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# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

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June 21, 2000

TO: Internal File

THRU: Dave Darby, Team Lead *[Signature]*

FROM: James D. Smith, Reclamation Specialist *JDS*

RE: Technical Analysis for Lila Canyon Significant Revision, Utah American Energy, Inc., Horse Canyon Mine, ACT/007/013 SR98(1)-4

## SUMMARY:

The Lila Canyon Significant Revision to the Horse Canyon Mine plan was submitted by Utah American Energy on September 8, 1998. After the permittee made several changes and additions, the submittal was determined to be Administratively Complete on February 25, 1999. UDOGM's initial TA was dated May 26, 1999, the second TA was dated October 19, 1999, and the third February 4, 2000. Utah American Energy submitted their response to the third TA on March 10, 2000.

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.

## TECHNICAL ANALYSIS:

# ENVIRONMENTAL RESOURCE INFORMATION

## GENERAL CONTENTS

Regulatory Reference: R645-302.122.

The permittee states (Section 100-122) that referenced materials not on file at the Division or readily available to the Division will be provided upon request.

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Outside sources are referenced many times in Chapters 6 and 7 and their appendices. Many of the publications cited are probably available to the Division and the general public through libraries. References are provided at the end of chapter and appendices. The citation in Chapter 7 for Waddell and others, 1983 (p. 11) is not complete. References in Appendix 7-3 to Balsley, 1981 (p. 5) and Sieler and Baskins, 1986 (p. 4) are not complete, but refer to the Horse Canyon MRP where the original cite is located.

## **GEOLOGIC RESOURCE INFORMATION**

Regulatory Reference: 30 CFR Sec. 784.22; R645-301-623, -301-724.

### **Analysis:**

Geologic information includes a description of the geology of the proposed permit and adjacent areas down to and including the stratum immediately below the lowest coal seam to be mined. The coal seams and adjacent strata comprise an aquifer that may be adversely impacted by mining. Geology may affect the occurrence, availability, movement, quantity, and quality of potentially impacted surface and ground water.

The application includes geologic information in sufficient detail to assist in determining the probable hydrologic consequences of the operation upon the quality and quantity of surface and ground water in the permit and adjacent areas, including the extent to which surface- and ground-water monitoring is necessary, and whether the proposed operation has been designed to prevent material damage to the hydrologic balance outside the permit area. Current information is not sufficient to assist in determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined and determining whether reclamation can be accomplished, but excavated or mined materials will be examined and tested as necessary to determine acid- and toxic-forming potential (Section 536). Geologic information is sufficient to assist in preparing the subsidence control plan.

Required resource maps and plans and detailed site specific information are based on published geologic information, permit applications of the adjacent Sunnyside and South Lease areas, and drilling records of U. S. Steel Corporation and the Los Angeles Department of Power and Water. Some of these are included in the Lila Canyon Significant Revision, others are readily available, but some of the information is proprietary or otherwise not readily available to the Division and public.

Strata above the coal seam to be mined will not be removed, so samples have been collected and analyzed from test borings or drill cores. Bore holes S-1 through S-23 were drilled between 1948 and 1975. S-24 through S-31 were drilled in 1980 and 1981.

An unsuccessful attempt was made to convert S-26, S-28, and S-31 to ground-water observation wells. 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). Table 6-3 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, p. 21) and considers these wells unusable for ground-water monitoring (Section 724.100).

S-32 was drilled in 1981 and completed as a piezometer in the Grassy Member of the Blackhawk Formation. The location of S-32 is not known to the permittee and therefore not shown on any map: it can be determined from the log in Appendix 6-1 that it is in T. 17 S., R. 15 E. but the section cannot be identified. The permittee states that other than the log there are no other geologic or piezometric data from S-32 (Section 6.5.1, p. 21).

The Horse Canyon Well and the MDC (Minerals Development Corporation) well shown on Plate 7-1 were bored in Horse Canyon to monitor water in the alluvium (Section 6.5.1 Lila Canyon Significant Revision). There are no logs or other geologic or hydrologic data from these wells in the Lila Canyon Significant Revision (724.100).

In 1993 and 1994 IPA-1, IPA-2, and IPA-3 were drilled. Results of proximate and ash analyses of "floor" and "roof" from IPA-1, IPA-2 (roof only), and IPA-3 are in Appendix 6-2; however, the analysis reports show these are coal samples, not samples from strata overlying and underlying the coal seam. There are also proximate, ultimate, sulfur (total and pyritic), ash, and several other analyses for "middle" coal samples from the three bore holes.

Logs of bore holes IPA-1, IPA-2, IPA-3, S-14, S-27, and S-32 are in Appendix 6-1. Ground water was noted on the logs for IPA -1 and IPA-2: fluid levels were reported for S-27 and S-32 but the fluid may have been static drilling fluid in the bore hole rather than ground water. These logs show lithologic characteristics, including physical properties and thickness of each stratum that may be impacted. In addition to the bore holes, coal seams and adjacent strata were measured at seventeen out-crop locations in 1974 and 1975. Lithology and thickness of the coal seams and adjacent strata, based on the bore holes and measured out-crop sections, are shown on Plate 6-5.

Engineering properties of the strata immediately above and below the coal seam to be mined are listed in Table 6-6. Data are based on core samples from bore holes S-18 and S-22.

Access to the underground workings of the Lila Canyon Mine will be provided by two rock slopes driven upwards from the base of the cliff to the coal seam. Rock that will be removed from the tunnels will be called "slope rock", and it fits most closely into the classification of underground development waste. The slope-rock underground development waste will contain mostly shale, sandstone, and mudstone. Traces of coal may be found, but the permittee feels the amount will be insignificant.

Slope-rock will be used to fill in areas to be used as pads in the coal pile storage areas, with any additional being placed in the refuse pile: sandstone materials may be crushed and used for gravel (Section 528.320), although the use for the gravel is not described.

The slope-rock material will be examined and tested as necessary to determine acid- and toxic-forming potential (Section 536). The Lila Canyon Significant Revision contains no reports of analyses for acid- or toxic-forming or alkalinity-producing materials and their content in the strata immediately above and below the coal seam to be mined, including the rock through which the tunnels will be built. The permittee states that with over 100-years of mining experience at the adjacent Sunnyside Mines there have been no proven problems with acid- or toxic-forming materials (Section 6.5.5.1). The reclamation plan

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specifies 4 feet of undifferentiated subsoil and topsoil will be placed over the refuse pile. The slope-rock underground development waste used to build the pads will be left in place for final reclamation and buried with 4 feet of undifferentiated subsoil and topsoil (Chapters 2, 5, and 7, and Appendix 5-7).

Coal processing waste from the crusher will be placed in disposal areas within the permit area. The refuse pile has been designed as a location for the storage of underground development waste that is brought to the surface, including any excess slope-rock not used as fill; it is not anticipated that any underground waste other than the slope-rock will be brought to the surface. The capacity of the pile is designed for 150,000 tons, which is in excess of projected needs. Material not transported to the surface, such as overcast material, rock falls, and slope material may be disposed of underground according to the appropriate MSHA regulations. Because this will be an underground mine there will be no spoil.

The coal seam crops out at approximately 6,500 feet in the vicinity of the rock-slope tunnels. The Lila Canyon Significant Revision indicates the tunnels will intercept the coal seam at approximately 6,300 feet.

Underground mining always has a potential for impacting surface-water, ground-water, and other surface resources. The permittee states in Section 721 that subsidence effects are expected to be minimal due to the amount of cover and massive rock strata between the mining and the surface. Coal-seam elevations determined from bore holes are on Plate 6-4 - Cover and Structure Map.

The permittee has made no request to the Division to waive in whole or in part the requirements of the borehole information or analysis required of this section.

**Findings:**

Geologic Resource Information is considered adequate to meet the requirements of this section.

**HYDROLOGIC RESOURCE INFORMATION**

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

**Analysis:****Sampling and analysis.**

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 basis or less. 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 selection of parameters that were measured was based on 30 CFR 783.16: this 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 the Division 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

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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).

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). Monitoring of these wells should resume immediately both to assure that they are usable and to establish a current baseline that will be continuous with operational monitoring.

*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 (same as 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 (bicarbonate and carbonate were 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).

## 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		
		1978 - 1980 (Geneva)	1981 - 1983 (Geneva)	1985 (JBR)	1989 (Kaiser)	1993 (EarthFax)		1994 (EarthFax)			1995 (EarthFax)			1997 Annual Report	(Spring Name)
Utah American Energy	JBR - EarthFax			Nov		May	Oct	May	Aug	Oct	May	Aug	Oct	quarterly	
	<b>JBR</b>														
	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	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											
	<b>EarthFax</b>														
	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		

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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	
									D	S	F	D	F		
						F	F	F	D	S	F	F	F		
						F	F	F	D	D	F	D	D		
						F	F	F	D	D	F	F	F		
									D	S	S, F	F	F		
									D	S	F	F	F		
						F	D	F	D	Flow	F		D		
							F	F					D		
						F	D	F	D	S	F	S			
							D	D							
						D	F	S	S	S		F	F		
							D								
						F	F	F	S	Flow	S	F	F		
							F								
						F	F	F	F	F	F	F	F		
						F	F		D	Flow	F	F	F		
							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)
						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
												F	F		
						F	F	F	W		S, F	F	F		
										F	F	S	S		
						F	F	F	F	F	F	F	F		
						F	F	F	F	F	F	F	F		
						F	F	F	W	F	F	S	S		
						F	F	S	D	F	S, F		D		
									S	S	F	W	F		
						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 (Spring Name)	
		1978 - 1980 (Geneva)	1981 - 1983 (Geneva)	1985 (JBR)	1989 (Kaiser)	1993 (EarthFax)		1994 (EarthFax)			1995 (EarthFax)				1997 Annual Report
Utah American Energy	JBR - EarthFax			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

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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

### SURFACE-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	
	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	
	IPA-1														
	IPA-2														
	IPA-3														

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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 stream 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 dry-up, dissipate, or go underground before reaching the main drainage.

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).

Water-quality and quantity data for 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 Appendix 7-1 show HCSW-2 and HCSW-3 were dry when monitored in 1994 and 1995. Baseline data 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).

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.

Horse Canyon flows to the Price River by way of Icelander 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, but the outside sources are not adequately described nor listed in a reference section. The permit cannot be approved until the necessary hydrologic and geologic information is available.

### **Modeling.**

Modeling has not been used in preparation of the Lila Canyon Significant Revision.

### **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 (Appendix 7-3, page 4). 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. 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.

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.

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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 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 the Division 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.

Three of the springs proposed for operational monitoring are identified by the permittee as L-8-G, L-9-G (Pine Spring), and L-10-G and correspond with the springs monitored by EarthFax as 10, 16Z, and 14, respectively. Appendices 7-1 and 7-6 of the Lila Canyon Significant Revision contain data on Springs 10, 14, and 16Z from 1993, 1994, and 1995, when they were monitored for baseline for the South Lease by IPA, but nothing more recent.

There is still some confusion in the Lila Canyon Significant Revision on names and locations of springs to be monitored. In Section 731.321 (page 31), L-8-G, to be monitored at site 16Z, is identified as Pine Spring and L-9-G is not discussed: in Table 3, L-8-G is identified as an unnamed spring to be monitored at site 10, and L-9-G is identified as Pine Spring, to be monitored at site 16Z. On page 35, L-8-G is again identified as an unnamed spring and L-9-G as Pine Spring.

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 that table - 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.**

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

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data for these specific points, nor for any part of the Lila Canyon drainage. No monitoring is proposed for Little Park Wash, which had no observed flow during 1998 and 1999.

Streams will be monitored monthly. Sediment pond and mine discharges will be monitored monthly or as frequently as discharges occur (Table 7-3).

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 the Division 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:

**R645-301-724.100**, 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. 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). Monitoring of these wells should resume immediately both to assure that they are usable and to establish a current baseline that will be continuous with operational monitoring.

**R645-301-724.100**, water quality 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 has been no monitoring since. Monitoring of these springs should resume immediately to assure that they are still flowing and usable for monitoring, and to establish a current baseline that will be continuous with operational monitoring.

**R645-301-724.200**, 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 for these specific points, nor for surface water anywhere in the Lila Canyon drainage.

**R645-301-731.210**, there is still some confusion on names and locations of springs to be monitored. In Section 731.321 (page 31), spring L-8-G - to be monitored at site 16Z - is identified as Pine Spring and L-9-G is not discussed: in Table 3, L-8-G is identified as an unnamed spring to be monitored at site 10, and L-9-G is identified as Pine Spring, to be monitored at site 16Z. On page 35, L-8-G is again identified as an unnamed spring and L-9-G as Pine Spring.

**R645-301-731.214.2**, - the statement in this section of the Lila Canyon Significant Revision is unnecessary and potentially confusing. It should be removed or reworded.

## **MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION**

Regulatory Reference: 30 CFR Sec. 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

### **Analysis:**

#### **Coal Resource and Geologic Information Maps**

In the Lila Canyon Significant Revision, depth to the Sunnyside Seam, which is the seam to be mined, is shown on the Cover and Structure Map on Plate 6-4. Thickness of the Sunnyside Seam is shown on the Coal Thickness Isopach map on Plate 6-3. Thickness and nature of the Sunnyside Seam, of coal or rider seams above the Sunnyside Seam, and of the stratum immediately below the Sunnyside Seam are shown on the Coal Sections on Plate 6-5. The cross section on Figure 7-1 shows the relationship of the rock tunnels to structure, stratigraphy, and ground water.

Figures VI-1 and VI-2 in the Lila Canyon Significant Revision show the general stratigraphy of the permit and adjacent areas. Plate 6-1 shows surface geology, including coal crop lines, and the strike and dip of the Sunnyside Seam within the proposed permit area. Major faults are shown on Plates 6-1 through 6-5, and structural elevation contours on the Sunnyside Seam are on Plate 6-4. The Sunnyside fault, shown on Plates 6-1 and 6-2 of the Lila Canyon Significant Revision and Plate II-2 of the current MRP, limited mining to the east in the Horse Canyon Mine but is not expected to extend into the Lila Canyon Mine area, so is not expected to limit coal recovery at the Lila Canyon Mine.

The coal seam crops out at approximately 6,500 feet in the vicinity of the rock-slope tunnels. The Lila Canyon Significant Revision indicates the tunnels will intercept the coal seam at approximately 6,300 feet. Coal-seam elevations determined from bore holes are on Plates 6-2, 6-3, and 6-4.

#### **Mine Workings Maps**

Location and extent of the Horse Canyon Mine permit area is outlined on numerous plates in the Lila Canyon Significant Revision, including Plate 5-1, but it is not clear where mining was done and not done within this permit area. Plate 5-1 shows old or abandoned mine workings outside the Horse Canyon permit area, except the 6,080-foot exploration entry from the Horse Canyon Mine is not shown. Locations of sealed openings to the Horse Canyon Mine and other mines are not identified. Plate 5-1 shows an area west of the Horse Canyon Mine, outside the line marking the limits of old works, labeled "Book Cliffs Coal Company". The active coal fire area in the old workings north of Horse Canyon is not shown on any map or discussed in the text.

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**Monitoring Sampling Location Maps**

Elevations and locations of test borings are on Plates 6-2, 6-3, and 6-4, except that the location of S-32 is not known and therefore not shown on any map. It can be determined from the log in Appendix 6-1 that S-32 is in T. 17 S., R. 15 E. but the Section cannot be identified because of the poor quality of the copy. Elevations of core samples are tabulated in Tables VI-1 and VI-3. Monitoring wells IPA-1, IPA-2, and IPA 3 are shown on Plates 7-1 and 7-4.

The Lila Canyon Significant Revision (Table 7-1 and Appendices 7-1, 7-2, and 7-6) contains water-quality or -quantity data for springs and seeps 1 (S-1), 9 (S-9), 10 (S-10), 14 (S-14), 16(S-16, 16Z), H-1, H-2 (HC-2), H-3, H-4 (H-C4), H-5, H-6, H-7, H-8, H-9 (HC-9), H-10, H-11 (HC-11), H-13 (HC-13), H-14 (HC-14), H-18 (HC-18), H-19, H-20, H-21, H-22, and H-92. EarthFax also identified a number of springs and seeps that were dry or had low flows at the time of the quarterly visits and for which no water-quality analyses were done: 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 (Appendix 7-1). Elevations and locations of these monitoring stations are on Plate 7-1, except locations of dry springs 8B, 15A, 17B, and 19C could neither be found on Plate 7-1 nor matched with another identified seep or spring.

Springs HC-1A, H-21A, H-21B, H-18A, and H-18B and an unidentified spring 1,000 feet southwest of HCSW-2 were previously shown on 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).

Horse Canyon Mine UPDES discharge points UT022926 - 001, - 002, and - 003 (monitored from 1979 to 1991) are on Plates 7-1 and 7-4. Currently monitored UPDES discharge points, UT040013- 001A and - 002A are also shown. Proposed UPDES points L-4-S and L-5-G are on Plate 7-4

Data for surface-water monitoring point 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. Locations are shown on Plate 7-1. Locations for L-1-S, L-2-S, and L-3-S are on Plate 7-4: there are no baseline data for these points so they are not on Plate 7-1.

**Subsurface Water Resource Maps**

Ground water was encountered in several bore holes as well as in the Horse Canyon Mine. Water-level elevation contours are on Plate 7-1; otherwise, areal and vertical distribution of aquifers within the proposed permit or adjacent areas is not shown on a map. Seasonal variation in the water levels is tabulated in Appendix 7-1 for the IPA wells, but there is no portrayal of seasonal differences of head on cross sections and contour maps.

The MDC well in NW Section 9 of T. 16 S., R. 14 E. is listed in Table 7-2 - Water Rights; however, to the best of the permittee's knowledge the MDC well has been sealed. The Horse Canyon Well that is located nearer the Horse Canyon Mine surface facilities will be used during mine operation and reclamation. These wells, which were installed for observation of ground water

in the alluvium in Horse Canyon, are discussed in Sections 6.5.1 and 724.200. Both wells are shown on Plate 7-1.

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). 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, p. 21) and considers these wells unusable for ground-water monitoring (Section 724.100). These wells are not shown on Plate 7-1.

The ground-water elevation in the Horse Canyon Mine, at the rotary car dump at the intersection of the Main slope and 3<sup>rd</sup> level, is described in Section 724.100 (page 14); it was approximately 5,800 feet in 1986 and the permittee states that it probably has remained at this level since operations ceased in the Horse Canyon Mine. This projected ground-water elevation appears to have been used in projecting the piezometric surface mapped on Plate 7-1. The location of the dump is described in the text and is shown on Plate 7-1.

Water rights are listed in Table 7-2. The list includes Redden Spring plus springs identified as Mont, Leslie, Cottonwood, Williams, Kenna, and Pine. In addition there are eleven unnamed springs listed, plus a well. Locations are on Plate 7-3. Some locations described in applications filed with the Division of Water Rights, and used by the permittee in preparing Table 7-2 and Plate 7-3, are imprecise. Some locations correspond roughly with springs shown on Plate 7-1, but it is often unclear whether or not they are the same spring. There are several springs listed in Table 7-2 and shown on Plate 7-3 that are not shown on Plate 7-1, or at least do not correspond to any spring shown on Plate 7-1.

### **Surface Water Resource Maps**

Locations of streams and seeps and springs are shown on Plate 7-1. According to the permittee there are no known lakes or ponds within the permit and adjacent areas.

Table 7-2 lists water rights and Plate 7-3 shows locations of these water rights.

Text in Section 724.200 refers to Plate 7-1 for the location of Horse Canyon and Lila Canyon Creeks and Little Park Wash. Range Creek drainage is mentioned in the description of the ground-water divide of the main aquifer in Section 724.100, but Range Creek lies 6 miles east of the Lila Canyon area and is not shown on any of the maps.

### **Well Maps**

One oil exploration hole has been drilled on the property by Forest Oil Company. The location of the hole is shown on Plate 6-2. The depth and other details of this well are not known.

### **Contour Maps**

Surface-elevation contours are displayed on several maps.

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**Certification**

All maps and plans were prepared by, or under the direction of, and certified by a qualified, registered, professional engineer, with assistance from experts in related fields (Section 712).

**Findings:**

Maps, Plans, And Cross Sections of Resource Information is considered adequate to meet the requirements of this section.

**OPERATION PLAN**

**HYDROLOGIC INFORMATION**

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

**Analysis:**

**Ground-water monitoring.**

Ground-water monitoring will be conducted according to the ground-water monitoring plan in Section 731.210 of the MRP.

Operational ground-water monitoring sites are listed in Table 7-3 and locations are shown on Plate 7-4. Six seeps and spring ground-water monitoring sites, L-6-G through L-11-G, are proposed: they will be monitored quarterly for parameters listed in Table 7-5. This table lists the same parameters as Table 4 of UDOGM directive Tech 004, plus oil and grease, which is not normally necessary for ground water monitoring. Water levels will be measured quarterly in wells IPA 1, 2, and 3. Station L-5-G is the potential mine discharge point and will be monitored monthly or as frequently as discharges occur, in accordance with UPDES Permit requirements.

Ground-water monitoring data are to be submitted every three months to the Division. Sections 731.212 of the Lila Canyon Significant Revision contains a commitment from the permittee that when the analysis of any ground-water sample indicates noncompliance with the permit conditions, the operator will promptly notify the Division and immediately take the actions provided for in 145 and 731 (Sections R645-301-145 and -731 of the Coal Mining Rules).

Ground-water monitoring will continue through mining and reclamation until bond release (Section 731.214). If ground water is encountered in future mining in a quantity that requires discharge, it will be monitored in accordance with requirements of Section 731.210, and a monitoring plan will be proposed at

that time. Operational ground- and surface-water monitoring will be implemented upon approval of the plan.

The permittee commits in Section 731.215 that equipment, structures and other devices used in conjunction with monitoring the quality of ground water on-site and off-site will be properly installed, maintained and operated and will be removed by the operator when no longer needed.

#### **Surface-water monitoring.**

Surface-water monitoring will be conducted according to the water monitoring plan in Section 731.220 of the Lila Canyon Significant Revision. Operational surface-water monitoring sites are listed in Table 7-3 and locations are shown on Plate 7-4. 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. They will be monitored monthly for parameters listed in Table 7-4, which are the same parameters as listed in Table 3 of UDOGM directive Tech 004. No monitoring is proposed for Little Park Wash, although it appears to be a major surface drainage in the permit area, because no flow was observed during quarterly inspections during 1998 and 1999.

Point-source discharge monitoring, sediment pond discharge at L-4-S, and the potential mine discharge at point L-5-G 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 the Division of Environmental Health for the proposed sediment pond and mine water for the Lila Canyon operation. A copy of the UPDES permit application is provided in Appendix 7-5.

Streams will be monitored monthly. Sediment pond and mine discharges will be monitored monthly or as frequently as discharges occur (Table 7-3).

Monitoring reports will be submitted to the Division at least every three months, within 30 days following the end of each quarter (Section 731.220). When analysis of any surface water sample indicates noncompliance with the permit conditions, the company will promptly notify the Division and immediately take actions to identify the source of the problem, correct the problem and, if necessary, to provide warning to any person whose health and safety are in imminent danger due to the noncompliance (Section 731.223).

Surface-water monitoring will continue through mining and reclamation until bond release (Section 731.224). Operational ground- and surface-water monitoring will be implemented upon approval of the plan (Section 731.200).

The permittee commits in Section 731.225 that equipment, structures and other devices used in conjunction with monitoring the quality of surface water on-site and off-site will be properly installed, maintained and operated and will be removed by the operator and will be removed by the operator when no longer needed.

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**Acid and toxic-forming materials.**

The permittee proposes in Section 731.121 that surface-water quality protection is to be accomplished by the plan described in Section 731 and the following methods:

- (1) Minimizing surface disturbance and proper handling of earth materials to minimize acidic, toxic or other harmful infiltration to ground-water systems;
- (2) Testing (as-necessary) to ensure stockpiled materials are non-acid and non-toxic;
- (3) Controlling and treating disturbed area runoff to prevent discharge of pollutants into surface-water, by the use of diversions, culverts, silt fences, sediment ponds, and by chemical treatment if necessary;
- (4) Minimizing and/or treating mine water discharge to comply with UPDES discharge standards;
- (5) Establishing where surface-water resources exist within or adjacent to the permit area through a baseline study and monitoring quality and quantity of significant sources through implementation of a Water Monitoring Plan;
- (6) Proper handling of potentially harmful materials (such as fuels, grease, oil, etc.) in accordance with an approved Spill Prevention Control and Countermeasure Plan (SPCC).

Underground development waste will be stored in a designated area. Such waste will be tested for acid- or toxic-forming potential, and if found to be acid- or toxic-forming, the waste site will be protected from surface runoff by the use of earthen berms (Section 731.312).

All storage, burial and treatment practices will be as described in this permit and consistent with applicable material handling and disposal provisions of the R645-Rules (Section 731.320).

**Gravity discharges from underground mines.**

The proposed access portals are below the coal outcrop, as shown on Plates 5-2 and 7-5. The fan is to be located above the outcrop. The two 1,227 foot access tunnels will slope up at approximately 12%, from a starting elevation at the surface of approximately 6150'. The intersection of the coal seam and the rock slope will take place at approximately 6,300 feet elevation. Maximum ground-water elevation measured in the three IPA wells was 5,972 feet, and maximum projected elevation in the vicinity of the rock-slope tunnels is approximately 6,000 feet (Plate 7-1), so the likelihood that the rock slopes will intercept ground water in the regional aquifer is small.

Surface entries and accesses of drift mines are to be located so as to prevent or control gravity discharge from the mine. The cross section on Figure 7-1 shows the relationship of the rock tunnels to structure, stratigraphy, and ground water.

Numbers provided in the Lila Canyon Significant Revision (Figure 7-1) indicate ground-water levels would need to rise approximately 150 feet just to reach the starting elevation of the tunnels at the base of the Book Cliffs (6,150 feet) and approximately 300 feet to reach the intersection of the tunnels with the coal seam (6,300 feet). Mining will proceed down dip, to the east, from that intersection. Based on water

monitoring results and historical information, it is unlikely water levels will ever reach the intersection of the tunnel and coal seam, and therefore gravity discharge from the surface entries of the mine is also unlikely.

**Water quality standards and effluent limitations.**

A copy of the UPDES permit application is in Appendix 7-5.

**Casing and sealing of wells.**

There are no wells planned for the Lila Canyon Mine; however, if any wells are installed in the future, they will be permanently sealed in accordance with Section 765 of the Coal Mining Rules (Section 765).

**Findings:**

Operation Plan Hydrologic Information is considered adequate to meet the requirements of this section.

**MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS**

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

**Analysis:**

**Monitoring and Sampling Location Maps**

Operational ground-water and surface-water monitoring sites are listed in Table 7-3 and locations are shown on Plate 7-4. 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. No monitoring is proposed for Little Park Wash, although it appears to be the major surface drainage in the permit area, because no flow was observed during quarterly inspections in 1998 and 1999.

The sediment pond discharge at L-4-S and the potential mine discharge point at L-5-S will be monitored in accordance with UPDES Permit requirements. Currently monitored UPDES discharge points UT040013- 001A and - 002A are on Plate 7-4.

Five seep and spring ground-water monitoring sites, L-6-G through L-10-G, are proposed. Water levels will be measured quarterly in wells IPA 1, 2, and 3. Locations are shown on Plate 7-4.

**Certification Requirements.**

All cross sections, maps and plans required by R645-301-722 as appropriate, and R645-301-731.700 have been prepared and certified according to R645-301-512 (Section 712).

TECHNICAL MEMO

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**Findings:**

The Monitoring and Sampling Location Maps for the Mining Operations Plan provided in the Lila Canyon Significant Revision are considered adequate to meet the requirements of this section.

## RECLAMATION PLAN

### HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751.

**Analysis:**

**Ground-water monitoring.**

There is no specific reclamation ground-water monitoring plan. Ground-water monitoring, if implemented, will continue through mining and reclamation until bond release (Section 731.214).

**Surface-water monitoring.**

There is no specific reclamation surface-water monitoring plan. Surface-water monitoring will continue through mining and reclamation until bond release (Section 731.224).

**Acid and toxic-forming materials.**

The slope-rock material will be examined and tested as necessary to determine acid- and toxic-forming potential (Section 536). It has not been established that the underground development waste that will come from construction of the tunnels can be properly disposed of at a refuse pile and that reclamation of a refuse pile can be accomplished. The permittee states that with over 100-years of mining experience at the adjacent Sunnyside Mines there have been no proven problems with acid- or toxic-forming materials (Section 6.5.5.1). The reclamation plan specifies 4 feet of undifferentiated subsoil and topsoil will be placed over the refuse pile. The slope-rock underground development waste used to build the pads will be left in place for final reclamation and buried with 4 feet of undifferentiated subsoil and topsoil (Chapters 2, 5, and 7, and Appendix 5-7).

**Transfer of wells.**

There are no wells planned for the Lila Canyon Mine; however, if any wells are installed in the future, they will be permanently sealed in accordance with Section 765 of the Coal Mining Rules (Section 765).

### **Gravity discharges.**

Based on water monitoring results and historical information, it is unlikely water levels will ever reach the intersection of the tunnel and coal seam, and therefore gravity discharge from the surface entries of the mine is also unlikely.

### **Casing and sealing of wells.**

There are no wells planned for the Lila Canyon Mine; however, if any wells are installed in the future, they will be permanently sealed in accordance with Section 765 of the Coal Mining Rules (Section 765).

### **Findings:**

Reclamation hydrologic information that has been reviewed is considered adequate to meet the requirements of this section.

## **MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS**

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-323, -301-512, -301-521, -301-542, -301-632, -301-731.

### **Analysis:**

#### **Reclamation Monitoring and Sampling Location Maps**

There are no specific reclamation ground-water or surface-water monitoring plans. Ground-water and surface-water monitoring will continue through mining and reclamation until bond release (Sections 731.214 and 731.224).

#### **Certification Requirements**

All cross sections, maps and plans required by R645-301-722 as appropriate, and R645-301-731.700 have been prepared and certified according to R645-301-512 (Section 712).

### **Findings:**

Information on Maps, Plans, and Cross Sections of reclamation hydrologic monitoring and sampling is considered adequate to meet the requirements of this section.

## **CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT**

Regulatory Reference: 30 CFR Sec. 784.14; R645-301-730.

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**TECHNICAL MEMO**

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The Division will provide an assessment of the probable cumulative hydrologic impacts (CHIA) of the proposed operation and all anticipated mining upon surface- and ground-water systems in the cumulative impact area. The CHIA will be sufficient to determine, for purposes of permit approval, whether the proposed operation has been designed to prevent material damage to the hydrologic balance outside the permit area. The Division intends to use data and analyses submitted by the permittee in the Lila Canyon Mine Lila Canyon Significant Revision.

**RECOMMENDATION:**

Prior to approval, the requirements of R645-301-600 and R645-301-700 must be provided as outlined above.

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