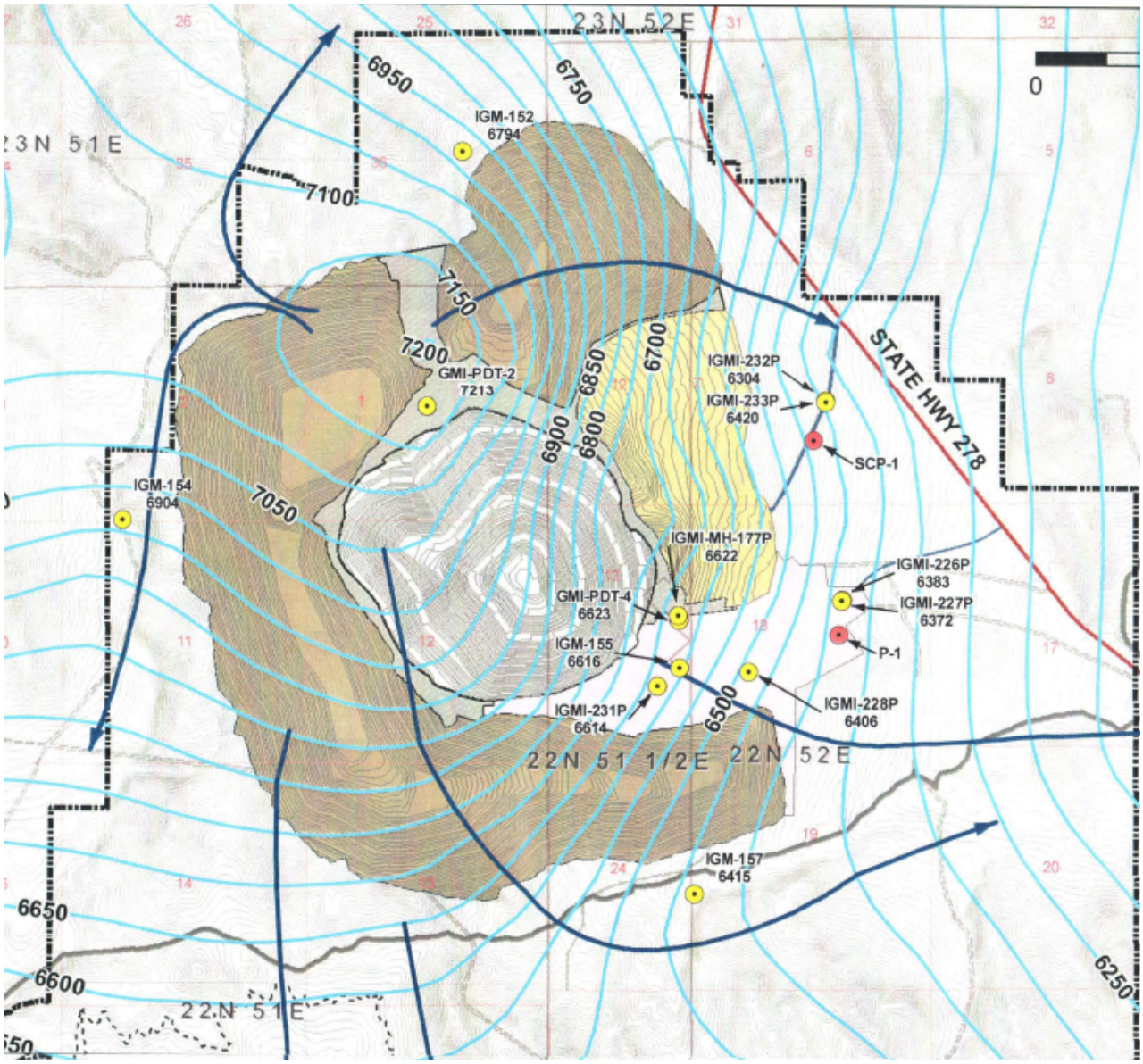

Figure 1: Snapshot from WPCP application Figure II-9 showing proposed monitoring wells and groundwater contours. The yellow wells have already been constructed.

Non-PAG (not potentially acid generating) Waste Dump Monitoring

The draft permit specifies the monitoring wells associated with different mine components (section I.D (10).) The non-PAG waste rock dump encircles the pit to the west and south (Figure 1). The draft permit states that well GMI-PDT-2 is upgradient of the facility; Figure 1 shows that that this well is existing and that a flow arrow through the well would be toward the pit, not under the waste rock dump. Well IGM-154 is considered downgradient but lies west of the dump and the flow path through

it both up- and downgradient would not go under the dump. Well IGM-157 is on the southeast corner of the dump at a point where a flowpath would extend under the dump. At best, well IGM-157 is the only one that based on its location is properly located to monitor flowpaths that could actually transport contaminants from the waste rock dump. Even if IGM-154 is on a proper flowpath (it is not), it is separated from IGM-157 by several miles; a huge contaminant plume could advect south and southeast from the waste rock between the monitoring wells without being detected. It is essential that at least three additional monitoring wells that screen across the water table be constructed along the southern boundary of the non-PAG waste rock dump west of IGM-157.

LGO (low grade ore) Stockpile Monitoring

The LGO stockpile lies east of the pit. The draft permit specifies that monitoring well SCP-1, IGMI-232P, and IGMI-233P are downgradient monitoring wells. Figure 1 confirms that all three lie on flow paths which flow beneath the stockpile. However, the IGMI wells appear to be at the same point. Well logs show these are both deep wells screened far below the water table. IGMI 232-P is screened from 1018 to 998 feet below ground surface (bgs) in shale with static water level at 763 ft bgs while IGMI 233-P is screened from 568 to 548 feet bgs in tuft with static water level at 85 ft bgs. Neither report indicates where water was first encountered nor are there geophysical logs in the application with which to determine saturated levels. These wells are apparently monitoring fracture zones in the respective lithologies. There is no discussion of how the monitoring depth was chosen, but it is reasonable based on the fractures and the dip of the formations that monitoring at this depth is warranted. However, a couple of shallower wells that screen any water levels in the alluvium are necessary. Well SCP-1 should be constructed to span the water table if there is a phreatic aquifer in the area; the permit should specify these construction details.

PAG Waste Dump Monitoring

Wells IGM-152, -226P, and -227P are all called downgradient monitoring wells for the PAG waste rock dump. The latter two are east of the southernmost end of the LGO stockpile and not downgradient of the PAG waste rock dump. IGM-152 is northwest of the PAG waste rock dump (Figure 1) and the groundwater contours show that a flowpath intersecting this well would not be underneath the PAG waste rock dump. The wells as shown on Figure 1 and specified in the draft permit will not monitor the PAG dump. Basically, this permit will allow the PAG waste rock to not be monitored. NDEP should specify at least three new monitoring wells east of the PAG waste rock dump with depth to screen chosen based on the presence of a water table aquifer and the presence of fracture flow zones at depth, as in the wells east of the LGO stockpile.

Wells IGM-226P and -227P lie east of the milling facility and the LGO stockpile, and are probably good wells for monitoring those facilities. The assemblage of up- and downgradient wells, including the two specified for the PAG dump, at the mill facilities are probably sufficient. They are well space laterally and vertically. However, well IGMI-MY-177P is not useful because the screen is too long; it spans 110 to 270 feet bgs, which allows dilution to minimize the observed concentrations.

Tailings Impoundment Monitoring

The tailings impoundment would be south of the pit. It lies southwest of the groundwater divide, therefore the groundwater flow will be to the southwest under the facility (Figure 2). The draft permit indicates that four upgradient and two downgradient wells will be used to monitor this site.

Figure 2 shows clearly that well TM-B is cross-gradient from the facility, although the draft permit refers to it as one of the two downgradient wells. A flowpath through this well would pass just east of the easternmost portion of the facility, therefore this well is not useful for monitoring contaminants

from the tailings impoundment. Wells TM-D, TM-A, and TSF-2 appear to be adequate upgradient monitoring wells, but well TM-C is also too far east; a flowpath through TM-C would miss the tailings impoundment by a quarter mile.

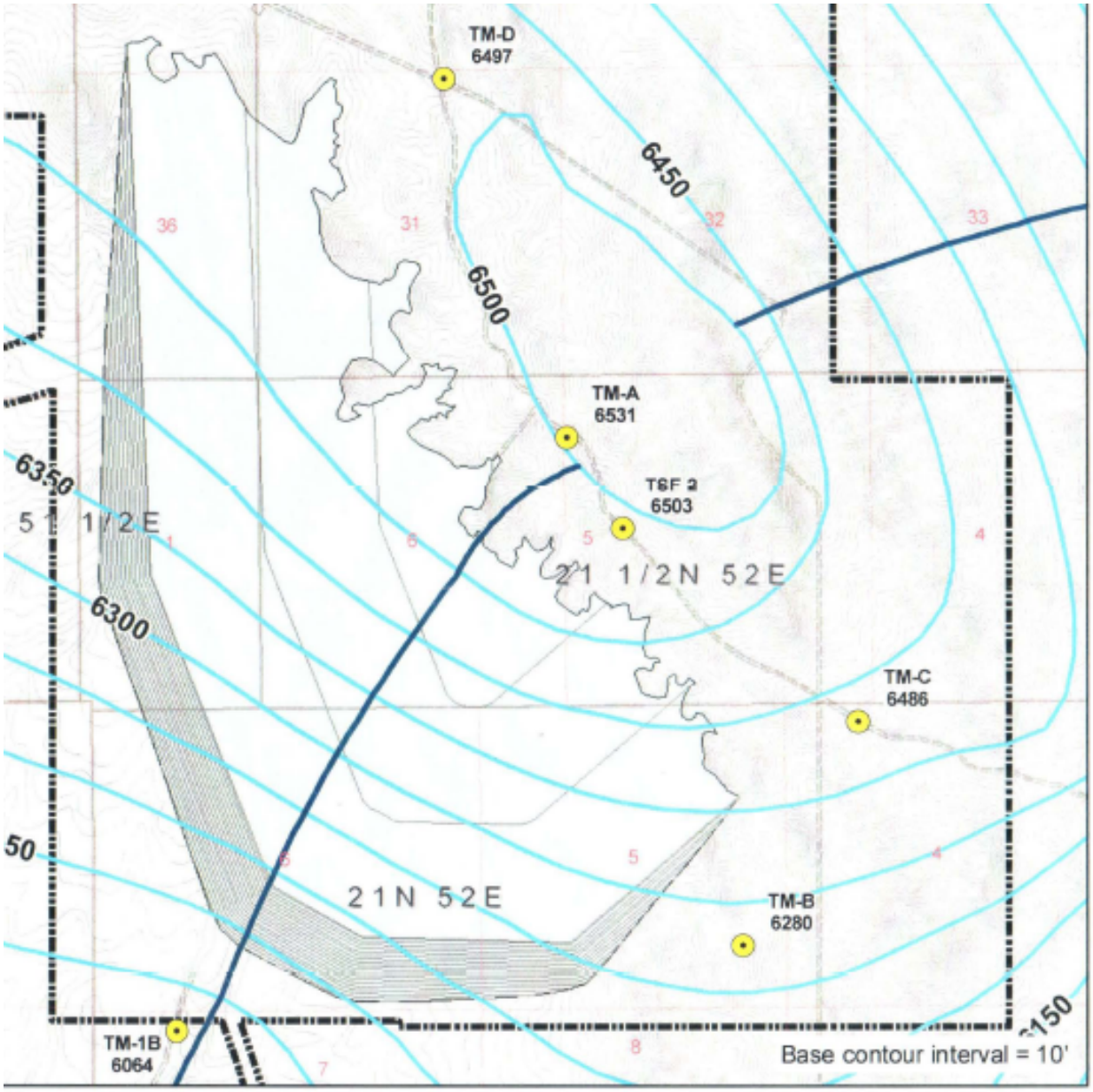

Figure 2: Snapshot from WPCP application Figure II-9 showing proposed monitoring wells and groundwater contours near the tailings impoundment. The yellow wells have already been constructed.

The draft permit therefore has just three adequate upgradient wells and one downgradient well. Because of the size of the impoundment and the potential contamination from leaky tailings, it is obvious there should be at least four additional monitoring wells downgradient from the tailings facility. Two should lie between TM-1B and TM-B and two should lie on a line between TM-1B and the number 6300 on the contour space about 1/3rd mile north from TM-1B.

Table II:3-2 in Volume 2 of the applications shows the well depths for wells near the tailings impoundments are very deep, with four of five wells 1000 or more feet deep. According to the well logs, however, they are screened at much shallower depths, in the order of hundreds of feet. Assuming the description of drill holes near the site is accurate, with no groundwater encountered in the upper 100 feet, the screen depths for the monitoring wells is appropriate. The required new wells should have similar screen depths.

General Monitoring Well Requirements

The draft permit specifies that if a well is dry or fluid is not otherwise accessible, they should just record "dry". However, the permit should specify what is to be done if the well goes permanently dry. The pit will require dewatering which will lower the water table in the nearby vicinity. It may be possible to argue that the pit will capture any contaminants so that monitoring wells become unimportant near the pit. NDEP should require profile 1 sampling of any dewatering wells for the same reason they require monitoring wells and to characterize the water that will become inflow to the pit after dewatering. If dewatering wells are not used, the permit should specify that inflow to the pit be sampled.

The permit must also establish sampling procedures, otherwise the methods used for sampling the wells may not be consistent and may not meet industry standards. Part II.E does not provide sufficient detail. For example, what are the requirements for purging the well prior to drawing a sample? What about taking field blanks? If indeed there is a standard, the permit should at least reference it.

Summary of Monitoring Well Requirements

The permit apparently utilizes existing wells for monitoring as much as possible. However, as shown in this memorandum, several proposed monitoring wells do not lie on a flow path from near a potential source of contaminants; monitoring them would be wasteful. Because the applicant did not consider the conceptual flow model when constructing some of these wells, additional wells are needed if this facility is to be adequately monitored.

There are no monitoring wells downgradient from the bulk of the non-PAG waste rock dump. At least three additional monitoring wells that screen across the water table should be constructed along the southern boundary of the non-PAG waste rock dump west of IGM-157. The PAG waste rock dump has no monitoring wells at all, because two of the proposed wells are actually east of the LGO stockpile and the other is northwest of the facility and not on a flowpath beneath it. NDEP should specify at least three new monitoring wells east of the PAG waste rock dump with depth to screen chosen based on the presence of a water table aquifer and the presence of fracture flow zones at depth. The LGO stockpile has two deep monitoring wells, so the currently planned-for third well should be shallower, sampling the water table aquifer if possible.

At least two of the proposed wells at the tailings impoundment are not on a flow pathway that could transport contaminants from the facility. Only one downgradient well is currently proposed (because the other in the draft permit is not actually downgradient). It is essential that NDEP require at least four additional monitoring wells constructed as specified above.

Pit Lake Monitoring

The draft permit contains requirements for monitoring water in the pit lake, but is not clear about monitoring of groundwater around the pit lake. The periodic updates to the pit lake model should include any current groundwater data that pertains to inputs for the modeling process. It appears as though a few of the proposed monitoring wells, which are on the periphery of the pit may serve this

purpose in part. In addition dewatering wells could also be used here; however, GBRW could not find the locations of those wells. The permit needs to indicate which wells would be used for this purpose and what data is to be obtained from them for model updates.

GBRW remains concerned that a flow-through condition could exist at some point during the filling of the pit lake. The analysis presented in the Mount Hope Environmental Impact Statement (FEIS) claims that at "all times during the simulated recovery period … , including a final equilibrium, the hydraulic gradients are inward toward the pit in all directions, indicating that the pit consistently acts as a hydraulic sink during and after mine closure" (FEIS, p 3-115)[2]. The pre-mine groundwater levels sloped several hundred feet across the proposed pit lake, which suggests the natural water levels on up- and down-gradient sides of the pit differ significantly. Because of the steep gradient in the area, it is possible that more rapid recovery in some areas may allow the pit lake to recover more quickly than the water table on all sides and at all level; simply considering the top of the water table is insufficient to predict whether the pit will always be a sink.

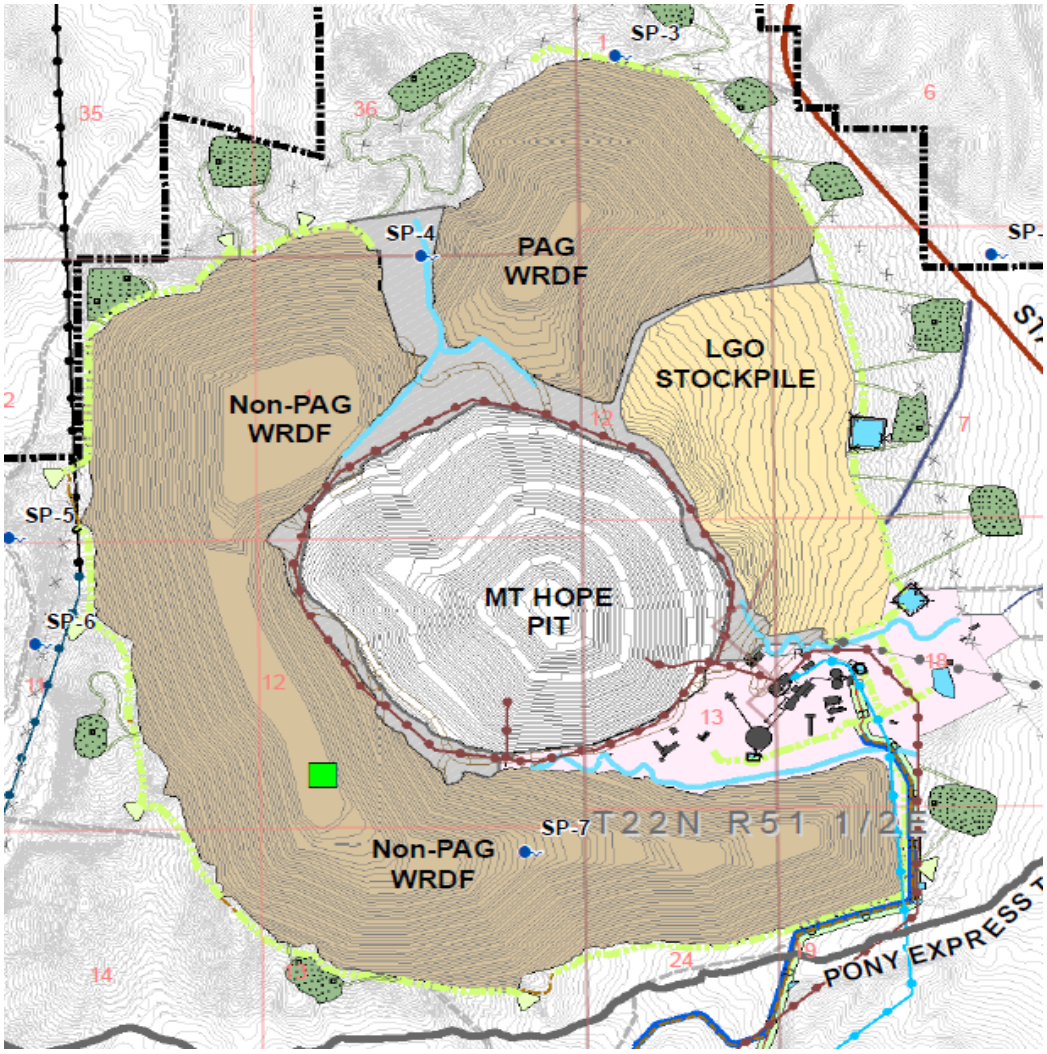

Figure 3: Diversion channel and ponds near the proposed pit, from FEIS figure 2.1.5

The groundwater inflow portion of the pit lake volume is initially small although the pit lake level recovers almost 550 feet in the first 50 years (FEIS Figure 3.3.12). Most of the simulated pit lake recovery is due to the pit wall runoff rate exceeding the groundwater inflow rate for the first 400 years (FEIS Figure 3.2.21). This could only occur if the groundwater levels around the pit recover slowly. It is therefore reasonable that the pit lake is above the groundwater level on one or more sides of the pit.

To better prove the consistent "sink" nature of the pit, Montgomery et al should add simulated monitoring wells around the pit to monitor the water levels in each model layer both at and at a small distance from the pit lake wall. Detailed consideration of the monitoring well hydrographs should provide evidence that the pit will be a sink or show that it is not. Additionally, it is essential to consider that fractures and preferential flow paths not currently known or simulated in the model could affect the hydraulic gradients around the pit, especially on a local basis.

GBRW is aware that the Bureau of Land Management disagrees with our suggestion of the potential for flow-though conditions; however, appropriate monitoring of groundwater surrounding the open pit should be part of the monitoring plan to assure that groundwater is not being degraded.

Miscellaneous Comments
The diversion channels will pass adjacent to the west side of the PAG waste rock dump, as shown in Figure 3. The flow in the diversion channel will apparently contact the PAG rock in the PAG WRDF where it could seep and cause oxidation conditions along the southwest portion of the dump. NDEP should require that this channel be rerouted or a barrier installed to prevent a hydraulic connection between the channel and the PAG rock.

The fact sheet (p 6) indicates that a "3-foot wide, 3.5-foot high berm" will hydraulically separate the PAG waste rock dump and the LGO stockpile. The berm material should be specified, and it must have a low conductivity to maintain the hydraulic separation.

In summary GBRW does not see that the monitoring in the draft WPCP to be sufficient and is open to discussing possible modifications with NDEP staff and Eureka Moly, LLC.

Sincerely,

John Hadder,
Director

[1] Myers, Tom, "Technical Memorandum, Review of the Water Pollution Permit NEV2008106, Mt Hope Mine," October 24, 2012.
[2] U.S. Department of the Interior Bureau of Land Management, *MOUNT HOPE PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT*, NV063-EIS07-019, October 2012.