GOLDCORP

Wharf Resources (USA), Inc.

May 18, 2011

Mr. Matt P. Hicks
Ground Water Quality Program
SD DENR
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501

RE: Reply to Completeness Review, American Eagle Ground Water Discharge Permit Application Amendment

Dear Mr. Hicks:

In response to your letter of May 12, 2011, I have two paragraphs to section 8 in the application document to address your comment. I have included a copy of the written portion of the application that follows the state form. Please replace the 10 page document in the original application sent to you on April 13, 2011 and subsequently modified on April 26, 2011.

We have completed drilling well MW-64 and will be sampling it this month. I will send you the drill log and as built survey when we get that information.

If you have any questions or comments, please don't hesitate to give me a call at (605) 584-4155.

Sincerely,

Ron Waterland
Environmental Manager

Xc: Mike Cepak, Minerals and Mining Program, SD DENR

10928 Wharf Road • Lead, South Dakota 57754-9710
Telephone (605) 584-1441 • Fax (605) 584-4188

Ground Water Discharge Plan Application
American Eagle Pit, Wharf Mine
Lead, South Dakota
Wharf Resources

#1. Name of discharger or person legally responsible for discharge (owner/ operator), refer to ARSD 74:54:02:06 (1):
Wharf Resources (USA), Inc.
c/o Ron Waterland, Environmental Manager

Address:
10928 Wharf Road,
Lead, South Dakota 57754-9710

Telephone:
(605) 584-4155

Local representative or contact person if different from above:
As above

#2. Legal Location of Discharge Facility, refer to ARSD 74:54:02:06 (2)
County: Lawrence
Township: 5N, **Range:** 2E, Portions of Sections 25, 26, 35 and 36, and
Township: 4N, **Range:** 2E, Portions of Sections 1 and 2

#3. Refer to ARSD 74:54:02:06(3)

Name of the facility and Project:
American Eagle Pit, Wharf Mine.

Estimated Project Life:
The estimated life of mine is 15 years with a start date of December 12, 2011.

Type of Operation:
Mining

Description of Operation:
The American Eagle Pit and the Portland pit will cover approximately 93 acres and extend approximately 360 feet deep. Wharf Resources (USA), Inc. (Wharf) estimates that an estimated 38,600,000 tons of ore and barren rock will be mined from the Wharf Mine. With approval of this discharge permit, the mined pit will be backfilled barren rock and with spent ore that will be processed and neutralized on site in the Process Area.

#4. Name, location (1/4, 1/4, 1/4, Section, Township, and Range), and description of all wells (existing, abandoned, or proposed), water bodies, drainages, natural or man-made structures, and water usage (past, present, or future) within a one- mile radius of the discharge site. Refer to ARSD 74:54:02:06 (4).

Location: Portions of Section 25, 26, 35 and 36 Township5N and Range 2E and Portions Sections 1 and 2, Township 4N and Range 2E. A Plat Map showing the American Eagle Pit layout is provided as Figure 8-1 (ERM, 2011).

Wells: Monitoring wells and private water supply wells within and around an approximate one-mile radius around the American Eagle Pit are shown Figure 8-1 (ERM, 2011) and listed in Exhibit 1, attached.

Water Bodies and Drainages:
Water bodies and drainages within and around an approximate one-mile radius around the American Eagle Pit are shown Figure 8-1 (ERM, 2011) and listed in Exhibit 2, attached.

Structures:
Structures within and around an approximate one-mile radius around the American Eagle Pit are shown Figure 8-1 (ERM, 2011) and listed in Exhibit 3, attached.

#5. A. Geologic Description - discussion must include:

1. **Structural Geology - regional and local**
2. **Stratigraphy - description of geographic formations and thickness – soil types, thickness, depth to bedrock, cation exchange capacity, and attenuation capabilities.**
3. **Geomorphology (topography)**
4. **Land use**

Refer to ARSD 74:54:02:06(5)

Structural, Stratigraphy and Geomorphology

The required geologic description is provided in the *Potential Impact of Spent Ore Disposal in the American Eagle Pit* dated April 6, 2011, Section 3.2 and 3.3 (ERM, 2011).

Land Use
The American Eagle Pit lies within the northeastern portion of the Wharf Mine in the Bald Mountain mining district which has experienced a long history of mining. Three closed and reclaimed mines lie within close proximity to the mine and include the former Wharf Resources Golden Reward Mine to the southeast, LAC Minerals'

former Richmond Hill Mine to the north and the former Homestake Mining Company, Homestake Mine to the northeast. The surrounding forested land is sparsely developed with residential homes and one recreational area, the Terry Peak Ski Area which lies south of the Wharf Mine. The nearest communities are Central City and Lead which lie approximately four miles to the east.

B. Hydrologic description - discussion must include:

1. Depth to ground-water or aquifer - must include all sources, description of the source, flow directions and gradients, well logs must be included.

A detailed hydrologic description is provided in the *Potential Impact of Spent Ore Disposal in the American Eagle Pit* Section 3.4, ERM (April 6, 2011). Surface water is described in Section 3.4.1, ground water is described in Section 3.4.2 and well Logs are included in Appendix A of this report.

2. The ground-water most likely to be affected by the discharge - description to include the name of the aquifer, saturated thickness, flow direction, porosity, hydraulic conductivity, and other flow characteristics, hydraulic connection with other aquifers or surface sources, recharge information, water in storage, usage, and the projected aerial extent of the aquifer. Refer to ARSD 74:54:02:06 (11).

Section 3.4.2 of the *Potential Impact of Spent Ore Disposal in the American Eagle Pit* (ERM, 2011) describes the groundwater that will be affected by the discharge.

3. The quality of all water sources in accordance to the parameters listed in ARSD 74:54:01:03 and 74:54:01:04, inclusive. Future monitoring sites will be required to submit sampling data upon completion.

<u>Ground Water</u>
Sections 4.1.1, 4.2.1, and 4.3.1 of the *Potential Impact of Spent Ore Disposal in the American Eagle Pit* describe the quality of the groundwater.

<u>Surface Water</u>
Sections 4.1.2, 4.2.2, and 4.3.2 of the *Potential Impact of Spent Ore Disposal in the American Eagle Pit* describe the quality of the surface water.

Ground water and surface water quality in the American Eagle Pit area are monitored in the False Bottom Creek drainage north of the facility, in the Cleopatra Creek drainage west of the facility, and in the

Deadwood Creek drainage northeast of the facility. The parameters including those listed below from ARSD 74:54:01:04 have been historically monitored and will continue to be monitored at the site in accordance with the approved Post-Closure Monitoring Plan for the Reliance and Juno/Foley Groundwater Discharge Permits as well as monitor plans fully described in Item 9.

CONTAMINANT	GROUNDWATER STANDARD*
Arsenic	0.01 mg/L2
Barium	2 mg/L
Cadmium (Cd)	0.005 mg/L
Copper (Cu)	1.0 mg/L
Cyanide (CN) as free cyanide	0.2 mg/L
Cyanine (CN) as weak acid dissociable	0.75 mg/L
Fluoride (F)	4 mg/L
Lead (Pb)	0.015 mg/L
Mercury (Hg)	0.002 mg/L
Nitrate (as N)	10 mg/L
Nitrite (as N)	1 mg/L
Selenium	0.05 mg/L
Silver	0.1 mg/L

*mg/L= milligrams per liter

4. Flooding potential of the site, the 100 year flood plain, if applicable, and any protection measures. Refer to ARSD 74:54:02:06 (14).

The discharge site is not within the 100 year flood plan and not in the FEMA map.

C. Agricultural Description - if applicable, the discussion must include land use; types of crops produced; irrigation, if used; locations of livestock confinement areas (existing or abandoned).

The permitted post-mining land use objectives for the Wharf Mine site, as described in the Wharf Expansion Project, Mine Permit Application (Wharf Resources and RESPEC, February 2011) include a number of options, including: rangeland (ARSD 74:29:07:20), recreation (ARSD 74:29:07:23), industrial (ARSD 74:29:07:24), and home sites (ARSD 74:29:07:25). The postmining land use planned is a mixture of rangeland or woodland grazing, recreation, home sites, and industrial or commercial development. Woodland grazing is the land use that Wharf has reclaimed to in the past and has provided beneficial uses such as habitat for many species. Recreation and development will primarily revolve around Terry Peak ski area and allow for expansion of existing ski runs and facilities. The American Eagle Pit will be reclaimed primarily as rangeland.

#6. **Description of construction, modification or operation of discharge system to include a quality assurance/quality control plan for construction. Copies of plans and specifications relating to construction, modification, and operation of discharge systems, including materials specifications provided by the manufacturer, must be submitted to the Department of Environment and Natural Resources. Refer to ARSD 74:54:02:13.**
The description must include the means of discharge (to a lagoon, cropland, septic tank-leach field, other - specify), the quantity, the quality, and the description of treatment, if any, prior to discharge. Refer to ARSD 74:54:02:06 (6) and (10).

Quantity
Average Volume discharged _____ gallons per day.
Maximum Volume discharged _____ gallons per day.
Number of days per year that facility will discharge. _____

If more than one discharge point exists, list the discharge volume (average and maximum) for each source in gallons per day.
Quality, refer to ARSD 74:54:01:03 and 74:54:01:04

Before Treatment

Parameter	Concentration (mg/L)

After Treatment - the quality of the discharge after treatment must be justified by the laboratory testing and calculation. If calculations are used, they must be submitted with the application. If more than one type of discharge, the quality for each must be submitted. Composites of more than one individual discharge streams will not be accepted.

Parameter	Concentration (mg/L)

ARSD 74:54:02:06 (10) requires a description of the construction and operation of discharge system.

A description of the Wharf Mine Expansion and operation of the American Eagle pit is described in the *Wharf Mine Expansion Mine Permit Application* submitted to the South Dakota Department of Environment and Natural Resources dated February 2011 (Wharf Resources and RESPEC, 2011). Specifically, Table 5.1 contains the spent ore offload schedule, Section 5.4 describes the pit backfilling activities, and Section 5.6 describes the off-load process.

ARSD 74:54:02:06 (6); ARSD 74:54:01:04 require a description of the type of discharge and source.

A description of the discharge including estimated discharge rate and quality of the discharge is described in Section 5.0, 5.1, 6.0, and 6.2 of the *Potential Impact of Spent Ore Disposal in the American Eagle Pit* (ERM, 2011). Table 6.6 outlines the estimated backfill drainage rates in gallons per day. Tables 6.7-6.11 have specific results from the geochemical model for groundwater quality in the drainage from the discharge activities.

#7. What conditions naturally exist, and what actions will the discharger take to assure that the discharge can be controlled and will not migrate into or adversely affect the quality of any waters of the state. This discussion should address chemical loading, attenuation, dilution, methods to minimize ground water discharge (i.e., synthetically lined ponds with leak detection), and methods for detecting system failures. Refer to ARSD 74:54:02:06 (7) and 74:54:02:21.

Geochemical modeling was performed based on the current conditions that exist to estimate the potential drainage rates and chemical concentrations in the drainage from the spent ore and barren rock. The potential future impact on the ground water and surface water quality at the American Eagle Pit and the Wharf Mine are summarized in Sections 7.0, 7.1, and 7.2 of the *Potential Impact of Spent Ore Disposal in the American Eagle Pit.*

Impacts to water quality will be mitigated through the construction and operation of the American Eagle Pit. Specific off-load criteria and effluent monitoring requirements are described in Number #10 of this application.

Methods for detecting system failures include the implementation of a monitoring plan that is described in Number #9 of this application.

#8. If applicable, describe the Perimeter of Operational Pollution (POP), and any Geologic or hydrological information used to determine the dimensions of the POP. A social and economic justification for the POP must be included. A plat map showing the proposed dimensions of the POP, monitoring points for the POP, and the compliance monitoring point must be included. Refer to ARSD 74:54:02:06 (8), 74:54:02:11, and 74:54:02:17.

Section 8.0 of the *Potential Impact of Spent Ore Disposal in the American Eagle Pit* (ERM, 2011), describes the POP and geochemical modeling conducted to identify it. The proposed dimensions, monitoring points, and compliance monitoring points of the POP are shown on Figure 8.1

of the *Potential Impact of Spent Ore Disposal in the American Eagle Pit* (ERM, 2011).

The operation of the American Eagle Pit and the resultant discharge to groundwater is required for the continued efficient operation of the Wharf mine. This operation in turn provides a significant economic contribution to Lawrence County and the State of South Dakota. The proposed POP has a small areal extent and will not adversely impact the existing beneficial uses of water. *Socioeconomic Assessment Wharf Mining Co.* prepared by Dr. Michael K. Madden dated 2010 and Section 4.0 Socioeconomic Assessment of the *Wharf Expansion Project Mine Permit Application* dated February 2011 contains information on the socioeconomic impacts of the expansion project.

The POP is estimated, as required in ARSD 74:54:02:17, to be within a ¼-mile radius of the discharge point of application on the west, east and south, and within the limits of land owned by Wharf on the northeast.

Wharf proposes to extend the POP zone further than the ¼-mile radius on the northeast so that it includes an area impacted by the historic Bald Mountain mine tailings. These tailings were reclaimed by Wharf Resources. There is a long history of monitoring this area at wells MW-42 and MW-43 which have been selected as two of the point of compliance wells for the proposed American Eagle Ground Water Discharge Permit. The Bald Mountain tailings may continue to add to impacts to ground water within the area. Therefore, the tailings have been included in the proposed POP zone. Additionally, it would not be practical to drill new point of compliance wells in these tailings if the POP zone boundary were proposed on the ¼ mile radius in this area.

The proposed POP zone will not extend beyond Wharfs property boundary even though it extends beyond the ¼ mile radius and in some locations beyond the existing Large Scale Mine Permit boundary. Wharf owns all of the property affected by this proposed POP zone.

#9. Refer to ARSD 74:54:02:06 (9) and 74:54:02:20, a monitoring plan to include:

A. The ambient water quality of the discharge site in accordance with ARSD 74:54:02:18.

Groundwater quality is monitored at the site in accordance with approved monitoring plans and is reported on a monthly basis.

B. A quality assurance/quality control plan for sampling, well construction, or other effluent or leachate monitoring devices (e.g., lysimeters or tensiometers).

The Wharf standard practices for quality assurance/quality control used for all groundwater monitoring will be followed.

C. A quality assurance/quality control plan for laboratories used by the operator.

MidContinent Testing Laboratories, who conducts the sample analysis for the Wharf Mine, maintains a quality assurance/control plan for all projects. Contact information is as follows:

Mid-Continent Testing
P.O. Box 3388
2381 South Plaza Drive
Rapid City, SD 57709
http://www.thechemistrylab.com/

D. An operational monitoring plan to address monitoring sites, parameters to be measured, a monitoring schedule, and reporting schedule.

Operational monitoring will be conducted using the *Water Sampling Protocol for Wharf Resources and Golden Reward Mining Companies* and the *Annual Water Sampling Schedule* (See Exhibit 4).

The monitoring will include the five proposed Points of Compliance MW-42, MW-43, MW-60, Joseph Well, and a new proposed well MW-64.

E. Post closure monitoring plan to address monitoring sites, parameters to be measured, a monitoring schedule, and reporting schedule.

Ground water monitoring will continue into post-closure. Periodic assessment and modification of the current groundwater monitoring plan will be conducted. A proposed post closure monitoring plan is included as Exhibit 5.

#10. **Define an operational compliance effluent (discharge stream) sampling plan. Include parameters to be sampled, a monitoring schedule, and the means or devices used for measurement of the rate of discharge (flow monitoring). Also address a reporting schedule of the discharge. Refer to ARSD 74:54:02:06 (13), 74:54:02:20 and 74:54:02:22.**

Wharf will monitor the effluent or pore water of every neutralized heap prior to off-loading spent ore. Additionally, Wharf will monitor the amount of nitrate as nitrogen and dissolved arsenic that is being off-loaded.

Off-Load Criteria

Before Wharf can off-load the spent ore, the values of all the parameters measured in the effluent or pore water are required to be less than the numeric Ground Water Quality Standards, ARSD 74:54:01, with the exception of arsenic, fluoride, nitrate as nitrogen, nitrite as nitrogen, pH, silver, and total dissolved solids (TDS). Wharf is also required to determine the amount of nitrate as nitrogen and dissolved arsenic that is being off-loaded. Nitrite concentrations are not currently being set because of instantaneous bacterial conversion. The off-load criteria for fluoride, pH, and TDS are as follows:

PARAMETER	REVISED OFF-LOAD CRITERIA*
pH (standard units)	6.5 to 9.5
Total Dissolved Solids	1500 ppm
Fluoride	5.0 ppm

*ppm = parts per million

Monitoring

Monitoring shall include collecting 3 individual effluent samples of equal volume over a 24 hour period from the heap, compositing the samples, 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.

Reporting Requirements

Monitoring results shall be submitted to the Ground Water Quality Program of the Department of Environment and Natural Resources (DENR) within 10 days after Wharf's receipt from the laboratory. Wharf will also submit an annual report each year in March.

#11. Define an operation and a post-closure contingency plan to bring the facility into compliance if the permitted allowable limits are exceeded. Refer to ARSD 74:54:02:06 (15), 74:54:02:22 and 74:54:02:27. Operation Contingency Plan.

To ensure protection of the groundwater resources, Wharf will monitor groundwater within the proposed POP and at the proposed five Points of Compliance (POC) for this discharge that include MW-42, MW-43, Joseph Well, MW-60, and a new proposed well MW-64. These wells will essentially act as an early warning system, and will enable Wharf

to respond if an increasing nitrate trend establishes itself in the POC wells. If noticeable increases are detected, Wharf personnel will have sufficient time to respond to the problem before these effects impact groundwater.

If the POC wells reach ½ of the standard for nitrate, the facility will develop a mitigation/response plan that potentially may include in-situ treatment for nitrates. Any long term response action will be negotiated with the DENR.

Post-Closure Contingency Plan
Wharf has developed a reclamation strategy that is documented in the *Wharf Mine Expansion Mine Permit Application* (Wharf Resources and RESPEC, 2011). If monitoring indicates a potential problem, a study will be conducted to determine the potential significance and the need for action.

#12 Define methods and procedures for inspections of facility operation and for detection of system failures. The discharger must include a notarized statement granting permission to inspect in accordance with ARSD 74:50:03:03. The document must be signed by a person legally responsible for the facility. Refer to ARSD 74:54:02:06 (16).

Facility operation inspection methods and procedures that can monitor system failure are described in the information provided in Numbers 10 and 11 of this discharge permit application.

A NOTARIZED STATEMENT GRANTING PERMISSION TO INSPECT IN ACCORDANCE WITH ARSD 74:50:03:03 is provided in Exhibit 6.

References:

ERM, April 2011. Potential Impact of Spent Ore Disposal in the American Eagle Pit.

Madden, Dr. Michael K., 2010. Socioeconomic Assessment Wharf Mining Co.

Wharf Resources, Inc. and RESPEC, February 2011. Wharf Mine Expansion Mine Permit Application.