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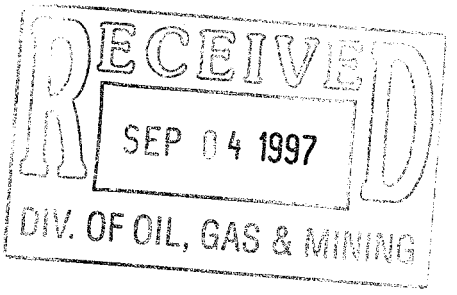

September 4, 1997

Coal Regulatory Program
Division of Oil, Gas, and Mining
1594 West North Temple
Suite 1210
P.O. Box 145801
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ACT/015/002 #2

RE: J.B. King Mine Reclamation - Sediment Pond Spillway Design

To Whom It May Concern,

We were asked by Western States Minerals Corporation to design a new spillway for the sediment pond at the J.B. King reclaimed mine site in Emery County, Utah. Western States Minerals Corporation has proposed relocating the existing spillway because runoff in the undisturbed drainage ditch near the north edge of the sediment pond can currently flow back through the existing spillway and into the sediment pond during localized runoff events. The undisturbed ditch follows a natural drainage channel through this area, so moving the undisturbed drainage channel is not practical. Relocating the sediment pond spillway a short distance to the west will result in the spillway joining the undisturbed ditch further downstream and will prevent runoff from the undisturbed ditch from flowing into the pond during storm events.

Western States Minerals Corporation indicated that the following criteria should be used to design the new spillway:

1) The spillway should safely convey the peak flow from the 25-year, 6-hour storm event with the pond water surface level with the flow line of the spillway at the beginning of the storm event.

2) The sediment pond should have capacity to contain the runoff from the 10-year, 24-hour storm event.

A new spillway with a trapezoidal cross section, a bottom width of 15 feet, 3H:1V side slopes, and a depth of approximately 1 foot will convey the peak flow of 28 cfs from the 25-year, 6-hour storm event. To provide the necessary headwater depth and at least 0.5 feet of freeboard, the approximate elevation of the spillway inlet will be 6249.5 feet MSL. We recommend that the spillway be graded at a 2% slope until it matches the existing ground surface. Based on survey data supplied by Western States Minerals Corporation, the spillway will "daylight" near the existing fence approximately 50 to 55 feet downstream from the spillway inlet. The location and cross sections for the proposed new spillway are shown on figures in the attached appendix.

Our calculations indicate that the sediment pond does not currently have the capacity necessary to contain the runoff from the 10-year, 24-hour storm event. The survey of the sediment pond provided

by Western States Minerals Corporation (survey performed by Wes Sorensen P.E, 12/14/97) showed that the pond has a maximum containment volume of approximately 4.78 acre-feet at an elevation of 6250 feet MSL and approximately 4.31 acre-feet at an elevation of 6249.5 feet. A runoff volume of 5.97 acre-feet was calculated for the 10-year, 24-hour storm event. The runoff volume exceeds the pond capacity by 1.66 acre-feet at the proposed elevation of the new spillway.

On behalf of Western States Minerals Corporation, we are seeking an exemption from the requirement that sediment pond have the capacity to contain the runoff from the 10-year, 24-hour storm event. We believe that an exemption is justified for the following reasons:

1) The existing pond has been in place for 12 years. Observations by Western States Mining Corporation indicates that the pond has never been overtopped during this period.

2) DOGM has already approved the sediment pond in its current configuration. The new spillway will be at approximately the same elevation as the existing spillway. Therefore, relocating the spillway will not change the current performance of the sediment pond.

3) The purpose of the sediment pond is to capture sediment from the area that is currently undergoing reclamation. Runoff that exceeds the pond capacity would cause some sediment to be transported downstream. However, a study by Samuel A. Bamberg, Ph.D. and Ingrid E. Hanne, M.S. in August 1994 indicates that undisturbed watershed in the Dog Valley area experiences high rates of erosion and sedimentation due to natural geomorphologic and climatic conditions. The study also states that an observation of the downstream drainage (from the mine site to I-70 - a distance of approximately 2 miles) found no wetlands, seeps, springs, or other special or sensitive habitats. Given the naturally high erosion rate and the absence of sensitive habitats, any additional sediment that is transported downstream by runoff discharged through the pond spillway will have negligible impacts.

The following sections describe the methodology and results of our analysis and design. Detailed calculations are attached.

METHODOLOGY

Runoff volumes were calculated using the SCS curve number methodology. The Army Corps of Engineer's "HEC1-Flood Hydrograph Package" was selected for use in runoff routing and predicting peak flowrates. The HEC-1 model allows use of the Soil Conservation Service (SCS) curve number and unit hydrograph method for modeling watersheds.

DESIGN STORMS

As indicated previously, the sediment pond spillway is designed to convey the peak flow from the 25-year, 6-hour storm event with the pond water surface level with the flow line of the spillway at the

beginning of the storm event. The SCS 6-hour storm distribution was used to determine peak runoff flowrates at the spillway. Design rainfall depths were obtained from NOAA Atlas 2, Volume VI, USDA, Soil Conservation Service. Design rainfall depths are given in Table 1.

DRAINAGE BASIN CHARACTERISTICS

The drainage basin tributary to the sediment pond is defined by the natural topography and the undisturbed runoff ditch. A total of 87.4 acres tributary to the sediment pond was measured by planimeter using Figure JBK-4 from the *J.B. King Mine Reclamation Plan Revision - 1994 Appendix to Permit ACT\015\002*, February 1994. The tributary area was divided into 8 subbasins. Subbasin boundaries are shown on a figure in the attached appendix. Subbasin characteristics are summarized in Table 2.

RUNOFF VOLUME (10-YEAR, 24-HOUR STORM)

The runoff volume from the 10-year, 24-hour storm event was calculated using the SCS Curve Number methodology. A representative composite curve number of 89 for the tributary area was estimated using an area weighted average of the individual curve numbers for each subbasin. The total estimated runoff volume from the 10-year, 24-hour storm event is 5.97 acre-feet.

PREDICTED PEAK RUNOFF FLOWRATES (25-YEAR, 6-HOUR STORM)

Predicted peak runoff flowrates at the outlet of the sediment pond were calculated using the Army Corps of Engineer's "HEC1-Flood Hydrograph Package." Runoff was routed through the sediment pond assuming that the water level was at bottom of the spillway (elevation 6249.5') at the beginning of the storm event. The predicted peak runoff flowrate at the pond spillway is 28 cfs for the 25-year, 6-hour storm event.

SPILLWAY DESIGN

A new spillway with a trapezoidal cross section, a bottom width of 15 feet, 3H:1V side slopes, and a minimum depth of approximately 1 foot will convey the peak flow of 28 cfs from the 25-year, 6-hour storm event. A normal flow depth of 0.5 feet was calculated using Manning's Equation for the peak flowrate of 28 cfs. The headwater depth at the spillway inlet will be approximately 0.8 feet based on the broad crested weir equation. To provide the necessary headwater depth and at least 0.5 feet of freeboard, the approximate elevation of the spillway inlet will be 6249.5 feet MSL. We recommend that the spillway be graded at a 2% slope until it matches the existing ground surface. Based on survey data supplied by Western States Minerals Corporation, the spillway will "daylight" near the existing fence approximately 50 to 55 feet downstream from the spillway inlet. We also recommend that riprap with D_{50} = 6" be placed along the spillway channel to provide protection against erosion.

TABLE 1
RAINFALL DEPTHS FOR DESIGN STORMS

Design Storm		Rainfall Depth (inches)
Return Period (years)	Duration (hrs)	
10	24	1.75
25	6	1.50

TABLE 2
SUBBASIN HYDROLOGIC CHARACTERISTICS

Subbasin	Area (acres)	Lag Time[1] (hrs)	Curve Number
A	34.2	0.273	90
B	16.6	0.168	90
C	1.9	0.166	90
D	2.5	0.143	90
E	2.7	0.172	90
F	2.6	0.148	90
G	5.6	0.175	90
H	21.3	0.196	86
Total =>	87.4	Composite CN[2] =>	89

1) Basin lag times were calculated using the methodology presented in *Urban Hydrology for Small Watersheds,* Technical Release No. 55, Soil Conservation Service, 1986.

2) Composite CN is the area weighted representative SCS Curve Number for the entire tributary area..

If you have any questions or need additional information, please feel free to call.

Sincerely,

HANSEN, ALLEN & LUCE, INC.

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Associate

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