

0021



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

Michael O. Leavitt
Governor
Kathleen Clarke
Executive Director
Lowell P. Braxton
Division Director

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

November 15, 2000

TO: Internal File
THRU: Dave W. Darby, Team Lead
FROM: James D. Smith, Reclamation Specialist
RE: Technical Analysis for Lila Canyon Significant Revision, Utah American Energy, Inc., Horse Canyon Mine, C/007/013 SR98(1)-4

SUMMARY:

The proposed Lila Canyon amendment expands the Horse Canyon Mine permit area from 1,116 acres to 6,462 acres. There will be approximately 41 acres of new surface disturbance because of construction of new portals and surface facilities. The history of this submittal is summarized in the following table.

Utah American Energy	Date	Division	Date
Initial Submittal	September 8, 1998	Administratively Complete	February 25, 1999
		First TA	May 26, 1999
Second Submittal	July 30, 1999	Second TA	October 19, 1999
Third Submittal	December 10, 1999	Third TA	February 23, 2000
Fourth Submittal	March 10, 2000	Fourth TA	June 29, 2000
Fifth Submittal	September 25, 2000	Fifth TA	This document

TECHNICAL MEMO

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

Analysis:

Sampling and analysis

The permittee states that all water-quality analyses performed to meet the requirements of R645-301-723 through -724.300, -724.500, -725 through -731, and -731.210 through -731.223 will be conducted according to the methodology in the current edition of "Standard Methods for the Examination of Water and Wastewater" or the methodology in 40 CFR Parts 136 and 434. Water-quality sampling will be conducted according to either methodology listed above when feasible (Section 723).

Baseline information

The U.S. Geological Survey conducted a water quality study in Horse Canyon Creek from August 1978 until September 1979, during the time that U.S. Steel operated the mine. Each month, field parameters were measured and samples were collected and analyzed for most major anions and cations. Additional analyses for metals, nitrogen and minor chemical constituents were done on a quarterly or less frequent basis. This is briefly mentioned in Appendix 7-3, and a summary of this monitoring is in Appendix 7-2.

Between January 1981 and April 1983, baseline water quality data were collected for surface water sites B-1 (HC-2), HC-1 (HCSW-1, HSW-1), RF-1 and spring site RS-2 (Redden Spring) on the Horse Canyon permit area. Between 14 and 19 samples, depending on the site, were taken and analyzed during the monitoring period (Appendix 7-2). The permittee has stated that selection of the parameters that were measured was based on 30 CFR 783.16 (Page 2, Appendix 7-3), which rule was removed from the federal rules in September 1983 and effectively replaced by 30 CFR 780.21(b)(2) and corresponding Utah Coal Mining Rules, except that acidity and dissolved iron are no longer required parameters. B-1 (HC-2), HC-1 (HCSW-1, HSW-1), and RF-1 - but not RS-2 - were visited monthly from March through September during 1989 and, when there was flow, samples were collected and analyzed for most of the parameters in UDOGM's current guidelines (Appendix 7-2). These sites have been monitored since 1989 in accordance with the approved water monitoring plan in the Horse Canyon Mine MRP and monitoring results have been submitted to UDOGM each year in Annual Reports.

There are two water-monitoring sites identified as HC-2 in different parts of the MRP, and this is explained in Section 731.220. Surface-water monitoring site B-1 is referred to as HC-2 on the 1997 field data sheets in Appendix 7-2: on Plate 7-1 this site has been labeled B-1, with (HC-2) added in parentheses.

The designation HC-2 is also associated with spring H-2 in Appendix 7-6. On Plate 7-1 this site has been labeled H-2 and (HC-2) added in parentheses.

Baseline monitoring of the Intermountain Power Agency (IPA) South Lease, which generally corresponds with the Lila Canyon Significant Revision area, was done by EarthFax Engineering in 1993-1995. The data are in Appendix 7-6.

Analysis for total manganese, a mandated parameter, has been inconsistent but some of the analysis results in Appendices 7-2 and 7-6 of the Lila Canyon Significant Revision do include total manganese. Appendix 7-2 includes the 1997 Annual Horse Canyon Mine Hydrologic Monitoring Report with copies of the laboratory reports for Redden Spring (RS-2), HC-1 (HCSW-1, HSW-1), HC-2 (B-1), and RF-1: the 1997 quarterly samples were analyzed for all Tech 004 parameters except total manganese and acidity. Data from Appendix VI-I of the Horse Canyon Mine MRP have been added to Appendix 7-2 of the Lila Canyon Significant Revision.

Annual reports were reviewed back to 1993: manganese has been reported but it is not clear whether this was total or dissolved. Table 1 (Table 1 from the 1986 UDOGM guidelines) in Appendix VI-5 of the current Horse Canyon Mine MRP specifies that both dissolved and total manganese will be determined as part of operational monitoring of surface water; however, Table 3 (Table 3 from the 1986 UDOGM guidelines) in Appendix VI-5 specifies that only dissolved manganese will be determined for operational monitoring of ground water, so at least for the ground-water samples the reported values should be for dissolved manganese. The operational parameter lists in Tables 7-4 and 7-5 of the proposed Lila Canyon Significant Revision are much clearer, and following them should eliminate this confusion and produce more clear and consistent monitoring analysis results and reports.

Ground-water information

Wells and bore holes

An unsuccessful attempt was made to convert bore-holes S-26, S-28, and S-31 to ground-water observation wells in 1980. S-26 and S-31, located south of the Williams Draw Fault, were offset with shallow piezometers A-26 and A-31 to observe ground water in the alluvium (Table 6-3): it is not clear from Table 6-3 whether or not these wells have been plugged and abandoned or if they are available for ground-water monitoring; however, the permittee has no data on A-26 and A-31 (Section 6.5.1) and considers these wells unusable (Section 724.100).

Two other wells (Plate 7-1) were bored in Horse Canyon to monitor water in the alluvium (Section 6.5.1 Lila Canyon Significant Revision). The Horse Canyon Well near the main Horse Canyon facilities will be used during mining and reclamation operations and sealed after reclamation is complete. To the permittee's best knowledge, the MDC well (Table 7-2) located near the road junction has already been sealed. There are no logs or other geologic or hydrologic data from these wells in the Lila Canyon Significant Revision (724.100).

TECHNICAL MEMO

S-32 was drilled in 1981 and completed as a piezometer in the Grassy Member of the Blackhawk Formation. Its exact location is not known. The Lila Canyon Significant Revision contains no data on ground-water elevation or quality for S-32 and the permittee states that other than the logs in Appendix 6-1 there are no geologic or piezometric data from S-32 (Section 6.5.1, p. 21).

In 1993 and 1994, IPA-1, IPA-2, and IPA-3 (Plate 7-1) were drilled. Water-levels were measured seasonally by IPA in 1994, 1995, and 1996 to provide baseline data (Appendix 7-1) for the South Lease. Data have not been collected since, but the permittee commits to resuming water-level monitoring upon approval of the Lila Canyon Significant Revision (724.100, Table 7-3). A commitment is made on page 8 (Chapter 7) to resume monitoring of these wells in July 2000: no data have been received by UDOGM for this recent monitoring, neither with the most recent version of the plan revision nor with the quarterly reports.

Seeps and springs

Locations of all known seeps and springs are shown on Plate 7-1 (Section 722.200). Names or numbers used to identify springs and seeps are sometimes different in Appendices 7-1, 7-2, and 7-6 and on the maps. The table below correlates the various names, dates, and types of data.

JBR Consultants Group conducted a seep and spring survey of the Horse Canyon area in 1985. Table 7-1 in the Lila Canyon Significant Revision contains flow, pH, conductivity, and temperature data for nineteen seeps and springs: H-1 through H-11, H-13, H-14, H-18 through H-22, and H-92. Laboratory report sheets for H-1 (RB-21), H-6 (RB-26), H-18 (EWL-25), and H-21 (EWL-26) for November 1985 are in Appendix 7-6.

Springs identified by JBR Consultants Group as HC-1A, H-18A, H-18B, H-21A, and H-21B and an unidentified spring 1,000 feet southwest of HCSW-2 were shown on a preliminary Plate 7-1 but were not listed or discussed in the Lila Canyon Significant Revision. The permittee states that no sample data or pertinent information are available for these sites, so they are no longer on Plate 7-1 (Section 724.100, page 12).

Appendices 7-1 and 7-6 contain seasonal information on ground-water quality and flow for seeps and springs 1 (S-1), 9 (S-9), 10 (S-10), 14 (S-14), 16 (S-16, 16Z), HC-2 (H-2), HC-4 (H-4), HC-9 (H-9), HC-11 (H-11), HC-13 (H-13), HC-14 (H-14), and HC-18 (H-18). Data are from work done in 1993, 1994, and 1995 by EarthFax Engineering for IPA. Water-quality descriptions include total dissolved solids or specific conductance corrected to 25°C, pH, total iron, and total manganese. Most other parameters listed in UDOGM directive Tech 004 were determined in these samples; however, total hardness, acidity, and total alkalinity were not reported. Total rather than dissolved concentrations were determined for all metals.

EarthFax also identified springs and seeps 1A, 1B, 2, 3, 3A, 3B, 3C, 3D, 4, 5, 6, 7, 8, 8A, 8B, 9R, 10A, 11, 12, 12A, 12B, 12C, 12D, 12E, 13, 13A, 13B, 13Z, 14A, 15, 15A, 15B, 15C, 16A, 16B, 16C, 17, 17A, 17B, 18, 19A, 19B, 19C, 20, and 22. These were dry or had low flows at the time of the quarterly visits and no water-quality analyses were done (Appendix 7-1). 8B, 15A, 17B, and 19C could neither be found on Plate 7-1 nor matched with another identified seep or spring.

RS-1 and RS-2 were sampled once a year during 1978, 1979, and 1980 and analyzed for most major chemical constituents. Data are in Appendix VI-1 of the current Horse Canyon Mine MRP.

Water rights are listed in Table 7-2. The list includes Redden Spring plus springs identified as Mont, Leslie, Cottonwood, Williams, and Kenna. There are two Pine Springs listed, at different locations and with separate water rights. In addition there are eleven unnamed or otherwise unidentified springs listed, plus three rights on "underground tunnels". Locations of water rights are on Plate 7-3, and some of the locations on Plate 7-3 correspond roughly with springs shown on Plate 7-1. A water right for the MDC well is listed in Table 7-2, but information in Sections 6.5.1 and 722.400 of the Lila Canyon Significant Revision indicates this was a water monitoring well that has been abandoned and, to the best of the permittee's knowledge, plugged.

Surface-water information

Within and adjacent to the permit area, surface water resources consist of three main intermittent drainages: Horse Canyon Creek, Lila Canyon Creek, and Little Park Wash (Section 724.200). The permittee states in Section 722.200 that the location of all known seeps and springs, as well as watering ponds or tanks are shown on Plate 7-1; however, there are no watering ponds and tanks evident on the map and UDOGM is not aware of any in the area. The permittee states that there are no streams, lakes or ponds, or irrigation ditches known to exist within the proposed permit or adjacent areas (Section 722.200).

Range Creek drainage is the perennial stream nearest to the Horse Canyon Mine permit area. It is approximately 6 miles east of the proposed Lila Canyon area and separated from it by the drainage divide at the top of the Roan Cliffs. Because of the distance from the Soldier Canyon Mine, there has been no collection of baseline from Range Creek (Section 724.200).

The main drainage through the permit area, Little Park Wash, is described briefly in Section 724.200 and in Table 7-2. There are no baseline water-quality data for the main channel in Little Park Wash. There has been no flow observed during quarterly observations in 1998 and 1999 (Section 724.200). Spring flows in this drainage evaporate or infiltrate into the alluvium before reaching the main channel. Channel flow most likely occurs only when there are thunderstorms or rapid snowmelt.

Water-quality and quantity data for Horse Canyon surface-water monitoring points HCSW-1 (HSW-1, HC-1), HCSW-2, HCSW-3, B-1 (HC-2), and RF-1 are in Appendices 7-1, 7-2, and 7-6. Data in Appendices 7-1 and 7-6 show HCSW-2 and HCSW-3 were dry when monitored in 1994 and 1995. Baseline data, from 1981 through 1983, for the Horse Canyon Mine's Utah Pollutant Discharge Elimination System (UPDES) discharge points 001, 002, and 003 are in Appendix 7-2.

It states in Section 724.200 that "Flows in Horse Canyon, generally, are limited to the early spring period (Lines and Plantz, 1981). By late spring to early summer, usually no flow is evident in Horse Canyon Creek, below the minesite or Lila Canyon Creek." Flow monitored in the valley at B-1 (HC-2) in 1989 was intermittent (Appendix 7-2).

GROUND-WATER MONITORING SITES

F = Field parameters only, R = Required parameters only, L = Lab parameters - operational or baseline,
Flow = Flow only, D = Dry or no-flow, W = Reported as 'wet', S = Reported as 'seep'

Name		Appendix 7-2				Appendices 7-1 and 7-6						App 7-2	Water Right		
Utah American Energy	JBR - EarthFax	1978 - 1980 (Geneva)	1981 - 1983 (Geneva)	1985 (JBR)	1989 (Kaiser)	1993 (EarthFax)		1994 (EarthFax)			1995 (EarthFax)			1997 Annual Report	(Spring Name)
				Nov		May	Oct	May	Aug	Oct	May	Aug	Oct	quarterly	
	JBR														
	HC-1A														
	H-1 (RB-21)			F, L							F				
	H(C)-2			F			L	F, L	F, L	F, L	F, L	F, L	F, L		
	H-3			F											
	H(C)-4			F					F, L	F, L	F, L	F, L	F, L		
	H-5			F											
	H-6 (RB-26)			F, L											
	H-7			F											
	H-8			F											
	H(C)-9			F				F, L	D	D					
	H-10			F											91-1903
	H(C)-11			F				F, L	F, L	F, L	F, L	F, L	F, L		
	H(C)-13			F				F, L	F, L	F, L	F, L	F, L	F, L		
	H(C)-14			F				L			F, L	F, L	F, L		
L-6-G	H(C)-18 (EWL-25)			F, L			L	F, L	W	S	F, L	F, L	F, L		91-618 (Mont) 91-617 (Leslie)
	H-18A														
	H-18B														
	H-19			F											
	H-20			F											
	H-21 (EWL-26)			F, L											
	H-21A														
	H-21B														
	H-22			F											
	H-92			S											
	EarthFax														
	1 (S-1)					F, L	F, L	F, L	F, L	D	F, L	F, L	F, L		
	1A					F	D	F	S	S	F	D	D		
	1B					S	D	S	D	D		W	W		

GROUND-WATER MONITORING SITES

F = Field parameters only, R = Required parameters only, L = Lab parameters - operational or baseline,
Flow = Flow only, D = Dry or no-flow, W = Reported as 'wet', S = Reported as 'seep'

Name		Appendix 7-2				Appendices 7-1 and 7-6							App 7-2	Water Right	
Utah American Energy	JBR - EarthFax	1978 - 1980 (Geneva)	1981 - 1983 (Geneva)	1985 (JBR)	1989 (Kaiser)	1993 (EarthFax)		1994 (EarthFax)			1995 (EarthFax)			1997 Annual Report	(Spring Name)
				Nov		May	Oct	May	Aug	Oct	May	Aug	Oct	quarterly	
	2								D	S	F	D	F		
	3					F	F	F	D	S	F	F	F		
	3A					F	F	F	D	D	F	D	D		
	3B					F	F	F	D	D	F	F	F		
	3C								D	S	S, F	F	F		
	3D								D	S	F	F	F		
	4					F	D	F	D	Flow	F		D		
	4A						F	F					D		
	5					F	D	F	D	S	F	S			
	5A						D								
	6					D	F	S	S	S		F	F		
	6A						D								
	7					F	F	F	S	Flow	S	F	F		
	7A						F								
	8					F	F	F	F	F	F	F	F		
	8A					F	F		D	Flow	F	F	F		
	8B						F		D						
L-7-G	9 (S-9)					F, L	F, L	F, L	F, L	F	F, L	F, L	F, L		91-399 91-2537 91-2521 (Cottonwood)
	9R					F			D		F	F	F		
L-8-G	10 (S-10)					F, L	F, L	F, L	F, L	F	F, L	F, L	F, L		91-808 91-2538
	10A											F	F		
	11					F	F	F	W		S, F	F	F		
	12									F	F	S	S		
	12A					F	F	F	F	F	F	F	F		
	12B					F	F	F	F	F	F	F	F		
	12C					F	F	F	W	F	F	S	S		
	12D					F	F	S	D	F	S, F		D		
	12E								S	S	F	W	F		
	13					F	F	F	W, L	F	F	W	F		

GROUND-WATER MONITORING SITES

F = Field parameters only, R = Required parameters only, L = Lab parameters - operational or baseline,
Flow = Flow only, D = Dry or no-flow, W = Reported as 'wet', S = Reported as 'seep'

Name		Appendix 7-2				Appendices 7-1 and 7-6							App 7-2	Water Right	
Utah American Energy	JBR - EarthFax	1978 - 1980 (Geneva)	1981 - 1983 (Geneva)	1985 (JBR)	1989 (Kaiser)	1993 (EarthFax)		1994 (EarthFax)			1995 (EarthFax)			1997 Annual Report	(Spring Name)
				Nov		May	Oct	May	Aug	Oct	May	Aug	Oct	quarterly	
	13A					F	D		D	D	D	D	F		
	13B					F	F	F	W	S	F	W	F		
	13Z					F	F	S	W	S	F	F			
L-10-G	14 (S-14)					F, L	F, L	F, L	F, L	F	F, L	F, L	F, L		91-809 91-2535
	14A					F	D	D	D	S	D	W	W		
	15					F	D	D	D	D	W	D	D		
	15A					F	F	F	W	F	F	W	W		
	15B					F	S	D	D	S	D	D	D		
	15C					S	S	S	D	D	D	W	D		
L-9-G	16(Z) (S-16)					S, L	F, L	F	F		F, L	F, L	F, L		91-2539 (Pine)
	16A					F	F	F, L	D	D		D	D		
	16B					F	D	D	D	D		D	F		
	16C					S	D	D	D	D	F	D	S		
	17					F	F	F	W	F	F	S	S		
	17A					F	D	S	D		W	S			
	17B (abandoned 10/26/94)					F			D						
	18					F	D	F	W	F	F	F	S		
	18A						F								
	19														
	19A					F	F	F	D	S	F	S	W		
	19B					F	F	F	D	F	F		F		
	19C						F	F	D						
	20					F	D	S	S	F	S	W	D		
	21														
	22					D	F	F	W	D	W	D			
	RS-1														91-4959 (Redden)
	RS-2	L	R											F, L	91-4959 (Redden)
															91-810

GROUND-WATER MONITORING SITES															
F = Field parameters only, R = Required parameters only, L = Lab parameters - operational or baseline, Flow = Flow only, D = Dry or no-flow, W = Reported as 'wet', S = Reported as 'seep'															
Name		Appendix 7-2				Appendices 7-1 and 7-6							App 7-2	Water Right	
Utah American Energy	JBR - EarthFax	1978 - 1980 (Geneva)	1981 - 1983 (Geneva)	1985 (JBR)	1989 (Kaiser)	1993 (EarthFax)		1994 (EarthFax)			1995 (EarthFax)			1997 Annual Report	(Spring Name)
				Nov		May	Oct	May	Aug	Oct	May	Aug	Oct	quarterly	
															91-2517
															91-2518 (Williams)
															91-2519
															91-2520

WELLS					
Name	1994		1995		1996
	July	Aug	May	Aug	April
IPA-1	Wtr Level				
IPA-2	Wtr Level				
IPA-3	Wtr Level				

SURFACE-WATER MONITORING SITES															
F = Field parameters only, R = Required parameters only, L = Lab parameters - operational or baseline, D = Dry or no-flow															
Name		Appendix 7-2				Appendices 7-1 and 7-6							App 7-2	Water Right	
Utah American Energy	JBR - EarthFax	1978 - 1980 (Geneva)	1981 - 1983 (Geneva)	1985 (JBR)	1989 (Kaiser)	1993 (EarthFax)		1994 (EarthFax)			1995 (EarthFax)			1997 Annual Report	(Spring Name)
				Nov		May	Oct	May	Aug	Oct	May	Aug	Oct	quarterly	
	HCSW-1 (HSW-1) (HC-1)		R		L	F, L	L	F, L	F, L	F, L	F, L			F, L	
	HCSW-2					D		D	D	D	D				
	HCSW-3					D		D	D	D	D				
	HCSW-4														
	B-1 (HC-2)		R		D									D	
	RF-1		R		L									F, L	

TECHNICAL MEMO

Discharge from the mine to Horse Canyon Creek at 001 and 002 appears to have been constant from May 1981 to June 1983, although flows were typically small. Flow volume at discharge point 003 below the mine was not reported, although water samples were collected throughout the 3-year period. Any surface-water data from this period, or earlier, would mainly be mine-discharge water rather than surface runoff. There was no reported flow from 003 from 1983 until reporting ceased in 1991.

Horse Canyon flows to the Price River by way of Icelfander and Grassy Trail Creeks, while Lila Canyon Creek flows southwest then south to the Price River by way of Grassy and Marsh Flat Washes. Little Park Wash, which is a major drainage of the proposed permit area, flows south, where its waters pass through a short stretch of Trail Canyon before reaching the Price River.

Water rights are listed in Table 7-2. Locations of water rights are on Plate 7-3.

Baseline cumulative impact area information

Much of the hydrologic and geologic information that is necessary to assess the probable cumulative hydrologic impacts of the proposed operation and all anticipated mining on surface- and ground-water systems for the cumulative impact area is probably available from federal and state agencies. Any needed information that is not available from such agencies may be gathered and submitted by the permittee as part of the permit application. As discussed already, outside sources are referenced many times in Chapters 6 and 7. Baseline data are missing or insufficient for most proposed surface- and ground-water monitoring points. The permit cannot be approved until the necessary hydrologic and geologic information is available.

Probable hydrologic consequences (PHC) determination

Appendix 7-3 contains a determination of the PHC of the proposed operation based upon the quality and quantity of surface and ground water under seasonal flow conditions for the proposed permit and adjacent areas. The PHC determination is based on baseline hydrologic, geologic, and other information collected for the permit application, but not on data statistically representative of the site. The permittee finds in the PHC determination that, based on available data and expected mining conditions, the proposed mining and reclamation activity is not expected to proximately result in contamination, diminution or interruption of an underground or surface source of water within the proposed permit or adjacent area that is used for domestic, agricultural, industrial or other legitimate purpose.

The permittee has determined that within the Lila Canyon Significant Revision area the general seasonal streamflow is ephemeral. The streams generally dry up by late spring, with only occasional runoff during the summer as the result of rainfall events (Appendix 7-3, page 7).

The permittee has determined that, due to the close proximity and similarities of mining and drainage conditions, water quality and impacts to the channels from pumping the Lila Canyon Mine would be very similar to those experienced in the adjacent Horse Canyon Mine. There are no pre-mining data for Horse Canyon, so the determination of impacts in Horse Canyon is based on water monitoring results and on the absence of reports of negative impacts (Section 6.5.5.1 - page 39). Channel morphology and characteristics will be determined before water is discharged from the mine to Lila Canyon, and impacts to Lila Canyon from mine water discharge can then be documented and, if necessary, reduced or eliminated (pages 25 and

26). Water discharged to Lila Canyon will be sampled and analyzed. If the natural quality of the discharge water does not meet UPDES standards, the water will be treated prior to discharge (pages 28, 30).

Because of the disturbed areas and the potential for large runoff events, the control of erosion is a prime factor in maintaining the hydrologic balance within the mine permit area. Sediment controls and a sediment pond will be constructed at the new mine site to minimize impacts. Surface water will be protected by use of sediment controls and all sediment from the disturbed area is to be delivered to and be deposited in the sediment pond.

Although subsidence has the potential to alter the groundwater flow regime in the area, several factors tend to limit the effects of subsidence on the groundwater regime. Most of the local springs flow from perched systems in the North Horn Formation and are separated from the underlying regional aquifer. The North Horn contains swelling clays that tend to heal small fractures. Finally, the perched aquifers are lenticular and discontinuous so there is a great probability that fractures in one area will not drain all the different aquifers.

Springs are used by wildlife and livestock and are mostly located upstream of the permit areas or are in areas where subsidence resulting from post-1977 mining has not been documented and is not expected. Current conditions of springs and seeps reflect the impacts (if any) of 50 years of mining, as well as pre-mining conditions.

The permittee has determined that it is unlikely there will be any measurable impacts from the mining and reclamation activities at the Lila Canyon. Pre-mining data are not available (Section 724.100), but depletion of ground-water flow and quality during operation of the Horse Canyon Mine is not indicated by monitoring results, such as those in Appendices 7-2 and 7-6, and the permittee has found no reports of depletion due to subsidence in the Horse Canyon permit area. Springs above the mine should continue to flow, with fluctuations that are related to variations in recharge rather than mining and subsidence.

The permittee finds that after reclamation it is unlikely that the groundwater level in the regional aquifer will ever rise to the level of any portal of either the Horse Canyon or Lila Canyon Mines, so there should be no natural discharge of ground water through any sealed portals. Stand pipes are to be incorporated into the sealed portals of the Lila Canyon Mine so that water levels can be checked annually.

In the PHC the permittee finds that, based on available data and expected mining conditions, the proposed mining and reclamation activity is not expected to proximately result in contamination, diminution or interruption of any underground or surface source of water within the proposed permit or adjacent areas; however, acid-forming or toxic-forming materials and flooding or streamflow alteration are two subjects that will require further investigation as mine construction and operation proceed.

Ground-water and Surface-water Monitoring Plans

The permittee has based the ground-water and surface-water monitoring plans on the PHC determination and the analysis of baseline hydrologic, geologic, and other information in the permit application. Water samples from seeps, springs, and streams will be analyzed for the parameters listed in

TECHNICAL MEMO

Tables 7-4 and 7-5. The parameters in Tables 7-4 and 7-5 match those in UDOGM directive Tech 004. Monitoring reports will be submitted to UDOGM at least every three months, within 30 days following the end of each quarter.

The permittee's water-monitoring plan is intended to provide data to show impacts to potentially affected springs, seeps, impoundments and drainages within and adjacent to the permit area by comparison with relevant baseline data and with applicable effluent limitations. The permittee has selected monitoring locations and frequencies, described in Table 7-3, so that significant springs, seeps, impoundments and drainages that could potentially be impacted by the mining and reclamation operations will be monitored on a regular basis. (Section 731.222.1).

Ground-water monitoring plan

Nine sites are proposed for ground-water monitoring: L-5-G through L-10-G and IPA 1, 2, and 3. They are listed in Table 7-3 and locations are shown on Plate 7-4. Seeps and springs will be monitored quarterly for parameters listed in Table 7-5. Station L-5-G is the potential mine discharge point and will be monitored in accordance with UPDES Permit requirements. IPA 1, 2, and 3 will be monitored quarterly for depth.

Stations L-6-G through L-10-G are significant springs located over the area of proposed mining. The relationship of these springs to seeps and springs monitored previously by JBR Consultants, EarthFax Engineering, and others is partially described in Table 7-3.

Four of the springs proposed for operational monitoring are identified by the permittee as L-7-G, L-8-G, L-9-G (Pine Spring), and L-10-G and correspond with the springs monitored by EarthFax as 9, 10, 16(Z), and 14, respectively. Appendices 7-1 and 7-6 of the Lila Canyon Significant Revision contain data on Springs 9, 10, 14, and 16(Z) from 1993, 1994, and 1995, when they were monitored for baseline for the South Lease by IPA. There is a commitment on page 30 (Chapter 7) to resume monitoring in July 2000 to establish a current baseline and assure the sites are viable, but no recent data were submitted.

L-6-G is in the vicinity of Mont Spring, water right 91-617, and Leslie Spring, water right 91-618. These water rights correspond closely to JBR sample sites H-21 and H-19 and are near H-20, H-21A, H-21B, and H-22; however, the only monitored site with consistent flow in this area is downgradient at H-18. H-18 is therefore the site that has been selected by the permittee to monitor ground water in this area.

The spring to be monitored by the permittee at L-7-G was monitored as 9 (S-9) from 1993 to 1995. Spring 9 is near springs 8, 19-A, and 19-B and has had the most consistent flow of the group. Baseline data for Spring 9 are in Appendices 7-1 and 7-6. The permittee identifies this as Cottonwood Spring, which is associated with water right 91-2521 in Table 7-2; however, the location for water right 91-2521 described in Table 7-2 - NE/4 Sec. 13, T. 16 S., R. 14 E. - is possibly incorrect because that area is a topographic high and there are no identified springs at that location. Water rights 91-399 and 91-2537 are closer to springs 8, 9, 19-A, and 19-B.

IPA 1, 2, and 3 will be monitored quarterly for water levels. A-26 and A-31 were bored as offsets to S-26 and S-31 to observe ground-water levels in the alluvium south of the Williams Draw Fault. Table VI-3 does not indicate that these wells have been plugged and abandoned; however, the permittee has no data on A-26 and A-31 (Section 6.5.1). S-32 was drilled in 1981 and completed as a piezometer in the Grassy Member of the Blackhawk Formation. The permittee considers A-26, A-31, and S-32 unusable (Section 724.100).

Surface-water monitoring plan

Streams will be monitored monthly. Sediment pond and mine discharges will be monitored monthly or as frequently as discharges occur (Table 7-3). No monitoring is proposed for Little Park Wash, which had no observed flow during 1998 and 1999.

Intermittent drainages in the area flow in response to snowmelt and precipitation events. The proposed surface-water monitoring program will monitor Lila Canyon both above and below the disturbed mine site area at L-1-S, L-2-S, and L-3-S and the sediment pond discharge at L-4-S. There are no baseline data, even no-flow reports, for L-1-S, L-2-S, and L-3-S in Lila Canyon, nor for surface water anywhere in the Lila Canyon drainage. A monitoring program was implemented in July 2000 (pages 7 and 30) to collect current baseline data that would be continuous with the operational data which are to follow: no data have been received by UDOGM for this recent monitoring, neither with the most recent version of the plan revision nor with the quarterly reports.

Point-source discharge monitoring will be conducted in accordance with 40 CFR Parts 122 and 123, R645-301-751 and as required by the Utah Division of Environmental Health for UPDES permits. A UPDES discharge permit application has been submitted to UDOGM of Environmental Health for the proposed sediment pond and mine water for the Lila Canyon operation. UPDES permit applications for the Lila Canyon Mine are provided in Appendix 7-5.

Findings:

Hydrologic Resource Information is not considered adequate to meet the requirements of this section. Prior to approval the permittee must provide the following information:

R645-301-724, water-levels in IPA-1, IPA-2, and IPA-3 were measured seasonally by IPA in 1994, 1995, and 1996 to provide baseline data (Appendix 7-1) for the South Lease. Surface-water quality and quantity was monitored at L-6-G, L-7-G, L-8-G, L-9-G, and L-10-G in 1993, 1994, and 1995. There are no baseline data, even no-flow reports, for L-1-S, L-2-S, and L-3-S in Lila Canyon, nor for surface water anywhere in the Lila Canyon drainage. A monitoring program was implemented in July 2000 (pages 7 and 30) to collect current baseline data that would be continuous with the operational data which are to follow: no data have been received by UDOGM for this recent monitoring, neither with the most recent version of the plan revision nor with the quarterly reports.

TECHNICAL MEMO

RECOMMENDATION:

Prior to approval, the requirements of R645-301-700 must be provided as outlined above.

sm

O:\007013.HOR\FINAL\jdsSR98(1)-4.wpd