

## Attachment 2

### NEVADA DIVISION OF ENVIRONMENTAL PROTECTION BUREAU OF MINING REGULATION AND RECLAMATION MINE CLOSURE PROCESS

The BMRR, Closure Branch is responsible for reviewing and approving mine closure plans as a part of the Water Pollution Control Permit. Closure plans address chemical mobilization of process components, both solid and liquid wastes, waste rock dumps, tailing piles, and any other associated mine components that may potentially lead to the degradation of waters of the State. A Final Permanent Closure Plan must be submitted two years prior to anticipated permanent closure of that process component.” A Final Closure Report must be submitted upon completion of closure activities. Post closure monitoring activities for a minimum of five years to a maximum of 30 years.

Closure plans include all closure-related activities including design, construction, monitoring and chemical characterization of components. They also propose post-closure (post-closure) monitoring and sampling. When a mining company submits a Final Permanent Closure Plan with the BMRR, the BMRR will contact the BLM project contact about the Plan and schedule the time frame for the review process. Cooperative reviews to apply the best methodology and technology will eliminate duplicative efforts and improve coordination of procedures to both agencies’ standards. The following outlines how BMRR operates when they receive documents from operators. The BLM will reciprocate in the same manner when we receive documents from operators.

Additional BMRR procedures specific to mine closure include:

Operator submits permit renewal application: Operator submits permit renewal for a Water Pollution Control Permit (WPC) every 5 years. This is a large submittal which includes any changes or additions to the engineering design of heap leach pads, ponds, diversion ditches and other facilities. This submittal may also include hydrologic and groundwater studies, water characterization and management plans, pit lake studies, etc., as necessary. It addresses potential impacts to the waters of the State. The BMRR project contact will contact the appropriate BLM project contact and will let them know that an application has been received. The BLM will request a copy of the application from the operator and inform them of the level of NEPA analysis required and that an amendment to the Plan may be necessary. The BLM and BMRR project contacts will coordinate and concur on any modifications to the original permit. The BMRR project contact will carbon copy the results of the cooperative review and the technical review to the BLM. A copy of the Draft Permit will be sent to the appropriate BLM project contact. BMRR will ensure that all BLM project contacts are on their mailing list.

Operator submits permit modification: The BMRR project contact will contact the appropriate BLM project contact and will let them know that a modification has been received. The BLM will determine, based on the scope of the modification, what level of NEPA analysis is required

and if an amendment to the Plan may be necessary. If necessary, the BLM and BMRR project contacts will coordinate and concur on the Plan modification.

Operator submits a plan for land application of fluids: BMRR will inform the BLM project contact of a submitted application and carbon copy the BLM on all correspondence dealing with this submittal. The BLM will request a copy of the application from the operator and inform them of the level of NEPA analysis required and that an amendment to their Plan may be required. The BLM will provide BMRR with any comments and/or concerns they may have on the application. The agencies will work together to address concerns and jointly concur on the proposed actions before the plan is approved.

Operator submits a plan for infiltration: BMRR will inform the BLM of a submitted application and carbon copy the BLM project contact on all correspondence dealing with this submittal. The BLM will request a copy of the application from the operator and inform them of the level of NEPA analysis required and that an amendment to their Plan may be required. The BLM project contact will provide BMRR with any comments and/or concerns they may have on the application. The agencies will work together to address concerns and jointly concur on the proposed actions before the plan is approved.

Operator submits bioremediation permit application: BMRR will inform the BLM of a submitted application and carbon copy the BLM project contact on all correspondence dealing with this submittal. The BLM will request a copy of the application from the operator and inform them of the level of NEPA analysis required and that an amendment to their Plan may be required. The BLM project contact will provide BMRR with any comments and/or concerns they may have on the application. The agencies will work together to address concerns and jointly concur on the proposed actions before the plan is approved.

Operator submits a revision to operating, monitoring or waste rock management plan: BMRR will inform the BLM project contact of a submittal to revise the operating, monitoring or waste rock management and carbon copy the BLM on all correspondence dealing with this submittal. The BLM will request a copy of the submittal from the operator and inform them of the level of NEPA analysis required and that an amendment to their Plan may be required. The BLM will provide BMRR with any comments and/or concerns they may have on the submittal. The agencies will work together to address concerns and jointly concur on the proposed actions before the revisions are approved.

Operator submits a Final Permanent Closure Plan: The Final Permanent Closure Plan details the entire site and single component will be closed and reclaimed and may have significant impacts on the Reclamation Plan. The BLM and BMRR Reclamation Branch need to be involved as part of the process. BMRR will inform the BLM of a submitted application and carbon copy the BLM project contact on all correspondence dealing with this submittal. The BLM will request a copy of the application from the operator and inform them of the level of NEPA analysis required and that an amendment to their Plan may be required. The BLM will provide BMRR with any comments and/or concerns they may have on the application. The agencies will work together to address concerns and jointly concur on the proposed actions.

Operator submits a Final Closure Report: The Final Closure Report details how the entire site was closed and reclaimed. BMRR will inform the BLM of a submitted report and carbon copy the BLM project contact on all correspondence dealing with this submittal. The BLM will request a copy of the report from the operator. The BLM will provide BMRR with any comments and/or concerns they may have on the report. The agencies will work together to address concerns and jointly concur on the actions taken and the results of closure.

Operator submits a quarterly and annual report: These reports are submitted to BMRR to summarize the monitoring at the site. If the BLM wants to see these reports they will request them from the operator or review the BMRR files.

Operator submits a post closure permit application: This permit specifies the monitoring requirements after the site has been chemically stabilized and will specify the monitoring method. BMRR will inform the BLM that an application was submitted and the BLM may request a copy from the operator.

BLM and BMRR site inspection for closure: The BMRR and BLM will coordinate a joint inspection for closure whenever possible. Each agency will carbon copy their project contact counterpart on all correspondence and reports. Both agencies shall concur on whether acceptable closure standards have been attained.

Temporary closure: An operator must inform the BMRR of a temporary closure. BMRR will inform the appropriate BLM contact and carbon copy the BLM project contact on all correspondence dealing with the temporary closure. BLM should evaluate the bond cost estimate to determine if it is adequate especially for fluid management. The BLM will closely monitor the site for maintenance of process components and fluid management and coordinate inspections with BMRR.

## CLOSURE PLAN

General Statement of Purpose: The permanent closure plan must be submitted to the BMRR with the intent to meet the requirements as defined in NAC 445A.447. It must detail the procedure proposed for the stabilization of applicable mine components. Details and direction of any proposed remedial and transport analysis of final closure configurations should be clearly described in the permanent closure plan. The BMRR will review proposed fate and transportation analysis as they relate to the quantity and quality of long term drainage and precipitation which may have the potential to degrade waters of the state. The operator/permittee must clearly demonstrate through the use of credible source, pathway and fate evaluations that the proposed site does not have the potential to degrade waters of the state.

### Site Location And Background Information

- A. Geographic location, site climatology, and overall site geology;
- B. Water Pollution Control Permit status; pre-mining land use; historic mining activity (under previous ownership); recent mining activity (under current ownership) -

exploration, construction, mining, leaching, etc.);

- C. Background ground water depth and quality. The operator must clearly establish both of these parameters, per component of concern. The establishment of these two parameters is critical for a successful closure program. Include a physical description of the aquifer(s) and nearest down gradient users of the aquifer(s).
- D. Background down gradient surface water quality (if applicable). As with ground water above, background water quality must be established. Discuss a representative location of any springs (whether seasonal or perennial) onsite. Indicate any components located on springs.

### Facility Description

- A. Provide a status of all mine components both active and inactive, e.g., mill, process solution circuit, heaps, ponds, tailings impoundments, conveyance devices, waste dumps, ore stockpiles, etc.
- B. Provide applicable figures and flow charts for process fluid within components. Include dimensions for all process components. Provide the location of any hydrocarbon remediation pads and any landfills.
- C. As applicable, describe the engineering specifications for all liners, to include subbase, and leak detection systems for the heap, ponds, tailings impoundments, and all associated conveyance devices that require containment. Provide a schematic that shows the locations of all leak detection systems and sampling ports.
- D. Describe all past, present and anticipated solid and liquid mine wastes and/or sources that require formal closure. Include septic systems.
- E. Provide all monitoring and detection well logs and their locations. Provide locations of all completed and exploratory borings beneath the site and clearly demonstrate that they have been properly sealed.

### Process Component Characterization

Process component characterization is a detailed sampling and analytical approach to 1) identify what materials, both solid and liquid, are present, per process component; and 2) to identify what materials may require special attention, per process component, in the closure and post-closure phases. A state certified Clean Water Act laboratory (in- or out-of-state) must be selected for all sample analysis.

As appropriate, the BMRR and the BLM will accept various types of laboratory testing such as the Toxicity Characteristic Leaching Procedure (TCLP), Synthetic Characteristic Leaching Procedure (SCLP), Meteoric Water Mobility Procedure (MWMP), soil attenuation studies, and column testing. The operator should discuss with the agencies the proposed goals and protocols

prior to initiating a sampling and testing program.

General Requirements - The following general requirements are requisite for any source that has the potential to degrade the environment. Describe all past, present, and anticipated future sampling programs, per component. The discussion should include field sampling protocols such as field filtering; sample number; sample preservation; sample holding times; and the approved method for analysis together with the method detection limits. Provide all sample analysis results from all previous and ongoing sampling programs. Provide an accurate and appropriately scaled map showing all past and present sample locations. Acid Base Accounting is required for each individual lithology in waste rock dumps, each pit, leach materials, and open pits. The operator will be required to provide all test results and analyses, per component, predicting whether or not a source has or will be a future concern regarding acid rock drainage.

Physical characteristics (as applicable to source):

- specific gravity of solids
- slurry density (solids: liquids ratio)
- deposition rate and method of deposition
- average operational dry density
- final operational height
- final operational area
- final operational top surface topography
- final operational water balance
- final operational embankment geometry
- strength characteristics of embankment and related components
- piezometric characteristics of embankment and related components
- anticipated range of stability characteristics under expected and of operational conditions (and pseudo static)
- anticipated peak water inventory at end of operations
- predicted surface hydrology at end of operations and for predicted post-operational conditions (stream diversion, required storm volume storage and runoff and infiltration characteristics)

Chemical characteristics and anticipated residual drainage

- mineralogy
- geochemistry
- metals leaching potential
- potential final run-off chemistry
- potential final seepage chemistry
- potential final drainage discharge chemistry

Individual Source Discussion - the following requirements are component specific:

### Waste Rock Dumps

- a. The BMRR document Waste Rock And Overburden Evaluation provides characterization guidance.

- b. Provide waste rock management plans, if applicable. Highlight and discuss potentially acid generating materials and locations, if applicable.

### **Open Pits**

- a. - discussion of pit geology/lithology  
- acid/base accounting for each lithology exposed in the pit.  
- if the pit intersected the ground water table, in effect creating a long-term pit lake, clearly demonstrate that the pit lake does or will not 1) have the potential to degrade the ground waters of the state or 2) have the potential to affect adversely the health of human, terrestrial or avian life.

### **Heap Leach Pads**

- a. Detail all previous detoxification, characterization, and closure process-related activities for process mine wastes (e.g., rinse times and frequency, volume, volumes, sampling, etc.).
- b. Discuss amounts and kinds of materials that make up the heap (i.e., homogenous vs heterogenous materials). Provide a discussion on those chemical constituents that will be or anticipated to be of concern if the material was agglomerated, provide details.

### **Tailings Impoundment**

- a. Discuss the homogeneity of the tailings material.
- b. Discuss impoundment construction, monitoring and analytical results.

### **Process Ponds**

- a. Provide pond sludge quantity, characterization results and analytical method for each pond.

### **Process Facilities**

- a. Discuss and characterize any liquid and solid wastes not discussed above and proposed to be left onsite following mine closure. This would include residual material in thickeners.

### **Ancillary Facilities**

- a. Identify all non-process mine waste components that will need either chemical stabilization or incineration for stabilization.
- b. Provide characterization information on any hydrocarbon remediation pads, septic systems, and any landfills proposed to remain onsite.

## **PROCESS COMPONENT STABILIZATION**

Process Component Stabilization will be those measures, per source, designed to preclude the migration of any contaminant that has the potential to degrade the environment.

Components - the following general requirements are requisite for any source that has the potential to degrade the environment.

Modeling - Computer modeling may be used as a tool in predicting future behavior in a component. The operator should provide a discussion of all assumptions used in the model.

Long Term Physical Stability - The BMRR requires all closure process components designed to withstand the run-off from a 24-hour storm event with a 500-year recurrence interval.

Goal of Zero Discharge - The best method to ensure that a component does not develop, or at least minimizes, a long term environmental problem is to preclude meteoric water from infiltrating through the component. A thorough discussion of various methods in preventing meteoric water infiltration such as an engineered cap, a topsoil cover, diversion ditches, regrading and reshaping, compacting, etc. Achieving a zero discharge situation in final closure should be the highest goal and the operator should be prepared to discuss those types of options in detail.

Should the evaluation of a component indicate that at some point a discharge (either surface or subsurface) may be possible, the operator shall provide:

- evaluation of anticipated seepage rate and chemistry
- evaluation of anticipated drain discharge rate and chemistry
- evaluation of potential storm water discharge and chemistry
- physical properties of pathways
- potential attenuation and diffusion in pathways

Evaluate the Potential to Degrade Waters of the State - Should it be determined that there is the potential to degrade waters of the state, the operator shall discuss:

- the need for additional controls to prevent or treat anticipated source releases, including seepage, drainage and runoff
- the necessity to further characterize potential pathways for source releases
- the necessity for additional controls of stormwater runoff and run-off
- data gaps limiting characterization
- proposed methods and schedule for additional data acquisition and evaluation required to refine predictions (e.g., source pathway-receiving water analysis, bench/field scale treatment attenuation tests, etc.)
- proposed operational modifications, additional construction, and schedules needed to reduce the potential for post-closure releases.
- proposed additional monitoring to validate the benefits of modifications with respect to demonstrating non-degradation of receiving waters
- potential attenuation options for reducing and/or treating post-closure source releases (e.g., cover application, anaerobic sulfate reduction)
- anticipated time period (i.e., time required for near equilibrium condition to be attained, after any source releases have no potential to degrade waters of the state)

For those process/waste materials that the operator may want to relocate please review the TDR document **Alternate Use of Mine Waste Solids - Disposal Outside of Containment**

Provide a complete and detailed post-closure monitoring plan. The proposed sampling and monitoring program should include field sampling protocols such as field filtering; sample number; sample preservation; sample holding times; and the approved method for analysis together with the method detection limits. Include frequency of monitoring and anticipated duration of closure and post-closure monitoring.

Individual Source Discussion - the following requirements are component specific.

## Waste Rock Dumps -

## Open Pits -

**Heap Leach Pads** - the permanent closure of heap leach pads is proving to be very complex. A complete discussion of all scenarios is beyond the scope of this document. Presented below are basic requirements.

- a. Heap leach facilities must meet the requirements as set forth in NAC 445A.430 Stabilization of spent ore.
- b. Provide a drain down curve (residual drain down flow, etc.). Provide all assumptions used in predicting what the long-term residual drain down will be.
- c. Describe or propose heap detox activities (if applicable). Provide proposed pore volume, application rates and duration, and planned sampling of the heap.
- d. The BMRR document **Land Application of Spent Ore by Rinsate And/or Drain-down Solution** provides guidelines regarding disposal of excess process solution in the closure period.
- e. The BMRR document titled **Monitoring And Assessment of Post-closure Heap Discharge** provides details and guidelines for managing the drain down in the post-closure and final closure periods.
- f. Describe the procedures for implementing closure activities on heap surface (e.g., reshaping, capping or covering, construction of erosion ditches), etc.

## Tailings Impoundment

- a. Tailings facilities must meet the requirements as set forth in NAC 445A.431 Stabilization of tailings.
- b. The operator must consult with the State of Nevada's Division of Water Resources and the Department of Engineering and Dam Safety, regarding tailings dams in the post-closure period.

## Process Ponds

- a. Based on required analytical characterization data, describe the fate of the solids (e.g., dewatered and disposed of or left in place);
- b. Describe how the liner material will be disposed of or left in place; and
- c. Indicate the fate of the process component (i.e., if the pond basin will be backfilled, describe the procedures and what backfill material is proposed for use), etc.

## Process Facilities

Discuss the ultimate fate of all process facilities (ie, sold, dismantled, buried onsite, etc).

## Ancillary Facilities

- a. Discuss the ultimate fate of all ancillary facilities (ie, ripped, removed, buried onsite, etc).