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March 5, 2001

TO: **Internal File**

THRU: Dave W. 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, C/007/013 SR98(1)-5

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
		SR98 (1)	May 26, 1999
Second Submittal	July 30, 1999	SR98 (1)-1	October 19, 1999
Third Submittal	December 10, 1999	SR98 (1)-2	February 23, 2000
Fourth Submittal	March 10, 2000	SR98 (1)-3	June 29, 2000
Fifth Submittal	September 25, 2000	SR98 (1)-4	November 20, 2000
Sixth Submittal	January 19, 2001	SR98 (1)-5	This Document

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TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

HYDROLOGIC RESOURCE INFORMATION

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

Analysis:

Ground-water information

The proximity of the proposed Lila Canyon Significant Revision of the Horse Canyon Mine to areas that are being advocated as wilderness will subject the operator's proposal and the Division's findings to more than the usual scrutiny; Southern Utah Wilderness Association (SUWA) has targeted this project on its web-site, and as a result letters have been sent to the Division and BLM opposing this mine. There are baseline data collected at various dates for many springs in the area, and baseline data were obtained by IPA in 1994, 1995, and 1996 for the wells and springs that are proposed for operational ground-water monitoring. Additional, current baseline data for these wells and springs were to have been obtained beginning in July 2000. The Division has received one set of well measurements (data from one well and the other two wells appear to be no longer usable), but nothing for the springs. While existing baseline data are considered sufficient to approve the permit, the permittee doesn't seem to appreciate that they and the Division would find it much easier to defend the MRP - in particular the PHC and monitoring plan, the CHIA, and the issuing of a permit with additional, current baseline data.

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 various names, dates, and types of data were tabulated in the November 20, 2000 Technical Analysis.

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.

A water-monitoring program was implemented in July 2000 to determine if the springs proposed for operational monitoring were still viable and to establish a current baseline that would be continuous with operational monitoring (page 30, Chapter 7): L-6-G (H-18, HC-18, EWL-25), L-7-G (9, S-9), L-8-G (10, S10), L-9-G (16, 16Z, S-16), and L-10-G (14, S14) were to have been monitored. No data for L-6-G through L-10-G have been received by UDOGM for this recent monitoring, neither with the most recent version of the plan revision nor with the quarterly reports.

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).

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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). The permittee considers S-32 unusable (Section 724.100).

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. Water quality has not been determined for these wells. A water-monitoring program was implemented in July 2000 to determine if the wells and springs proposed for operational monitoring were still viable and to establish a current baseline that would be continuous with operational monitoring (page 30, Chapter 7). In December 2000, UtahAmerican was able to measure the water level in IPA-2, but at IPA-1 and IPA-3 the probe was not able to go far enough into the wells to reach water.

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).

There are no baseline data, not even reports stating "no-flow", 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 water-monitoring program was implemented in July 2000: data are to be collected, when possible, at L-1-S through L-4-S (page 30, Chapter 7) to establish a current baseline and assure the sites are viable. No data for L-1-S, L-2-S, and L-3-S have been received by UDOGM for this recent monitoring, neither with the most recent version of the plan revision nor with the quarterly reports.

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 proposed amendment. Outside sources for hydrologic and geologic information are referenced many times in Chapters 6 and 7. Baseline data are in sufficient for proposed ground-water operational monitoring points. Deficiencies in baseline data for surface-water monitoring are discussed above.

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

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collected for the proposed amendment, 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 6).

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 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 Lila Canyon 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 proposed amendment. 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 the operational parameters 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 proposed amendment does not include a commitment to analyze ground- and surface-water samples for baseline parameters preceding each 5-year permit renewal; however, a commitment by the permittee to do this is implied by the inclusion in Appendix VI-5 of the current Horse Canyon Mine MRP of Tables 1, 2, 3, and 4 of the Division's Guidelines for the Establishment of Surface and Ground Water Monitoring Programs for Coal Mining and Reclamation Operations - the predecessor to Tech 004. For clarity, a commitment to perform these analyses should be explicitly stated in the Lila Canyon Significant Revision. UDOGM directive Tech 004 indicates these permit-renewal baseline analyses should be done for the surface-water samples collected at either high or low flow and for the spring samples collected at low flow during that year.

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

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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. A water-monitoring program was implemented in July 2000: data are to be collected, when possible, at L-6-G through L-10-G and wells IPA-1, IPA-2, and IPA-3 (page 30, Chapter 7) to establish a current baseline and assure the sites are viable.

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 described for water right 91-2521 in Table 7-2 (NE/4 Sec. 13, T. 16 S., R. 14 E.) is possibly very general (as are many descriptions of water-right locations) 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.

The MRP contains a commitment to monitor IPA 1, 2, and 3 quarterly for water levels. These wells were monitored in 1994, 1995, and 1996. In December 2000, UtahAmerican was able to measure the water level in IPA-2, but at IPA-1 and IPA-3 the probe was not able to go far enough into the wells to reach water. The permittee has not presented plans to repair, recondition, or replace these wells: the proposed ground-water monitoring plan, as written, cannot be carried out without IPA-1 and IPA-3. Baseline water levels for 1994, 1995, and 1996 have been established at three points. IPA-2 should be adequate to monitor effects of mining on the aquifer. Maps show approximately where the permittee anticipates that the mine will intercept ground water. When the interception occurs, water will begin to be pumped from the mine and the water level will start to decline. Eventually well IPA-2 will be intercepted by the mine and will no longer function. Even if they were operational, IPA-1 and IPA-3 would eventually succumb to mine operations also and provide no further water-level data.

Instead of drilling additional wells to monitor the status of the aquifer, accurate measurement of water entering the mine, of water discharged from the mine, of water pumped from one location to another within the mine, and of water consumed in mine operations would provide much more useful data as to the impact of the mine operations on the ground water.

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, not even reports stating "no-flow", 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 water-monitoring program was implemented in July 2000: data are to be collected, when possible, at L-1-S through L-4-S (page 30, Chapter 7) to establish a current baseline and assure the sites are viable. No data for L-1-S, L-2-S, and L-3-S 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 discharge for the Lila Canyon operation. A copy of the UPDES permit applications for the Lila Canyon Mine is 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, -731.200, (1) A ground-water monitoring program was implemented in July 2000: in December 2000, UtahAmerican was able to measure the water level in IPA-2, but at IPA-1 and IPA-3 the probe was not able to go far enough into the wells to reach water. **(2)** The permittee has not presented plans to repair, recondition, or replace these wells: the proposed ground-water monitoring plan, as written, cannot be carried out without IPA-1 and IPA-3. **(3)** A continuing effort should be made to recover IPA-1 and IPA-2 as monitoring wells. **(4)** Instead of drilling additional wells to monitor the status of the aquifer, combining information from IPA-2, the remaining well, with accurate measuring and accounting of water entering the mine, of water pumped from one location to another for storage within the mine, of water consumed by mine operations, and especially of the volume of water discharged from the mine would provide very useful information regarding the impact of the mine operations on ground water.

R645-301-724, -731.200, a ground-water monitoring program was implemented in July 2000: L-6-G (H-18, HC-18, EWL-25), L-7-G (9, S-9), L-8-G (10, S10), L-9-G (16, 16Z, S-16), and L-10-G (14, S14) were to have been monitored to determine if these