

**DENR RECOMMENDED CONDITIONS**  
**GWD 1-11 (American Eagle Spent Ore Depository)**  
**October 3, 2011**

1. Wharf's application dated April 13, 2011, for the American Eagle Ground Water Discharge Permit shall become part of this plan, as well as the additional information submitted by Wharf on April 26, 2011, May 18, 2011, May 25, 2011, June 6, 2011, July 5, 2011, July 7, 2011, July 14, 2011, September 15, 2011, and October 3, 2011, and with the addition of the following Board approved conditions, superseding or modifying the items in the application and supplemental letters. The plan consists of a construction permit, ground water quality variance, and a ground water discharge permit.
2. For the purposes of this plan, neutralization shall be defined as fresh water rinsing and/or hydrogen peroxide treatment. Following are the requirements for spent ore effluent chemical characterization and neutralization compliance monitoring:
  - a. Wharf shall notify the Department 72 hours prior to the initiation of neutralization to provide the Department opportunity to take effluent samples for chemical characterization. Wharf shall also notify the Department 72 hours prior to the initiation of neutralization compliance monitoring.
  - b. Chemical Characterization of Effluent Prior to Initiation of Neutralization:
    - i. Prior to initiation of neutralization (during drain down) a time composite sample (3 individual samples of equal volume taken over a 24 hour period and composited) of effluent draining from the toe of the heap will be obtained. This sample shall be tested for the parameters listed in Table 1. A complete chemical characterization of the effluent shall be completed for every heap.
  - c. Neutralization Compliance Monitoring:
    - i. Based on the results of the chemical characterization, the Department shall designate, in writing, key parameters (to include those parameters that do not meet the numeric ground water quality standards during the chemical characterization) to be monitored after neutralization has been completed. At a minimum, weak-acid dissociable (WAD) cyanide, total dissolved solids, pH, fluoride, total mercury, nitrate as nitrogen (nitrate), arsenic, and conductivity are required as key parameters for every heap.
    - ii. Monitoring shall include collecting 3 individual effluent samples of equal volume over a 24 hour period from the heap, compositing the samples, and analyzing the composite sample for the key parameters, except nitrate as nitrogen and arsenic which are measured as the mean value of 9 samples taken over a 72 hour period. (These values are used to calculate nitrate as nitrogen and dissolved arsenic off-loaded to the American Eagle permitted area.) If the effluent results indicate that the numerical standards cannot

be met for fluoride, total mercury, pH, and total dissolved solids, neutralization compliance may be based on leachate samples obtained from a column leachate test to determine suitability for off-loading. Leachate results must demonstrate compliance with the numeric ground water quality standards or the following off-load criteria:

<b>Parameter</b>	<b>Off-Load Criteria</b>
pH (standard units)	6.5 to 9.5
Total Dissolved Solids	1500 ppm
Fluoride	5.0 ppm

Other key parameters that do not meet the numeric ground water quality standard in the effluent may also be based on leachate samples obtained from a column leachate test if the Department determines that the parameter will not impact the ambient ground water quality at the compliance monitoring point. Wharf shall submit both the effluent and the leachate data to the Department prior to off-loading.

- iii. If monitoring shows extreme variability or unpredictability in analytical results, or if the reliability of the monitoring program or the parameters monitored are inappropriate, or quality control issues are identified, the monitoring program may be revised by the Department to correct the identified deficiencies. If future sampling (as determined by the neutralization studies conducted by or for the Department) proves treatment to be inadequate, other criteria may be specified by the Department on a site specific basis.
- d. Spent ore shall be considered suitable for off-loading when the following conditions have been met:
  - i. The mean value of 9 samples taken over a 72 hour period of the effluent draining from the toe of the neutralized heap is less than 0.50 mg/l WAD cyanide with no one sample exceeding 2.5 times 0.50 mg/l (or 1.25 mg/l WAD cyanide) WAD cyanide concentration.
  - ii. The values for all other parameters measured in the effluent draining from the toe of the neutralized heap are less than the numeric ground water quality standards, with the exception of arsenic, nitrate, and nitrite. Leachate results for fluoride, total mercury, pH, total dissolved solids, and other key parameters must also meet the numeric ground-water quality standards or specified off-load criteria, if consistent with the neutralization compliance monitoring criteria established above (Refer to c-ii above).
  - iii. Prior to off-loading, Wharf shall submit copies of all sampling and analytical data, including quality assurance/quality control data, required by the monitoring schedules indicated above to the Department for review and approval. In addition, Wharf shall also submit all moisture content

data collected during the off-load of the spent ore including the final moisture content of the spent ore. Spent ore moisture content will be used as a tracking tool to determine the mass loading of nitrate to the ground water system. Wharf shall obtain verbal approval from the Department prior to off-loading. The Department shall verbally respond to offload requests within two (2) state working days. The Department shall confirm the verbal approval with written approval within seven (7) state working days.

- Ground water monitoring is to be conducted for the sites, parameters and at the schedule outlined in the Water Sampling Schedule of the April 13, 2011 Ground Water Discharge plan application. The permitted allowable limits (PAL) to be maintained at the compliance points for the parameter list in the Water Sampling Schedule are the South Dakota numeric Ground Water Quality Standards (ARSD 74:54:01:04) as they are at the time of initial permit issuance, with the exception of pH and arsenic. At present, the existing ambient pH exceeds the South Dakota numeric Ground Water Quality Standard in compliance points MW-42 and MW-43; and concentrations of arsenic exceed the South Dakota numeric Ground Water Quality Standard in compliance points MW-42, 43, 60, and the Joseph Well. The present ambient concentrations of arsenic and pH will be set as the permitted allowable limits for the compliance points as indicated in the table below. If this limit is exceeded, probable out-of-compliance monitoring in accordance with ARSD 74:54:02:27 must be initiated.

	Arsenic permitted allowable limit*	pH permitted allowable limit*
MW-42	0.070 mg/l	4.6-8.5
MW-43	0.041 mg/l	5.5-8.5
MW-60	0.032 mg/l	Ground water standard (6.5-8.5)
MW-64	Ground water standard (0.010 mg/l)	Ground water standard (6.5-8.5)
Joseph Well	0.013 mg/l	Ground water standard (6.5-8.5)

\*Permitted allowable limit calculated from ambient concentrations unless noted.

- Wharf is required to submit an annual report every March 1st, which shall address the amount of spent ore and waste rock disposed in the American Eagle permitted area, and the amount of nitrate+nitrite as nitrogen being off-loaded to the American Eagle permitted area. The nitrate+nitrite accounting information shall be submitted in a format similar to that used under the existing Juno/Foley Ground Water Discharge Permit (GWD 1-98).
- Wharf shall not exceed the loading limit for nitrate as nitrogen, which is set at a total of 110.7 tons and represents the nitrate load in entrained liquid only of mined rock disposed in the American Eagle permit area following permit issuance. This limit is calculated based on data from the geochemical modeling in the permit application and supplementary submitted information. If the nitrate loading limit is reached, Wharf shall cease off-loading spent ore into the American Eagle permitted area, or develop either a

denitrification plan or a contained disposal system similar to the lined disposal areas of the Juno/Foley Facility.

6. In accordance with ARSD 74:54:02:23(4) the Board authorizes the Department to approve technical revisions to a ground water discharge facility without the requirement of a permit modification or renewal. Such technical revisions include the following:
  - a. Monitoring plans or parameters;
  - b. Plans and specifications for permitted facilities;
  - c. Reasonable changes to the quality of discharged waste;
  - d. Reasonable changes in volume of discharged waste;
  - e. Quality control and quality assurance plans;
  - f. Any other changes that will not result in the degradation of the ground water above the South Dakota Water Quality Standards.

Technical revisions must be submitted to the Department in writing. The Department shall either approve, disapprove, conditionally approve, or request additional information within 30 days after receipt.

**TABLE 1**  
**Parameters for Chemical Characterization of Effluent**

pH	Mercury (total)	sulfate
potassium	selenium	nitrate*
arsenic	silver	nitrite
barium	magnesium	ammonia
cadmium	sodium	WAD cyanide
chromium	conductivity	chloride
copper	total dissolved solids	calcium
fluoride	carbonate	
lead	bicarbonate	

\* Wharf may measure Nitrate + Nitrite with the requirement that the value obtained shall be treated as Nitrate as N.