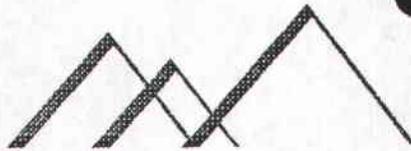


**WESTERN
STATES
MINERALS
CORPORATION**



LDB
This is the first
2 pgs. of cover
letter that contained
Appendix 3 - Technical
Memorandum (WSMC)
See attachment
September 15, 1992

HAND DELIVERED

Dr. Dianne R. Nielson
Director
UTAH DIVISION OF OIL, GAS & MINING
3 Triad Center
355 West North Temple
Suite 350
Salt Lake City, Utah 84180

File in:

Confidential

Shelf

Expandable

Refer to Record No. 0026 Date 10/14/1999

In C 015002 1999 Incoming

For additional information

Re: Western States Minerals Corporation, J.B. King Mine
ACT/015/002, Folder No. 2, Emery County, Utah
(NOV N91-35-6-1, N91-35-7-1, N91-32-6-1;
Stipulation Response R614-301-742.113)

Dear Dr. Nielson:

Earlier this year Western States Minerals Corp. (WSMC) received violations from the Division concerning the J.B. King mine site and Stipulation R614-301-742.113 Response. In order to resolve the outstanding violations and to prevent future violations, several meetings have been held between WSMC and the Division, including an onsite meeting August 11, 1992. After thorough consideration of these matters, WSMC has done all that it deems practicable to reclaim the J.B. King site. Any additional effort onsite would destroy the progress which has been made to date, unnecessarily prolong the reclamation process, and not significantly enhance successful reclamation of the site. This response has been prepared to reconcile the J.B. King permit, with the site conditions, and the regulations.

Violations N91-35-6-1 and N91-35-7-1

Both of these violations concern erosion. N91-35-6-1 is for erosion on reclaimed areas and N91-35-7-1 is for erosion on the refuse pile. Both violations refer to R614-301-742.113 of the regulations which states, "Minimize erosion to the extent possible."

R614-301-742.113 cross references to 817.45 in the permit. This section of the permit is copied and attached for convenience as Appendix 1. Recent meetings between WSMC and DOGM, including the August 11 site meeting, have established that erosion on the site is inevitable and that all reasonable measures have been taken to minimize erosion to the extent possible. The erosion prevention measures which have been implemented are those described in 817.45 of the permit so the permit and the site are consistent with each other. The permit accurately reflects site conditions. Erosion has been minimized to the extent possible, the site and this section of the permit are in compliance with the regulatory standards for erosion. It is, therefore, respectfully requested that these two violations be vacated.

Dr. Dianne R. Nielson
September 15, 1992
Page 2

To assess the environmental impact of erosion of the J.B. King site, a study was performed by Hansen, Allen & Luce, and the resulting report, Effects and Timing of Erosion at the J.B. King Mine Site, is enclosed in Appendix 2. The following is a summary of the findings resulting from this study.

- It will take at least 20 years and maybe as long as 2,000 years for erosion to expose the coal refuse pile on the J.B. King site.
- When the refuse material is exposed there will be between 2% and 63% of the amount of coal exposed in the J.B. King basin as is naturally exposed in the undisturbed basin adjacent to J.B. King.
- The refuse material will not sustain combustion.
- It will take 65 to 100 years for the sediment pond at J.B. King to fill.

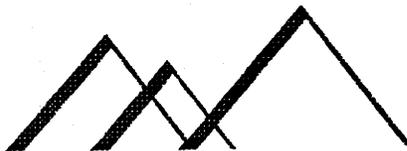
Samples of the refuse material, soils, and sediment were analyzed to determine environmental impact if coal refuse sediment were to leave the site. The results of analyses of the samples are reported in a WSMC internal memo from Larry Berg to Buzz Gerick which is attached as Appendix 3. The following is a summary:

- The soils in the area have the capacity to neutralize any acidic runoff which may result from the coal refuse.
- The lowest pH solution generated by leaching the refuse material with meteoric water was 6.43. The highest pH value obtained was 7.54. This is in the "Good" range according to the Division's Guidelines (James Leatherwood and Dan Duce, April, 1988).
- The SAR for the refuse material ranged from 1.5 to 6.6 which is in the "Good" to "Fair" range according to the Guidelines.
- Solutions generated by leaching the refuse material meet Primary Drinking Water Standards for arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and fluoride.

Independently, Dr. Samuel Bamberg reported his observations and recommendations in a letter dated August 28, 1992, to Buzz Gerick. This letter is attached as Appendix 4. Dr. Bamberg's observations are that:

- Vegetation should continue to stabilize on site over the next 35 years.
- The reclaimed site will not present a hazard or risk from sediment and exposed coal on and off site greater than the other basins along the sandstone bluffs around Dog Valley because erosion and exposed coal seams are a natural part of this part of the Colorado Plateau.

APPENDIX 3



TECHNICAL MEMORANDUM

September 10, 1992

To: Edward M. Gerick, Vice President of Operations (WSMC)
From: Larry D. Berg, P.E. / Environmental Engineer (WSMC)
Subject: J.B. King Mine, Analytical Results of Coal Refuse and Surrounding Soils

cc: B.J. Barnum (Hansen, Allen, & Luce, Inc.), D.J. Crossland (WSMC)

INTRODUCTION:

Western States Minerals Corporation (WSMC) recently performed an investigation of our J.B. King Mine located in Emery County, Utah, to characterize the contents of the coal refuse material, surrounding native soils, and accumulated sediments in the runoff control structure located on-site. Field sampling was performed on July 18, 1992 by WSMC personnel. Analytical results (raw data) were presented to Utah Division of Oil, Gas & Minerals (UDOGM) on August 11, 1992 during a meeting with WSMC personnel. The purpose of this investigation was to assess potential impacts (if any) to the surrounding environment due to the coal refuse material being leached by meteoric waters or being mechanically transported to adjacent lands. Based on a series of prior meetings between UDOGM and WSMC, it became apparent that additional data was needed to accurately characterize the physical and chemical nature of the coal refuse and surrounding soils. While this report is not intended to be a stand-alone-document addressing contaminant transport/ fate analysis, it is intended to be a technical supplement to the present issues at the J.B. King Coal Mine, upon which final conclusions may be made when accompanied by supporting documentation. Presented is a summary of WSMC's findings of the investigation for the J.B. King Coal Mine presented to the Division.

FIELD INVESTIGATION:

On July 18, 1992, WSMC personnel collected a total of seven soil and coal refuse samples (See Figure 1). Samples were excavated using a post-hole digger and taken at a depth of approximately 30-inches. Samples TPCS-1, TPCS-2, and TPCS-3 were taken in the exposed coal refuse area adjacent to a metal "T" post located at each sampling point. Samples RPS-1, RPS-2, and RPS-3 were taken from native soils near the toe of the coal refuse pile (See Figure 1). The sediment pond sample (SPM-1) was taken from the deepest point (visually located) in the sediment retention pond. All samples were

placed in a heavy duty plastic sample bags, sealed, labeled, and transported to CHEM-X Laboratories in Reno, NV for analyses.

ANALYTICAL TESTING PROGRAM:

The purpose of the analytical testing program was to characterize the existing coal refuse material regarding adverse impacts to the surrounding environment should these materials be eroded or leached from their present location. In addition, the surrounding native soils and sediment from the retention pond were also evaluated as to their ability to resist potential adverse impacts and to see if the existing sediments contained any evidence of contaminants already migrating from the refuse pile or native cover soils into the catchment structure. CHEM-X Laboratories performed the following tests on all samples collected for this investigation: Nevada Meteoric Water Mobility Test (includes Acid Neutralization / Acid Generation Potential), Sodium Adsorption Ratio (SAR), Electrical Conductance, and Ignitability Test (non-standard test). The analytical results are discussed below and summarized in Tables 1 and 2. The complete laboratory reports for this investigation are presented in Appendix A.

ANALYTICAL RESULTS AND FINDINGS:

A summary of the Meteoric Water Mobility Test (MWMT) results are presented in Table 1. Only those parameters having a positive detection are listed (with the exception of the Primary Drinking Water Standard Metals). The analytical results for all other parameters (including the 33-Element ICP Scan) are presented in Appendix A. None of the seven samples analyzed using the MWMT exceeded Primary Drinking Water Standards for arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and fluoride. All samples analyzed were reported as having nitrate concentrations below the maximum contaminant level (MCL) of 10 mg/l with the exception of coal refuse sample TPCS-1 (13 mg/l). Secondary Drinking Water Standards (MCLs) were exceeded for Total Dissolved Solids (TDS) and sulfate for all samples collected from the coal refuse pile and two of the three samples collected from the native soils. The reported concentrations of TDS and sulfate for samples collected from the coal refuse material exceeded those reported concentrations of the native soils. Analyses of the sediment retention pond materials show that these sediments have the lowest reported concentrations of TDS and sulfates.

Acid Neutralization / Generation Potential:

All samples collected on July 18, 1992, at the J.B. King mine were analyzed for Acid Generation/ Neutralization Potential (See Table 2). The acid generation potential is calculated as the neutralization potential minus the acidification potential. When the neutralization potential is greater than the acidification potential, the resulting acid generating potential is a positive value. All units are reported in "tons of calcium carbonate per 1,000 tons of material (See Appendix B for further explanation of the Acid Neutralization / Acid Generation Potential Test). Samples taken from the native soils

and the sediment retention pond were reported as being non acid generating (a positive value). In addition, the native soils have a strong neutralization potential, thus they have the ability to neutralize low pH fluids. Coal refuse samples TPCS-1 and TPCS-3 are reported to have a negative acid generating potential, thus having the ability to generate low pH solutions under certain conditions (note sample TPCS-2 was reported as be non-acid generating). The strong neutralization potential of the native soils surrounding the coal spoils / refuse piles would have the capacity to neutralize any low pH fluid generated at the J.B. King Mine.

Ignitability:

All samples collected from the J.B. King Mine were evaluated for their ability to ignite and burn. The sampling procedure consisted of sweeping an open flame (propane torch) over the surface of the sample, observing any evidence of ignition and self-sustaining combustion. The coal refuse samples TPCS-1, TPCS-2, and TPCS-3 all exhibited a positive ignitability characteristic when directly exposed to an open flame. However, based on studies by Hansen, Allen and Luce, Inc. (located in Salt Lake City, Utah), the coal refuse material is comprised of approximately 90.6 % of noncoal material and 9.4 % coal refuse. According to 30 CFR, Part 75.403, coal refuse material with greater than 65 % noncoal materials are incombustible. Based on the known composition of the coal refuse, sustained combustion of the refuse pile is highly unlikely, if not impossible. The native soil samples and the sediment pond samples showed no evidence of ignition or self sustaining combustion. The test methodology used to evaluate the ignitability of the materials is a non-standardized test developed at the request of WSMC personnel by CHEM-X Laboratories.

Sodium Adsorption Ratio:

The Sodium Adsorption Ratio (SAR) was measured for all samples and found to be well below the threshold level typically ranging from SAR = 8-12. The SAR is a measure of the availability of water in the soil substrate for vegetation. The higher the SAR value the more difficult it is for vegetation to pull moisture from the surrounding soil. The results of the SAR testing are presented in Table 2. The sample having the highest SAR was native soil sample RPS-1 (SAR = 6.7), and the lowest reported SAR was for coal refuse sample TPCS-1 (SAR = 1.5).

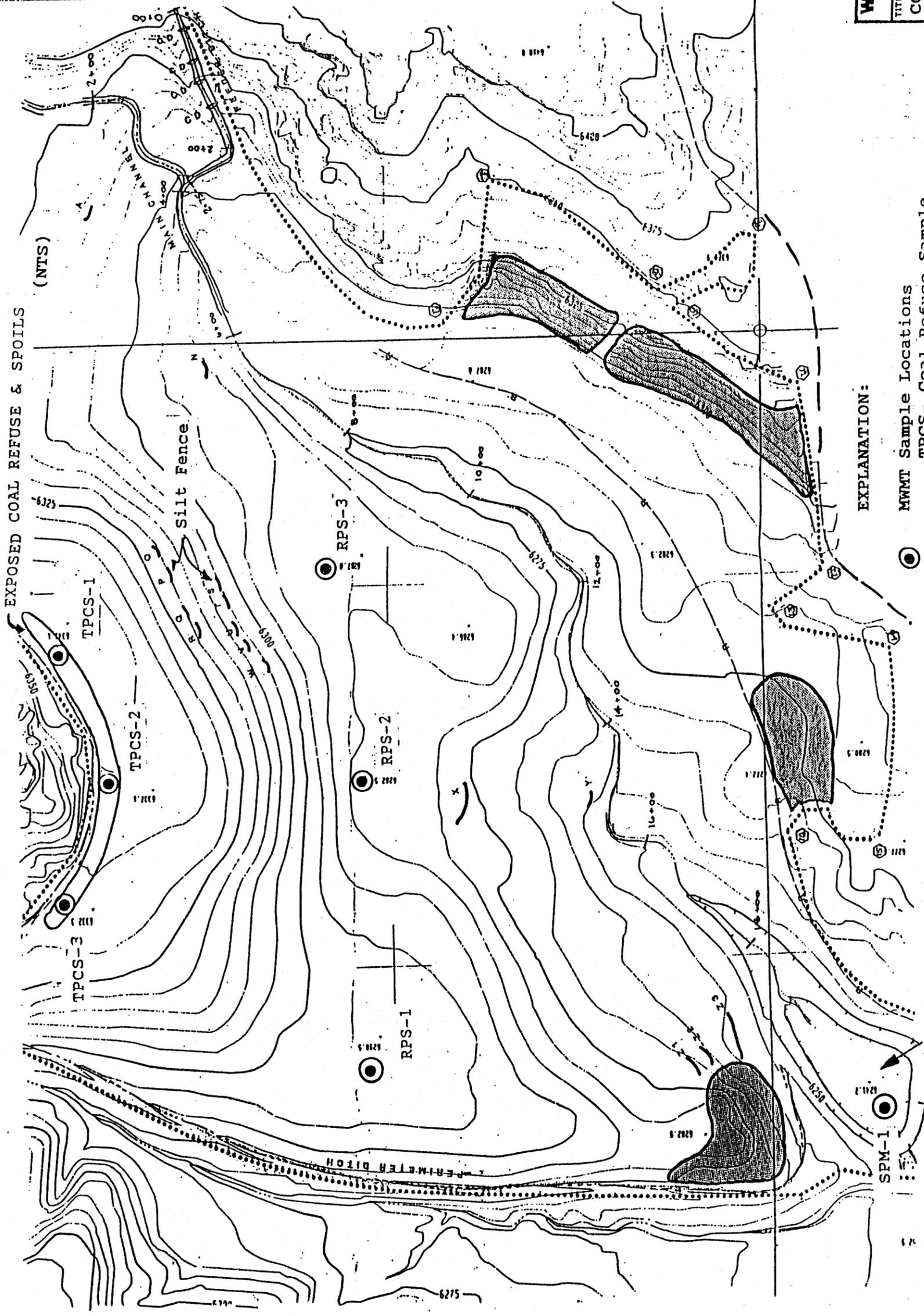
CONCLUSIONS:

Based on the data presented it appears the coal refuse material presents no apparent potential for degradation of the surrounding environment due to leaching of metals. Analyses of the lixiviant from the MWMT for Secondary Drinking Water parameters showed the coal refuse and spoils materials are able to leach higher concentrations of TDS and sulfate than the surrounding soils. The SAR values for all samples were acceptable for all samples collected and analyzed. The coal refuse and spoils material did indicate the potential to be acid generating in two of the three samples analyzed. However, the high neutralization potential of the surrounding soils would effectively

neutralize any migration of low pH fluids generated at the J.B King Mine. The study also showed that the coal refuse materials when exposed to a proper heat source (open flame) combined with sufficient oxygen, will ignite. Based on the high composition of noncoal materials (90.6 %), sustained combustion of the refuse pile is not likely and not considered a problem at the reclaimed J.B. King Mine.

Attachments: (4)

NORTH



EXPLANATION:

- MWMT Sample Locations
- TPCS- Coal Refuse Sample
- RPS - Soil Sample
- SPM - Sediment Pond Sample

- ⊕ — Disturbed Area Marker
- ⋯⋯ Disturbed Area Perimeter

SEDIMENT POND

WESTERN STATES MINERALS CORPORATION			
TITLE:	COAL REFUSE & SOIL SAMPLE LOC.		
PROJECT:	J-B. KING MINE		
STATE:	UTAH	COUNTY:	EMERY
SCALE:	1"=143 FT.	DATA BY:	DJC
DATE:	9/10/92	DRAFTED BY:	LOB
Figure 1			

TABLE 1
SUMMARY OF MWMT ANALYTICAL RESULTS
J.B. KING MINE, July 1992

COAL REFUSE SOIL SEDIMENT POND

PARAMETER:	Units	MCL	COAL REFUSE			SOIL			SEDIMENT POND	
			JBK TPCS-1	JBK TPCS-2	JBK TPCS-3	JBK RPS-1	JBK RPS-2	JBK RPS-3	JBK SPM-1	
Meteoritic Water Mobility Test										
Initial pH	pH-units	(6.5-8.5)	6.15	6.36	6.20	6.20	6.20	6.15	6.15	6.15
Final pH	pH-units	(6.5-8.5)	7.54	7.16	6.43	7.53	7.85	7.70	7.75	7.75
Alkalinity, as CaCo3	mg/l	--	78	38	14	60	70	68	116	116
Total Dissolved Solids (TDS)	mg/l	500	2960	2870	1170	878	346	946	232	232
Fluoride	mg/l	(2.0)	0.32	0.21	0.12	0.82	0.64	2.0	0.76	0.76
Chloride	mg/l	250	<1	<1	<1	53	<1	1.0	1.8	1.8
Nitrate, As NO3	mg/l	10	13	<4	<4	<4	<4	<4	<4	<4
Sulfate	mg/l	250	1960	1920	831	498	180	637	66	66
Arsenic	mg/l	(0.05)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	mg/l	(1.0)	<0.1	<0.1	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1
Cadmium	mg/l	(0.01)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	mg/l	(0.05)	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.032	0.032
Lead	mg/l	(0.05)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury	mg/l	(0.002)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	mg/l	(0.05)	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	mg/l	(0.10)	<0.025	<0.025	<0.025	0.026	<0.025	<0.025	<0.025	<0.025
33-Element ICP Scan (Pos. Detections) **										
Aluminum	mg/l	--	<0.25	<0.25	<0.025	<0.25	<0.25	<0.25	3.3	3.3
Calcium	mg/l	--	110	110	88	55	41	91	32	32
Iron	mg/l	(0.3)	0.082	0.19	0.15	0.24	0.39	0.17	12	12
Magnesium	mg/l	--	76	74	41	38	11	35	11	11
Potassium	mg/l	--	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	9.1	9.1
Sodium	mg/l	--	24	7	59	60	5.6	16	7.9	7.9
Strontium	mg/l	--	2.1	0.91	0.86	0.55	<0.5	1.3	<0.5	<0.5
Zinc	mg/l	(5.0)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.078	0.078

< Denotes Non-detect at Concentration Shown
(MCL) -Maximum Contaminant Level
** ICP Scan For Remaining 25 Elements Presented in Appendix A

TABLE 2 (Summary)
J.B. KING MINE ANALYTICAL RESULTS (July 1992)

	Units	Coal Refuse			Soil			Sed. Pond
		JBK TPCS-1	JBK TPCS-2	JBK TPCS-3	JBK RPS-1	JBK RPS-2	JBK RPS-3	
ACID GENERATION/ NEUTRALIZATION POTENTIAL:								
pH (Saturated Paste)	pH	6.69	6.49	5.64	7.55	7.62	7.67	7.37
Neutralization Potential	**	34	33	14	71	84	89	68
Acidification Potential	**	57	20	84	<1	<1	<1	1
Acid Generating Potential or "Acid Base Potential"	**	-23	+13	-70	+71	+84	+89	+67
SODIUM ADSORPTION RATIO:								
Sodium	mg/l	130	32	48	1000	70	140	79
Magnesium	mg/l	38	330	260	500	150	220	100
Calcium	mg/l	61	640	570	580	580	570	270
Sodium Adsorption Ratio:	--	1.5	6.6	5.5	7.7	3.1	4.4	2.8
ELECTRICAL CONDUCTANCE AND IGNITABILITY:								
Electrical Conductance	m Ω /cm	3.6	2.9	2.8	6.7	2.6	3	1.8
Ignitability, (Pos/Neg)	--	Pos.	Pos.	Pos.	Neg.	Neg.	Neg.	Neg.

** Units, Tons Calcium Carbonate Equivalent/1000 Tons of Material
Note- Laboratory Data Sheets Presented in Appendix A

APPENDIX A

LABORATORY TEST RESULTS, J.B KING MINE

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
250 South Rock Boulevard, Suite 130
Reno, NV 89502

Lab Report No.: 8609
Account No.: WSMIN

Telephone: 856-3339

Fax: 856-1818

Work Authorized By: Larry Berg
Date Sampled: 07/18/92
Number of Samples: 7
Source: See Below
Chemax Control No. 92-3574 thru 3580
Notes:

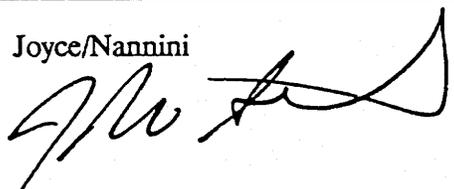
Date Submitted: 07/20/92
Sampled By: Client
Your Reference: P.O. #02-10228

Parameter	Results		
	JBK-TPCS-1	JBK-TPCS-2	JBK-TPSC-3
<u>NDEP METEORIC WATER MOBILITY PROCEDURE:</u>			
Procedure for collecting representative sample	Field sampling by client. Subsample taken for analysis by "coning-and-quartering"		
Adjusted pH of original lixiviant	6.15	6.36	6.20
Final pH of fluid after mixing	7.54	7.16	6.43
Percentage of sample passing through 200-mesh	<1	5	1
Total weight of solid sample, grams	5,000	5,000	5,000
Moisture required to saturate sample, approx., mL	710	850	700
Time of contact in extraction device, hours	23	23	23
Synopsis of technique and equipment	Batch mixing process using submersible pump to effect continuous agitation		

Remarks:

Analysis By: Joyce/Nannini

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 1 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals

Lab Report No.: 8609

Parameter	Results		
	JBK-TPCS-1	JBK-TPCS-2	JBK-TPCS-3
<u>NDEP METEORIC WATER MOBILITY PROC.</u>			
pH	7.54	7.16	6.43
Alkalinity, mg/L as CaCO ₃	78	38	14
Total Dissolved Solids, mg/L	2,960	2,870	1,170
Fluoride, mg/L	0.32	0.21	0.12
Chloride, mg/L	<1	<1	<1
Nitrate, mg/L as NO ₃	13	<4	<4
Sulfate, mg/L	1,960	1,920	831
Primary Drinking Water Standards, Metals	See Page 3	See Page 4	See Page 5
33-Element Semi-Quant. ICP Scan	See Page 3	See Page 4	See Page 5
<u>ACID GENERATING POTENTIAL*</u>			
pH (saturated paste)	6.69	6.49	5.64
Neutralization Potential**	34	33	14
Acidification Potential**	57	20	84
Acid Generating Potential**	- 23	+ 13	- 70

Remarks:

* Per EPA 600/2-78-054, "Field and Laboratory Methods Applicable to Overburdens and Mine Soils".

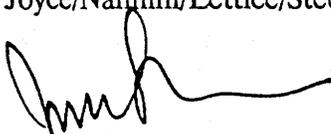
** In tons CaCO₃ equivalent/1,000 tons material.

Acid Generating Potential = (Neutralization Potential) - (Acidification Potential)

Analysis By: Joyce/Nannini/Lettice/Steele

Date: 08/06/92

Approved By:



Date: 08/06/92

Page 2 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
Sample ID: JBK-TPCS-1

Lab Report No.: 8609

QUANTITATIVE ANALYSIS, PRIMARY DRINKING WATER STANDARDS, METALS

All results below in mg/L

Arsenic*	<0.005	Lead	<0.005
Barium	<0.1	Mercury	<0.001
Cadmium	<0.005	Selenium*	<0.01
Chromium	<0.025	Silver	<0.025

MULTI-ELEMENT SPECTROGRAPHIC ANALYSIS (Semi-Quantitative ICP Scan)

Sample Preparation: Meteoric Water Mobility Procedure TCLP Extraction
 Digestion for Total Metals Other: _____

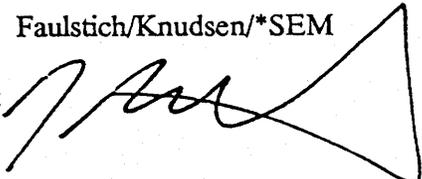
All results below in ppm: mg/L mg/kg

Aluminum	<0.25	Gallium	<0.5	Potassium	<2.5
Antimony	<0.5	Iron	0.082	Scandium	<0.5
Arsenic	<0.5	Lanthanum	<0.5	Selenium	<2.5
Barium	<0.25	Lead	<2.5	Silver	<0.25
Beryllium	<0.05	Lithium	<0.5	Sodium	24
Bismuth	<0.5	Magnesium	76	Strontium	2.1
Cadmium	<0.15	Manganese	<0.5	Thallium	<2.5
Calcium	110	Mercury	<2.5	Tin	<0.5
Chromium	<0.05	Molybdenum	<0.25	Titanium	<0.1
Cobalt	<0.5	Nickel	<0.5	Vanadium	<0.15
Copper	<0.05	Phosphorus	<0.5	Zinc	<0.05

Remarks:

Analysis By: Faulstich/Knudsen/*SEM

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 3 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
Sample ID: JBK-TPCS-2

Lab Report No.: 8609

QUANTITATIVE ANALYSIS, PRIMARY DRINKING WATER STANDARDS, METALS

All results below in mg/L

Arsenic*	<0.005	Lead	<0.005
Barium	<0.1	Mercury	<0.001
Cadmium	<0.005	Selenium*	<0.01
Chromium	<0.025	Silver	<0.025

MULTI-ELEMENT SPECTROGRAPHIC ANALYSIS (Semi-Quantitative ICP Scan)

Sample Preparation: Meteoric Water Mobility Procedure TCLP Extraction
 Digestion for Total Metals Other: _____

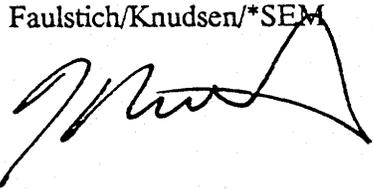
All results below in ppm: mg/L mg/kg

Aluminum	<0.25	Gallium	<0.5	Potassium	<2.5
Antimony	<0.5	Iron	0.19	Scandium	<0.5
Arsenic	<0.5	Lanthanum	<0.5	Selenium	<2.5
Barium	<0.25	Lead	<2.5	Silver	<0.25
Beryllium	<0.05	Lithium	<0.5	Sodium	7.0
Bismuth	<0.5	Magnesium	74	Strontium	0.91
Cadmium	<0.15	Manganese	<0.5	Thallium	<2.5
Calcium	110	Mercury	<2.5	Tin	<0.5
Chromium	<0.05	Molybdenum	<0.25	Titanium	<0.1
Cobalt	<0.5	Nickel	<0.5	Vanadium	<0.15
Copper	<0.05	Phosphorus	<0.5	Zinc	<0.05

Remarks:

Analysis By: Faulstich/Knudsen/*SEM

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 4 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
Sample ID: JBK-TPCS-3

Lab Report No.: 8609

QUANTITATIVE ANALYSIS, PRIMARY DRINKING WATER STANDARDS, METALS

All results below in mg/L

Arsenic*	<0.005	Lead	<0.005
Barium	<0.1	Mercury	<0.001
Cadmium	<0.005	Selenium*	0.01
Chromium	<0.025	Silver	<0.025

MULTI-ELEMENT SPECTROGRAPHIC ANALYSIS (Semi-Quantitative ICP Scan)

Sample Preparation: Meteoric Water Mobility Procedure TCLP Extraction
 Digestion for Total Metals Other: _____

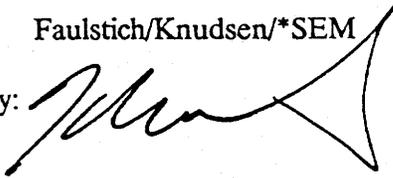
All results below in ppm: mg/L mg/kg

Aluminum	<0.25	Gallium	<0.5	Potassium	<2.5
Antimony	<0.5	Iron	0.15	Scandium	<0.5
Arsenic	<0.5	Lanthanum	<0.5	Selenium	<2.5
Barium	<0.25	Lead	<2.5	Silver	<0.25
Beryllium	<0.05	Lithium	<0.5	Sodium	59
Bismuth	<0.5	Magnesium	41	Strontium	0.86
Cadmium	<0.15	Manganese	<0.5	Thallium	<2.5
Calcium	88	Mercury	<2.5	Tin	<0.5
Chromium	<0.05	Molybdenum	<0.25	Titanium	<0.1
Cobalt	<0.5	Nickel	<0.5	Vanadium	<0.15
Copper	<0.05	Phosphorus	<0.5	Zinc	<0.05

Remarks:

Analysis By: Faulstich/Knudsen/*SEM

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 5 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
250 South Rock Boulevard, Suite 130
Reno, NV 89502

Lab Report No.: 8609
Account No.: WSMIN

Telephone: 856-3339

Fax: 856-1818

Work Authorized By: Larry Berg
Date Sampled: 07/18/92
Number of Samples: 7
Source: See Below
Chemax Control No. 92-3574 thru 3580
Notes:

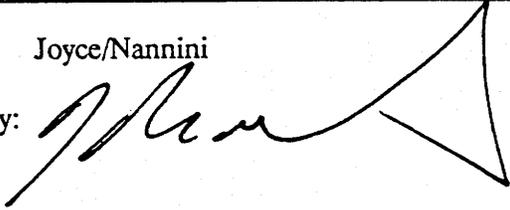
Date Submitted: 07/20/92
Sampled By: Client
Your Reference: P.O. #02-10228

Parameter	Results		
	JBK-RPS-1	JBK-RPS-2	JBK-RPS-3
<u>NDEP METEORIC WATER MOBILITY PROCEDURE:</u>			
Procedure for collecting representative sample	Field sampling by client. Subsample taken for analysis by "coning-and-quartering"		
Adjusted pH of original lixiviant	6.20	6.20	6.15
Final pH of fluid after mixing	7.53	7.85	7.70
Percentage of sample passing through 200-mesh	9	12	6
Total weight of solid sample, grams	5,000	5,000	5,000
Moisture required to saturate sample, approx., mL	700	830	830
Time of contact in extraction device, hours	23	23	23
Synopsis of technique and equipment	Batch mixing process using submersible pump to effect continuous agitation		

Remarks:

Analysis By: Joyce/Nannini

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 6 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals

Lab Report No.: 8609

Parameter	Results		
	JBK-RPS-1	JBK-RPS-2	JBK-RPS-3
<u>NDEP METEORIC WATER MOBILITY PROC.</u>			
pH	7.53	7.85	7.70
Alkalinity, mg/L as CaCO ₃	60	70	68
Total Dissolved Solids, mg/L	878	346	946
Fluoride, mg/L	0.82	0.64	2.0
Chloride, mg/L	53	<1	1.0
Nitrate, mg/L as NO ₃	<4	<4	<4
Sulfate, mg/L	498	180	637
Primary Drinking Water Standards, Metals	See Page 8	See Page 9	See Page 10
33-Element Semi-Quant. ICP Scan	See Page 8	See Page 9	See Page 10
<u>ACID GENERATING POTENTIAL*</u>			
pH (saturated paste)	7.55	7.62	7.67
Neutralization Potential**	71	84	89
Acidification Potential**	<1	<1	<1
Acid Generating Potential**	+ 71	+ 84	+ 89

Remarks: * Per EPA 600/2-78-054, "Field and Laboratory Methods Applicable to Overburdens and Mine Soils".

** In tons CaCO₃ equivalent/1,000 tons material.

Acid Generating Potential = (Neutralization Potential) - (Acidification Potential)

Analysis By: Joyce/Nannini/Lettice/Steele

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 7 of 13

CHEMEX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
Sample ID: JBK-RPS-1

Lab Report No.: 8609

QUANTITATIVE ANALYSIS, PRIMARY DRINKING WATER STANDARDS, METALS

All results below in mg/L

Arsenic*	<0.005	Lead	<0.005
Barium	<0.1	Mercury	<0.001
Cadmium	<0.005	Selenium*	<0.01
Chromium	<0.025	Silver	0.026

MULTI-ELEMENT SPECTROGRAPHIC ANALYSIS (Semi-Quantitative ICP Scan)

Sample Preparation: Meteoric Water Mobility Procedure TCLP Extraction
 Digestion for Total Metals Other: _____

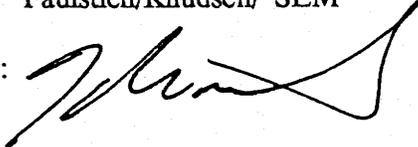
All results below in ppm: mg/L mg/kg

Aluminum	<0.25	Gallium	<0.5	Potassium	<2.5
Antimony	<0.5	Iron	0.24	Scandium	<0.5
Arsenic	<0.5	Lanthanum	<0.5	Selenium	<2.5
Barium	<0.25	Lead	<2.5	Silver	<0.25
Beryllium	<0.05	Lithium	<0.5	Sodium	60
Bismuth	<0.5	Magnesium	38	Strontium	0.55
Cadmium	<0.15	Manganese	<0.5	Thallium	<2.5
Calcium	55	Mercury	<2.5	Tin	<0.5
Chromium	<0.05	Molybdenum	<0.25	Titanium	<0.1
Cobalt	<0.5	Nickel	<0.5	Vanadium	<0.15
Copper	<0.05	Phosphorus	<0.5	Zinc	<0.05

Remarks:

Analysis By: Faulstich/Knuksen/*SEM

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 8 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
Sample ID: JBK-RPS-2

Lab Report No.: 8609

QUANTITATIVE ANALYSIS, PRIMARY DRINKING WATER STANDARDS, METALS

All results below in mg/L

Arsenic*	<0.005	Lead	<0.005
Barium	<0.1	Mercury	<0.001
Cadmium	<0.005	Selenium*	<0.01
Chromium	<0.025	Silver	<0.025

MULTI-ELEMENT SPECTROGRAPHIC ANALYSIS (Semi-Quantitative ICP Scan)

Sample Preparation: Meteoric Water Mobility Procedure TCLP Extraction
 Digestion for Total Metals Other: _____

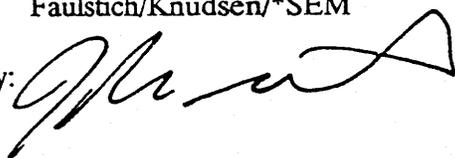
All results below in ppm: mg/L mg/kg

Aluminum	<0.25	Gallium	<0.5	Potassium	<2.5
Antimony	<0.5	Iron	0.39	Scandium	<0.5
Arsenic	<0.5	Lanthanum	<0.5	Selenium	<2.5
Barium	<0.25	Lead	<2.5	Silver	<0.25
Beryllium	<0.05	Lithium	<0.5	Sodium	5.6
Bismuth	<0.5	Magnesium	11	Strontium	<0.5
Cadmium	<0.15	Manganese	<0.5	Thallium	<2.5
Calcium	41	Mercury	<2.5	Tin	<0.5
Chromium	<0.05	Molybdenum	<0.25	Titanium	<0.1
Cobalt	<0.5	Nickel	<0.5	Vanadium	<0.15
Copper	<0.05	Phosphorus	<0.5	Zinc	<0.05

Remarks:

Analysis By: Faulstich/Knudsen/*SEM

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 9 of 13

CHEMEX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
Sample ID: JBK-RPS-3

Lab Report No.: 8609

QUANTITATIVE ANALYSIS, PRIMARY DRINKING WATER STANDARDS, METALS

All results below in mg/L

Arsenic*	<0.005	Lead	<0.005
Barium	<0.1	Mercury	<0.001
Cadmium	<0.005	Selenium*	<0.01
Chromium	<0.025	Silver	<0.025

MULTI-ELEMENT SPECTROGRAPHIC ANALYSIS (Semi-Quantitative ICP Scan)

Sample Preparation: Meteoric Water Mobility Procedure TCLP Extraction
 Digestion for Total Metals Other: _____

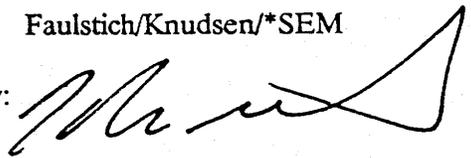
All results below in ppm: mg/L mg/kg

Aluminum	<0.25	Gallium	<0.5	Potassium	<2.5
Antimony	<0.5	Iron	0.17	Scandium	<0.5
Arsenic	<0.5	Lanthanum	<0.5	Selenium	<2.5
Barium	<0.25	Lead	<2.5	Silver	<0.25
Beryllium	<0.05	Lithium	<0.5	Sodium	16
Bismuth	<0.5	Magnesium	35	Strontium	1.3
Cadmium	<0.15	Manganese	<0.5	Thallium	<2.5
Calcium	91	Mercury	<2.5	Tin	<0.5
Chromium	<0.05	Molybdenum	<0.25	Titanium	<0.1
Cobalt	<0.5	Nickel	<0.5	Vanadium	<0.15
Copper	<0.05	Phosphorus	<0.5	Zinc	<0.05

Remarks:

Analysis By: Faulstich/Knudsen/*SEM

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 10 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
250 South Rock Boulevard, Suite 130
Reno, NV 89502

Lab Report No.: 8609
Account No.: WSMIN

Telephone: 856-3339

Fax: 856-1818

Work Authorized By: Larry Berg
Date Sampled: 07/18/92
Number of Samples: 7
Source: See Below
Chemax Control No. 92-3574 thru 3580
Notes:

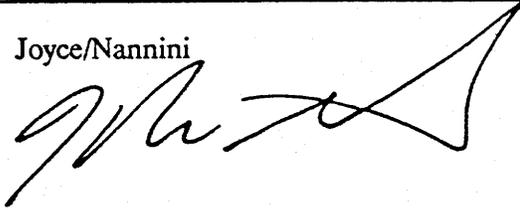
Date Submitted: 07/20/92
Sampled By: Client
Your Reference: P.O. 02-10228

Parameter	Result
<u>NDEP METEORIC WATER MOBILITY PROCEDURE:</u>	JBK-SPM-1
Procedure for collecting representative sample	Field sampling by client. Subsample taken for analysis by "coning-and-quartering"
Adjusted pH of original lixiviant	6.15
Final pH of fluid after mixing	7.79
Percentage of sample passing through 200-mesh	21
Total weight of solid sample, grams	5,000
Moisture required to saturate sample, approx., mL	940
Time of contact in extraction device, hours	23
Synopsis of technique and equipment	Batch mixing process using submersible pump to effect continuous agitation

Remarks:

Analysis By: Joyce/Nannini

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 11 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals

Lab Report No.: 8609

Parameter	Result
<u>NDEP METEORIC WATER MOBILITY PROC.</u>	<u>IBK-SPM-1</u>
pH	7.79
Alkalinity, mg/L as CaCO ₃	116
Total Dissolved Solids, mg/L	232
Fluoride, mg/L	0.76
Chloride, mg/L	1.8
Nitrate, mg/L as NO ₃	<4
Sulfate, mg/L	66
Primary Drinking Water Standards, Metals	See Page 13
33-Element Semi-Quant. ICP Scan	See Page 13
<u>ACID GENERATING POTENTIAL*</u>	
pH (saturated paste)	7.37
Neutralization Potential**	68
Acidification Potential**	1
Acid Generating Potential**	+ 67

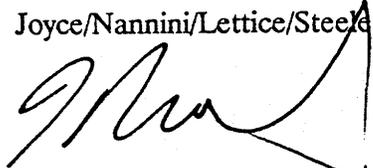
Remarks: * Per EPA 600/2-78-054, "Field and Laboratory Methods Applicable to Overburdens and Mine Soils".

** In tons CaCO₃ equivalent/1,000 tons material.

Acid Generating Potential = (Neutralization Potential) - (Acidification Potential)

Analysis By: Joyce/Nannini/Lettice/Steel

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 12 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
Sample ID: JBK-SPM-1

Lab Report No.: 8609

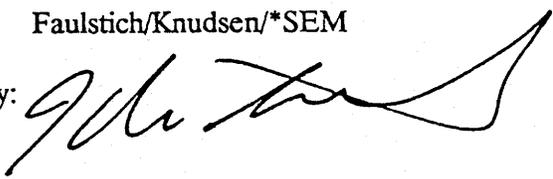
QUANTITATIVE ANALYSIS, PRIMARY DRINKING WATER STANDARDS, METALS			
All results below in mg/L			
Arsenic*	<0.005	Lead	<0.005
Barium	<0.1	Mercury	<0.001
Cadmium	<0.005	Selenium*	<0.01
Chromium	0.032	Silver	<0.025

MULTI-ELEMENT SPECTROGRAPHIC ANALYSIS (Semi-Quantitative ICP Scan)					
Sample Preparation: <input checked="" type="checkbox"/> Meteoric Water Mobility Procedure <input type="checkbox"/> TCLP Extraction					
<input checked="" type="checkbox"/> Digestion for Total Metals <input type="checkbox"/> Other: _____					
All results below in ppm: <input checked="" type="checkbox"/> mg/L <input type="checkbox"/> mg/kg					
Aluminum	3.3	Gallium	<0.5	Potassium	9.1
Antimony	<0.5	Iron	12	Scandium	<0.5
Arsenic	<0.5	Lanthanum	<0.5	Selenium	<2.5
Barium	<0.25	Lead	<2.5	Silver	<0.25
Beryllium	<0.05	Lithium	<0.5	Sodium	7.9
Bismuth	<0.5	Magnesium	11	Strontium	<0.5
Cadmium	<0.15	Manganese	<0.5	Thallium	<2.5
Calcium	32	Mercury	<2.5	Tin	<0.5
Chromium	<0.05	Molybdenum	<0.25	Titanium	<0.1
Cobalt	<0.5	Nickel	<0.5	Vanadium	<0.15
Copper	<0.05	Phosphorus	<0.5	Zinc	0.078

Remarks:

Analysis By: Faulstich/Knudsen/*SEM

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 13 of 13

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
250 South Rock Boulevard, Suite 130
Reno, NV 89502

Lab Report No.: 8610
Account No.: WSMIN

Telephone: 856-3339

Fax: 856-1818

Work Authorized By: Larry Berg
Date Sampled: 07/18/82
Number of Samples: 7
Source: See Below
Chemax Control No. 92-3574 thru 3580
Notes:

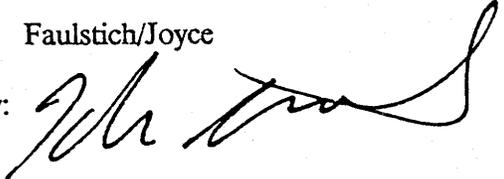
Date Submitted: 07/20/92
Sampled By: Client
Your Reference: P.O. #02-10228

Parameter	Results			
	JBK-TPCS-1	JBK-TPCS-2	JBK-TPCS-3	JBK-RPS-1
Sodium, mg/L	130	32	48	1,000
Magnesium, mg/L	38	330	260	500
Calcium, mg/L	61	640	570	580
Sodium Adsorption Ratio	1.5	6.6	5.5	7.7
EC, mU/cm	3.6	2.9	2.8	6.7
Ignitability*, Pos./Neg.	Pos.	Pos.	Pos.	Neg.

Remarks: * By sweeping an open flame over the surface of the sample and observing any evidence of ignition and self-sustaining combustion.

Analysis By: Faulstich/Joyce

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 1 of 2

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
FAX (702) 355-0817

LABORATORY REPORT

Report To: Western States Minerals
250 South Rock Boulevard, Suite 130
Reno, NV 89502

Lab Report No.: 8610
Account No.: WSMIN

Telephone: 856-3339

Fax: 856-1818

Work Authorized By: Larry Berg
Date Sampled: 07/18/82
Number of Samples: 7
Source: See Below
Chemax Control No. 92-3574 thru 3580
Notes:

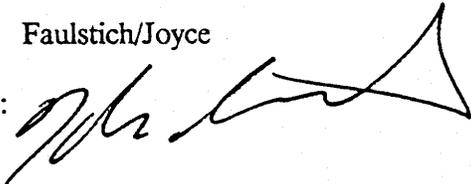
Date Submitted: 07/20/92
Sampled By: Client
Your Reference: P.O. #02-10228

Parameter	Results		
	JBK-RPS-2	JBK-RPS-3	JBK-SPM-1
Sodium, mg/L	70	140	79
Magnesium, mg/L	150	220	100
Calcium, mg/L	580	570	270
Sodium Adsorption Ratio	3.1	4.4	2.8
EC, mU/cm	2.6	3.0	1.8
Ignitability*, Pos./Neg.	Neg.	Neg.	Neg.

Remarks: * By sweeping an open flame over the surface of the sample and observing any evidence of ignition and self-sustaining combustion.

Analysis By: Faulstich/Joyce

Date: 08/06/92

Approved By: 

Date: 08/06/92

Page 2 of 2

APPENDIX B

METEORIC WATER MOBILITY TEST PROCEDURE

EXPLANATION: ACID GENERATION POTENTIAL CALCULATION



DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
201 South Fall Street
Carson City, Nevada 89710

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING REGULATION AND RECLAMATION

METEORIC WATER MOBILITY PROCEDURE

May 23, 1990

Collect a representative sample of the material. The minimum sample size for this procedure is 5 kilograms. If the material to be sampled has particle sizes greater than 5 centimeters, sufficient material must be classified to provide 5 kilograms of sample with maximum particle size less than 5 centimeters. This classified sample is placed in an extraction device which allows the sample to be continuously wetted by circulation of the synthetic meteoric water (lixiviant). The volume of the synthetic meteoric water must be equal in weight to the weight of the classified sample plus the additional volume necessary to saturate the sample. The lixiviant is circulated, agitated, or mixed for 24 hours, continuously wetting the full surface of the sample. For this procedure the lixiviant is laboratory grade water whose hydrogen ion activity (pH) has been adjusted to between pH 5.5 and 6.5 with reagent grade nitric acid before charging it to the extraction device. No further adjustment of the pH during extraction is required. One hour after ceasing to circulate, a sample of the lixiviant is decanted and prepared for analysis. Analysis shall be performed for the constituents listed at the end of this procedure. Elements for which a standard has been established shall have a lower level of quantification equal to or less than that standard.

The extraction device can be a packed column with small recycle reservoir or bottle roll or large barrel fitted with internal circulation/agitation or equivalent.

The information to be recorded and reported is:

1. The procedure used to collect a representative sample.
2. The adjusted pH of original lixiviant;

3. The final pH of fluid after mixing;
4. Percentage of sample passing 200 mesh;
5. Total weight of solid sample;
6. Moisture required to saturate sample;
7. Time of contact in extraction device;
8. Synopsis of the technique and equipment used to leach sample, i.e., column, batch, etc.; and
9. Results of the analysis of the lixiviant after ending the extraction.

Alkalinity
 Aluminum
 Antimony
 Arsenic
 Barium
 Beryllium
 Bismuth
 Cadmium
 Calcium
 Chloride
 Chromium
 Cobalt
 Copper
 Fluoride

Gallium
 Iron
 Lanthanum
 Lead
 Lithium
 Magnesium
 Manganese
 Mercury
 Molybdenum
 Nickel
 Nitrate
 pH
 Phosphorus
 Potassium

Scandium
 Selenium
 Silver
 Sodium
 Strontium
 Sulfate
 Thallium
 Tin
 Titanium
 Total Dissolved Solid
 Vanadium
 *WAD CN
 Zinc

* When Appropriate

HvD/tjd/sld:56
 revised 5/23/90

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists

(702) 355-0202
FAX (702) 355-0817

IMPORTANT NOTE

We have recently modified the manner in which we report Acid Generation Potential data by adopting the more conventional practice of expressing the Acid Generation Potential (or "acid-base account") as a positive or negative value. The formula used for the calculation is:

$$\text{Acid Generating Potential} = (\text{Neutralization Potential}) - (\text{Acidification Potential})$$

A Neutralization Potential which is higher than the Acidification Potential will result in a *positive* net result. Conversely, an Acidification Potential which is higher than the Neutralization Potential will result in a *negative* net result. As before, all units are in "tons of calcium carbonate equivalent per 1,000 tons of material".

Please call if you have any questions.

CHEMAX LABORATORIES, INC.

June, 1992