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BEFORE THE STATE OF NEVADA

STATE ENVIRONMENTAL COMMISSION

In the Matter of:

GREAT BASIN RESOURCE WATCH APPEAL OF NOTICE OF DECISION TO RENEW WATER POLLUTION CONTROL PERMIT NEV2008106 TO EUREKA MOLY, LLC FOR THE MOUNT HOPE PROJECT /	**PETITIONER'S REPLY TO NEVADA DEPARTMENT ENVIRONMENTAL PROTECTION AGENCY RESPONSE BRIEF**

COMES NOW Great Basin Water Watch ("GBRW"), by and through their attorney of record, CAVANAUGH-BILL LAW OFFICES, LLC, and hereby submits this Reply to Nevada Department of Environmental Protection's ("NDEP" or the "Agency") Response Brief as follows:

__**The Agency's Argument on Ripeness Fails.**__

First and foremost, NDEP argues that the appeal should be dismissed on "ripeness". As a matter of law, an issue is ripe for appeal once the agency's Final Decision is rendered. What the agency is essentially asking is that it be allowed to issue its permit, then argue against their own data or findings to then assert that the Commission should wait until more data come in. The agency should not be allowed to have it both ways - arguing that it's permit approval is final to allow the project to begin, but at the same time argue it needs more data to determine the true impacts. This simply underscores the Petitioners' assertion that the decision was, in fact, arbitrary as there was insufficient data collected. NDEP assumes that uncertainty in the modeling for pit lake predictions can only be addressed with additional data that will be collected once the mine begins to excavate for the open pit. The agency cannot use this uncertainty to disavow the

EIS' predictions, or unilaterally limit its authority and duty to act upon them. This issue was squarely faced in Save Our Cabinets v. U.S. Dep't. of Agric., 254 F.Supp.3d 1241 (D. Mont. 2017). There, USFS' FEIS included long-term models predicting that the mine's dewatering would eventually reduce stream flows. Plaintiffs argued that such streamflow depletions violated state nondegradation water quality standards. Like here, USFS attempted to escape from its own modeled predictions: "The defendants argue that the modeled baseflow data cannot and should not be relied upon to reach a degradation conclusion because the model is conservative, more data will be collected during the Evaluation Phase, and the model will be updated before the Project proceeds." Id. at 1253.

The court rejected USFS' argument:

> [T]hat again ignores the fact that the Forest Service determined it had enough information to proceed with the ROD. … To say that noncompliance does not matter in the face of 'adaptive management' is contrary to the evidence before the agency. Cf. Greater Yellowstone Coalition v. Servheen, 665 F.3d 1015, 1029 (9th Cir. 2011)("[I]t is not enough to invoke 'adaptive management' as an answer to scientific uncertainty."). Id. at 1254.

As in the instant case, in *Greater Yellowstone*:

> The Service's ultimate (and understandable) conclusion is that it simply does not yet know what impact whitebark pine declines may have on the Yellowstone grizzley. ***But we nonetheless have a responsibility to ensure that an agency's decision is not arbitrary. Cf. *Lands Council v. McNair*, 537 F.3d 981 (9th Cir. 2008) (en banc). It is not enough for the Service to simply invoke "scientific uncertainty" to justify its action. *Greater Yellowstone* at 1028.

In fact, the NDEP argument of "ripeness" underscores the very concerns set forth by GBRW and necessitates the additional measures that GBRW has been advocating throughout its comments and discussions. For example, better characterization data can still be collected prior to construction of the mine. As noted previously by GBRW, in addition the underlying conceptual "rind model" used for the Mt Hope pit lake is the same as was used for the Lone Tree pit lake. Predictions for the Lone Tree Mine pit lake have been found to be very far off from reality. The Division should be more critical of this type of modeling given its very poor predictability based upon actual case examples.

In addition the Division was unwilling to examine other molybdenum mines for a comparative analysis to provide additional information for decision making. Nevada is host to another molybdenum mine near Tonapah called the liberty site, where the pit lake is of very poor quality. There are other examples such as Golden Sunlight in Montana, Climax mine in

Colorado, and the Questa mine in New Mexico that all have already demonstrated poor water quality. *See* Exhibit G - comparison chart. GBRW acknowledges differences in geology and the physical environment of the different mines; however, the predicted water quality for the Mt Hope pit like is much better than what is seen at existing molybdenum mines and predictions for others under development. The Division should be required to use the information from other molybdenum mines and conduct a comparative analysis to better understand how the Mt Hope site will evolve in time and reduce uncertainty.

NDEP also dismisses GBRW's argument that NDEP will be less inclined to deny the Mt Hope permit once construction begins as speculative. There is nothing speculative about the pressure on the Division to approve future permit renewals once the mine is under construction. It is not uncommon for mining companies to argue that once construction has begun that to deny the permit will cost the hosting community many jobs and weaken the local economy. The time to address the impacts is prior to beginning construction, not mid-way through. This is why the laws are written the way they are and matters are appealable once the Final Decision is issued, not waiting until ground has already been broken.

<u>NDEP's Claim that GBRW's Concerns were Addressed in the Revised WPCP is False.</u>

Despite the Agency's contention otherwise, GBRW's concerns were not addressed in the revised WPCP. GBRW's technical analysis leads to the conclusion that the proposed mine plan is inadequate due to an incomplete characterization of the waste rock, multiple incorrect assumptions regarding the management of the waste rock, particularly the PAG waste rock, and a faulty pit lake water quality analysis. The permit requires a good faith attempt using defensible technical analysis to characterize and predict future conditions at the mine site. This is needed prior to allowing the construction of the mine to begin. To require the Agency only to reassess this after construction of the mine commences fails the upfront standard demanded by Nevada law.

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The Agency's conclusion that Water Quality is Not Expected to Harm Human, Terrestrial or Avian Life is Based on Insufficient Information.

A. Rock Characterization Data

GBRW disagrees with the Agency's argument that there has been sufficient rock characterization data collected. GBRW reviewed the literature on sampling for geochemical characterization. Most of the recommendations pointed to a larger sampling rate than Eureka Moly ("EML") has performed in its analysis and which NDEP depended upon. GBRW's comments, in part, to NDEP on this aspect was and still is the following:

> Key to prediction of future water quality at mine site is judicious and sufficient sampling of the various rock types and alterations. The bare minimum for characterization as cited in an EPA review[1] is 1 sample per million tons of rock, which Eureka Moly LLC (EML) approximately achieves. According to the mine plan 1,750 million tons of waste rock is anticipated[2], so the minimum would be on the order of 1,750 samples, and in total EML appears to have based waste rock characterization on 1,844 samples from 1,545 "historic" pulp samples, 250 historic core samples, and 48 recent core samples (It was not clear to GBRW from the report whether kinetic testing used samples from the 1,844 or additional samples).[3] The EPA review article cites other expert sampling opinions; 1 for every 20,000 tons (Gene Farmer, US Forest Service), 1, for every 40,000 tons (British Columbia AMD Task Force. Extrapolating in a linear fashion from these opinions EML would have needed to collect from 40,000 to 70,000 samples, roughly 20 to 40 times as many as were collected. Although, EPA does not indicate whether a linear extrapolation is appropriate, GBRW acknowledges that such an estimate may be overly conservative. In a more recent review of predicting water quality at mine sites, Maest and Kuipers recommend the following[4]:
>
> **TABLE 1**
>
> | Mass of Each Separate Rock Type (tonnes) | Minimum Number of Samples |
> |---|---|
> | <10,000 | 3 |
> | <100,000 | 8 |
> | <1,000,000 | 26 |
> | 10,000,000 | 80 |
>
> Using this prescription adapted from Price and Errington 1994,[5] yields a similar sampling rate as indicated from Farmer and the BC AMD task force. In view of these

1 U.S. Environmental Protection Agency, "Technical Document Acid Mine Drainage Prediction," EPA530-R-94-036, December 1994,. (p. 11)

2 U.S. Department of the Interior Bureau of Land Management, *Mount Hope Project Final Environmental Impact Statement (NV063-EIS07-019)*, October, 2012 (p. 2-24)

3 General Moly Inc., "Mount Hope Project Waste Rock and Pit Wall Rock Characterization Report," January 28, 2008, (pp. 4-2 – 4-3)

4 Maest, A.S., Kuipers, J.R., Travers, C.L., and Atkins, D.A., 2005. Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the-Art (p. 22)

5 Price, W. and Errington, J, 1994. ARD Policy for Mine Sites in British Columbia. Presented at International Land Reclamation and Mine Drainage Conference and the Third International Conference on the Abatement of Acid Drainage, Pittsburgh, PA,. (p. 287)

reviews and our opinion of the potential for acid drainage and poor water quality that has occurred at other mines in Nevada GBRW does not see the sampling rate for the Mt. Hope Project to be sufficient. The most glaring example of this is that paucity of potential pit wall samples that were used for the pit lake water quality analysis, as indicated in the FEIS *"There were little sampling data from some of the pit wall areas because of the relatively cylindrical nature of the orebody."* [6] Regardless of whether the approach to the pit lake model is justified, this statement clearly indicates how incompletely the sampling was done. EML was relying on samples that were taken 30-40 years earlier, where the mine plan was likely to have been much different that the current plan. These "pulp" samples appear to have been largely from the periphery of the ore body as part of those early explorations when resource evaluation was the primary goal. GBRW recognizes that these samples are useful; however, we are skeptical that they and the additional recent samples have been sufficient to fully understand PAG versus Non-PAG breakdown and ultimately water management plan and closure of the site.

BLM in response to GBRW draft EIS comments refers to the BCATF recommendations and stated that, "According to this method, the recommended minimum number of samples should be 25 for a 1 million ton geologic unit and the maximum number of samples recommended by the BCATF is 500."[7] A more current, 2009, analysis[8] to which the BCATF refers, cites the same table that GBRW used in the FEIS comments (Table I above) as the recommended starting point for sampling rate. It is also recommended that, "...the final sampling frequency be determined site specifically based on the variability of critical parameters, prediction objectives and required."[9] There is no mention of a 500 maximum number of samples; perhaps that was the previous thinking.

In addition to the overall number of samples is the matter of sufficient samplings of rock types and alterations. In Table 2 below GBRW has compared the sampling for the primary alterations of rock types (based on Table 3.3-3 of the FEIS, p. 3-209) deduced from Table 4.1 of Waste Rock and Pit Wall Rock Characterization Report, 2008, with recommended sampling for the same tonnage based on Table 1 above. We have provided two methods of estimating the number of samples needed shown in the two columns under the column heading, "Approximate Number of Samples required based on Maest and Kuipersi." The left and right columns use a linear and non-linear respectively interpolation and extrapolation from Table I. It is likely the best reasonable conservative estimate of the sampling rate lies in between these two estimates, with the non-linear approach underestimating, and the linear approach overestimating for large tonnages. Note that some rock types are on the order of hundreds of millions of tons, so extrapolation needs to be cautiously done, since it extends well beyond the basis for the model. In general, based on this analysis the overall sampling should be from ~3,600 - ~ 14,000 (non-linear to linear) compared to the 1,844 samples actually used, and sampling under each rock type/primary alteration with a few exceptions is also fewer than recommended. GBRW also notes that as rock strata is subdivided further into various alterations, etc, the number of samples recommended increases."

NDEP did agree that more data is better, and required an updated waste rock management plan including additional characterization data in the schedule of compliance, so the Division

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6 *U.S. Department of the Interior Bureau of Land Management, Mount Hope Project Final Environmental Impact Statement (NV063-EIS07-019),* October, 2012. (p. 3-212)

7 U.S. Department of the Interior Bureau of Land Management, *Mount Hope Project Final Environmental Impact Statement (NV063-EIS07-019),* October, 2012. (Vol. III, p. 331)

8 Price, William A., "Prediction Manual for Drainage Chemistry for Sulphidic Geologic Materials," CANMET – Mining and Mineral Sciences Laboritories, Smithers, British Columbia, V0J 2N0, December 2009.

9 Price, William A., "Prediction Manual for Drainage Chemistry for Sulphidic Geologic Materials," CANMET – Mining and Mineral Sciences Laboritories, Smithers, British Columbia, V0J 2N0, December 2009. (p. 8-8)

shows concern on this point, but didn't go far enough to require the increased data prior to permit approval.

B. Pit Lake Water Quality is an Issue During this Permit Cycle.

NDEP then argues that since the pit lake water quality will be addressed at a later time as a Schedule of Compliance item prior to mining below the pre-dewatering groundwater elevation that it is "not an issue" during the permit cycle. What then is the purpose of the initial pit lake analysis if it is considered irrelevant at the issuance of the permit? There must be a good faith effort to determine pit lake water quality for the permit to be issued in the first place. This is important for planning of the mine project and ensuring that the mine will be able to comply with all state laws during operation and through closure. If NDEP does not require the best possible prediction for the pit lake or any aspect of the mine then the best mine plan at the outset is not likely and the state will have failed to regulate as required by law.

The Division misrepresents GBRW's contention on pit lake water quality by stating that GBRW is taking the position that the pit lake must meet drinking water standards. GBRW stated that drinking water quality or near so water will be flowing into the pit lake, and that the pit lake water will be of lower quality than the water in the aquifer surrounding the pit lake. In this way waters of the state are degraded.

Furthermore, since there is no beneficial use applied to the pit lake there will be no specific water quality standard - only the stipulations contained in NAC 445A.429. More importantly, the pit lake water derived largely from bedrock aquifer will not be used, where prior to flowing into the pit lake as groundwater the water could be used. The pit lake effectively removes water from use, so long as no beneficial use is established for the pit lake.

The Division argues that in NAC 445A.429 the word potential refers to a "meaningful possibility" that the pit lake will degrade the groundwater of the State or adversely affect human, terrestrial, or avian health. But, this still is dancing around the issue. NDEP still needs to clarify what constitutes "meaningful possibility," how poor must the water quality be for there to be a *potential* to degrade the groundwater of the State or adversely affect human, terrestrial, or avian health?

Finally, the Division continues to rely on a pit lake analysis that is suspect. As stated above other molybdenum mines existing and proposed suffer from poor water quality and predicted or existing poor water quality in the pit lake. Is the Mt. Hope deposit that unique to produce so much better pit lake water quality? Just the anticipated amount of potentially acid generating (PAG) rock at the site (~30%) would suggest that it is not unique and likely to have poor water quality. GBRW has commented extensively on the errors in the modeling of the pit lake and suggested that a respected third party, an analyst acceptable to NDEP, be enlisted to do an independent assessment. Yet, neither NDEP nor Eureka Moly LLC have supported this course of action to resolve the conflict.

NDEP assumes that the pit lake will be a hydrologic sink and thus there will not be outflow from the pit lake. However, the conditions at the site suggest that outflow could occur. GBRW discussed this in our comments to NDEP on the WPCP,

> 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" . 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.
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> 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 . 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.6 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.
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> 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.

Finally, the calculation models used estimates water-quality degradation from mine waste are inherently challenging to understand because the mass of available pollution actually varies over time. That is, the primary source of pollutants from mine waste--mainly sulfate, acidity, and heavy metals--is initially in sulfide minerals, such as pyrite (FeS2). But these sulfide minerals are essentially insoluble in water. The pollutants are thus not converted into a mobile water-soluble form until the sulfide minerals react with atmospheric oxygen and water. Only then are the pollutants mobilized in the form of aqueous leachate, where then can be carried in water, such as into a pit lake, down to groundwater, or in surface flow the a stream.

The amount of pollutants release from sulfide minerals in mine wall rock (or from waste rock or from tailings) thus depends directly on how long the rock is exposed to the atmosphere and allowed to oxidizing. In the case of mine pit walls, this duration over which the sulfide rock is exposed to the atmosphere is almost always many years, and can be many centuries.

As an additional chemical complication, in mine waste that contains insufficient acid-buffering minerals, the sulfuric acid produced by the oxidation of the sulfide minerals can produce acidic pore water. In the terminology used in the Mt. Hope pit lake study, this is the potentially acid generation, or "PAG" rock. In the Mt. Hope mine pit lake, the primary source of pollution will be the sulfate and metals that are liberated from the wall rock during the time when these sulfide minerals are exposed to atmospheric oxygen and meteoric water that percolates into the pit benches.

A logical sequence for estimating the load of pollutants to a mine pit lake is typically:

1) Estimate the rate at which sulfide S minerals in the exposed wall rock react with oxygen from the air (e.g., Kg sulfate produce per meter-squared wall rock per year). These calculations often consider the rate at which oxygen diffuses into wall rock, as well as the sulfide sulfur concentration in the wall rock. The results provide estimates of the mass of sulfide mineral oxidize in a unit area of wall rock over a given amount of time. There are many examples of these wall-rock-reaction-rate estimates in Nevada mine lake studies, but initial values are typically between ~2 and 20 Kg sulfate produce per meter-square wall rock per year. The calculations generally predict that this rate will decrease over time as the sulfide minerals near the pit wall are completely reacted away and oxygen must travel farther into the wall rock to reach sulfide minerals. An important component in the estimates of wall rock reaction is often the thickness of the "damaged wall rock zone," or depth affected by blasting. The value used for the Mount Hope Mine lake model, 1.8 meters, is on the extreme low end of what has been measured in open pit mines (i.e, range between ~1.1 to 15 meters).

2) Estimate the rate at which other pollutants (metals and acidity) are produced, based on association with the amount of sulfide minerals are oxidized. This is typically where "humidity cell" tests come in--among the important results from these is an estimate for the ratio of acid and metals released from the wall rock relative to the amount of sulfide mineral that has oxidized.

3) Use this general behavior of pollution release (i.e., Kg sulfate produce per meter-squared wall rock per year) in conjunction with the area of rock exposed in pit

walls, to estimate a total amount of sulfate, metals, and acidity that is released from the entire pit wall in each year of mining.

4) Make an estimate of the transport and fate of the pollutants that are released from wall rock. Some of these soluble pollutants may dissolve in run off into the pit during mining, being pumped out during mining, or flowing into the pit lake after closure. Some may remain as concentrated water or salt minerals in the pores of the wall rock until they are leached by percolating water. Once an area of wall rock is submerged below the lake, inflowing groundwater will almost certainly cause these pollutants to flow into the lake.

5) Estimate the chemical reactions that occur in the pit lake as pollutants leached from wall rock mix with lake water. Importantly, it is only at this stage, after the main assumptions about pollution production and transport into the lake are complete, would a public domain equilibrium model, such as the USGS model PHREEQC, come into use.

The huge deficiency in the Mount Hope mine pit lake prediction study is that it does not present their estimate of mine lake water quality in terms of these very standard mine-lake model components. Specifically, the Slumberger, April 2010, Final Pit Lake Geochemistry Report, Mount Hope Project, does not:

- Present estimates for the wall-rock oxidation rate (and thus the rate of production of soluble pollutants) over time,
- Present in table or graph estimates for the rate at which the primary pollutant in the wall rock (i.e., soluble sulfate) is produced over time.
- Provide a quantitative estimate for the fate of the soluble pollutants that are produced by oxygen reaction with sulfide minerals in the wall rock (e.g., what is the mass of pollutants that, in each year, either percolate down through the pit benches and seep to the pit bottom, reach the pit lake in water percolating through pit walls or as runoff over the pit benches, or wind up flushed into the lake when a region of wall rock is submerged below the water table.

The result is that it is not possible to understand the exact methods used to estimate water quality in the Mt. Hope pit lake, and thus not possible to make a quantitative confirmation of the predicted water quality. The technical analysis discussed in our comments was not addressed by NDEP, so this issue remains unresolved. Thus, the potential to degrade groundwater also remains unresolved.

C. Potential of acid generating (PAG) waste rock disposal facilities (WRDF) and low grade ore (LGO) stockpiles to degrade groundwater.

NDEP states that drainage from a potentially expanded PAG WRDF will affect the two springs SP-3 and SP-4. However, these two springs have been determined to be Public Water Reserves (PWR) by the Bureau of Land Management. Springs and waterholes on public land in the West are reserved for public use by Public Water Reserve No. 107 ("PWR #107"), which was created by Executive Order by President Calvin Coolidge in 1926. PWR 107 provides:

> [I]t is hereby ordered that every smallest legal subdivision of public land surveys which is vacant, unappropriated, unreserved public land and contains a spring or water hole, and all land within one quarter of a mile of every spring or water hole located on unsurveyed public land, be, and the same is hereby, withdrawn from settlement, location, sale, or entry, and reserved for public use in accordance with the provisions of Section 10 of the Act of December 29, 1916.

As PWR's access to the springs as well water quality and water quality is important, and it is a violation of federal law to deny or impede access to these springs. Even the existing footprint for the PAG WRDF is likely to violate PWR 107 let alone an expansion of the footprint (see Figure 1 below).

The Operations and Closure Plans Are Not Protective of Groundwater Resources.

On page 13 lines 15 and 16 NDEP states that, "NDEP does not anticipate perpetual treatment of solution from the LGO Stockpile, non-PAG WRDF, or the PAG WRDF." However, NDEP does not define what is meant by perpetual treatment. In fact the State of Nevada has no regulatory definition of perpetual treatment. Without a clear definition or explanation of what NDEP means by perpetual treatment the statement is ambiguous and arbitrary.

CONCLUSION

In conclusion, the Agency has failed to demonstrate that there will be no long term negative effects to the environment or groundwater quality. In addition, the record demonstrates an unacceptable risk of degradation of waters of the State of Nevada therefor the permit should be denied.

DATED this 11th day of April, 2019

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