0021

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

September 2, 2004

OK

TO: Internal File

FROM: James D. Smith, Environmental Specialist, Team Lead JS

RE: Permit Boundary Expansion, Hidden Splendor Resources, Horizon Mine, C/007/0020, Task ID #1933

SUMMARY:

Hidden Splendor Resources (HSR) submitted an amendment to the Horizon Mine MRP on May 21, 2004. This amendment will increase the permitted acreage from 711 acres to 1,577 acres. The additional acreage is the part of federal lease UTU-74804 that lies north of Beaver Creek. There are also some minor changes to the surface facilities. This is a significant revision of the mine plan.

The Horizon Mine permit area includes federal coal lease UTU-74804 (1,272 acres) and fee coal owned by Hidden Splendor Resources (305 acres). Hidden Splendor Resources has been the owner and operator of the Horizon Mine since March 2003, when it acquired the rights to the Horizon Mine from Lodestar Energy, Inc. through the US Bankruptcy Court for the Eastern District of Kentucky.

Lodestar Energy, Inc. received a permit to expand mine operations into the 406 acres of Federal Lease UTU-74804 located south of Beaver Creek in 2001. Knowledge of the hydrology north of Beaver Creek was not sufficient to allow permitting of the entire federal lease at that time.

Steve and Pete Stamitakis own the surface surrounding Beaver Creek. They have written the Division to express concerns about loss of water in streams and springs due to mining and surface disturbance from subsidence (letter received August 20, 2004). They have expressed these same concerns in the past.

TECHNICAL ANALYSIS:

GENERAL CONTENTS

PERMIT APPLICATION FORMAT AND CONTENTS

Regulatory Reference: 30 CFR 777.11; R645-301-120.

Analysis:

Pages 7-47 through 7-52 were replaced after the initial submittal because they were not readable. There are numerous other pages in the submittal that are not readable, such as the incomplete formulas on page 7-19 and illegible text on page 6-5. Page 7-78 and Table 7-2 are missing. Before submitting the document, the Permittee needs to carefully check it for formatting and printing problems.

Findings:

R645-301-121.200, The Permittee needs to carefully check the entire document, insert missing pages and tables, and correct formatting and printing problems.

REPORTING OF TECHNICAL DATA

Regulatory Reference: 30 CFR 777.13; R645-301-130.

Analysis:

If used in the permit application, referenced materials will either be provided to the Division by the applicant or be readily available to the Division. If provided, relevant portions of referenced published materials will be presented briefly and concisely in the application by photocopying or abstracting and with explicit citations. At a minimum, there should be explicit citations to clearly identify referenced sources.

Sources of technical information used in the MRP but not included in the References sections include:

Chapter 6 - Geology	Chapter 7 - Hydrology	
Leatherwood and Duce, 1988	Bouwer and Rice, 1976	Neumann, 1974
	Duffield and Rumbaugh, 1989	Skaggs, 1992
	Freeze and Cherry, 1979	US Soil Conservation Service, 1986
	Gentry and Abel, 1978	Von Schonfeldt et al., 1980

Some of these are fairly standard or well known, but others are not. For example, the discussion in the PHC on potential effects of subsidence on ground water refers to Von Schonfeldt et al., 1980 and Gentry and Abel, 1978, which are references not typically found in mine plans in Utah and not readily available to the Division.

Sources of technical data used in preparation of the MRP are to be accompanied with information on the qualifications and names of persons or organizations that collected and analyzed the data, dates of the collection and analysis of the data, and descriptions of the methodology used to collect and analyze the data.

Findings:

R645-301-121.100, -121.200, -131, The Permittee must provided referenced materials to the Division or make them readily available. There should be explicit citations to clearly identify referenced sources. Specifically, explicit citations for the following need to be added to the References sections:

Chapter 6 - Geology	Chapter 7 - Hydrology	
Leatherwood and Duce, 1988	Bouwer and Rice, 1976	Neumann, 1974
	Duffield and Rumbaugh, 1989	Skaggs, 1992
	Freeze and Cherry, 1979	US Soil Conservation Service, 1986
	Gentry and Abel, 1978	Von Schonfeldt et al., 1980

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

GENERAL

Regulatory Reference: 30 CFR 783.12; R645-301-411, -301-521, -301-721.

Analysis:

The MRP includes a description of the existing, pre-mining environmental resources within the proposed permit area and adjacent areas that may be affected or impacted by the proposed underground mining activities.

Steve and Pete Stamitakis own the surface surrounding Beaver Creek. They have written the Division to express concerns about loss of water in streams and springs due to mining and surface disturbance from subsidence (letter received August 20, 2004). They have expressed these same concerns in the past.

Findings:

General Environmental Resource Information is sufficient to satisfy the requirements of the Coal Mining Rules.

CLIMATOLOGICAL RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.18; R645-301-724.

Analysis:

Climate information in Chapter 11 is from the nearby Skyline Mine. In the past the Division has recommended that the operator set up a weather station at the site so that precipitation events can be correlated with other monitoring data: this has not been done.

Findings:

Climatological Resource Information meets the minimum regulatory requirements.

HYDROLOGIC RESOURCE INFORMATION

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

Analysis:

Baseline Information

Perennial and intermittent springs flow from sandstone units in the Price River Formation and Castlegate Sandstone and from faults and fractures. Ephemeral springs are more likely to flow from shallow, local aquifers in soils, alluvium, or colluvium. Numerous springs and seeps exist in and adjacent to the permit area, especially in the Beaver and Jump Creek area. Baseline water monitoring points are shown on Plate 7-1, and baseline data are in Appendix 7-2 and the Division's database. The operator has committed to monitor significant surface- and ground-water sources, including drainages above and below the disturbed mine site area, and all point-source discharges.

Piezometer HZ-01-06-1 was installed in November 2001 and since then water levels have been measured during the second, third, and fourth quarters, the site usually being inaccessible during the first quarter. Results are tabulated in Table 7-1 in the Annual Reports and in the Division's database. Potentiometric surface maps have not been updated with the new data.

Monitoring points SP-1, -2, and -4 were monitored for baseline information beginning in 1989. The USGS monitored SP-9 (Jewkes Spring) during the period of 1979 through 1983, Beaver Creek Coal Company monitored it from 1985 through 1995, and Horizon has monitored it since 1996.

Beaver Creek, which bisects the federal coal lease, is considered a perennial stream, and Jewkes Creek and Beaver Creek generally flow throughout the year. Adjacent canyons flow during spring snowmelt and summer thunderstorms. The limited drainage area and high elevation of some of the canyons shortens the duration of the snowmelt runoff and limits it to very early spring.

Surface-water quality data have been collected from the permit and adjacent areas since 1989, when sample sites have been accessible. SS-7 and SS-8 along Beaver Creek have been monitored since 1992, and SS-11 in Sand Gulch and SS-12 on Beaver Creek since 1996. Prior to 1996 data were generally collected in accordance with the Division's guidelines published in 1986. Beginning in 1996, data have been collected, where feasible, in accordance with the Division's guidelines published in April 1995. The data collected from the monitored sites, together with tables outlining the parameters that have been monitored, are presented in Appendix 7-3 (page 7-37). Data are also in the Division's database.

Water rights information is in Appendix 3-5. Points of diversion are shown on Plate 7-3. The operator has indicated that the area is almost exclusively used for stock watering (page 7-29).

Probable Hydrologic Consequences Determination

Only sections of the PHC that are affected by the proposed amendment are discussed.

Impacts to the Regional Aquifer System

(The term *regional aquifer* is commonly used to describe the saturated portions of the Blackhawk Formation and Star Point Sandstone [and sometimes other strata] in the Book Cliffs and Wasatch Plateau Coal Fields. However, ground-water storage and movement in these areas is typically of a local or intermediate nature and the Division feels there is little or no basis for generally describing these as regional systems.)

The Permittee anticipated that the coal in the Horizon No. 1 Mine would be saturated essentially from the beginning of mining and that inflow to the mine would be in the range of 36 to 90 gpm, the latter number representing inflow as mining expanded north of Beaver Creek. Under the anticipated future conditions, approximately 300 gpm of water might have been discharged from the mine during average operating periods (page 7-71).

The PHC states on page 7-74, "Soon after initiating mining it became evident that far more than 36 to 90 gpm was flowing into the mine. The old workings had intercepted a fault that was conveying a large volume of groundwater into the workings," perhaps the same fault encountered in the Beaver Creek Coal Company No. 3 Mine or a fault connected to it. The PHC continues,

> The North Mains and a panel were extended to the north until the same water-bearing fault was encountered. When mining first encountered the fault the inflow was greater than 450 gpm. After the initial surge of groundwater, which lasted approximately 2 months, the fault produced between 200 and 300 gpm. During a period when the mine was shutdown in 2002 and 2003 the mine pumped an average of 279 gpm from the mine. During the period of shutdown the pumping data shows a slight decrease in the pumping rate over time. During the period of shutdown in 2002 the average pumping rate was 294 gpm. During the period of shutdown in 2003 the average pumping rate was 269 gpm. Thus the formation is slowly being de-watered and is producing less water with time. Upon resuming mining in the West Mains in August of 2003 the average pumping rates increased due to groundwater encountered at the mining face. Operators estimate the inflow at the face to be approximately 30 gpm ...
>
> ...based on the mining plan, mining can be expected to intercept the fault in the future. The maximum inflow to the mine can be expected to be similar to the maximum inflow rate encountered when the water bearing fault was first encountered plus whatever ground water is being produced by the mine workings in unfractured areas. Based on the highest monthly average pumping rate from March of 2002 of 473 gpm and the maximum estimated inflow based on Lines (1985) methods the maximum inflow would be approximately 560 gpm. This is considered a conservative estimate since the formation is being further de-watered

as mining continues. Also an inflow of this magnitude would be expected to only last a short period of time before returning to an average inflow between 200 and 300 gpm.

Approximately 25 gpm (41 acre-feet per year) of groundwater will be removed with the mined coal based on average moisture content of 7.99 percent in the coal and maximum production of 700,000 tons per year (page 7-71). Dust suppression and similar uses will consume 6 gpm. Data in Appendix 7-9 indicate that the net loss of water by evaporation due to mine ventilation will be approximately 6 gpm (10 acre-feet per year), so the total consumptive loss to the hydrologic system will be 37 gpm (60 acre-feet per year):

- 6 gpm for surface consumptive uses,
- 25 gpm as moisture in the coal, and
- 6 gpm as evaporative loss in the mine ventilation system.

With an average consumptive use of 37 gpm, it is likely that ground water will be discharged from the mine, approximately 300 gpm during average operating periods and exceeding 500 gpm for short periods of time after mining intercepts the water-bearing fault (page 7-72).

In November 2001, monitoring well HZ-01-06-1 was installed to provide potentiometric data for the area north of Beaver Creek. Water levels have been measured and results are tabulated in Table 7-1 in the Annual Reports and in the Division's database. The potentiometric surface dropped 85 feet between the first and second readings. It is not clear to the Permittee whether the drop was due to the mine de-watering the aquifer or if the initial reading was inaccurate. Circulation was lost numerous times during drilling, resulting in drilling fluid flowing into the formation, and drilling fluid flowing back into the borehole may have artificially elevated the potentiometric surface for the first reading. However, HZ-95-1 experienced a 104-foot drop in a similar time period between the fall of 1999 and spring of 2000. "Due to the rapid drop in the potentiometric surface and the magnitude of the drop at HZ-95-1", the Permittee feels it can be concluded that the influence of the water-bearing fault extends "at least as far north as Beaver Creek", and if the initial water level reading for HZ-01-06-1 is valid then the influence of the water-bearing fault on the potentiometric surface may extend "at least to the northern permit boundary" (page 7-75).

The Permittee states on page 7-75 that water-level monitoring indicates mining will depress the regional aquifer to the maximum depth of the mined entries, and that due to the large amount of water being transported by faulting, the potentiometric surface will be depressed in an area much larger than the permit area; however, when pumping ceases the potentiometric surface will return to pre-mining conditions. Beaver Creek Coal Company No. 3 Mine had previously intercepted the water-bearing fault. Inflows of approximately 400 gpm occurred when this fault was encountered (according to Roger Skaggs of the Blue Blaze Coal Company) and dropped the potentiometric surface, but when mining ceased in these old workings the potentiometric surface

recovered, as shown by the water-level measurements taken prior to initiating mining at the Horizon Mine. Therefore, the impact to the regional aquifer is expected to be temporary and the potentiometric surface will return to pre-mining conditions "as soon as pumping ceases".

Impacts to the Hydrologic System Resulting From Subsidence

The Permittee refers to Gentry and Abel (1978), who apparently have concluded that topographic lows tend to be protected by upwarping of adjacent slopes during subsidence, and if this is so then "mining-induced surface fracturing should be very limited (or nonexistent) within the Beaver Creek stream channel area" (page 7-76): the Gentry and Abel document is not included in the References section. The Permittee also states that as overburden is approximately 1,000 feet and coal thickness 7.5 feet, there is little potential for subsidence cracks to propagate to the surface. Also, any fracturing that does occur in the stream channel is likely to fill rapidly as a result of sedimentation (page 7-76).

Appendix 7-13 contains a copy of the US Forest Service study of the impacts of subsidence caused by full-extraction mining beneath Burnout Canyon at the Skyline Mine. The study was carried out from 1992 to 1998 by the Forestry Sciences Laboratory, Rocky Mountain Research Station in conjunction with the Manti-Lasal National Forest and Arch Coal Company/Canyon Resources LLC. The study was completed where both the Upper and Lower O'Conner Seams were extracted by longwall mining beneath the perennial stream in Burnout Canyon. The O'Conner Seams and the Hiawatha Seam are in the Blackhawk Formation and the general stratigraphy and lithology at the Skyline and Horizon Mines are similar.

Based on the Burnout Canyon study, the Permittee has concluded that with 800 feet of cover or more, with panels oriented perpendicular to the stream, and with full extraction of the coal, some short-term effects occurred to the stream, but after three years the stream had reverted to a pre-mining configuration. Other conclusions are:

- There were no "measurable" significant impacts due to subsidence on stream flow, silt, or vegetation.
- There was year-to-year variability in the stream, but it was less than the year-to-year variability of the nearby control stream.
- There were temporary changes during the first year after mining in the number of pools, stream drops, and stream width, but the stream had reverted to normal by the third year after mining.

If the same conditions exist at Beaver Creek as existed at Burnout Creek, it would be reasonable to conclude that the impacts from mining beneath Beaver Creek would be similar, that is, minimal and without lasting effect.

Based on a statement from Von Schonfeldt and others (1980) that uniform subsidence "rarely causes problems to renewable resources such as aquifers, streams, and ranch lands." the Permittee concludes that, "It is also not anticipated that subsidence will significantly affect springs within the permit and adjacent areas", and that " Since second mining will occur uniformly across the permit area except in buffer zones, the resulting subsidence should also be uniform, minimizing the potential impacts to overlying springs" (page 7-75). The Von Schonfeldt document is not included in the References section.

The Permittee states on page 7-76, "As noted in the Cumulative Hydrologic Impact Assessment, mining in the area adjacent to the proposed Horizon permit area has not resulted in hydrologic impacts due to subsidence ", and that "Given the lack of extensive aquifer systems in lithologic units that overlie the coal within the permit and adjacent areas, it is not anticipated that groundwater will be significantly affected by subsidence. Thus, subsidence caused as a result of mining by Hidden Splendor Resources, Inc. should not cause significant surface or groundwater impacts within the permit or adjacent areas."

Potential Hydrocarbon Contamination

In addition to the existing discussion on containment of spills, the Permittee has added a statement that there is no intention of abandoning equipment underground. Should it be necessary to abandon any equipment underground, the Permittee commits to drain all petroleum products from the equipment, and show locations of abandoned equipment on a mine map that will be submitted to the Division.

Flooding Potential of Downstream Areas and Streamflow Alteration

Flooding potential is discussed on pages 7-78 and 7-79 (Note: page 7-78 is missing from the hard copies). All disturbed-area runoff will flow through the sedimentation pond or other sediment-control device. Sediment-control devices will minimize flooding impacts to downstream areas because the sediment-control devices are designed to be stable, minimizing the potential for breaches that could cause downstream flooding; sediment is retained on-site, so bottom elevations of stream channels downstream from the disturbed areas are not artificially raised and the hydraulic capacity of the stream channels is not altered; and flow routing through the sediment control devices reduces peak flows from the disturbed areas, precluding flooding impacts to downstream areas. Following reclamation, stream channels will be returned to a stable state, minimizing detrimental effects that may result from flooding.

There has been no reported discharge from the sedimentation pond (UTG040019-001) since May 2000. Reported discharge from the mine directly to Gordon Creek (UTG040019-002) has averaged 200 to 300 gpm since January 2000. The MRP does not discuss flooding potential and streamflow alteration from this discharge that does not pass through the sedimentation pond or other sediment control device.

The plan does not address the effects of subsidence at the edges of the graben and at the permit area boundaries. Mining at Horizon will be done in a graben, and activation of the bounding faults by subsidence needs to be considered. Creation of scarps across Beaver Creek would create ponding on the downstream side of the permit and headcutting on the upstream side. Erosion would eventually cut through the downstream scarp, removing topsoil, forming a gully, and increasing sedimentation downstream outside the permit area. The MRP does not contain a map showing projected limits of subsidence. Neither do maps show the relationship of the planned mine workings and projected subsidence to the faults bounding the graben.

The Division concludes that the possible interaction of the planned coal mining and subsidence with Beaver Creek at the graben's bounding faults needs to be addressed. Also, monitoring of stream and adjacent environments is being recommended.

Groundwater Monitoring Plan

Seeps and springs in the permit and adjacent areas are shown on Plate 7-1.

The mine operators conducted surveys for watercourses, seeps, and springs in the federal lease and surrounding areas. Areas evaluated included Sand Gulch, Coal Canyon, and several unnamed drainages that contribute to Jump Creek. Flow and temperature for each seep or spring are summarized in Appendix 7-2. These data were gathered to provide baseline information in anticipation of future mining.

In November 2001, monitoring well HZ-01-06-1 was installed to provide potentiometric data for the area north of Beaver Creek. Water levels have been measured in the second, third, and fourth quarters and results are tabulated in Table 7-1 in the Annual Reports and in the Division's database. The potentiometric surface dropped 85 feet between the first and second readings.

Surface-Water Monitoring Plan

Surface water resources and locations from which samples have been collected in the permit and adjacent areas are shown on Plate 7-1.

For clarity, creek and drainage names that are used in the submittal are:

PREVIOUS NAME	NEW NAME
Gordon Creek	North Fork Gordon Creek
North Fork Gordon Creek	Jewkes Creek
Right Fork North Fork Gordon Creek	Portal Canyon Creek
Right Middle Fork North Fork Gordon Creek	Spring Two Canyon Creek

The "Previous Names" are local or familiar names and may be used in existing sections of the MRP. The "New Names" correspond to names used by the USGS on their 7.5-minute Quads.

Baseline hydrology was based on review of literature and available data obtained from the USGS, the US Forest Service, the State of Utah, Beaver Creek Coal Company, Blue Blaze Coal Company, and mine permit applications for the surrounding mines. Field reconnaissance was performed to confirm the location and characteristics of surface watercourses, springs, and seeps.

The three principal surface water courses in and adjacent to the mine permit area are Beaver Creek to the north of the permit area, Jewkes Creek through the center of the property, and North Fork Gordon Creek to the south of the property. Streamflow within the permit and adjacent areas is typical of the region, with maximum streamflow occurring in late spring and early summer as a result of snow melt runoff. Flows decrease significantly during the autumn and winter months. Both Jewkes Creek and Beaver Creek have experienced periods of no-flow, primarily in the winter and late summer months.

Small seeps and springs maintain the flow in Beaver Creek, which is considered to be perennial in spite of frequent no-flow periods, mainly in winter and late summer. Downstream decreases in flow have been observed in Beaver Creek between the upstream monitoring station SS-7 and the downstream station SS-8. This is most prevalent during the low-flow season; however, even during periods of high flow, higher discharge rates are occasionally observed at SS-7 as compared with SS-8.

The USGS formerly maintained gauging station 09312700 near the mouth of Beaver Creek, approximately 9 miles northeast of the permit area. During the 29-year period of record from October 1960 to October 1989, the minimum annual discharge was 254 acre-feet during water year 1981, and the maximum annual discharge was 9,950 acre-feet in water year 1983, only two years later (Appendix 7-7). The average annual discharge of Beaver Creek at the USGS monitoring station was 3,310 acre-feet. The Permittee determined the coefficient of variation for the station to be 74 percent, indicating high variability of flow.

Jewkes Creek is an intermittent stream that drains an area slightly greater than 1 square-mile. Portal Canyon Creek, a small drainage that discharges into Jewkes Creek from the northeast, contains the mine facilities and surface operations. Jewkes Creek empties into North Fork Gordon Creek. Flow data in Appendix 7-3 indicate that Jewkes Creek occasionally ceases flowing at station SS-3 even though it continues to flow at low rates upstream at station SS-5. This lost surface flow probably continues through the streambed sediments and contributes baseflow to North Fork Gordon Creek.

North Fork Gordon Creek flows next to County Road 290 southeast of the permit area. The elevation of the creek is lower than the Hiawatha coal seam. Proposed mining operations will occur north of the creek and should not significantly affect the quantity or quality of the flow in North Fork Gordon Creek.

Findings:

R645-301-728.333, The PHC must include a discussion what impact the discharge at UTG040019-002, which does not pass through the sedimentation pond or other sediment control device, will have on the potential for flooding and streamflow alteration.

R645-301-525.100, -525.130, -525.300, -728.333, The PHC must address the possible effects subsidence will create at the bounding faults of the graben and resultant potential impacts both on and off the permit area.

MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

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

Analysis:

Page 6-2 with Figure 6-1, the Location Map, is missing.

Coal Resource and Geologic Information Maps

The streams are not shown on Plate 6-1. Perhaps the drawing layer was turned off or was in a color that doesn't show on the black-and-white print.

Monitoring and Sampling Location Maps

Monitoring and sampling locations are shown on Plate 7-1.

Subsurface Water Resource Maps

Piezometer HZ-01-06-1 was installed in November 2001 and water levels have been measured in the second, third, and fourth quarters. Results are tabulated in Table 7-1 in the Annual Reports and in the Division's database. Potentiometric surface maps have not been updated with the new data.

Surface Water Resource Maps

Surface water resources and locations from which samples have been collected in the permit and adjacent areas are shown on Plate 7-1.

Findings:

R645-301-722.200, HSR must add information from piezometer HZ-01-06-1 to the potentiometric surface maps and update the contours.

R645-301-121.220, Page 6-2 with Figure 6-1, the Location Map, must be restored to the plan.

R645-301-724.310, Streams need to be shown on Plate 6-1.

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, -300-147, -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:

Steve and Pete Stamitakis stated in their letter to the Division that monitoring had not been done "since Horizon left"; it isn't clear what date or event this refers to, but some of the monitoring was not done in 2000. There have also been quarters when there was no access for some monitoring sites because of snow cover. Data in the Division's database indicate that the monitoring plan described in the MRP has basically been followed and reporting to the Division is up-to-date.

Groundwater Monitoring

The Ground Water Monitoring Plan is in Chapter 7. Operational and reclamation ground-water monitoring parameters are supposed to be in Table 7-2, but there is no Table 7-2 in the plan. Monitoring points SP-1, -2, and -4 were monitored for baseline information beginning in 1989. The USGS monitored SP-9 (Jewkes Spring) during the period of 1979 through 1983, Beaver Creek Coal Company monitored it from 1985 through 1995, and Horizon has monitored it since 1996.

In November 2001, monitoring well HZ-01-06-1 was installed to provide potentiometric data for the area north of Beaver Creek. Water levels have been measured in the second, third, and fourth quarters and results are tabulated in Table 7-1 in the Annual Reports and are in the Division's database. The potentiometric surface dropped 85 feet between the first and second readings. It is not clear to the Permittee as to whether the drop was due to the mine de-watering the aquifer or if the initial reading was inaccurate. Circulation was lost numerous times during drilling, resulting in drilling fluid flowing into the formation, and the loss of the drilling fluid may have artificially elevated the potentiometric surface for the first reading. However, HZ-95-1 experienced a 104-foot drop in a similar time period between the fall of 1999 and spring of 2000.

On page 7-74 it states:

> Soon after initiating mining it became evident that far more than 36 to 90 gpm was flowing into the mine. The old workings had intercepted a fault that was conveying a large volume of groundwater into the workings. This fault may be the same fault encountered in the Beaver Creek Coal Company No. 3 Mine or a fault connected to it. The North Mains and a panel were extended to the north until the same water bearing fault was encountered. When mining first encountered the fault the inflow was greater than 450 gpm. After the initial surge of groundwater, which lasted approximately 2 months, the fault produced between 200 and 300 gpm. During a period when the mine was shutdown in 2002 and 2003 the mine pumped an average of 279 gpm from the mine. During the period of shutdown the pumping data shows a slight decrease in the pumping rate over time. During the period of shutdown in 2002 the average pumping rate was 294 gpm. During the period of shutdown in 2003 the average pumping rate was 269 gpm. Thus the formation is slowly being de-watered and is producing less water with time. Upon resuming mining in the West Mains in August of 2003 the average pumping rates increased due to groundwater encountered at the mining face....

And on page 7-75:

> ...Due to the rapid drop in the potentiometric surface and the magnitude of the drop at HZ-95-1 it could be concluded that the influence of the water-bearing fault extends at least as far north as Beaver Creek. If the initial water level reading for HZ-01-06-1 is valid then it can be concluded that the influence of the water-bearing fault on the potentiometric surface extends at least to the northern permit boundary.

Groundwater monitoring during operation of the mine will be conducted in accordance with R645-301-723 and will consist of:

- Collection of flow and water-quality data from springs SP-1, -2, -4, -9, 2-6-W (Homestead Spring), and GV-70;
- Collection of flow and water-quality data from sustained inflows to the mine and mine water discharge quantities (temporary or permanent); and
- Collection of water-level data from the HZ monitoring wells.

Surface Water Monitoring

Surface-water quality data have been collected from the permit and adjacent areas since 1989, when sample sites have been accessible. SS-7 and SS-8 along Beaver Creek have been monitored since 1992, and SS-11 in Sand Gulch and SS-12 on Beaver Creek since 1996. Prior to 1996 these data were generally collected in accordance with the Division's guidelines published in 1986. Beginning in 1996, data have been collected, where feasible, in accordance with the Division's guidelines published in April 1995. The data collected from the monitored sites, together with tables outlining the parameters that have been monitored, are presented in Appendix 7-3 (page 7-37). Data are also in the Division's database.

Water-Quality Standards And Effluent Limitations

Temporary mine discharge quantities will be reported monthly and submitted to the Division with quarterly monitoring data. Reports will contain the period of pumping and the daily flow rate. A continuous flow meter was installed in 2001 and has been used to report mine discharge since that time (page 7-30).

Language in the MRP regarding the UPDES permits is confusing. In places it discusses a mine discharge permit that was rejected but will be reapplied for in the future, and that mine discharge will be routed through the sedimentation pond in the interim. There is no copy of the UPDES permit in the MRP. The Division's database indicates the sedimentation pond discharged once, in 1999, and the mine has been discharging directly to Gordon Creek since 2001.

Diversions: Perennial and Intermittent Streams

There are no new diversions of perennial or intermittent streams

Diversions: Miscellaneous Flows

There are no diversions of miscellaneous flows.

Stream Buffer Zones

Under R643-301- 731.610, no land within 100 feet of a perennial stream or an intermittent stream will be disturbed by coal mining and reclamation operations, unless the Division specifically authorizes coal mining and reclamation operations closer to, or through, such a stream. The Division may authorize such activities only upon finding that:

- 731.611. Coal mining and reclamation operations will not cause or contribute to the violation of applicable Utah or federal water quality standards and will not adversely affect the water quantity and quality or other environmental resources of the stream; and

- 731.612. If there will be a temporary or permanent stream channel diversion, it will comply with R645-301-742.300.

No diversion of Beaver Creek or other streams to the north is planned, so 731.612 does not apply for this Permit Boundary Expansion. Diversion culverts in Jewkes Creek and Portal Canyon have been approved in previous permit reviews.

Mining is planned beneath Beaver Creek, a perennial stream. The Permittee believes that no damage will occur to Beaver Creek with the planned mining. There are no plans for a buffer zone. Subsidence protection is planned for Beaver Creek by orienting the panels perpendicular to the stream and using full extraction pillaring (page 3-2). There will be no surface mining activity in the Beaver Creek watershed, so no stream buffer zone is needed along Beaver Creek to protect structures from surface activity.

The Permittee states in the PHC (Section 7.3.2) that retreat mining results in uniform downwarping and lowering of strata above the mined interval. This uniform downward movement is generally not accompanied by a significant degree of fracturing. As a result, the original attitude and integrity of the strata are maintained. Little impact on the perched aquifers of the overburden is expected to result from downwarping.

Appendix 7-13 contains a copy of the US Forest Service study of the impacts of subsidence caused by full extraction mining beneath Burnout Canyon at the Skyline Mine. The study was carried out from 1992 to 1998 by the Logan Forestry Sciences Laboratory, Rocky Mountain Research Station in conjunction with the Manti-Lasal National Forest and Arch Coal Company/Canyon Resources LLC. The study was completed over an area of the mine where both the Upper and Lower O'Conner Seams were extracted by longwall mining beneath the perennial stream in Burnout Canyon. The O'Conner Seams and the Hiawatha Seam are in the Blackhawk Formation and the general stratigraphy and lithology at the Skyline and Horizon Mines are similar.

Based on the Burnout Canyon study, the Permittee has concluded that with 800 feet of cover or more, with panels oriented perpendicular to the stream, and with full extraction of the coal, some short-term effects occurred to the stream but after three years the stream had reverted to a pre-mining configuration. Other conclusions are:

- There were no "measurable" significant impacts due to subsidence on stream flow, silt, or vegetation.

- There was year-to-year variability in the stream, but it was less than the year-to-year variability of the nearby control stream.

- There were temporary changes during the first year after mining in the number of pools, stream drops, and stream width, but the stream had reverted to normal by the third year after mining.

If the same conditions exist at Beaver Creek as existed at Burnout Creek, it would be reasonable to conclude that the impacts from mining beneath Beaver Creek would be the same, would be minimal and without lasting effect.

There is no overburden isopach map in the MRP. Table 6-2 lists depths to the top of the Hiawatha Seam as measured in five bore holes: depths range from 215 feet to 1,149 feet, and only two of the five are greater than 800 feet, so an average based on these data indicate the overburden is thinner than 800 feet. However, boreholes LMC-1 and HZ-95-1 are located adjacent to Beaver Creek and indicate the Hiawatha overburden thickness in the graben is at least 800 feet beneath the creek. The cross section on Plate 6-2 also indicates a thickness greater than 800 feet. Therefore, the conclusions from Burnout Creek, which relate to overburden being over 800 feet thick, would indicate that subsidence will cause only minor and temporary impacts to Beaver Creek.

The plan does not address the effects of subsidence at the edges of the graben and at the permit area boundaries.

One factor that is different from the Skyline Mine and Burnout Canyon is that mining at Horizon will be done in a graben, and activation of the bounding faults by subsidence needs to be considered. Creation of scarps across Beaver Creek would create ponding on the downstream side of the permit and headcutting on the upstream side. Erosion would eventually cut through the downstream scarp, removing topsoil, forming a gully, and increasing sedimentation downstream outside the permit area. The MRP does not contain a map showing projected limits of subsidence. Neither do maps show the relationship of the planned mine workings and projected subsidence to the faults bounding the graben.

The Division concludes that, within the purview of R643-301- 731.610, the possible interaction of the planned coal mining and subsidence with Beaver Creek at the graben's bounding faults needs to be addressed. Also, monitoring of stream and adjacent environments is being recommended.

The Permittee notes in Section 3.3.2.2 that no surface structures exist within the zone of potential subsidence. There are, however, private unpaved roads adjacent to Beaver Creek, in Sand Gulch, and in an unnamed side canyon to Jump Creek that could be affected by subsidence. Surface owners Steve and Pete Stamatakis have expressed concern over damage to their property from subsidence. Subsidence of roads is allowed by the Coal Mining Rules, but it is reasonably foreseeable that damage to these roads from subsidence could result in diminished use, so the Permittee needs to add a discussion of the potential damage to these roads, and formulate a plan repair any damage to these roads that might be sufficient to result in impairment, loss of use, or material damage.

Sediment Control Measures

There is no new surface disturbance. There is no new or modified sedimentation pond or any other new or modified sediment control measure.

Water Replacement

On page 3-28 is the statement:

> ...Should a substantial inflow of groundwater occur, mitigation measures may include: attempts to seal off the inflow, increased monitoring efforts, lining of the stream bed through the affected area if it is determined to be surface water, and replacement of lost water if the groundwater does not rebound after mining is completed as indicated by monitoring.
>
> An extended mitigation plan will be enacted should a measurable impact occur to surface water due to mining activity. The mitigation plan will be correlated with Water Rights and UDOGM [the Division].

Under R645-301-525.480 and R645-301-731.530, there needs to be plan in the MRP, before any damage actually occurs, to repair damage to surface facilities and promptly replace state-appropriated water supplies. Mitigation of impacts to water supplies cannot be put off until "after mining is completed."

Findings:

R645-301-731.211, Table 7-2 must be included in the plan.

R645-301-623.300, The Permittee needs to provide an overburden thickness isopach map.

R645-301-731.222.2, The Permittee needs to include a copy of the current UPDES permit in the MRP.

R645-301-525.120, -525.480, -525.500, The Permittee needs to add a discussion of the potential for damage to the private unpaved roads adjacent to Beaver Creek, in Sand Gulch, and in an unnamed side canyon to Jump Creek that could be affected by subsidence, and formulate a plan to repair any damage that results in impairment, loss of use, or material damage to these roads.

R645-301-525.480, -525, -731.530, The Permittee needs to add a plan to promptly replace contaminated, diminished, or interrupted water supplies.

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:

Mine Workings Maps

The mine-workings map, Plate 3-3, does not show the projected angle-of-draw or the positions of the bounding faults of the graben.

Monitoring and Sampling Location Maps

Monitoring and sampling locations are shown on Plate 7-1.

Certification Requirements

The plates in this submittal have all been certified by Mark Wayment, a professional engineer registered in Utah.

Findings:

R645-301-525.240, -623.300, -724.310, The Permittee needs to show the relationship of the existing and projected mine workings and projected angle-of-draw to the bounding faults of the graben on Plate 3-3 or another appropriate map.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

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

Analysis:

The CHIA was updated when the south part of Federal Lease UTU-74804 was added to the permit in 2001. That revision included assessment of the entire federal lease UTU-74804. The Division is updating the CHIA for this significant revision, but major changes are not anticipated.

Findings:

The Division will update the CHIA as needed for this permit extension, a significant revision to the mine plan.

RECOMMENDATIONS:

This amendment to the MRP should not be approved. There are numerous deficiencies that need to be addressed before approval can be recommended.

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