

# PERMIT TRACKING FORM

Permit Amendment(INS)  
  Exploration Permit(INS)  
  N.O.V. (INS)  
  D.O.  
  Permit Transfer  
  Incidental Boundary Change  
 Permit Midterm (MT)  
  Permit Renewal (PR)  
  New Permit  
  Significant Revision (SR)  
  Bond Release (BR)

DATE RECEIVED	09/04/97	By: <b>tat</b> (Initial)	PERMIT NUMBER	ACT/015/002
Title of Proposal: Relocate Sediment Impoundment Spillway			PERMIT CHANGE #	97B
Description:			PERMITTEE	WESTERN STATES MINERAL CORP.
# Copies Required 3      # Copies Received 3			MINE NAME	J.B. KING

PERMIT CHANGE APPLICATION SENT TO SLC      DATE: \_\_\_\_\_      LETTER TO PERMITTEE: \_\_\_\_\_

<input type="checkbox"/> 15 DAY INITIAL RESPONSE TO PERMIT CHANGE APPLICATION OR INITIAL COMPLETENESS REVIEW	DATE DUE	DATE DONE	LETTER TO PERMITTEE:
		9/8/97 →	

<input type="checkbox"/> Notice of Affidavit of Publication. (If change is a Significant Revision, New Permit or Permit Transfer)	DATE DUE	DATE DONE	PUBLIC COMMENT RECEIVED:

PRICE REVIEW TRACKING	REVIEW		SLC REVIEW TRACKING	REVIEW	
	DUE	DONE		DUE	DONE
<input type="checkbox"/> Lead <input type="checkbox"/> Generalist			<input type="checkbox"/> Lead		
<input type="checkbox"/> Administrative			<input type="checkbox"/> Administrative		
<input type="checkbox"/> Land Use/AQ			<input type="checkbox"/> Land Use/AQ		
<input type="checkbox"/> Biology			<input type="checkbox"/> Biology		
<input type="checkbox"/> Engineering			<input type="checkbox"/> Engineering		
<input type="checkbox"/> Geology			<input type="checkbox"/> Geology		
<input type="checkbox"/> Soils			<input type="checkbox"/> Soils		
<input type="checkbox"/> Hydrology			<input type="checkbox"/> Hydrology <i>Sharon</i>		9/23

TA Review Due	Date: 9/29/97	Permittee Response Due	Date: 10/13/97	DIVISION DECISION LETTER
		<input checked="" type="checkbox"/> Stipulation <input type="checkbox"/> Condition <input type="checkbox"/> No Requirements		<input type="checkbox"/> APPROVE <input type="checkbox"/> DENY

TA Review Done	Date:	Response Received	Date: 10/2/97	Date:
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COORDINATED REVIEWS	PHONE CONTACT	SENT	DUE	RECEIVED	ADDITIONAL TRACKING	Date:
<input type="checkbox"/> OSMRE		10/7			PUBLIC HEARING	
<input type="checkbox"/> US Forest Service					LETTER FROM COMPLIANCE SUPER.	
<input type="checkbox"/> BLM					AVS COMPLETED	
<input type="checkbox"/> US FWS					APPROVAL EFFECTIVE DATE	10/7/97
<input type="checkbox"/> US NPS					APPROVED COPY TO FILE	
<input type="checkbox"/> UT SHPO					APPROVED COPY TO PERMITTEE	
<input type="checkbox"/> UT DEQ (L)					APPROVED COPY TO PFO/SLC	
<input type="checkbox"/> UT Water Rights (L)					APPROVED COPY TO AGENCIES	
<input type="checkbox"/> UT Wildlife Resources(L)					CHIA MODIFIED	
<input type="checkbox"/> UT SITLA (L)					UPDATE MASTER TA    DONE/NEEDED	

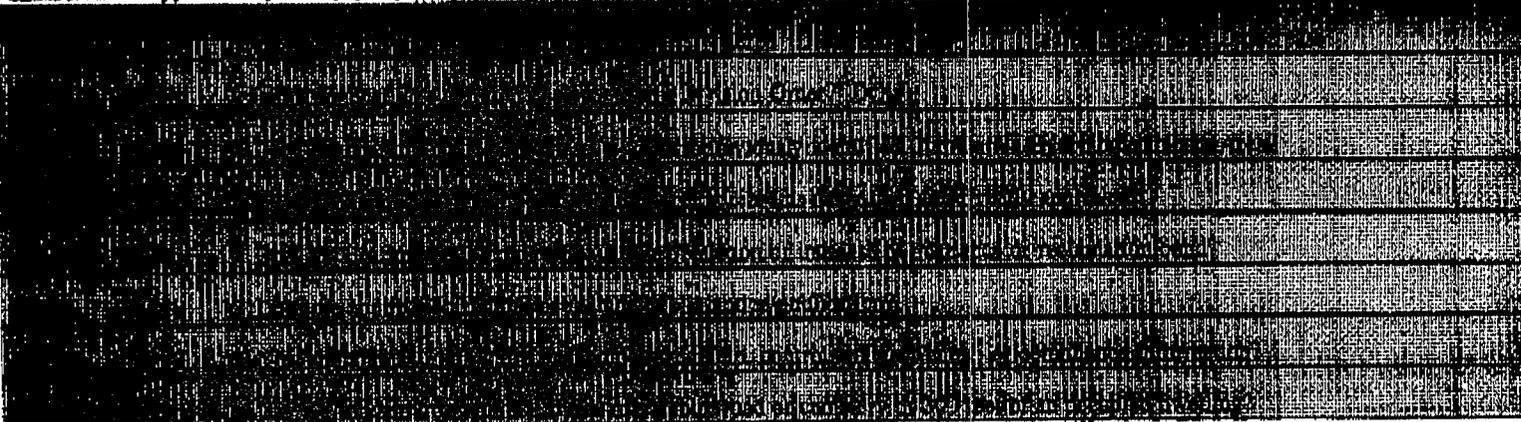
PRICE FIELD OFFICE COMMENTS:	SLC OFFICE COMMENTS:
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# APPLICATION FOR PERMIT PROCESSING

Permit Change <input checked="" type="checkbox"/>	New Permit <input type="checkbox"/>	Renewal <input type="checkbox"/>	Transfer <input type="checkbox"/>	Exploration <input type="checkbox"/>	Bond Release <input type="checkbox"/>	Permit Number: ACT/015/002
Title of Proposal: <b>Request to relocate sediment impoundment spillway</b>						Mine: J.B. KING
						Permittee: WESTERN STATES

Description, include reason for application and timing required to implement: **Minor modification - relocate sediment impoundment spillway. This modification will prevent runoff from an undisturbed drainage channel from spilling into existing site sediment impoundment. To be implemented within one month from date of approval.**

Instructions: If you answer yes to any of the first 8 questions (gray), submit the application to the Salt Lake Office. Otherwise, you may submit it to your reclamation specialist.



<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	9. Is the application submitted as a result of a Violation? NOV #
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	10. Is the application submitted as a result of other laws or regulations or policies? Explain:
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	11. Does the application affect the surface landowner or change the post mining land use?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2?)
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	13. Does the application require or include collection and reporting of any baseline information?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	15. Does application require or include soil removal, storage or placement? <b>Minor - removal/placement, less than 0.040 acres total</b>
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	16. Does the application require or include vegetation monitoring, removal or revegetation activities? <b>Minor - reseed; less than 0.020 acres</b>
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	17. Does the application require or include construction, modification, or removal of surface facilities? <b>Modification</b>
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	18. Does the application require or include water monitoring, sediment or drainage control measures? <b>Drainage control</b>
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	19. Does the application require or include certified designs, maps, or calculations? <b>Designs &amp; calculations by third party - HAGL</b>
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	20. Does the application require or include subsidence control or monitoring?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	21. Have reclamation costs for bonding been provided for? <b>Existing bond covers this minor modification</b>
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	22. Does application involve a perennial stream, a stream buffer zone or discharges to a stream?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	23. Does the application affect permits issued by other agencies or permits issued to other entities?

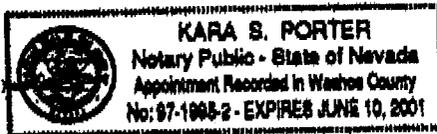
Attach 3 complete copies of the application.

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to constitutional, administrative and other laws, being

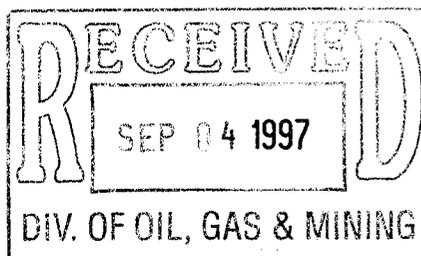
Signed - Name - Position - Date  
*E.M. Gerick* 9-3-97  
**E.M. Gerick - Vice Pres. Operations**

Submitted and sworn to before me this 3 day of Sept, 1997.

Notary Public \_\_\_\_\_, 19\_\_\_\_  
 of \_\_\_\_\_, \_\_\_\_\_



*Kara S. Porter*



# Application for Permit Change

## Detailed Schedule of Changes to the Permit

Title of Change: *Request to relocate sediment impoundment spillway*

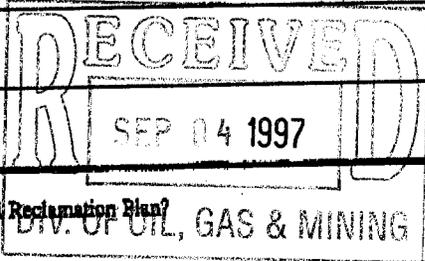
Permit Number: *ACT10151002*

Mine: *J.B. King*

Permittee: *Western States Minerals Corp.*

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the existing mining and reclamation plan. Include page, section and drawing numbers as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
<input checked="" type="checkbox"/> ADD	<input checked="" type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>UMC 817.46 add to or replace portions of this section associated with spillway design and the design storm event</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

DIV. OF UTL, GAS & MINING



6771 South 900 East  
 Midvale, Utah 84047  
 Phone: (801) 566-5599  
 Fax: (801) 566-5581

# Letter of Transmittal

To: <u>Sharon Falvey</u> <u>Senior Reclamation Hydrologist</u> <u>Division of Oil, Gas &amp; Mining</u>		<b>Consulting Engineers Specializing in Water Resources, Civil Engineering and the Environment</b>	
Date: <u>10/2/97</u>	Fax#:	<b>SUBMITTED</b>	
Job #:	Project:	<input type="checkbox"/> For Approval	<input type="checkbox"/> For Review and Comments
DATE	ITEM	<input checked="" type="checkbox"/> As Requested	<input type="checkbox"/> For Use
		<input type="checkbox"/> Approved as Submitted	<input type="checkbox"/> Returned for Corrections
		<input type="checkbox"/> Approved as Noted	<input type="checkbox"/> Other _____
<b>GENERAL COMMENTS</b>			
<u>Project: Sedimentation Pond Spillway Ammendment, Western States Minerals, J.B King Mine</u>			
<u>As requested, we are submitting 3 copies of certification for the submitted design of the sedimentation pond. Please replace the old pages with the new pages</u>			
<u>Joe,</u>			
<u>This is the DBK stuff</u>			
<u>A-OK. Submit approval letter</u>			
<u>No C1 - C2 form was filled out</u>			
<u>This guy is New.</u>			
<u>John B</u>			
<u>I told him the procedure for next time</u>			
<u>Sharon</u>			
Copies to:		Signed: <u>John Byersgaard, P.E.</u>	



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 Midvale, Utah 84047  
 Phone: (801) 566-5599  
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Date: <u>10/2/97</u>	Fax#:		
Job #:	Project:	<input type="checkbox"/> For Approval	<input type="checkbox"/> For Review and Comments
DATE	ITEM	<input checked="" type="checkbox"/> As Requested	<input type="checkbox"/> For Use
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		<input type="checkbox"/> Approved as Noted	<input type="checkbox"/> Other _____
GENERAL COMMENTS			
Project: <u>Sedimentation Pond Spillway Ammendment, Western States Minerals, J.B King Mine</u>			
<u>As requested, we are submitting 3 copies of certification for the submitted design of the sedimentation pond. Please replace the old pages with the new pages</u>			
Copies to:		Signed: <u>John Bjersgaard, P.E.</u>	



State of Utah  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt  
Governor  
Ted Stewart  
Executive Director  
James W. Carter  
Division Director

1594 West North Temple, Suite 1210  
Box 145801  
Salt Lake City, Utah 84114-5801  
801-538-5340  
801-359-3940 (Fax)  
801-538-7223 (TDD)

October 7, 1997

E.M. Gerick, Vice President of Operations  
Western States Minerals Corporation  
250 South Rock Blvd., Suite 130  
Reno, Nevada 89502

Re: Sediment Pond Spillway, Western States Minerals Corporation, J.B. King Mine,  
ACT/015/002-97B, File #2, Emery County, Utah

Dear Mr. Gerick:

As requested, the Division has received the certified information regarding the redesign of the sediment pond spillway at the J.B. King Mine. A stamped approved incorporated copy of this submittal is enclosed for incorporation into your Mining and Reclamation Plan.

Thank you for your participation. Please call if you have any questions.

Sincerely,

Joseph C. Helfrich  
Permit Supervisor

tat

Enclosure

cc: Mark Page, Water Rights, w/o  
Dave Ariotti, DEQ, w/o  
Bill Bates, DWR, w/o  
David T. Terry, SITLA, w/o  
Susan White, DOGM, w/o  
Price Field Office

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State of Utah  
DEPARTMENT OF NATURAL RESOURCES  
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801-538-7223 (TDD)

September 29, 1997

E.M. Gerick, Vice President of Operations  
Western States Minerals Corp.  
250 South Rock Blvd., Suite 130  
Reno, Nevada 89502

Re: Sedimentation Pond Spillway, Western States Minerals, J.B. King Mine, ACT/015/002-97B, File #2, Emery County, Utah

Dear Mr. Gerick:

The referenced amendment has been reviewed by Sharon Falvey, Senior Reclamation Hydrologist for the Division. A copy of her technical memo is attached for your review and response. The findings section of Sharon's memo indicate the need for certification of the designs, cross sections, and maps of your submittal. Receipt of the certified information by October 13, 1997 is appreciated.

We look forward to completion of this project in the near future.

Sincerely,

A handwritten signature in cursive script that reads "Joseph C. Helfrich".

Joseph C. Helfrich  
Permit Supervisor

tt

Enclosure

cc: Sharon Falvey

O:\015002\JBK\FINAL\DEFECIEN.97B



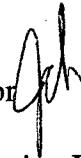
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801-538-7223 (TDD)

September 23, 1997

TO: File

THRU: Joe Helfrich, Permit Supervisor 

FROM: Sharon Falvey, Senior Reclamation Hydrologist 

RE: Sedimentation Pond Spillway Amendment, Received Sept 4, 1997, Western States Minerals, J.B. King Mine, ACT/015/002-97B, File #2, Emery County, Utah

**SYNOPSIS**

This amendment is presented to resolve design issues that resulted from a previous rainfall event. The pond received runoff from a drainage adjacent to the spillway. The spillway is located in a shallow low gradient area. Flow from the drainage enters the pond via the spillway but, the pond is not designed to receive the flow.

**ANALYSIS**

The amendment proposes to move the existing spillway away from the adjacent ephemeral drainage. Designs, design criteria, and methodologies are presented in the amendment. The proposed spillway meets minimum design criteria.

The analysis conducted in the amendment show the existing approved pond and "as-built's" do not contain the minimum runoff volume for permanent structures. The predicted runoff volume exceeds the pond volume by 1.66 acre feet. The existing pond capacity is 4.31 acre feet according to the calculations presented in this amendment. A variance from the requirement to contain the 10 year - 24 hour design event within the pond was requested, from Hansen Allen & Luce Inc, dated September 4, 1997, in a cover letter associated with the amendment. The reasons stated are summarized below:

- 1) The pond existed for 12 years without a known discharge through the existing spillway.
- 2) The spillway will remain at the existing elevation thus, no change to the existing containment volume will result.

- 3) The nearest downstream (perennial) drainage is approximately 2 miles from the site. Natural sedimentation rates in the surrounding area are (relatively) high and they stated that any additional sediment transported downstream by runoff through the pond will have negligible impacts.

The Division may approve a lesser design than the 10 year - 24 hour event according to R645-301-742.221.33. On the basis of climate or other site specific conditions and on a demonstration by the operator that the effluent limitations will be met;

No demonstration that effluent limitations will be met were presented by the applicant in the amendment. However, no effluent requirements from the State Department of Health are required at the existing pond at this time. In other words, no UPDES discharge point is associated with this pond. No discharges are known to have been observed or documented to occur from this pond.

Although the designs and maps are adequate for approval, they lack certification.

### **FINDINGS**

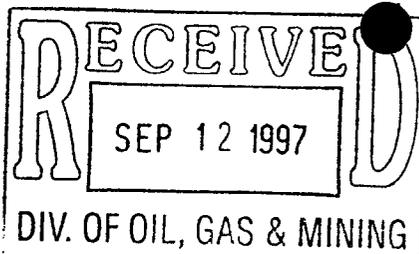
The amendment must incorporate the following in accordance with:

**R645-301-512.** Provide the required certification for the submitted cross sections and maps.

**R645-301-512.240.** Provide the required certification for the submitted design of the sedimentation pond as required under R645-301-742.213 and cross-reference R645-301-743.

### **RECOMMENDATION**

It is recommended the proposed modification be approved upon receipt of the requirements outlined in the findings section above. It should be noted the amendment does not identify reseeding, however, the application form identifies an area of less than 0.020 is to be reseeded.



September 5, 1997

ACT/015/002 #2  
ACT/015/002-97B  
JOE  
SUSAN

Mr. Joe Helfrich  
Ms. Susan White  
1594 West North Temple, Suite 1210  
Box 145801  
Salt Lake City, UT. 84114-5801

**RE: J.B. King reclaimed minesite- ACT/015/002- Minor permit modification- Request to relocate sediment impoundment spillway**

Dear Mr. Helfrich and Ms. White:

On September 4, 1997, our consultant- Hansen, Allen & Luce, Inc., submitted a Permit Modification on our behalf. The modification is for our J.B. King reclaimed minesite - ACT/015/002. The modification has two objectives: First, it is a request to relocate the existing spillway to prevent the runoff from an undisturbed drainage ditch from entering the on site sediment impoundment; and second, Western States Minerals Corporation requests an exemption from the requirement that the sediment impoundment have the capacity to contain the runoff from the 10-year, 24-hour storm event. The design criteria and exemption logic are presented in the submitted documents.

I respectfully request your approval of this permit modification. We are prepared to begin the implementation of this modification within two weeks from your approval date. If you have any questions, please call at your convenience.

Sincerely,

E.M. (Buzz) Gerick  
Vice President of Operations

cc: Greg Poole & John Bjerregaard, HAL, Inc.



September 5, 1997

FILE FOLDER 2 + AMD. Folder

ACT/015/002-97H

ACT/015/002 #2

Mr. Joe Helfrich  
Ms. Susan White  
1594 West North Temple, Suite 1210  
Box 145801  
Salt Lake City, UT. 84114-5801

**RE: J.B. King reclaimed minesite- ACT/015/002- Minor permit modification- Request to relocate sediment impoundment spillway**

Dear Mr. Helfrich and Ms. White:

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Sincerely,

E.M. (Buzz) Gerick  
Vice President of Operations

cc: Greg Poole & John Bjerregaard, HAL, Inc.



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September 8, 1997

E.M. Gerick, Vice President of Operations  
Western States Minerals Corp.  
250 South Rock Blvd, Ste 130  
Reno, Nevada 89502

Re: Sediment Pond Spillway Design, Western States Minerals Corp., J.B. King Mine,  
ACT/015/002-97B, File #2, Emery County, Utah

Dear Mr. Gerick:

By way of correspondence from Hansen, Allen, & Luce, Inc, dated September 4, 1997, we are in receipt of your submittal which depicts a new design proposal for the spillway for the J.B. King Mine Sediment Pond. We anticipate completing our review for this proposal by September 19, 1997. This information will be available for review at our Salt Lake and Price Office Locations.

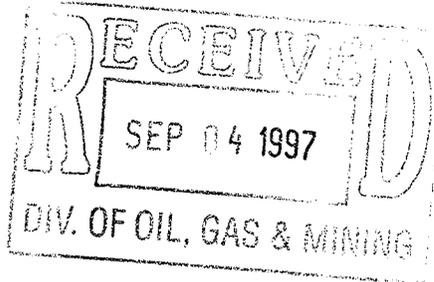
If you have any questions please contact Sharon Falvey or me at (801) 538-3940.

Sincerely,

Joseph C. Helfrich  
Permit Supervisor

tat  
cc: Mark Page, Water Rights  
Dave Ariotti, DEQ  
Bill Bates, DWR  
David Terry, SITLA  
Susan White  
Sharon Falvey  
Price Field Office  
O:\015002.JBK\FINAL\TRANSMTL.97B

Coal Regulatory Program  
Division of Oil, Gas, and Mining  
1594 West North Temple  
Suite 1210  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801



September 4, 1997

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 <sup>1</sup> (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 <sup>2</sup> =>	89

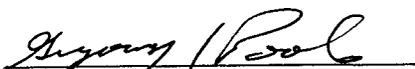
- 1) Basin lag times were calculated using the methodology presented in *Urban Hydrology for Small Watersheds*, Technical Release No. 55, Soil Conservation Service, 1986.
- 2) Composite CN is the area weighted representative SCS Curve Number for the entire tributary area..

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September 4, 1997  
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If you have any questions or need additional information, please feel free to call.

Sincerely,

**HANSEN, ALLEN & LUCE, INC.**



Greg Poole, P.E.  
Associate



John Bjerregaard, P.E.  
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