May 5, 2009
Web posting date 5/7/09

NOTICE OF DECISION

Water Pollution Control Permit
Number NEV2008101

Manhattan Mining Company
Gold Wedge Project Rapid Infiltration Basins

The Nevada Division of Environmental Protection has decided to issue Water Pollution Control Permit NEV2008101 to Manhattan Mining Company. This permit authorizes the construction, operation, and closure of approved Rapid Infiltration Basins (RIBs) in Nye County. The Division has been provided with sufficient information, in accordance with Nevada Administrative Code (NAC) 445A.350 through NAC 445A.447, to assure the Division that the groundwater quality will not be degraded by this operation, and that public safety and health will be protected.

The permit will become effective May 20, 2009. The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to Nevada Revised Statute (NRS) 445A.605 and NAC 445A.407. All requests for appeals must be filed by 5:00 PM, May 15, 2009, on Form 3, with the State Environmental Commission, 901 South Stewart Street, Suite 4001, Carson City, Nevada 89701-5249. For more information, contact Rob Kuczynski, P.E. at (775) 687-9441 or visit the Division's Bureau of Mining Regulation website at www.ndep.nv.gov/bmrr/bmrr01.htm.

One comment letter was received during the public comment period. The letter, dated December 1, 2008 was received electronically from Mr. John Hadder, Staff Scientist, Great Basin Resource Watch (GBRW). Division responses to Mr. Hadder's comments are attached to this Notice of Decision.

NDEP acknowledges the assistance provided by the Permittee in addressing GBRW's concerns.
GBRW Comment #1: "Is the projected dewatering rate correct?"…"The applicant should also provide a plan for mitigation if the dewatering rate exceeds the projected rate sufficiently to overwhelm the RIBs."

NDEP Response: The Permittee intends to dewater at a rate between 50 and 120 gallons per minute (gpm); however this rate could increase to a maximum of 600 gpm should conditions (both economic and underground mining) become favorable for additional development. The

maximum dewatering rate was based on the amount of groundwater inflow observed and calculated during underground development.

The RIB system is only operated when the Settling Pond and Freshwater Pond are near capacity and either the gravity separation process is not operating or the dewatering volume exceeds process requirements. In this situation, dewatering water is pumped directly to the RIB system. In an effort to optimize RIB system operation, the design features two identical RIBs (RIB "A" and RIB "B") which allow for dewatering water inflow to be cycled between either cell, thereby providing "rest" periods for each cell. The amount of "rest" time (if it is necessary) will be determined by the observed infiltration/percolation rate for each cell, however it is anticipated that the wet/dry cycle of the two ponds will be no longer than seven days.

Furthermore, pursuant to Parts I.G.1 through I.G.4 in the WPCP include the following Permit limitations:

1. *Discharge to the RIBs shall be managed to prevent overtopping of the basin(s) or surface discharge from the basin(s).*
2. *The maximum cumulative discharge to RIB "A" and RIB "B" is 600 gpm.*
3. *Discharge to the RIBs shall be managed and the infiltration mound shall be controlled to prevent the formation of surface seeps or artificial springs.*
4. *Minimum freeboard for each RIB is 2 feet.*

The Permittee is not allowed to exceed the 600 gpm permitted discharge rate. An "action level" of 500 gpm has been established in which the Permittee must implement short-term dewatering water discharge scenarios while developing a long-term dewatering water management plan.

The short-term disposal scenarios include:

1. *A decrease in the dewatering rate;*
2. *Discharge dewatering water to the existing pond system; and*
3. *Reduce the use of production well make-up water and incorporate more dewatering water into the Gold Wedge beneficiation process.*

Potential short-term disposal scenarios requiring Division review and approval are limited to:

1. *Pumping limited amounts of dewatering water to the top of the tailings which is under full containment; and*
2. *Using the water for county road dust control, provided water quality is acceptable.*

The Permittee has stated that excess dewatering water could be transferred to a neighboring placer operation for use in its gravity separation process. This activity however, deals strictly with water rights issues and would require approval from the Nevada Division of Water Resources.

A long-term solution would include expanding the RIB system and/or constructing additional RIBs at a Division-approved location as a major modification of the Permit. The Permittee would be required to submit predictive modeling results, engineered designs, calculations and modification fees to the Division for review and approval.

GBRW Comment #2: "There should be more monitoring wells under the projected mound to avoid not discovering potential contamination until after the project closes."

NDEP Response: The Permittee was advised by the Division that additional groundwater monitoring wells and piezometers would be required and must be installed prior to the introduction of any dewatering water into the RIBs. There are four existing wells installed around the proposed RIBs, three of which extend to groundwater. While these wells appear sufficient to monitoring groundwater, there is only one well in the general area of the predicted infiltration mound.

The Permittee will install two additional monitoring wells (MW-09-01 and MW-09-02) downgradient of the RIBs and projected mound. The location of the proposed monitoring wells and existing monitoring wells were identified in the RIB Water Pollution Control Permit application and supplemental information provided by the Permittee.

Furthermore, SOC item I.B.4 states: "Within thirty (30) days after the effective date of this Permit and prior to the construction of the Rapid Infiltration Basins (RIBs) "A" and "B", the Permittee shall provide the Division for review and approval, the proposed locations for at least six (6) RIB piezometers (PZ-1 through PZ-6) to be installed and operational for the purpose of delineating the infiltration mound limits and elevations around the periphery of the RIBs." As is the case with any monitoring device(s) whose design and location is unacceptable or fails to perform as expected, the Permittee would be required to submit within thirty (30) days, proposed locations for replacement of the monitoring device(s) for review and approval by the Division.

GBRW Comment #3: "There has been insufficient testing of soils beneath the RIBs, both for potential natural leaching and for buried old mining waste."

NDEP Response: The Fact Sheet states that the location of the RIBs had to be moved several times due to right-of-way issues and the location of the historic trash and waste rock dumps. The selected final location (south of SR-377) does not have the same buried trash and mine waste issues inherent to the previously selected locations. To demonstrate this, the Division requested that the Permittee perform additional soil tests, including percolation, characterization and meteoric mobility tests. Five (5) test pits (TP-07-01 through TP-07-05) were excavated in the general area of the proposed RIBs and three (3) test pits (TP-08-01 through TP-08-03) were excavated within the footprint of the proposed RIBs. The soil materials encountered in all of the test pits were all very similar. Percolation test results for the material encountered yielded similar percolation rates. A percolation rate of 10 minutes per inch was used in the design which is the most conservative of all field tests performed.

The test results showed that the selected RIB locations posed no concerns or issues with respect to percolation, attenuation or leaching and would not impact groundwater quality. Their study results were submitted separately as an addendum to the original RIB application and were available for review during the public comment period.

In those locations where the historic mine tailings and waste rock were deposited, the soils appear to be more uniform than those placed by natural deposition. This is most likely the result of repeated excavation and disposal activities during the historic placer operations has created a more homogeneous gravel deposit due to the repeated mixing.

GBRW Comment #4: "[The Permittee's consultant] should also better discuss the transient nature of the mound."

NDEP Response: The predictive model utilized by the Permittee's consultant evaluated the transient nature of the mound by varying the amount of hydraulic head on the RIBs, the hydraulic conductivity of the alluvium beneath the RIBs and static groundwater depths for the modeling scenarios.

To provide much more conservative modeling results the following were incorporated into the GMS-6 predictive model:

- *A maximum inflow of 600 gpm to RIB "A" and RIB "B", with alternating recharge and rest periods for each RIB. In addition, a predictive model was also run with equal inflows of dewatering water discharged simultaneously to each RIB.*
- *Hydraulic head ranging from a low of 0.5 feet to 2.0 feet (the maximum RIB "A" and RIB "B" water depth at 2 feet of freeboard) in 0.25 foot increments.*
- *Hydraulic conductivity ranging from a minimum of 2,100 feet/year (half of the conductivity determined through laboratory testing of percolation test pit soils) to a maximum conductivity of 21,000 feet/year, 10 times the minimum.*
- *Varying groundwater depths from 140 feet below ground surface to 230 feet below ground surface to assess the sensitivity of the hydraulic head on the infiltrating water relative to the mound.*
- *Homogeneous alluvial soils (predominantly sandy gravels with some silt stratifications).*
- *Silt layers lateral (horizontal) hydraulic conductivity to one half of the vertical hydraulic conductivity flowrate.*

Conclusions:

- *The most significant influence on the infiltration rate through the floor of the RIBs appears to be the hydraulic head of the water within the RIBs. The predictive modeling results effectively demonstrate the relationship between the amount of hydraulic head and mound formation. The modeling results show that when the hydraulic head is less than 0.75 feet, the mound is predicted to remain within the confines of the combined footprints for RIB "A" and RIB "B". This is due to the fact that 600 gpm infiltration rate is relatively small compared to the available pore space in the alluvial matrix and is far less than the prerequisite rate necessary to completely saturate the alluvium beneath the RIBs and initiate mounding.*
- *When the hydraulic head is greater than 0.75 feet, the modeling results show the mound moving beyond the combined footprints of RIB "A" and RIB "B". At a hydraulic head of 2 feet, the modeling results show the extent of mounding to be no more than 160 feet up stream and 258 feet downstream of the embankments for RIB "A" and RIB "B". Even though mounding occurs beneath the RIBs, infiltration continues.*
- *The predictive modeling indicates that mounding commences when soil hydraulic conductivity is approximately 1000 feet per year and the inflow to RIB "A" and RIB "B" is at the 600 gpm maximum.*
- *The predictive modeling results demonstrate the impact of shallow static groundwater elevations on infiltration and mound configuration to be minimal, due to the relatively*

small infiltration rate (600 gpm) and the relatively high hydraulic conductivity of the alluvium.

- *The extent of mounding could potentially increase in time, if the alluvial matrix experiences localized blinding. However, this is not expected to occur, since the water to be discharged into the RIB is from clean groundwater with very little particulate.*

GBRW Comment #5: "Monitoring wells…MW-08-2 and MW-08-3 were installed without the knowledge of BMRR"... "[Schedule of Compliance item] SOC I.B.3 requires the applicant to provide BMRR with well completion information for these wells."…"NDEP should include in this SOC a statement that RIB construction not proceed until NDEP approves these monitoring wells."

NDEP Response: To avoid any misunderstanding, SOC I.B.3 has been re-written to state that within thirty (30) days after the effective date of this Permit and prior to the introduction of any dewatering water into the RIBs, the Permittee shall provide the Division with detailed information on the location, hydrostratigraphy, characterization results, completion data (including groundwater and collar elevation) and a groundwater quality analysis (Profile I) for downgradient monitoring wells MW-08-02 and MW-08-03 for approval by the Division. Should any well design and location be unacceptable or inadequate or fail to adequately monitor groundwater quality and groundwater elevation, the Permittee shall submit within thirty (30) days, proposed location(s) for replacement monitoring well(s) for review and approval by the Division.

GBRW Comment #6: "The applicant was remiss in not submitting the designs of the piezometers with the original application and NDEP should have returned the application to the applicant so that it could be completed properly."

NDEP Response: Comment noted. During the "Technical Review" process, the Division worked with the Permittee to address any outstanding technical deficiencies encountered. The Permittee was aware that additional information would need to be provided during the course of the permitting process and agreed to implement the Division's monitoring requirements.

GBRW Comment #7: "The dewatering water quality should be discussed"…"If there are data in the DMRs filed for the temporary discharge permit, such data should be discussed in the Fact Sheet and summarized in the application."… "The application states that the dewatering water is "clean and potable" and mentions that wildlife drink from it."…"[the application] refers to detailed data in Tab 7, but the labels of the laboratory reports do not clearly state where each sample is from. NDEP should discuss this water quality."

NDEP Comment: Pursuant to the requirements listed in the Temporary Discharge Permit, the Division only requires the Permittee to report water flow and duration of water discharge for the monthly DMR submittals. No monitoring of specific chemical constituents is required. The DMR reports are available for public review at the Bureau of Water Pollution Control at the Division's offices in Carson City.

The groundwater quality data presented in Tab #7 was obtained from production well/monitoring well MW-1, which is located approximately 320 feet south and down gradient of the decline portal. This well is identified on the laboratory reporting forms under Tab #7 as "GWMW" or "MW" and has been monitored continuously since 2002, pursuant to WPCP

NEV2002107, and water quality analytical results indicate no exceedence of the Division's Profile I reference values.

Water quality data from Dewatering Well (DW)-1 was not available during the Public Comment Period. The Division has since received analytical results from the most recent (March 2009) sampling event and these results indicate that the dewatering well water is of good quality, meets the Division's Profile I reference values, and that it compares favorably to the production well data discussed in the preceding paragraph. The only exception is manganese, which showed a slight exceedence of the 0.10 mg/L Profile I standard with a concentration of 0.16 mg/L. The Fact Sheet has been revised to reflect this new information.

Although the water quality is clean and potable, the Division (and NDOW) will require installation of perimeter fencing around the RIBs to discourage wildlife entry as stated in the Fact Sheet.

<u>GBRW Comment #8</u>: "Neither the Fact Sheet, Application, nor the consultant's correspondence to the Division provide much information about the groundwater modeling used to estimate the extent of mounding"…"It appears that the [model] may have [been] run…in steady state mode…If so, they [the Permittee's consultant] should actually have described it as such."… "They need to discuss the time frame involved for the mound to become established."…"[T]hey [should] run the model in steady state without RIBs and then…in transient mode…to simulate the growth of the mound…"

<u>NDEP Response</u>: The groundwater model utilized for predicting RIB behavior was Groundwater Modeling System, Version 6.0 (GMS-6). The GMS-6 is a comprehensive software package for building and running groundwater flow and contaminant transport models. The model provides tools for site character-ization, model development, post-processing, calibration, and visualization. It supports triangular irregular networks, solids, borehole data, two and three dimensional geostatistics, and both finite-element and finite-difference models in two and three dimensions, such as MODFLOW, SEEP2D and SEEP3D. Parameter estimation is supported through the processes included with various add-on modules. The GMS-6 model allows the user to select these modules in custom combinations to perform such operations as pre- and post-processing, model selection, and calibration routines.

As stated previously in the Division response to GBRW Comment #3, the percolation and groundwater modeling results adequately predict the potential impacts resulting from the dewatering water infiltration into the soil. The prevailing alluvial hydraulic conductivity and relatively small infiltration rate will not result in any appreciable mounding issues.

The model assumed a depth of the unsaturated layer, above the groundwater level between 130 and 140 feet. The depth of the aquifer was estimated to be 90 feet of gravel. The model was run assuming the gravel alluvium above the groundwater table has a horizontal permeability of 2,100 feet annually and a vertical rate of 1,050 feet. These values were determined from the grain-size distribution of the alluvium and NAVFAC (Naval Facilities Engineering Command) document DM-7, Mar 1971 Figure 8.5 and the formula $K=100D_{10}^2$ (in centimeters) with a D_{10} size of 0.45 millimeters. The Permittee's consultant believes this relationship to be reasonable for alluvial granular soils with fine to medium grain sands. The GMS-6 model results predicted down gradient mounding extending approximately 258 feet downstream of the RIBs and approximately 160 feet upstream.

Refer also to the Division response to GBRW Comment #4.

GBRW Comment #9: "The application discusses a meteoric water mobility test completed of [on] the soils at the bottom of one of the test pits. This is insufficient to insure that there will be no leaching of contaminants from the unsaturated zone to the groundwater"…"NDEP should [have] required the applicant to take cores of the unsaturated zone all the way to the groundwater to determine the presence of leachable elements including salts, nitrates, or metals."

NDEP Response: Refer to the Division response to GBRW Comment #3.

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