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DIVISION OF OIL, GAS AND MINING

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OK

January 9, 2003

Dan Meadors, General Manager
Canyon Fuel Company, LLC
HC 35 Box 380
Helper, Utah 84526

Re: Approval of James Canyon Road & Wells Amendment, Canyon Fuel Company, Skyline Mine, C/007/005 AM 01K-2, Outgoing File

Dear Mr. Meadors:

The above-referenced amendment is approved effective December 2, 2002. A stamped incorporated copy is enclosed for your copy of the Mining and Reclamation Plan (MRP). A copy of the Technical Analysis is also enclosed.

Please note that your submittal for this amendment also included the submittal for the Winter Quarters/North Lease significant revision. This was done per agreement between the mine and the Division since there were considerable overlaps in the two. Therefore, the enclosed stamped incorporated copy serves to update your MRP for both the James Canyon Road & Wells amendment and the Winter Quarters/North Lease significant revision.

If you have any questions, please feel free to call me at (801) 538-5325.

Sincerely,

Daron R. Haddock

Daron Haddock
Permit Supervisor

an
Enclosure
cc Ranvir Singh, OSM
Pat Gubbins, BLM
Elaine Zieroth, USFS
Mark Page, Water Rights w/o
Dave Ariotti, DEQ w/o
Derris Jones, DWR w/o
Price Field Office
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Utah Oil Gas and Mining

Coal Regulatory Program

Skyline Mine
James Canyon Road & Wells Amendment
C/007/005-AM01K-2
Technical Analysis
November 21, 2002

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TECHNICAL ANALYSIS

The Division ensures compliance with the Surface Mining Control and Reclamation Act of 1977 (SMCRA). When mines submit a Permit Application Package or an amendment to their Mining and Reclamation Plan, the Division reviews the proposal for conformance to the R645-Coal Mining Rules. This Technical Analysis is such a review. Regardless of these analyses, the permittee must comply with the minimum regulatory requirements as established by SMCRA.

Readers of this document must be aware that the regulatory requirements are included by reference. A complete and current copy of these regulations and a copy of the Technical Analysis and Findings Review Guide can be found at http://ogm.utah.gov/coal

This Technical Analysis (TA) is written as part of the permit review process. It documents the Findings that the Division has made to date regarding the application for a permit and is the basis for permitting decisions with regard to the application. The TA is broken down into logical section headings which comprise the necessary components of an application. Each section is analyzed and specific findings are then provided which indicate whether or not the application is in compliance with the requirements.

Often the first technical review of an application finds that the application contains some deficiencies. The deficiencies are discussed in the body of the TA and are identified by a regulatory reference which describes the minimum requirements. In this Technical Analysis we have summarized the deficiencies at the beginning of the document to aid in responding to them. Once all of the deficiencies have been adequately addressed, the TA will be considered final for the permitting action.

It may be that not every topic or regulatory requirement is discussed in this version of the TA. Generally only those sections are analyzed that pertain to a particular permitting action. TA's may have been completed previously and the revised information has not altered the original findings. Those sections that are not discussed in this document are generally considered to be in compliance.

INTRODUCTION

On August 16, 2001 Skyline Mine encountered large groundwater inflows. The inflows were estimated to be about 4,500 gallons per minute (gpm) and required emergency actions to prevent loss of life and equipment. Subsequent pumping and pipelines resulted in expenditures of well over $ 6 million dollars to keep water from filling the mine. Part of the flooding response was to drill two wells in order to pump water to the surface. The wells pump groundwater only and are not pumping water that has been inside the mine. This was intended to relieve water pressure and decrease water inflow to the mine. The wells are located in James Canyon, on the ground surface above the water inflow location. The wells were originally permitted by the Bureau of Land Management (BLM) as an exploration project.

On November 15, 2001 the Division received an amendment, which, among other things, addressed potential impacts to groundwater due to inflows to the mine. This includes past inflows, in addition to the most recent one on August 16, 2001. On April 1, 2002 the Division responded to the Operator with a Technical Analysis containing several deficiencies. This resulted in the Operator submitting a revised amendment that was received by the Division on July 8, 2002. The Division responded with a Technical Analysis on October 10, 2002 and a follow-up Technical Analysis on October 24, 2002. Both documents identified deficiencies in the amendment and the Operator responded with revisions, that the Division received on October 29, 2002. This Technical Analysis is a review of that latest submittal. There are no deficiencies.

It should be noted that the urgency of the situation necessitated two other MRP amendments, which were approved. The first amendment (AM01H) dealt with burial of a pipeline from the James Canyon wells to discharge the well water into Electric Lake. The pipeline is buried adjacent to an old road that runs from the wells down to the lake. The pipeline is to be abandoned at the end of its life and the road has been reclaimed. The second amendment (IB01I-1) dealt with burial of a power line to supply electricity to the wells in James Canyon. The power line is buried adjacent to the same old road as the pipeline; however, it's along the section of road leading from the mountaintop down the road to the wells. This section of road and the power line are still in use.

GENERAL CONTENTS

PERMIT APPLICATION FORMAT AND CONTENTS

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

Analysis:

The James Canyon drill pad and pipeline are located in Section 35, T.13S, R6E (pp 2-63 (a), 2-120 (f) and Soil Resource Evaluation Report of Appendix A2). The powerline is in Sections 25 and 36, T13S, R6E. The pipeline was buried and reclaimed from the drill site in James Canyon to the mouth of the canyon (Electric Lake) and the power cable was buried in the road from the head of the canyon to the drill site (p 2-63(b).

Plate 3.4-1 indicates that the permit and disturbed area boundaries for the length of the James Canyon Road. The permit area is also shown on Drawing No. 1.6-3. Most of the road is within the permit area and a "cherry-stem" has been drawn to include a portion of the road extending outwards from the permit area.

Findings:

Information provided with the submittal is accurate and meets the requirements of this section.

REPORTING OF TECHNICAL DATA

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

Analysis:

Soils analyses and field report of the James Canyon area were conducted after disturbance on the topsoil stored and on the berms along the roadways. Mr. Daniel Larsen, Soil Scientist with Environmental Industrial Services of Helper, Utah, conducted a soil survey in September 2001. Inter-Mountain Laboratories of Sheridan, WY analyzed the soil samples.

Findings:

The information meets the requirements of the Regulations.

GENERAL CONTENTS

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:

During construction of Electric Lake, the James Canyon County road was constructed. The road was reclaimed in 1972 and included construction of water bars every one hundred fifty feet (page 2-63b and 2-120i). The road was vegetated with grasses, rabbit brush and sagebrush. According to the soils report in Appendix A2, the route of the buried pipeline in James Canyon is mostly southern exposure from 9,600 feet down to about 8,560 feet elevation.

The site was redisturbed during August of 2001 for construction of the drill site, burial of power cable to the drill site and burial of water pipeline from the drill site to Electric Lake. The power cable originates from the Questar (gas) property at the head of Boardinghouse Canyon and continues along the Monument Peak Road to the head of James Canyon.

Vegetation and soils analysis of the site were conducted after the disturbance to evaluate the condition of the adjacent land and make presumptions about the disturbed area. Both vegetation and soils reports are in Appendix A2.

Findings:

The information provided is adequate for the General Environmental Resources Information section of the Regulations.

HISTORIC AND ARCHEOLOGICAL RESOURCE INFORMATION

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

Analysis:

Montgomery Archaeological Consultants conducted a cultural resources survey of the dewatering drill holes and access road on August 21, 2001. The report did not state that the

pipeline route was included in the survey although one aspen art site was documented in this survey adjacent to the pipeline. Chris Hansen, Canyon Fuels, stated on August 24, 2001 that the consultant refers to the pipeline route as the access road.

The James Canyon segment of the county road from Scofield to Fairview was documented as a historic site (42Em2734) along with two aspen art sites (42Em2732 and 42Em2733). The earliest documented date for the James Canyon road was a map dated 1923. The road was decommissioned in 1975 during construction of Electric Lake. The aspen art site adjacent to the road exhibits one carving consisting of "Don Probert 46" and another more recent carving. The three historic sites were recommended as not eligible for the National Register of Historic Places (NRHP) because of lack of artistic elements for the aspen art and lack of retention of structural integrity for the road.

Findings:

Information provided in the application meets the minimum Historic and Archeological Resource Information requirements of the regulations.

VEGETATION RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.19; R645-301-320.

Analysis:

The vegetative communities within the U. P. & L. Tract of the permit area are:

- sagebrush/grass
- riparian
- conifer-timber
- aspen.
- Mountain herbland

Dwg. No. 2.7.1-1a.dwg, UP&L Tract Vegetation Map delineates the vegetative community for the additional permit area.

An unpaved county road through James Canyon was abandoned in 1972. The abandonment consisted of minor regrading, scarification, installing water bars, and seeding. The current road and well were constructed in late summer of 2001 under a coal exploration permit issued by BLM. The vegetation along the road prior to redisturbance consisted of grasses, rabbitbrush, and sagebrush (page 2-63b).

The James Canyon road dissects several different plant community types but generally passes through aspen forests with openings. Understory cover was 58 percent and overstory cover 6 percent. Productivity of the area is estimated at 3000 pounds/acre (Forest Service letter from Rod Player).

Findings:

Information provided in the application is adequate to meet the minimum Vegetation Information requirements of the regulations.

FISH AND WILDLIFE RESOURCE INFORMATION

Regulatory Reference: 30 CFR 784.21; R645-301-322.

Analysis:

Dr. Clayton White conducted a goshawk survey of Burnout Canyon and adjacent areas in May 2001. No goshawks were found, although goshawks and red-tail hawks have been observed in the area in past years (Appendix Volume A-2). There are goshawks nesting in adjacent drainages. (Phone conversation with Rod Player, Forest Service Biologist, on 1/28/02 with Susan White.)

The pipeline will be buried upslope from James Creek. The mouth of James Creek is critical to the Yellowstone cutthroat trout spawning. The Permittee has committed to sampling fish and macroinvertebrates in James Creek (page 2-71 and page 2-72).

Findings:

Information provided in the application meets the minimum Fish and Wildlife Resource Information requirements of the regulations.

SOILS RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.21; 30 CFR 817.22; 30 CFR 817.200(c); 30 CFR 823; R645-301-220; R645-301-411.

Analysis:

In a telephone conversation on October 5, 2001, with Gary Taylor, Environmental Coordinator for the Skyline Mine, I verified that for the stretch of Forest Service road outside of the mine's disturbed area boundary and to the James Canyon well site:

1. There was no topsoil.
2. There was no topsoil salvage.
3. There was no topsoil redistribution.

Consequently, soil survey information provided in Appendix 2 of Chapter 2 is for the half-mile section of reclaimed road in James Canyon where the 16-inch poly pipe has been buried and for the well site. Mr. Dan Larsen, Soil Scientist, with EIS Environmental and Engineering Consultants, Helper, Utah, September 2001, has provided a soil description and field notes for the well site location, and brief notes for the rest of the reclaimed road, supported by hand-dug excavations. Laboratory analysis was conducted on five composite samples collected from soil representing each of the identified soil types and the stockpiled topsoil and subsoil at the well site.

The survey indicates that soils supporting the Aspen/Grass/Forb vegetation type (A) had a topsoil layer that was 16 – 24 inches in depth, very dark brown color and a texture of sandy loam or loam with a granular structure. The subsoil had 15 – 30 percent rock fragments in the fravel and cobble size and was brown to yellowish brown in color, 20 – 40 inches thick. Below this, a dark grayish-brown to brown clay loam soil with blocky structure was encountered. These are Pachic Palecryolls and Pachic Haplocryolls.

Soils supporting sagebrush (S) were found at the lower elevations and were generally loam soils with a brown topsoil horizon of 6 – 12 inches in thickness. The soils were formed from sandstone and shale with deeper subsoils (to forty inches) forming in the colluvial deposits. Generally, these soils are more shallow than the soils that support aspen growth.

An inclusion of calcareous tufa (T) was identified for a 100 feet along the pipeline route, near a spring, approximately ¼ southwest of the drill pad. The Tufa soils had the following characteristics: a 7 – 12 inch dark brown surface layer overlying white subsoil grading to rock at about 20 – 24 inches.

Productivity information for James Canyon is found in Section 2.12 Land Use Attachment 3 Eccles and Mud Creek Work Plan. A grass/forbe community at the head of coal canyon was evaluated by Robert Thompson, Botanist, U. S. Forest Service. The site had a high production rate of 2,910 lbs/acre and was classified as Fair condition.

Findings:

The information provided is adequate for the Environmental Soil Resources Information section of the Regulations

ALLUVIAL VALLEY FLOORS

Regulatory Reference: 30 CFR 785.19; 30 CFR 822; R645-302-320.

Analysis:

Alluvial valley floor determination

The Division's March 1984 Technical Analysis written for the Valley Camp Mine (ACT/007/001) provides a summation of the history of the alluvial valley floor determination. In 1984, the Division stated that Whisky Canyon and Pleasant Valley above the Utah No. 2 facilities (White Oak Load Out) were observed by the Office of Surface Mining in August of 1983 to be too narrow for flood irrigation or subirrigation agricultural activities. Also in 1984, it was noted that the pastures below the Utah No. 2 Mine (White Oak Loadout) are flood irrigated and the grasses on the valley bottom may be subirrigated. In the Valley Camp MRP, Map R645-301-411.100 Premining Land Use Map shows the land use down stream of the Belina Mine Complex. Shown on this map, are two pastures along Mud Creek in Pleasant valley below the Utah No. 2 Mine (now called the White Oak Load Out).

Since August 2001, the Skyline Mine has been discharging approximately 10,000 to 15,000 gpm (approximately 20 - 25 cfs) into Eccles Creek. The discharge rate has currently stabilized at 9,200 gpm (20 cfs, July 2002 Addendum to the PHC). These waters flow down Eccles Creek and then to Mud Creek. Mud Creek flows through Pleasant Valley, an alluvial valley floor.

The historical record of flow in Mud Creek is graphed in Figure 2.12.C, as recorded at the USGS station just downstream of the confluence with Winter Quarter's Creek. Ordinarily, high flows of approximately 100 – 150 cfs occur for a short duration during the months of May and June. Flows quickly subside after snow melt back to the baseline flow of approximately 6 – 12 cfs. According to Section 2.12, the highest daily mean flow during the period from 1974 – 2002 was 384 cfs during the month of May 1984. The lowest daily mean flow was 1.6 cfs during January 1980. The mine water discharge is constantly contributing an additional 20 cfs to the baseline flow. i.e. 2 to 3 times the normal base flow. Mine water discharge will decline over the next two years to approximately 2,800 gpm (5cfs) (Appendix F of the October 2002 Addendum to the PHC).

Measurements of flows taken on November 26, 2001 (Appendix D) recorded 18.4 cfs in Mud creek after the confluence with Eccles Creek (station MW1) and 24.44 cfs after the confluence with Winter Quarters Creek (station MW3). The gain in flow downstream is attributed to contributions from springs and side streams (2 – 3 cfs) and re-emerging base flow from the alluvium of 3 – 4 cfs (Section 2.12 and Appendix D July 2002 Addendum to the PHC).

The mine waters being discharged had an average Total Dissolved Solids (TDS) level of 600 mg/L in July of 2000. With continued pumping, the concentration of TDS has decreased to less than 400 mg/L as of March 2002. Above the mine, the average concentration of TDS is 300 mg/L (July 2002 Addendum to the PHC).

Cross sections of the channel were measured at six different stations shown on Figure 2.12B Valley Cross Section Location Map and Attachment 1 Land Use of Section 2.12. The piezometric surface was measured at four of those stations. In the vicinity of Green Canyon, the groundwater is four feet below the surface (Station 7300). In the area of Station 14480, on Mr. Radakovich's property (Figure 2.12.D Farm Location Map), the groundwater level is eight feet below the surface, reflecting the incised nature of the stream channel in this section of Mud Creek. The ground water rises back up to four feet below the surface at Station 17340 on Mr Jensen's property.

Station 17340 is located at the site of an irrigation diversion. As a result, the depth to groundwater at a point 400 feet distant from the stream is closer to the surface than that along the stream channel, due to irrigation return flow as well as stream channel entrenchment.

Land along Mud Creek is owned by four landowners (Drawing 1.6-1 Surface Ownership and Table 2.12.3). The land is used for grazing. Figure 2.12 D of Section 2.12 provides a location map for the pastures along Mud Creek. Ray Jensen, Range Specialist for the Bureau of Land Management (BLM) describes the area as sub-irrigated, grazed land with an historical yield of 4000-6000 pounds/acre. The predominant vegetation type is grass. The number of animals grazed on the pastures by each land owner is variable with time. Table 2.12.4 shows the number of animals grazing on each parcel in July 2002.

The Permittee has evaluated the value of the pasture ground in terms of the replacement cost for feed (Section 2.12). At a consumption rate of 0.5 Tons/mo and a cost of $100/Ton hay, the replacement cost is #50/animal/month. The replacement of feed is not likely however, since the Permittee has shown that grazing will not be impeded due to high flows along Mud Creek and reduction in the area available for grazing is limited to the immediate vicinity of the channel banks which may become instable and collapse as they are eroded by the high water.

Mud Creek stream channel vegetation was assessed in December 2001 by Dr. Patrick Collins of Mt. Nebo Scientific (Appendix A of Appendix D July 2002 Addendum to the PHC). A level II investigation was conducted using the methods of the USDA Forest Service. Two

reaches were located on Mud Creek. Just below the confluence of Eccles and Mud Creeks at Reach #4 (corresponding to MW1), the riparian community was approximately 91 feet wide and consisted of willows, sedge and rush grasses. Using a qualitative measure, approximately 80% of the bank in Reach #4 were vegetated and stable. Downstream, at Reach #5 (corresponding to MW3), the width of the riparian community broadened to 120 feet and consisted mostly of willows growing in both riparian and wetland communities. Approximately 60% of the bank was vegetated and stable. Channel vegetation was not assessed between MW1 and MW3, a distance of approximately 4 stream miles. "Observations of this section between MW1 and MW3 from the road are that willows and grasses that extend to the edge of the active channel in reaches up and downstream area generally absent from this section" (February 27, 2002 EarthFax report in Appendix D of July 2002 Addendum to the PHC).

The gradient of Mud Creek is approximately 0.0091 ft/ft with a sinuosity ratio of 1.6 (as stated on page 2-133d of Section 2.12) The figure was derived from aerial photographs (personal communication Rich White, Earth Fax Engineering, November 15, 2002). The channel flattens on approach to Scofield Reservoir with an average gradient of 0.02 to 0.1 ft/ft. Channel subsoils are silty sands and clayey silts, classified by the 1988 Carbon County Soil Survey as Silas and Silas Brycan series. The results of laboratory analysis on the physical properties of the soils in the creek are found in Appendix B of Appendix D of the July 2002 Addendum to the PHC. The roughness coefficient (Mannings "n") is a low value around 0.03 or 0.04 (Appendix D of the July 2002 Addendum to the PHC), indicating a soft channel bed. Cross sections of the channel describe a channel bed that is 96% cobbles and gravels and side slopes that are 100% sand, silt and clay (Appendix E of Appendix D of the July 2002 Addendum to the PHC). Low flow terraces are limited in extent and the channel is slightly incised. There is no broad flood plain.

The current stream flows do not approach natural bankfull discharge (Table 5 of Appendix D July 2002 Addendum to the PHC). The erosional stability of the Mud Creek channel beds and banks was evaluated and found to fall within the allowable-velocity using the techniques of evaluation described by the Soil Conservation Service (Table 3 of Appendix D July 2002 Addendum to the PHC).

A stability evaluation of the channel concluded that well vegetated slopes (grasses and willows) can handle the increased flow with out erosion (Appendix D of the July 2002 Addendum to the PHC). There are channel banks of Mud Creek that are not well vegetated and the Division would encourage landowners of these lands to avail themselves of programs that would provide assistance to armor the bank and divert flow to allow the eroding banks an opportunity to reclaim. The Permittee expressed a willingness to help in this effort (see field visit report and associated photographs dated October 29, 2002). The Division is facilitating a meeting with the Natural Resources Conservation Service and the landowner for this purpose. The July 2002 Addendum to the PHC (page PHC A-21) commits to armoring stream channel banks, planting of stream bank stabilizing vegetation or redirection of some flows should

monitoring reveal that deterioration of stream chemistry or stream morphology or vegetative community is related to mine water discharge.

In conclusion, the Division recognizes that the impact to Mud Creek from the increased flows, is not the interruption of agricultural activity, but could be the acceleration of instability in the channel banks and increased erosion of the stream channel in reaches of the channel that are not well vegetated. The area impacted would be very small in relation to the acreage being pastured and would be negligible to the total production of the pastures.

Scofield Reservoir is a drinking water source for Price, a top cold water fishery in the State and has been listed as an impaired water body by the EPA. Of special concern is the concentration of total phosphorus in the reservoir (Appendix E of the July 2002 Addendum to the PHC). A significant source of phosphorus pollution in the Scofield Reservoir is the sediments entering the reservoir delivered by Mud Creek. Using the information in the Division's Water Quality Database for TSS and flow at sample locations C6 on Eccles Creek, VC9 on Mud Creek and VC1 on Mud Creek, the average sediment yield carried by Eccles and Mud Creek prior to 1999 was 2,710 Tons/yr. The average sediment yield carried by Eccles and Mud Creek between 1999 and 2002 has been 2,908 Tons/yr. This translates to an increase of 7% annually.

Consequently, the contributions of mine water to the increased phosphorus loading will be evaluated in the monitoring plan proposed by the Permittee (Section 2.12 Attachment 3). Monitoring at two sites on Eccles and five sites on Mud Creek will include: total flow, TDS, TSS, and total phosphorous, stream morphology. (Station locations are shown on Figure 1 Location of Reference Sites Attachment 3 Land Use of Section 2.12.) Stations will be monitored four times a year (seasonally) and for a period of one year following a reduction in discharge to a rate of 350 gpm or less. Sediment yield loading from flows in Mud Creek will be computed from the TSS and flow data collected. Annual evaluations of the stream will be summarized in a report to be submitted to the Division with the Skyline Mine Annual Report. The monitoring plan will also evaluate the changes in stream morphology and vegetation at the stations over the same time period. The Study Plan prepared by Dr. Patrick Collins on July 4, 2002 entitled "Continuing Studies of the Effects of Increased Flows on Riparian Communities at Eccles Canyon Creek & Mud Creek," is included in Attachment 3 of Section 2.12. This Level III assessment of the riparian communities of Eccles and Mud Creeks will be conducted for two years beginning in 2002 and being completed in 2003, with fieldwork being conducted in July and August.

Findings:

In accordance with R645-302-323.122, the Division finds that the Skyline Mine operations have not materially damaged the underground water systems in Pleasant Valley, which is outside the permit area of the existing coal mining and reclamation operation. The

Division finds that there has been no significant impact to productivity of the pasturelands in Pleasant Valley. The Division finds that the quality of the mine water discharge in terms of Total Dissolved Solids has improved with the quantity of water discharged. No conclusive information on the Phosphorus contributions of sediments carried by the Mud Creek waters is available at this time.

In accordance with R645-302- 324.300, The Division has required continued monitoring of the vegetation, erosion of banks, flows and chemical quality of the waters at established locations on Mud Creek.

HYDROLOGIC RESOURCE INFORMATION

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

Analysis:

Probable Hydrologic Consequences Determination

The amendment begins with a review of the history of water inflows to Skyline Mine. All mine inflows are pumped from the mine and discharged into Eccles Creek. The location, date, estimated original inflows, and estimated present inflows, are summarized in the following table. These are taken from the amendment Table PHC A-1 and Dwg. PHC A-2. Note that, while some individual inflows have decreased, they have not stopped. According to the Operator, this is unlike previous experiences in the mine where water inflows have typically slowed down considerably, and often stopped altogether. Also, previous inflows were much smaller. Prior to 1999, typical total inflows to Skyline Mine were about 300 to 400gpm. It appears that in the last 4 years, as the mining operation continues, more water inflows are encountered, and the total amount of inflow to the mine has increased. Most of the individual inflows have declined so the total current inflows are less than the total initial inflows.

Inflow Location	Date	Estimated Initial Flow, gpm	Estimated October 2002 Flow, gpm
14-Left HG	03/1999	1,600	800
16-Left HG	12/1999	1,200	800
W. Submains	03/2000	1,000	300
10-Left	08/2001	6,500	3,200
E. Submain XC5	10/2001	1,000	400
11-Left HG XC24	02/2002	1,000	1,000

11-Left HG XC40	02/2002	1,000	1,500
11-Left Setup Rm.	03/2002	1,500	1,300
	Totals	14,800	9,300

These estimated numbers are consistent with the amount of water being pumped from the mine to Eccles Creek. Every month the Operator provides the Division quantities of the pumped discharges to Eccles Creek and to Electric Lake. The average discharge to Eccles Creek from 8/16/01 to 9/30/02 has been 8,080 gpm with no days without pumping. The average discharge to Electric Lake from 9/16/01 to 9/30/02 has been 2,220 gpm, with 38 days of no pumping. Of course, these natural inflows vary with time according to geologic conditions.

In the past the Division had suggested that mine waters pumped into Eccles Creek might be pumped instead to Electric Lake. This would have reduced possible adverse impacts to Eccles Creek and Mud Creek. That is not a viable option due to water quality considerations. Electric Lake is a Category II water body and therefore, cannot accept water of lesser quality than is already in the lake. The mine discharge water has total dissolved solids that are higher than that of the lake. Other constituents of the mine discharge water would also render it unsuitable for discharge into Electric Lake.

Mine Plan Changes.

As a result of the several water inflows to Mine 2, the overall mine plan, or sequence of mining the coal, has changed. Those sections of Mine 2 that can be mined, will be mined out over the next 19 months. Mining will simultaneously be expanded to the Winter Quarters/North Lease area in Mine 3 and continue there for the next 7 years. Further hydrogeologic investigations will continue during these 8 years. During this time a minimum portion of Mine 2 will be kept serviceable to provide continuous access for future mining. Depending on the outcome of those investigations, coal mining will return to Mine 2 and continue west into the Flat Canyon area. During this sequence the total mine water inflows are estimated to decrease substantially, although they will not stop altogether. The following paragraph provides details as understood at this time.

Several seals and pumping locations will be employed during the following sequence. The 10-Left area, which had the largest inflow, was abandoned in September 2002. Water has been flooding the area resulting in reduced inflows. It's estimated that by December 2002 the water will have risen to elevation 8120 and inflows at 10-Left will be reduced to 2,490 gpm. Mining will continue in panels 11-Left, and 12-Left, A and B, which are closer to Electric Lake. Since the lake is believed to NOT contribute to mine inflows, this should work. Details of this belief will be presented later in this document. When mining is complete in these areas, water will be allowed to rise to elevation 8240. The estimated time for completion to this point is March 2004, at which time the total estimated inflow to be pumped out of the mine is 4,200 gpm.

Mining will continue in 6-Left panel with completion estimated in June of 2004. By the end of 2004, all seals will be completed in Mine 2 and water will be allowed to rise to an elevation of about 8,290. At that time total estimated inflow to be pumped out of the mine should be no greater than 2,900 gpm. This is the estimated pumping rate during the time mining is completed in the Winter Quarters/North Lease area. While not stated in the amendment, Mr. Doug Johnson of Skyline Mine has indicated via phone on November 14, 2002, that these calculations assume there is NO pumping of the wells in James Canyon. If pumping were continued at the James Canyon wells, the mine inflow waters would be expected to be less than the estimated 2,900 gpm. All inflows would be pumped into Eccles Creek as is being done presently.

It's important to note that upon completion of all mining and abandonment of Skyline Mine, the maximum groundwater elevation is estimated to be 8550. With the lowest mine portal at elevation 8580, no gravity discharges from the mine are expected. For reference, the Electric Lake spillway elevation is 8575 and the Skyline Mine sediment pond outlet spillway elevation is 8581.

James Canyon Wells

Skyline Mine drilled two wells in James Canyon for the purpose of dewatering the region and reducing inflows to the mine. Only one well, JC-1 is currently being operated and is pumping at about 4,000 gpm. This water is being discharged into Electric Lake via a buried pipeline down James Canyon. This well is not connected to the mine workings and discharges only groundwater intercepted in the fault leading to the inflow at 10-Left. The pumped water also serves to provide water to Electric Lake that is utilized by water users in the Huntington Creek drainage. Importantly, this includes PacifiCorp who use the water for cooling at the Huntington Power Plant. The pump will be operated for at least one year. After that, natural precipitation amounts and mine plans will determine how the pump will be operated.

Springs and Streams

As requested by the Division, the amendment contains a graph of spring flow versus Palmer Hydrologic Drought Index (PHDI) for springs S15-3, S22-11, S24-12, S26-13, S34-12, S35-8, S36-12, and 2-413. A paragraph is provided for each spring that evaluates the spring flow when compared to the PHDI. Except for S34-12, all of the springs respond to seasonal climatic changes. That is, the springs flow more in the spring of the year in response to snowmelt. Thus far, there are no significant indicators to suggest that mining has impacted these springs. Flow of S24-12 appears to have declined in response to a shift in location of the spring rather than volume of flow. All of this gives credulence to the concept of a so-called "active" groundwater flow regime as proposed by Mayo and Morris, 2000. It does not appear the recent mine inflows have had any effect on spring flows.

As requested by the Division, there is a graph of flows in Burnout Creek compared to the PHDI. The stream appears to follow seasonal climatic fluctuations. The graph shows no apparent influence of the recent mine inflows on the flows in the stream. Also, the Forest Service has done a multi-year, in-depth study of Burnout Creek and found virtually no impacts due to mining.

Investigation of Fault-Related Groundwater Inflows at the Skyline Mine

In the amendment, PHC Addendum, Appendix G, contains the report Investigation of Fault-Related Groundwater Inflows at the Skyline Mine, by Peterson Hydrologic, dated 27 October 2002.

Section 1.0 Introduction, of the report indicates the purposes of the investigation are

1) "Characterize the nature and likely origins of the fault-related groundwater systems, "

2) "Determine the likely impacts of the fault inflows on the hydrologic balance."

Section 2.0 Methods of Study, briefly outlines

- Collection and Interpretation of Isotopic Data.
- Existing Maps and Reports.
- Compilation of Existing Hydrologic Data.

Section 3.0 Hydrostratigraphy and Geology, contains descriptions of the North Horn Formation, Price River Formation, Castlegate Sandstone, Blackhawk Formation, Starpoint Sandstone, and the Structure of these formations.

Section 4.0 Climate, contains a brief description of precipitation and the Palmer Hydrologic Drought Index at Skyline Mine.

Section 5.0 Presentation of Data, contains a description of how the several parameters are used to characterize water. Included are descriptions of the rationale for using the parameter as well as limitations and advantages of each parameter. Included are the stable isotopes δ^2H and $\delta^{18}O$, Tritium (^3H), and Radiocarbon.

Section 6.0 Description of Groundwater Systems, contains a series of considerations which lead to the belief that, "the source of the groundwater in the fault-related groundwater systems is the Star Point Sandstone."

Division Comment: The Star Point Sandstone is located beneath the coal seams being mined in Mine 2. This is an important concept as it indicates the primary source of mine water inflows is not derived from surface waters.

Section 6.1 Source of fault-related groundwaters, contains a discussion of water temperatures encountered in the mine waters. This section indicates, "Consideration of in-mine groundwater discharge temperatures strongly supports the conclusion that the fault-related inflows originate from the Star Point Sandstone."

Division Comment: The major premise of this argument is the earth is hot at the core and becomes cooler as it approaches the surface. That is, there is a temperature gradient from hot to cool. Water encountered in the various regions of the earth will take on the temperature of the surrounding rocks. For those unfamiliar with the Centigrade temperature system, the following is provided. Notice that a difference of 1 °C is considerably greater than a difference of 1 °F. Specifically, 1 °C is 9/5 or 1.8 times 1 °F.

- Boiling Water 100 °C 212 °F
- Room Temperature 20 °C 68 °F
- Ice 0 °C 32 °F

Division Comment: The average temperature of the mine is 8.9 C. The temperature of all the inflow waters is much warmer than the mine temperature. This indicates the water has its origin below the mine. Data provided indicate very little variation in the temperature of the inflow waters. This suggests equilibrium in the heat flow from the water to the surrounding earth. This makes sense in light of the time the inflows have been occurring. Also, water temperature is a reliable parameter to investigate since the earth is literally a huge heat sink and thus accurately reflects actual conditions.

Location	Temperature Measurement Time	Temperature Variation °C	Average Temperature, °C
10-Left Sump	3 months	0.5	13.2
East Submains E1 XC 5	5 months	0.1	15.2
9-Left Borehole	5.5 months	1.0	9.7
JC-1 Well	1 year	0.7	14.3

The 9-Left borehole water travels horizontally 1,000 feet and is not flowing like the actual inflows, so its temperature has equilibrated nearer to that of the mine itself. The report indicates, "Based on an average geothermal gradient of approximately 23 °C per kilometer of depth, upwelling fault groundwater has a circulation depth on the general order of 614 to 955 feet below the mine workings. These circulation depths are consistent with groundwater residing

in the Star Point Sandstone beneath the coal seams. It is difficult to envision a mechanism whereby warm groundwater could migrate downward vertically through horizons of colder rock and colder groundwater above the coal seams and emerge as warm groundwater in the mine floor."

Section 6.2 Potential for groundwater flow in adjacent geologic formations, presents a discussion of, "the hydrologic properties of the geologic formations that exist above and below the mined coal seams".

Division Comment: The formations discussed are the Mancos Shale, Blackhawk Formation, and Star Point Sandstone. Mancos Shale is very unlikely to be the source since it's permeability is very low and it has very low hydraulic conductivity. Further, it has very high TDS, which is not characteristic of mine inflow waters. The Blackhawk Formation is very unlikely to be the source due to claystone layers of low permeability. Although this layer does contain some sandstone layers, there is little or no interconnection to allow water transfer. This section indicates, " The Star Point Sandstone beneath the coal seams is believed to be the source of the fault-related groundwater that has entered the Skyline Mine."

Section 6.3 Nature of groundwater flow, elaborates on how the Star Point Sandstone formation was determined to be the source of the mine inflow waters. The following quotes summarize the contents of this section.

- "In portions of the Skyline Mine where the Star Point Sandstone in under a tensional stress regime and fractures can remain open, appreciable groundwater flow throughout the formation can occur."

- "Water levels in monitoring wells in the region surrounding the mine workings have shown rapid responses to perturbations in the fault-related groundwater system resulting from in-mine groundwater inflows and in the pumping regime at well JC-1."

- "A substantial discharge from the low-permeability Star Point Sandstone can occur if there is sufficiently large cross-sectional area through which groundwater discharge can occur. It is believed that the large network of fracture planes that make up the regional fracture network provide the surface area necessary to drain the water stored in the matrix of the Star Point Sandstone at a reasonable rate."

- "Inactive-zone groundwater systems in the Star Point Sandstone occur in isolated partitions that are not in hydraulic communication with the land surface or shallow overlying active-zone groundwater systems that support springs and seeps and provide baseflow to streams. Therefore, groundwater being removed from the Star Point Sandstone is almost entirely groundwater that is being removed from storage."

- "The precise recharge locations for the fracture-related Star Point Sandstone groundwater systems are not known. Although the groundwater recharge locations are unknown, it seems plausible that the recharge may have occurred in the highland regions south and east of the Skyline Mine workings."

- "The large fault-related inflows into the Skyline Mine are sustained by decreases in storage in the Star Point Sandstone. Corresponding recharge to the formation in up-gradient locations is not occurring, as is evidenced by the lack of observable or quantifiable diminution of spring discharges in the surrounding area. Based on this information and on the antiquity of the fault-related water discharged into the mine, it is believed that little or no recharge to the fault-related groundwater system is occurring."

Section 6.4 Potentiometric levels in the fault-related groundwater system, presents a discussion of the use of monitoring wells finished in the Star Point Sandstone were used to develop potentiometric level maps for the area. Figure 4 presents potentiometric levels for the end of 1999, 2000, 2001, and 2002. While informative, the generalized nature of the maps does not allow interpretation other than the lateral migration outward of the several levels.

Section 6.5 Potential for modern recharge to the fault-related groundwater system, contains a series of considerations demonstrating that the mine inflow waters are very unlikely to be derived from the ground surface or active-zone sources, specifically Electric Lake. The following quotes summarize these considerations.

- "While a minor component of modern recharge cannot be completely ruled out, several lines of evidence indicates that the fault-related groundwater is not derived from shallow, active-zone sources."

- "Active-zone groundwaters and surface waters in the region contain abundant tritium, have modern radiocarbon ages, and contain anthropogenic carbon. In contrast, the fault-related groundwaters have very old radiocarbon ages and contain little or no tritium."

Division Comment: A table on page 16 summarizes the results of a two-tailed T-Test to confirm that compared waters are statistically different. Comparing mine inflow waters, including JC-1, to Electric Lake water shows, "Populations statistically distinguishable, Probability >99.9%" for δ^2H, $\delta^{18}O$, tritium, and radiocarbon. Similarly, comparing 10-Left Sump and JC-1 groundwater to Electric Lake water shows, "Populations statistically distinguishable, Probability >99.9%" for δ^2H, $\delta^{18}O$, tritium, and radiocarbon.

- "The average chloride content of the water in Electric Lake (6.5 mg/l) is nearly four times greater than the average chloride content in the fault-related systems (1.7mg/L). Chloride is considered a conservative species, meaning that the constituent is not attenuated from a groundwater system, other than by dilution. In other words, there is no mechanism

whereby the chloride in the lake water could be removed were it to flow through a fault system, regardless of the residence time in the fracture."

- "The average bicarbonate content of the fault-related groundwater (216 mg/l) is approximately 50% greater than the average lake content (148 mg/l). The average magnesium content of the fault-related groundwater (23.0 mg/l) is more than three times that of the average lake water (7.5 mg/l)."

- "Electric Lake waters are supersaturated with respect to both calcite and dolomite, indicating that they have the thermodynamic tendency to precipitate rather than dissolve those minerals. Thus, ... the lake water cannot dissolve carbonate minerals (likely the only plausible mechanism whereby the groundwater could acquire additional bicarbonate and magnesium) along a groundwater flowpath regardless of the residence time in the fracture system."

- "The dissolved oxygen content of water in Electric Lake (average 7.0 mg/l) is more than 10 times greater than that measured in the in-mine fault-related groundwaters (average 0.60 mg/l). Although dissolved oxygen can readily be removed from a groundwater system through chemical or biological processes, it seems unlikely that this would occur if the lake water were moving rapidly and in large volumes through a sandstone fracture system directly into the mine workings."

- "The evidence presented above clearly demonstrates that the in-mine fault-related groundwater is not the same as the water in Electric Lake. It is also evident that Electric Lake water (without mixing with other waters) cannot chemically evolve into groundwater with a chemical composition like that of the fault-related groundwater in the hydrogeologic environment of the Skyline Mine area."

Section 6.6 Potential modern component of recharge, contains a discussion of whether Electric Lake water could be contributing to the inflow at 10-Left and an estimate of the amount. The following quotes summarize the contents of this section.

- "Tritium concentrations in excess of about 1 TU (tritium unit), which can be indicative of a component of recharge within the last 50 years, have also been encountered in a single fault-related location in the Skyline Mine. (Division Comment: This is at 10-Left.) At other fault-related inflows in the Skyline Mine, tritium concentrations have generally been substantially below 1 TU, indicating that these groundwaters have been isolated from the surface for at least the past approximately 50 years."

Division Comment: Five samples of tritium levels at 10-Left averaged 1.20 TU from 7/2/2002 to 8/28/2002. Three tritium levels were taken at JC-1 on 9/25, 9/26, and 10/3 all in 2001. The average of the 3 samples is 0.21 TU. Seven tritium levels were taken at JC-1 from

5/24/2002 to 8/1/2002. The average of the 7 samples is 1.09 TU. This is a noteworthy increase, about 5.2 times, in tritium at JC-1. This, and the 1.20 TU in the 10-Left inflow waters, suggests there is a component of modern water in the fault associated with those inflows. Importantly, the higher tritium levels have remained very constant or steady, suggesting the component of modern water is remaining stable. The Operator will continue to monitor tritium, and other parameters, at JC-1 to see if the water chemistry changes with time.

- "With the existing data, it is not possible to determine with certainty the source of the small amount of modern recharge in the 10-Left Sump area. However, in a general sense, it may be stated that the modern water is likely derived from either 1) leakage from shallow or intermediate depth, active groundwater systems that surround the coal seams in the vicinity of the fault inflow, 2) losses from nearby surface water systems that contain abundant tritium, or 3) a combination of both of these sources."

- "Although the precise origin of the small modern water component has not been determined, it is clearly evident that Electric Lake water cannot be a primary source of the fault inflows."

- "Based on the assumption that there could be a small component of modern recharge in the fault-related groundwater in the 10-Left area, it is possible to calculate the approximate magnitude of that component using a flow-weighted partitioning of the old and modern components of the groundwater using tritium contents."

- "Based on the potential modern recharge percentage calculations presented above, it is determined that of the total inflow to the 10-Left region (approximately 3,800 gpm), a maximum of approximately 262 to 471 gpm could have originated as modern recharge."

Division Comment: 262 + 471 = 366.5 gpm average modern recharge. About 10% of the total inflow at 10-Left, at the time of the 3,800 gpm inflow, could be modern recharge. 366.5/ 3,800 = 9.6

- "Canyon Fuel has been pumping approximately 2,200 gpm from the 10-Left groundwater system into Electric Lake since September 2001. The potential net impact to the Electric Lake watershed, were it occurring, would be completely mitigated by the current pumping."

Division Comment: The amount of water pumped to Electric Lake has increased to about 4,000 gpm since this report was prepared. This is due to PacifiCorp installing a larger pump in the JC-1 well. This means the water currently pumped into Electric Lake is about 11 times greater than the potential modern component of the 10-Left inflows (4,000/366.5 = 10.9).

Section 7.0 Likely Impacts to the Hydrologic Balance indicates the following.

- "Because the springs and streams in the permit area discharge almost exclusively from active-zone groundwater systems, while the fault-related in-mine groundwater inflows are from inactive-zone groundwater systems that are generally not in communication with the surface, the potential for detrimental impacts to the hydrologic balance is believed to be minimal."

- "To date, while a significant depressurization of the Star Point Sandstone has already occurred in the vicinity of the mine, no impacts to spring discharge rates or water quality that could be attributed to this depressurization have been observed. Likewise, detrimental impacts to stream discharge rates and water quality have not occurred."

- "Rather, the impacts of the fault-related groundwater inflows and associated pumping on the local watersheds during the ongoing period of serious drought have been positive. The ancient groundwater encountered in the mine is currently being pumped to both Scofield Reservoir in the Price River drainage, and to Electric Lake in the Huntington Creek drainage. This water is water that otherwise would likely not naturally discharge to the surface at any significant rate. Thus, the pumping of fault-related groundwaters to the surface is making significant quantities of water available for use that, otherwise, would not be available."

Water Monitoring Changes

The water-monitoring plan has been revised to include several new monitoring points and parameters. MD-1 is a composite sample of all the water discharged from Skyline Mine to Eccles Creek. JC-1 is composite sample of the water discharged from the James Canyon ground water discharge wells. Both sites are monitored for total flow and the results are reported to the Division on a monthly basis. Quarterly, both sites are also monitored for TSS, TDS, and total phosphorous. In addition, JC-1 is monitored quarterly for ^{14}C to determine Mean Residence Time, Tritium, and the stable isotopes δ^2H and $\delta^{18}O$. As discussed with the Operator, the rationale for testing these last 3 parameters in JC-1 is to monitor whether the water in the fault near the 10-Left inflow changes composition. Should changes occur, they might indicate a shift in the source of the water. Continuation of current values of these parameters would indicate continued derivation of water in the fault from the Starpoint Sandstone formation underlying Mine 2.

Five new monitoring sites were added to Mud Creek to determine possible changes to stream morphology. These sites were added to determine if the significantly increased mine discharge flows are having a significant impact to Mud Creek. These sites will be monitored for total flow, TDS, TDS, and total phosphorous. In addition, the stream cross-section and profile will be monitored at the sites. Similarly, 3 existing monitoring sites on Eccles Creek will also be monitored for stream cross-section and profile to see if any significant impacts to that stream

occur as a result of the increased mine flows. Details of the study to determine impacts to the streams are contained elsewhere in this Technical Analysis.

Progress Report No. 2

In the amendment, Appendix C, HCI PROGRESS REPORT NO. 2, contains an in-depth review of the geologic, hydrologic, and mining conditions encountered at Skyline Mine. The report is titled, UPDATED CONCEPTUAL HYDROGEOLOGY, EVALUATION OF CURRENT AND FUTURE DEWATERING, AND PROPOSED TESTING PROGRAM FOR SKYLINE MINE. It's dated February 2002. Included in the report are two area maps, Plates I and II with three associated cross-sections, Plates III, IV, and V. Together, these provide a graphical representation to accompany the explanatory text.

Section 1, INTRODUCTION, of the report gives the historical background of the events leading to the investigation and work done previously. Also included are the aims of the study:

1) "Assess whether the inflow to the 10-Left entries can be stopped in a cost-effective manner."
2) "Define the hydrogeologic conditions in the Flat Canyon tract; evaluate the potential need for dewatering that area, and design, if deemed necessary, a dewatering system to be installed as timely and cost-effectively as possible."
3) "Evaluate, on a preliminary level, whether the Winter Quarters area would constitute a better mining option in terms of hydrologic risk."

Division Comment: This report is the most comprehensive and meaningful of the investigations done to date. The aims of the report are all mining-related. However, this investigation resulted in the best insight to the hydrologic conditions in the mine permit area and the adjacent area. Nearly all of the work is relevant to understanding the mechanisms of the mine inflows and potential Hydrologic Consequences.

Section 2, SUMMARY OF HYDROGEOLOGIC INVESTIGATION TO DATE, of the report lists "a point summary of the tasks completed to date as part of HCI's hydrogeologic investigation of the Skyline Mine area."

Section 3, UPDATED CONCEPTUAL HYDROGEOLOGIC MODEL, of the report contains several sub-sections that will be discussed separately below. The introductory paragraph describes development of a "conceptual model" and a "predictive numerical ground-water flow model".

Section 3.1, HYDROSTRATIGRAPHY, of the report examines the geologic formations above and below the coal seams. Figure 1, Isopach of Storrs Sandstone and Figure 2, Isopach of Panther Sandstone show the variation in thickness of those two formations, fault

locations, and mine inflow locations. The report indicates that these figures show, "no obvious correlation between inflow and the thickness of either sandstone". Further, the report comments, " It is important to note that the storage capacity of the Storrs, Panther, and Trail Canyon Sandstones beneath the Skyline Mine is insufficient to account for the sustained ground-water inflows experienced in the mine." Continuing on, the report describes the log of a nearby gas exploration drillhole.

Division Comment: The exploration drillhole is located in the northwest portion of the permit area, due west of the disturbed (mine facilities area in Eccles Canyon and near the west permit boundary. The hole is about 6,000 feet north-northwest of the inflow at 16-Left, which is the northern-most inflow to the mine. The drill log showed 14 seams of sandstone of varying thickness from 24 to 115 feet thick. The total thickness was 743 feet of such sandstone formations. All of these are BELOW the mine elevation.

The report concludes this section with, "This (stacked sequence of sandstones beneath the Panther and Storrs Sandstones) is a most significant finding. If present beneath the Skyline Mine, these sandstones could explain the sustainability of the five existing major inflows into the mine – the missing source – as well as pose risk to future mining".

Division Comment: Unstated, but understood from the maps and cross-sections in the report, is the sandstones in the region are all faulted. These faults likely provide large surfaces for the water in the formations to come out of the rocks as well as provide conduits for water flow.

Section 3.2, MAJOR FAULTS, of the report describe, "Major north-south trending, regional-scale faults cut through the Skyline Mine area. The two most significant are the Pleasant Valley Fault Zone along Mud Creek to the east of the mine, and the Gooseberry Fault Zone, a segment of the Joes Valley Fault, in Gooseberry Creek to the west. The two faults juxtapose lower-permeability rocks of the Blackhawk Formation (on the east) and the North Horn Formation (on the west) against the Starpoint sandstones in the block beneath the mine area." Also, "The Connelville Fault, with about 200 ft of vertical displacement, defines the southeast boundary of the mine." Further, "A number of lesser faults and fracture zones occur between the Pleasant Valley and Gooseberry Creek Faults, many of which have been encountered in the mine workings." Plate I, Base Map of Hydrogeologic Investigation of Skyline Mines, and Plate IV, Conceptual Hydrogeologic Base Map show the major and minor faults described in the text.

Division Comment: The report, including the maps, appears to indicate that the three major faults, Gooseberry, Pleasant Valley, and Connelville, form regional boundaries to the groundwater regime in the Skyline Mine area. Regionally, the faulting has resulted in low permeability rocks being displaced vertically next to the permeable and water-bearing sandstones. The area within the major faults has several interconnected fractured zones, which

are likely to make groundwater transfer relatively easy within the boundaries formed by the three major faults.

Division Comment: Although not stated in the report, it's believed that the mine area is in extension or upward bulging, due to intrusion from below. This is suggested by the large number of dikes throughout the mine area, especially in the center of Mine 2. This extension tends to push the faults apart thus increase their ability to carry water flows. This is based on communications with the mine Operator, and Alan Mayo, a Hydrogeologist who has investigated the area.

The report points out that "All of the significant ground-water inflows in the Skyline Mine to date have been associated with north- and northeast-trending faults in the Level 2 area. The east-west trending faults in the Level 3 area (north of Level 2) area apparently have not produced large nor persistent inflows". Further, the report indicates, "Ground-water inflows to other coal mines in the Wasatch Plateau and Book Cliffs have been characterized as highly compartmentalized. Although there is definitely strong structural control of ground-water in the Skyline Mine area, measured changes in water levels over relatively large areas suggest the ground-water system might not be as compartmentalized as at other mines in the Wasatch Plateau."

Section 3.3, GROUND-WATER LEVELS, of the report includes Figure 4, Water Levels in Flat Canyon Monitoring Wells. This figure is a plot of water surface elevation in 8 wells plotted over time from 11/11/98 to about 01/15/02. Dates and locations of four of the mine water inflows are shown. After discussing the data, the report indicates, "These interpreted water levels and drawdowns suggest:"

1. "Drawdown from the major inflows to the mine has propagated primarily along the larger, mapped fault zones. However, there is a broad area in the northeast corner of the Flat Canyon Tract, centered on the three earliest inflows, where water levels have drawn down an estimated 200 to 300 ft since the original water "hits" in 1999."

Division Comment: Figure 4 shows clear downward trends in well water elevation in the monitoring wells after most of the mine inflows. Keep in mind that these drawdowns are in the potentiometric surface above the coal seams. Using the figures in No 1 above, the Division calculated the overall rate of water elevation drop to be at least 0.31 ft/day. This is a large overall decline in potentiometric surface and it happened at a fast rate. This clearly indicates large amounts of groundwater have an easy time moving quite rapidly.

Division Comment: The following definition is provided for those unfamiliar with the term potentiometric surface. "A surface that represents the level to which water will rise in tightly cased wells. If the head (water level) varies significantly with depth in the aquifer, then there may be more than one potentiometric surface. The water table is a particular

potentiometric surface for an unconfined aquifer". Source: Applied Hydrogeology, by C.W. Fetter, Third Edition, 1994. Multiple wells are needed to define this surface over large areas. The mine employs many such monitoring wells and the potentiometric surface is defined over the mine area.

Division Comment: In Figure 6, Potentiometric Levels as of October 2001, there are 4 lines indicating contours of equal potentiometric level. Taken together, the contours bend or "point" when they encounter 3 of the faults in the area. Two of these faults do not intersect Electric Lake while one of the faults does intersect the lake. In addition, the fault that intersects the lake is the same fault where the mine encountered water at 10-Left. Keep in mind, the potentiometric surface is a representation of the energy or "head" of water available, and may or may not, be indicative of the actual physical water surface underground. The contours clearly indicates the mine is drawing down that potentiometric head.

Division Comment: The outline of Electric Lake was added to Figure 6, Potentiometric levels as of October 2001. In Figure 6, the outer-most line of equal potential is at an elevation of 8,500 feet and it crosses over Electric Lake about the center of the lake. The Division researched Pacificorp records and found the average level of Electric Lake during October was 8,521 feet. The underground water potentiometric surface and lake level are almost identical during the month of October 2001. Their physical locations also coincide. This is a striking comparison. However, it does not actually establish any cause and effect relationship.

Section 3.3, GROUND-WATER LEVELS, of the report continues:

2. "The inflow at 10-Left and pumping from JC-1 alone has resulted in more than 100 ft of additional Drawdown locally since August 8 and between 10 and 35 ft of additional Drawdown across the Flat Canyon Tract."

Division Comment: Wells in the Flat Canyon Tract are nearly two miles from the mine inflows and covers about 6 square miles. Similar to conclusion 1 above, this indicates that large amounts of groundwater have an easy time moving great distances in a short time, and over a large area.

3. "There are no apparent vertical gradients between the Storrs Sandstone, Panther Sandstone, and the LOB seam."

4. "All of the mapped faults in the Level 2 and Flat Canyon areas are hydraulically connected and have propagated drawdown into areas where faults have not yet been mapped."

Section 3.4 WATER CHEMISTRY of the report, contains four arguments, using different water chemistry parameters, to conclude, "the water chemistry data clearly indicate that

the ground water flowing into the mine (specifically at 10-Left) and the water being pumped from dewatering wells JC-1 and JC-2 are significantly different from Electric Lake water. This precludes the existence of a direct "conduit" between Electric Lake and the 10-Left inflow and JC wells."

Ionic Composition

Division Comment: The first analysis takes a group of water samples from the mine & James Canyon wells and a group of water samples taken from Electric Lake. The samples are examined for their ionic composition and then they're plotted on a trilinear (Piper) diagram, which is shown as Figure 8, Trilinear Plot of Water Chemistry: Mine Inflows, Dewatering Wells, and Electric Lake. All three portions of the diagram show the same general groupings. The Electric Lake waters all plot in a tight cluster and the mine inflow and well waters plot as another cluster. The report indicates, "surface water samples from Electric Lake have an ionic composition quite distinct from the water samples collected from the underground."

Stable Isotope Ratios

After a brief description of the isotope data, and the plot of Figure 9, δ^2H and $\delta^{18}O$ for Mine Inflows, Dewatering Wells, and Electric Lake, the report concludes, "the waters are different."

Division Comment: This analysis takes three samples from Electric Lake and four samples from the underground and analyzes them for stable isotope ratios. The data does suggest that the waters are different.

Tritium

In addition to the data listed in Table 1, the report indicates, "These data strongly indicate that the underground inflow at 10-Left and the discharge from JC-1 do not have a significant hydraulic connection with Electric Lake."

Division Comment: The analysis for Tritium uses water samples from Electric Lake and underground. There are four samples from underground water and three samples from Electric Lake. See Table 1, Water Chemistry Data.

Division Comment: PHC Addendum, Appendix A, lists twenty-two samples of underground water taken at various locations where water entered the mine. Importantly, all samples in this set were taken from faults, and most are from faults that are a part of the current water inflow situation. The average Tritium Units (TU) was 0.15 and varied from –0.01 to 0.88.

Division Comment: Table 1 of the HCI report indicates Electric Lake had one shallow water sample taken with 13.0 TU and two deep-water samples taken with values of 11.7 and 12.3, for an average of 12.0 TU. The additional data provided by the Operator showed 7 samples were taken of Electric Lake. The Tritium Units ranged from 8.48 to 12.6, with an average of 9.01 TU. The water at JC-1 is currently at about 1.05 TU, and Electric Lake is currently about 9 to 12 TU, which is about an order of magnitude different.

^{14}Carbon

Table 1, of the HCI report indicates the following: One in-mine Carbon sample was taken at 3 West Submain with a value of 15.8 pmC (percent modern Carbon). One Carbon sample was also taken from JC-1 with a value of 30.4 pmC and one Carbon sample was taken from JC-2 with a value of 24.3 pmC. One shallow and one deep Carbon sample was taken from Electric Lake. The values were 72.4 and 82.2, respectively. Based on these numbers, the report indicates "Analyses of ^{14}C concentrations also strongly indicate that the waters from the mine and Electric Lake are very different."

PHC Addendum, Appendix A lists twenty-two samples of underground water taken at various locations where water entered the mine. Importantly, all samples in this set were taken from faults, and most are from faults that are a part of the current water inflow situation. Mean Residence Times (age) ranging from 5,900 years to 25,800 years. The Appendix also shows seven roof drips and floor seeps at various locations throughout the mine were also sampled for ^{14}C; they showed ages from 2,500 to 18,500 years.

Section 4.0, EVALUATION OF CURRENT AND FUTURE DEWATERING of the report, indicates, "The question of being able to stop, or at least significantly reduce, the 10-Left inflow with pumping has been partly answered by the disappointing results of the James Canyon wells. CFC's current plan is to flood the lower part of the Level 2 mine once mining has been completed in the 8-Left and 9-Left panels." The report further states, "if water were allowed to pond to the floor level at the north end of the Diagonal Mains, the driving head differential would be reduced by about 95 ft.... and such a reduction in the head differential would decrease the inflow at 10-Left by approximately 1,000 gpm."

Section 4.1, INFLOW TO 10-LEFT of the report, is an attempt to quantify the inflow based on records of power consumption by the pumps. This was done since, "The rate of ground-water inflow has not been monitored with an adequate degree of accuracy and precision over time."

Division Comment: The results are not significant in terms of changing any analysis in this document. It's interesting to note that there is a suggestion of continuous drainage from Mine 1 of about 100 to 150 gpm.

Section 4.2, EFFECTS OF PUMPING OF JC-1 AND JC-2 ON INFLOW TO 10-LEFT of the report concludes, "In summary, an accurate and reliable measure of the effects of pumping from the James Canyon wells on the inflow at 10-Left has yet to be made. Estimates of the decrease in inflow based on three different methods range from about 200 to 800 gpm. HCI is of the opinion that the higher end of the range provides the most reasonable estimate." The report further states, "keeping the wells pumping solely for the purpose of regional dewatering is not justified."

Section 4.3, FLAT CANYON TRACT of the report is a discussion of conditions and methods to dewater the tract to accommodate coal mining. The Division selected items it felt were relevant to quote below:

- "Various water-bearing units in the Starpoint Formation are reasonably well connected hydraulically probably via the more prominent faults, throughout this area."
- "Relatively large quantities of water might have to be managed at the relatively large hydraulic heads that will exist in that down-dip area."
- "Dewatering challenges in the Flat Canyon tract might not be significantly different than those experienced by CFC in the current Level 2 mine."
- "It can be estimated... it would take about 17 years for the water level to decline to the level of the coal in this area."

The last part of section 4.3 indicates, "Planning the most appropriate dewatering system for the Flat Canyon area should consider:"

- "Managing inflow passively vs. actively dewatering in advance of mining."
- "Development of a better method for predicting the occurrence and hydraulic nature of water-bearing faults."
- "Targeting faults vs. dewatering the "source" sandstones."
- "The timing of implementing any active dewatering," and
- "Using wells drilled from surface versus from underground wells."

Section 4.4, WINTER QUARTERS TRACT of the report, is a short discussion that concludes, "Although there are even fewer existing hydrogeologic data for the Winter Quarter tract than for Flat Canyon tract, the hydrologic risk is intuitively lower in the Winter Quarters area."

Section 5.0, PROPOSED ADDITIONAL HYDROGEOLOGIC INVESTIGATION of the report is a consideration of future work. Sections include:

- 5.1 HYDRAULIC TESTING, General Logistics, Drilling and Testing Program,
- 5.2 CONTINUOUS MONITORING,
- 5.3 DRILLING FROM SURFACE, and
- 5.4 NUMERICAL GROUND-WATER FLOW MODELING.

Evaluation of Water Balance for Electric Lake Reservoir

Division Comment: Part of the investigation of a possible connection between the flooding in Skyline Mine and loss of water in Electric Lake was a report by Hydrologic Consultants, Inc. (HCI) titled, DRAFT – Evaluation of Water Balance for Electric Lake Reservoir. HCI is a hydrogeologic consulting firm located in Lakewood, Colorado that has been hired by Canyon Fuel for work at Skyline Mine. The report was received by the Division on August 28, 2002, after the original amendment submittal. It should be noted that the report is DRAFT and, according to the author, is being revised.

The report indicates the investigation was prompted by a July 10, 2002 meeting with Canyon Fuel Co., HCI, and Pacificorp. The report states, "Pacificorp asserted that the level of Electric Lake is unusually low in comparison to levels during other periods of drought even though discharge rates have remained essentially the same." The first section of the report presents the Water Balance Calculated by Pacificorp.

Division Comment: The basic Pacificorp approach is to use the lake as a system and compute the inflows and outflows, which result in "missing water." This term results from 4 dependent variables. In the second section of the report, Evaluation of Pacificorp's Analysis, the point is made that water has been "missing" from the reservoir throughout its history. The report claims "a more comprehensive review and evaluation of the data" and creation of Figure 1, Discharge from Electric Lake and Precipitation from Nearby Station.

The report explains, "During this 28-year period, water levels in the lake have in fact risen when total precipitation exceeded lake discharge by about 30,000 acre-ft/year or more, and water levels have fallen during those times when the difference has been less than 30,000 acre-ft/year."

Division Comment: As shown on Figure 1, this is generally true, but not always true. In 1984 the precipitation exceeded discharge by about 13,000 acre-ft/year (44% greater than 30,000) and the lake did not rise, but remained steady. Similarly, in 1988 the precipitation exceeded discharge by about 7,500 acre-feet/year (25% greater than 30,000) and the lake did not rise, but maintained a continued fall as started 4 years earlier and continued to fall for another 2 years. More importantly, the years 1975, 1976, and 1977 were three consecutive years when the difference was less than 30,000 acre-ft/year by about 6%, and the lake level did not fall but stayed constant. The reservoir gates were closed on November 27, 1973 so the reservoir was filling and outflows from the reservoir were still stabilizing with greater leakage from the reservoir. One would expect the lake level to have been more prone to decline under these conditions and it did not. This contradicts the general trend and weakens the argument.

The third section of the report, Re-Evaluation of Water Balance by HCI suggests "a more generalized water balance equation, one that balances water not just in the reservoir, but in the entire drainage area above the dam".

Division Comment: The "missing water" in this HCI evaluation is determined using 6 dependent variables. The resulting conclusion is that the lake has been losing about 7.0 to 7.8 cfs since the lake was filled. One variable, evapotranspiration, is acknowledged in the report to "comprise a large abstraction relative to yearly precipitation, and of all the following calculations were found to be sensitive to changes in the estimate of the (evapotranspiration) rate." The Pacificorp approach uses the lake as a relatively simple system with inputs and outputs that can be measured directly. Notably some of them have NOT been measured until recently. The HCI approach uses the entire 30+ square-mile drainage area of the entire reservoir and is much more complex. The HCI approach involves inputs that must be estimated, over large areas, and some of the variables are not possible to quantify. The resulting conclusion is that the lake has been losing about 7.0 to 7.8 cfs since the lake was filled. By way of perspective, literally all reservoirs are "leaky". If one pours water from a bucket onto the ground, the water soaks into the ground. A reservoir can be viewed as a large open bucket with the water naturally flowing by gravity out of the reservoir. Reservoirs are commonly grouted or lined to minimize this expected and inevitable outflow.

The fourth and final section of the report is Conclusions. It points out, "The basic assumption of Equation 3(the HCI equation)...is valid only over relatively long periods of time. Therefore Equation 3 cannot be used to calculate an accurate basin water balance over short time periods (i.e., those of approximately three years of less)." Also, evapotranspiration would be expected to be "somewhat higher in wet years and lower in dry years." Reference there is made to Figure 4, Water Losses from Electric Lake vs. Precipitation, "which plots the net water imbalance vs. precipitation, calculated on a yearly basis." There is reference to the "resulting trend".

Division Comment: Although there is no line, the data can be seen to generally form a line from lower left to upper right. This would indicate that in years of less precipitation the missing water, or reservoir leakage, is less than in years of more precipitation.

The report also indicates, "During relatively wet years, Equation 3 will tend to exaggerate water "losses" as a consequence of both more water entering the shallow ground-water system... and slightly higher losses from Et (evapotranspiration). Conversely, during relatively dry years, the calculation will yield low or even negative water "losses"."

Division Comment: In order to better understand this relationship, the Division used monthly figures provided by the National Climatic Data Center to calculate the average Palmer Hydrologic Drought Index (PHDI) for the 28 years shown on Fig. 4. The PHDI defines wet years as having a PHDI equal to or greater than 1.50, and dry years as having a PHDI equal to or

less than –1.50. The PHDI numbers were then plotted on the graph. It was found that all the dry years had water losses that were positive. This included two years of severe drought with PHDIs of -3.32 and –4.95. In addition, there are only 5 negative water loss years during the whole 28-year period. Three of them are normal PHDI years and the other two are positive, with one year having severe wetness of 3.55. These results are not consistent with the HCI assertions regarding the validity of their equation.

Division Comment: Both the Pacificorp and HCI approach to the issue appear valid and based upon sound technical reasoning. Pacificorp relies on "imputed" inflows to the lake, which are not actually measured. The HCI approach is larger, more complex, and subject to estimating error. While both approaches appear indicative, they come up with opposing conclusions. Neither approach is conclusive in proving that the water is, or is not, flowing from Electric Lake into Skyline Mine.

Division Considerations

While reviewing the submitted data, the Division made some independent investigations and summaries. They're described below.

A curve of pumping to Eccles Creek vs. time was compared to a curve of Electric Lake water surface elevation vs. time. Both were compared for the period of 8/16/01 to 8/29/02. If there was a direct connection between the lake and the mine, it was thought that a reduction in hydrostatic head of the lake might result in a similar reduction of mine water inflow. No correlation was found even when time lags of different length were considered.

As discussed below, Pacificorp provided their estimate of missing water during the time period from June 19 to August 31, 2002. The estimate was 1,521 acre-feet over that 72-day period. This was compared to the amount of water pumped out to Eccles Creek during the same time period. The pumped amount was 2,860 acre-feet. It can be said that the amount of water unaccounted for in Electric Lake is 53% (1,521/2,860 = 0.53) of the water pumped into Eccles Creek during that time period. While this is an interesting comparison, no conclusions can be drawn. This led to consideration of how long it might take for water to reach the mine, IF there were a connection to the lake via a fault system shown in Pacificorp's Aquatrack study. The distance from the lake to the 10-Left inflow was scaled to be about 9,000 feet. It was assumed that the volume of water flowing was the inflow at 10-Left, about 4,500 gpm. At this point a major assumption was made about the size of the opening that the water might flow through. The result was a transit time of one hour. Even if that estimate were off by a factor of 1000, the water would take 1000 hours, or 42 days to travel from the lake to the mine. Interestingly, this is consistent with the time it took for dye to travel through fractured sandstone faults at Little Bear Spring. There it took less than 40 days to travel 1.5 mile. In our estimate, it takes about 42 days to travel 1.7 mile. Of course, this exercise is in no way conclusive. Still, the water comparisons

provide some insight and we have an "order of magnitude" of the water travel time, IF such a connection exists.

Pacificorp Investigations

On July 31, 2002, the Division received a packet of charts and graphs from Darce Guymon, Engineering Technician, of Pacificorp. He expressed concern that Electric Lake was losing water and that this might be due to the inflows to Skyline Mine. On September 19, 2002 Pacificorp representatives Rodger Fry, Geologist, and Carly Burton, Hydrologist, came to the Division to discuss concerns they had regarding a possible connection between Electric Lake and Skyline Mine. The Division requested, and Pacificorp provided, copies of their investigations done to that time. These reports are filed in the Skyline Mine Mining and Reclamation Plan. They are summarized below. In the following discussions, "positive inflows" mean that the total inflow to the lake is greater than the total outflow. "Negative inflows" means the total inflow to the lake is less than the total outflow. That is, a negative inflow means the lake is losing water.

Date vs. Calculated Inflow

Division Comment: There is a graph of Date vs. Calculated Inflow, cfs for Electric Lake. The time span is from 1974 to 2001. There is an obvious peak during the spring of every year and inflows are all positive with three exceptions. There are two brief negative spikes, perhaps for one monthly reading, during1989 and 1991. However, in the fall of 2001, the inflows went negative and stayed there for about 5 months. Inflows went positive thereafter as winter precipitation accumulated.

Pacificorp Comment: The gates were closed to begin filling the lake on November 27, 1973. Fall of 2001 was the first time in the history of the lake that inflows went negative and stayed there for any length of time. Since a large inflow of 4,700gpm to Skyline Mine occurred on August 16, 2001 it's believed the two events might be connected. The inflows are calculated or imputed and not measured. Pacificorp started measuring lake inflows in June 2002.

Elevation vs. Date

Division Comment: There are two graphs of Lake Elevation vs. Date. One covers the time period of 1985 to 1993 and the other from 1994 to 2002. There is an annual rise in elevation as the lake fills each spring. There is also a "flattening" of the curve as the lake empties with water usage each fall. There is a characteristic slope to the flattened part of the graph each year, which shows the rate at which the lake is being emptied. While the slopes during the years 1995 through 2000 remain relatively consistent, the slope for 2001 to 2002 is sharply steeper. Approximation from the graph shows it to be about 3.8 times steeper.

Pacificorp Comment: The sharply steeper slope during 2001 to 2002 indicates the lake is emptying much faster during that time period than any other time shown on the graphs. Since the mine had significant inflows during that time, the two occurrences may be connected.

Division Comment: Based on monthly figures from the National Climatic Data Center, the Division calculated the average Palmer Hydrologic Drought Index (PHDI) for each of the years to be as follows:

Year	PHDI	Year	PHDI	Year	PHDI
1985	3.76	1991	-0.96	1997	2.62
1986	3.55	1992	-2.33	1998	3.55
1987	-1.78	1993	2.24	1999	3.55
1988	-3.32	1994	0.05	2000	-1.92
1989	-3.11	1995	3.00	2001	-2.42
1990	-3.21	1996	1.24	Thru 7/2002	-1.5 prelim.

Division Comment: Notice that the 2000 to 2002 time period is a "mild to moderate drought" (as defined by the National Climatic Data Center). This may explain some of the increased slope steepness. The steep 2001 to 2002 slope is also presented on the 1985 to 1993 graph. The flattened slopes during this period vary considerably with one, 1986, being steeper than the rest. When compared to the 2001 to 2002 slope, the latter is 1.6 times steeper. Notice that 1985 and 1986 were markedly wet years and the slope was still steep.

Lost Water

Division Comment: A graph titled, Electric Lake Comparison of Computed vs. Measured Inflows was provided. The vertical axis is CFS of Water and the horizontal axis is Date in 2002. The time span is from June19 to July 27. Another similar graph covers the time period from Aug 01 to Aug 31. A bar on each day shows Computed Inflow, Measured Inflow, and Missing Water. During the period from Aug13 to Aug 25 the Missing Water becomes noticeably greater. The pump at JC-1 was apparently shut off during this time. This would stop the 2,000-gpm inflow to the lake and logically increase the Missing Water.

Pacificorp Comment: These graphs plot Computed Inflow minus Measured Inflow = Missing Water. Based on these graphs, and other calculations, "Our calculations show over twenty acre-feet per day is being lost for which we cannot account through storage change, releases, or evaporation."

Division Comment: Another graphic was provided by Pacificorp showing the lake conceptually as a bowl. All inflows and outflows are plotted for the time period from June 19 to August 31. The net result is 1521 acre-feet of water missing for that time period. That is 20.8 acre-feet per day of Missing Water. The 1521 acre-feet over 73 days converts to 4,714 gpm.

The estimated inflow at 10-Left in Skyline Mine is 4,700 gpm. See Dwg. PHC A-2 of this amendment. The rate at which water is believed missing from Electric Lake is the same rate as the largest mine inflow. This is a striking comparison. However, it may just be coincidence since no cause and effect relationship has been established.

Resistivity Survey

Division Comment: At the Division's request, Pacificorp provided a report titled, PACIFICORP, ELECTRIC LAKE RESISTIVITY SURVEY, By Geo-Western, July 2002. Two maps and several sheets of plotted resistivity data accompany the 8-page report. The designations JCR- 1, 2, 3, 4, and 5 are east-west lines located 1,000 feet apart. The entire survey area is located on the east side of Electric Lake between the James Canyon wells to the north and Electric Lake to the south. There is a small portion of the mine workings under the survey area. The west side of the development workings of the 9-Left panel of the mine extend south, crossing JCR-1, going about half way between JCR-1 and JCR-2. This is on the east half of those survey lines. It appears unlikely the workings affected the survey.

The Results and Conclusions section of the report includes the following observations.

- "The area stretching through lines JCR-1, JCR-2 and JCR-2, for a minimum distance of 3,000 feet North to South, and from 4 East to 14 east for an East-West distance of 1000 feet appears to contain considerable water. The center of this zone is cut by the inferred North-South fracture... This fracture is presently producing 2,500 gpm on the same fracture roughly 2,500 feet North of JCR-1."

- "Resistivity and IP data collected over the zone appears to suggest a resistive zone at or below the 8,500 foot elevation mark"

- "Three inferred fractures which are expected to contain fresh water above the 8,500 foot elevation are noted on line JCR-3. All three are expected to contain fresh water at least 300 feet above the 8,500 foot mark and continuing to at least the 600 foot depth."

- "High resistivity intersects on line JCR-4... all indicate the presence of fresh water at least 200 to 300 feet above the 8,500 foot elevation."

Division Comment: The fracture discussed above is the fault that runs between the mine inflow at 10_Left and Electric Lake. The accompanying maps show the same two faults shown in the HCI report that extend through both the mine and the lake. This resistivity study establishes a more accurate and precise location of the faults. In addition, they show 3 inferred fractures between those faults, one inferred fracture west of the west-most fault, and one inferred fracture east of the east-most fault. This establishes the area to be faulted and fractured. IF four of the inferred faults were extended north, they would intersect mine workings in the 9-Left panel. The survey did not go north far enough to verify this.

Division Comment: The Division checked Pacificorp records and determined the average water surface of Electric Lake during July (the time of this survey) was 8,505 feet. The resistivity survey appears to establish that the entire area between the lake and the mine contains "considerable water" at depths below 8,500 feet. Also, there are two main faults and five inferred faults, all north-south trending, in that same area. The elevation of the water found is consistent with the lake surface elevation during the time of the testing. These conditions are all conducive to water transfer from the lake to the mine. However, the resistivity survey did not actually indicate water flows of any kind.

AquaTrack Survey

Division Comment: At the Division's request, Pacificorp provided a report titled, ELECTRIC LAKE SURVEY, DRAFT COPY ONLY. This report was prepared by Sunrise Engineering, Inc., Aqua Track. No date is given, but reportedly the work was done in August 2002. The report is preliminary and consists only of 6 sheets of 11"x17" paper. There is no written narrative and no explanation of the material. The last 4 sheets appear to be cross sections of electric field strength at several locations taken perpendicular to the preferred underground water path.

Pacificorp Comment: Verbal explanation by Rodger Fry, Geologist, indicates the first two sheets are a graphic representation indicating a preferred path for underground water. That is, the electrical signals used in this survey show where water would likely flow underground.

Division Comment: The preferred underground water path runs from Electric Lake to the James Canyon well, which is located directly above the mine inflow at 10-Left. This suggests that there is a path for water to follow between those two locations. However, there are some inconsistencies. The preferred path does not actually follow either of the two main faults between the lake and the mine. Going from north to south, the path crosses the east-most fault twice (at very low angles) and then turns northwest to run alongside the west-most fault. The path ends at the James Canyon wells. These inconsistencies might be explained by the results of the resistivity survey. That found the whole area to contain "considerable water" and, in addition to the two main faults, there were 5 inferred fractures in the area. These faults and inferred fractures are in the preferred path indicated in this AquaTrack survey.

Division Comment: In order to better understand AquaTrack technology, the Division requested a technical paper titled, "TRACKING, MAPPING, MONITORING, AND DEVELOPING OUR GROUNDWATER RESOURCES." Montgomery, Kofoed, and Sellers authored this paper. It was sent by email from Val O. Kofoed, of Sunrise Engineering, on 9/24/02. The paper is not specific to Pacificorp or to any project. It presents the electromagnetic principles and techniques underlying the AquaTrack technology. While informative and very

helpful, the contents will not be reviewed here. Two comments from the paper important to this discussion are presented below.

- The technology "... can be used to...infer the shape, location, and path of the channel or porous zone used by the subsurface water being energized."

- "At this point in the development of AquaTrack, it is not possible to determine the quantity or quality of groundwater present."

Division Comment: These parameters do not include any indication of flow, with attendant direction and amounts.

Division Summary of Mine Operation and Investigations

Mine Operation

- Before 3/99, typical mine inflows had been low, about 300 to 400 gpm.
- Significant mine inflows began in 3/99. Between 3/99 and 8/01 (3yr., 5mo.) the inflows totaled about 4,600gpm. On 8/16/01 an additional 4,700-gpm inflow began at 10-Left. Several additional inflows have occurred since then. The total estimated inflow was about 9,300 gpm at the end of October 2002.
- The mine inflows result in a total of about 9,000 gpm being pumped out of the mine, while Electric Lake is losing about 4,700 gpm. This suggests that, even if the lake were involved, at least half of the water (4,300 gpm or 48%) is being drawn from elsewhere.
- All mine inflows are pumped from the mine and discharged into Eccles Creek.
- The James Canyon wells pump groundwater only from the fault near 10-Left. No mine inflow water is involved. This water is piped to Electric Lake at an average 4,000 gpm.
- All of the inflows have occurred in Mine 2. No significant inflows have occurred in Mine 1, which is above Mine 2 and to the east. No significant inflows have occurred in Mine 3, which is north of Mine 2.
- The mine elevation at the 10-Left water inflow is 8,043 feet.
- Because of the water inflows to Mine 2, that mine will be phased out over the next 19 months. Mining will move to Mine 3 in the North Lease/Winter Quarters area for the next 7 years. Water inflows to Skyline Mine will decrease substantially as a result, however, they will not be eliminated.
- Mine 2 will be kept serviceable for possible future mining. This, and the operation of Mine 3, will result in estimated maximum inflows to be pumped out of the mine of 2,900 gpm. This number assumes no pumping of the James Canyon wells. If those wells were pumped, the inflows would be less than 2,900 gpm.
- The 2,900 gpm, or less, pumping rate will continue during mining in the North Lease/Winter Quarters mining operations.

- Depending on the outcome of hydrogeologic investigations, mining may continue in the Flat Canyon area in Mine 2 in the future.
- Upon completion of mining and closing of Skyline Mine, no gravity discharges are expected from the mine.
- There are no indications that mining, including the recent water inflows, have impacted surface springs or streams.
- JC-1 is monitored quarterly for ^{14}C to determine Mean Residence Time, Tritium, and the stable isotopes δ^2H and $\delta^{18}O$. This will show possible water composition changes which may indicate possible changes in percent modern water in the fault at 10-Left.
- Eccles Creek and Mud Creek are being monitored to determine possible erosion damage and possible addition of sulfates to Scofield Reservoir.

Peterson Study

- Comparison of mine temperatures to inflow water temperatures provides evidence the mine inflow waters originate about 614 to 955 feet below the coal seam. These depths are consistent with known Star Point Sandstone layers below the coal seam.
- Portions of the Star Point Sandstone in the mine area are in tension and allow appreciable groundwater flow.
- Monitoring well water levels, several of which are screened in the Star Point Sandstone, in the area respond rapidly to water inflows to the mine.
- Substantial water discharge from the Star Point Sandstone can occur if there is sufficiently large cross-sectional area for the water to move through. The large network of faults in the region is believed to provide such large area.
- The Star Point Sandstone is believed to be the source of the inflow waters in Mine 2.
- Due to lack of connection to the surface, groundwater removed from Star Point Sandstone is being removed from storage.
- Active-zone groundwaters and surface waters in the region contain abundant tritium, have modern radiocarbon ages, and contain anthropogenic carbon. In contrast, the fault-related groundwaters have very old radiocarbon ages and contain little or no tritium
- Chloride content in Electric Lake is nearly four times that in the mine. Except by dilution, chloride content cannot be reduced by traveling through fault systems.
- Bicarbonate levels in the mine inflows are about 50% greater than those in Electric Lake. Magnesium levels in the mine inflows are more than 3 times those in Electric Lake. Both of these constituents are supersaturated in the lake water and could not gain concentrations while such water was moving through the ground.
- Dissolved Oxygen content of Electric Lake water is more than 10 times that of mine inflow waters. Such a reduction is unlikely if water were moving rapidly in faults.
- Tritium levels in JC-1 have risen about 5 times since pumping began shortly after the inflow at 10-Left. Tritium levels in JC-1 have remained constant after this rise.

- Tritium levels in 10-Left are higher than would be expected of waters that are older than 50 years. These tritium levels remained constant while 10-Left was accessible for sampling.
- Based on these tritium data, there is believed to be a small component of modern water in the 10-Left inflow. The modern water component is estimated to be 10% of that inflow.
- The modern water component could be coming from shallow and intermediate depth active-groundwater systems near the fault inflows.
- The water pumped into Electric Lake by the James Canyon wells is about 11 times greater than the estimated component of modern water entering the mine at 10-Left.
- Since the active and inactive zone groundwater systems are separate and not in communication with one another, there is minimal potential for damage to the hydrologic balance.
- No impacts to springs and streams have been observed so the mine inflows appear to have had no detrimental impacts.
- Given the three-year drought in the area, the pumping of mine inflow waters have had a positive impact on both the Price River and Huntington Creek drainages. Water that would otherwise not have seen daylight has been provided to water users.

HCI Study

- An in-depth hydrogeologic study (HCI) presents considerable evidence to support the existence of a large underground reservoir of water beneath the coal seams. This underground reservoir appears to provide a potentiometric head to push the water into the mine at the several mine inflows.
- The HCI study delineates a hydrologic system bounded on the west, east and southeast by major regional faults. There are numerous faults and fractures defined inside this system. The ground water is not compartmentalized.
- The HCI study shows water is draining out of the ground at high rates due to mine inflows. Water moves throughout the area vertically and laterally very rapidly when compared to typical underground water movement.
- A potentiometric surface map indicates a distinct drop in elevation from the surrounding area to the mine inflows. The total drop in head is over 300 feet. The shape of the potentiometric contours suggests at least 3 faults contribute to the flow of underground water.
- All 6 mine inflow locations are directly associated with faults.
- Four water chemistry analyses all indicate that Electric Lake waters and mine inflow waters are separate and distinct. This includes Ionic Composition, Isotope Ratios, Tritium, and ^{14}Carbon.

PacifiCorp Investigations

- The first-ever prolonged negative inflow to the lake occurred at about the same time that the largest inflows to Skyline Mine occurred. That is, Fall of 2001. However, those negative inflow calculations are based on calculated or imputed inputs and not on actual measured inputs to the lake.
- Lake water elevations vs. time slopes indicate that Electric Lake was experiencing a markedly increased rate of water loss during 2001 to 2002. Compared to the lake's history, this is the greatest rate of water loss ever. Three years of "mild to moderate drought" explains at least part of this. Still, the lake began experiencing this loss during the same time there are large inflows to Skyline Mine.
- The lake is losing about 4,700 gpm while the largest inflow to the mine is also 4,700 gpm. This is a striking comparison. That mine inflow is also the closest one to the lake, about 9,000 feet (1.7 miles) away along a fault path that intersects both the lake and the mine inflow location.
- The underground water potentiometric surface level and lake level were almost identical during the month of October 2001. Potentiometric surface 8,500 vs. lake level 8,521. Further, the 8,500 ft. potentiometric contour is located about the center of the lake, which is where the water would be physically located. This is a striking comparison.
- A resistivity survey indicates two major faults running between Electric Lake and the mine. The inflow at 10-Left in the mine is located on one of these major faults. The area also contains 5 inferred fractures and the area between the lake and mine contains considerable water below the 8,500-foot elevation.
- An AquaTrack survey indicates there is a preferred path for water flow between Electric Lake and the water inflow at 10-Left in the mine. While inconsistencies exist in this survey, the preferred path seems valid.

Division Comments

Based on the above conditions and investigations, the Division finds that the Operator has provide sufficient information to define the Probable Hydrologic Consequences (PHC) due to mining. At this time, there is no evidence to indicate adverse impacts to the Hydrologic Balance. Specifically, groundwater and surface water availability appear to remain unchanged. There does not appear to be any contamination, diminution, or interruption of underground or surface water sources within or adjacent to the permit area.

Surface and ground waters will continue to be monitored. Such monitoring has been increased substantially due to the unique nature of the mine inflow situation. In-depth hydrogeologic investigation and modeling is under way and will continue into the future. As this monitoring and investigations develop new data and information, the Operator will be required to revise the PHC accordingly.

Findings:

The proposed amendment meets minimum regulatory requirements.

OPERATION PLAN

FISH AND WILDLIFE INFORMATION

Regulatory Reference: 30 CFR Sec. 784.21, 817.97; R645-301-322, -301-333, -301-342, -301-358.

Analysis:

Protection and Enhancement Plan

The recommended seasonal buffer for the goshawk and red-tailed hawk is March 1 to August 15. Assuming operations continue as reported no protection plan will be required in James Canyon further than keeping the road gated and locked (page 2-99(a)) to restrict public assess. The Forest Service has stated keeping the gate locked is sufficient to protect raptor nests in near by canyons.

All electric power lines to the James Canyon wells are buried.

The MRP (page 2-71) commits to conducting macroinvertebrate studies and fish studies in James Creek for 2 years beginning in October 2001 and then every three years thereafter. This is confusing since an October 2000 study has already been conducted. Sampling should identify any slow degradation of the creek due to sedimentation. Unfortunately, only one year of baseline data was obtained prior to mining activities. Mt. Nebo Scientific, Inc collected the data for the first two years. Dr. Dennis Shiozawa conducted the surveys. The October 17, 2000 and 2001 (2001 Annual Report) reports found James Creek to be in excellent condition despite the large decrease in macroinvertebrate and fish numbers, Table 1 summarizes the sampling.

Table 1. Summary of aquatic resource sampling on James Creek in 2000 and 2001.

Date	Macroinvertebrate #/m^2	Biomass (g/m^2)	Total Fish
Fall 2000	378,510*	272	587
Spring 2001**	335,000		
Fall 2001	127,875	256	93

*Used summary data from Fall 2001 report, because Fall 2000 report indicates 34,757/m^2.
** Spring 2001 report not found; used summary data from Fall 2001 report.

The 2001 report provides several explanations for the decrease in macroinvertebrate and fish numbers and cannot directly attribute the decrease to mining activities. The large amount of drilling fluids that spilled into James Canyon was not mentioned or accounted for in this study. However, a subsequent conversation with Dr. Shiozawa indicates that the drilling fluids could have influenced the fish numbers. At the time of the spill the James Canyon wells were permitted under an exploration permit administered by the BLM.

Because of the lack of adequate baseline data and the dramatic decrease in numbers of macros and fish for Fall 2001 these baseline studies should continue. Mitigation will likely be required.

Wetlands and Habitats of Unusually High Value for Fish and Wildlife

The MRP states that low flows in Eccles Creek are often 2 cfs in late summer and fall and high flows seldom exceed 50 cfs (page 2-65). Current discharges are 13 to 20 cfs into Eccles Creek. Eccles Creek is a tributary to Mud Creek and Mud Creek flows directly into Scofield Reservoir. Scofield Reservoir is:

- A culinary water source
- One of the top four trout fishing lakes in Utah
- Has over a one million dollar recreational fishing value (E-mail from Louis Berg to Susan White dated February 4, 2002).

The PHC states (PHCA-27) Nickel concentrations have reached as high as 40 ug/l. This level is greater than the 15 ug/l known to inhibit the reproductive capabilities of *Ceriodaphnia dubia*, an invertebrate biologic indicator species. However, the limits are below those required by UPDES levels.

Currently three studies are being conducted on Eccles Creek and one study on Mud Creek to address impacts related to the discharge.

The Permittee submitted A Compilation and Comparison of Eccles Creek Macro-Invertebrate Data for the Period of 1979 – 2002 on August 27, 2002 as required by a 2002 condition to the Permit. Dr. Shiozawa authored the compilation and comparison. Dr. Shiozawa states the comparison was difficult because different procedures, analytical approaches, sampling station designation, and creek conditions occurred throughout the 23 year time span. During this 23 year time span data was collected on 24 site visits. The report documents that Eccles Creek has undergone a progressive change in benthic community structure. Total numbers and species diversity have decreased and species dominance has shifted.

Table 2. Selected summary statistics for 1979 and 2002 taken from the August 27, 2002 study, A Compilation and Comparison of Eccles Creek Macro-Invertebrate Data for the Period of 1979 - 2002.

Year	1979	2002
Range in number of Taxa sampled	21 to 39	6 to 14
Range of total invertebrate densities/m^2	9321 to 34,233	3703 to 8757
Range in Diversity Indices	1.96 to 3.51	.398 to .957
Range in Community Tolerance quotient	55 to 74	52 to 99

Although the mine is likely the dominant influence on this creek other factors including, floods, drought, roads, and other mines may and likely have impacted the stream. Because of the other factors in the watershed blaming solely Skyline Mine on the degradation of Eccles Creek cannot be done. However, the report demonstrates the resilience and adaptability of Eccles Creek to disturbance through floods, longwall fluid spills and other continued water quality exceedances.

The Permittee has committed to a three year or longer macroinvertebrate sampling of Eccles Creek beginning in spring 2002. Fish studies will begin in Fall 2003 and results will be compared to results of previous studies (page 2-71c). Mitigation will likely be required when all studies have been completed.

A study is currently being conducted to evaluate the changes to the physical conditions of Mud and Eccles Creek due to the sustained increase flows. Parameters being monitored include flow, water quality, channel bank stability, and vegetation. Documenting the return of the riparian community to a stable condition after the flows decrease is a necessary part of the study.

Findings:

Information provided in the application is considered adequate to meet the minimum Fish and Wildlife requirements of the regulations.

TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-230.

Analysis:

Drill Site

Drawing #1.6-3 shows the site location. Plate #3.4-1 shows the location of the well site and topsoil storage pile along the road.

Development of the well site is described on page 3-63 (a). The site includes a drill pad (100' X 200'), sediment pond, undisturbed drainage ditch and 18 inch culvert. Two water wells were drilled, JC-1 and JC-2. Topsoil was removed to a depth of two inches (on the average) from the drill pad area (page 2-120 (f).

The soil survey (Appendix 2) reported that in the vicinity of the well site, the access road and the pipeline burial roadway, the topsoil was between 16 and 24 inches in depth (Aspen soil). However, only an average of two inches was salvaged from the drill pad and access road, yielding a total of 126 cubic yards of topsoil that is stored at the intersection of James Canyon Road and the Monument Peak Road (Drawing 3.4-1). The Permittee indicates that drill pad and access road were constructed on a previously disturbed road cut (page 2-120f) and therefore salvage of more than two inches was not possible. This information is not supported by the consultants report found in Appendix 2 and repeated on page 2-120 g. But, if this information were accurate, then R645-301-232.300 would have allowed salvage of six inches of topsoil/subsoil where topsoil was inadequate.

The reclamation plan describes the replacement of two inches of salvaged topsoil to the site (Section 4-20, page 4-30 (a)).

Pipeline

The 16-inch polypipe is buried for a distance of about a half mile along the James Canyon road from the drill site to the dewatering site at Electric Lake in Section 35, T.13S, R6E.

For polypipe burial, the plan indicates that the top few inches of soil on the flat portions of the road (page 2-120 j) were salvaged and the subsoil was removed to a depth of three feet and replaced.

The pipeline was reclaimed in September 2002 (page 4-30(b)), no mulch was incorporated into the surface.

Power Cable

The power cable is buried in the road in James Canyon in the SW1/4 SE1/4 of Section 25, T13 South R6 East. The present configuration of the road is 19 feet wide with ditches on

both sides. The ditches have 1:1 side slopes. There is four inches of road base on the roads (IB01I-1). The power line was buried 30 – 40 inches deep, in an eight inch wide trench (page 2-120 j). Power cable was laid in the bottom of the trench and the trench was backfilled.

The buried power line runs from the power pole for a distance of 4,400 feet along the James Canyon road (page 3-63a)) to the well site (a total distance of approximately 1.2 miles). DWG 1.6-3 indicates that a portion of the James Canyon road was not initially in the permit area, but was incorporated into the permit area as a result of this activity.

Stipulations were placed on the power cable installation and burial by the U.S. Forest Service in a letter to Mary Ann Wright of the Division, dated October 15, 2001, signed by Elaine Zieroth, Forest Supervisor. For the portion of the power cable burial falling within the mine permit boundary, the following soils issues were stipulated by the Forest Service:

- Typical details showing the depth of burial and trench relative to the road
- Plan for protecting the topsoil berm an the outer edge of the road and
- Seeding of the topsoil berm and cutslope of the road prior to winter.

The submittal describes the trench on pages 3-28 (b) through 3-28 (e). Page 4-30 states, "soil was removed from the road surface and pushed to the side for use as a temporary berm." The topsoil was stored in a berm approximately two feet four inches high (as shown in cross-sections on pages 3-63 c –f) along the outslope of the road. As described on page 2-120 (f) and 2-63 (b), the outslope of the road was protected from erosion by reseeding with the seed mix shown on page 2-63 (e). During reclamation of the road (page 4.30a) the berm will become the topsoil, so protection during operations is quite critical.

Findings:

The information retroactively provides the Operations Topsoil and Subsoil handling information for the James Canyon pipeline emergency construction.

SPOIL AND WASTE MATERIALS

Regulatory Reference: 30 CFR Sec. 701.5, 784.19, 784.25, 817.71, 817.72, 817.73, 817.74, 817.81, 817.83, 817.84, 817.87, 817.89; R645-100-200, -301-210, -301-211, -301-212, -301-412, -301-512, -301-513, -301-514, -301-521, -301-526, -301-528, -301-535, -301-536, -301-542, -301-553, -301-745, -301-746, -301-747.

Analysis:

Impounding structures

A sediment pond was constructed at the drill site. The pond served to capture the drilling fluids produced during well development. Before reclamation of the site, the sediments in the pond will be sampled and analyzed using methods outlined on Table 6 of the Division's Approved Soil and Overburden Handling Guidelines, dated 1988. Table 6 includes the following parameters: pH; Electrical Conductivity; Saturation Percentage; Particle Size Analysis; Soluble calcium, magnesium, and sodium; Sodium Adsorption Ratio; Selenium; Total Nitrogen; Nitrate-Nitrogen; Boron; Maximum Acid Potential; Neutralization Potential; Organic Carbon; Exchangeable Sodium; Available Water Capacity; and Rock Fragments.

Findings:

Information provided with the submittal is adequate for the purposes of Operations Spoil and Waste Materials handling requirements of the Regulations.

RECLAMATION PLAN

PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL VALUES

Regulatory Reference: 30 CFR Sec. 817.97; R645-301-333, -301-342, -301-358.

Analysis:

Fish and Wildlife enhancement measures during reclamation for the James Canyon road, pipeline include planting of woody species, placement of rocks and logs, and seeding with native species.

Because the pipeline burial reclamation was done prior to resolution of the deficiencies, no surface mulch was used. Since James Canyon is critical breeding habitat for the Yellowstone cutthroat this area will need to be observed and remedial action taken if erosion is noticed. Surface mulch must be used in reclamation of the road and pipeline.

Findings:

Information provided in the application is considered adequate to meet the minimum requirements of the regulations.

TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-240.

Analysis:

Redistribution

The reclamation plan for the James Canyon Road and Drill Pad is outlined on page 4-30a:

- The topsoil (berm) will be "set aside."
- The gravel road surface will be pushed to the inside of the road cut.
- The road outslope of the road will be pulled up onto the road.

The average depth of topsoil and subsoil replacement is as follows (page 4-30 (a) & (b):

Drill pad = 2.0 inches

Pipeline = 0

Powerline = use road berm

Staging area (topsoil pile location) = use subsoil on outslope

There is very little topsoil being replaced at the site, although the area was rich with topsoil prior to disturbance (see Appendix A-2).

The reclamation plan is described on page 4-30(a & b). The road will be ripped to a depth of four feet to reduce compaction. The plan calls for pushing the gravel on the surface of the road to the cut slope side; filling the cut with outslope material; and topping the surface with the soil stored in the road berm.

The Division requested that there be no compaction in the upper four feet of the root zone. The Permittee has indicated that compaction will be kept to a minimum during soil placement on the road and that the site will be gouged to 18 inches depth (page 4-30(a). The reclamation plan should include ripping the road surface prior to restoring the contour.

Since two inches of topsoil was salvaged from the site reported to have between 16 and 24 inches in depth, reclamation of the drill pad and access road will be enhanced with supplemental organic matter, such as Biosol. The type of organic amendment will be determined in cooperation with bothe the U.S. Forest Service and the Division prior to reclamation of James Canyon.

Findings:

Information provided with the submittal is adequate to ensure an adequate rooting zone

REVEGETATION

Regulatory Reference: 30 CFR Sec. 785.18, 817.111, 817.113, 817.114, 817.116; R645-301-244, -301-353, -301-354, -301-355, -301-356, -302-280, -302-281, -302-282, -302-283, -302-284.

Analysis:

General Requirements

A seed mixture for the James Canyon was developed in coordination with the Forest Service (page 2-63(d). It is crucial that the Permittee be vigilant with a weed control program. The Weed Web at: http://extension.usu.edu/coop/ag/crops/weedweb/index.htm provides current information for weed control programs.

Timing

Final seeding of the buried pipeline was completed in November 2001. Seeding of other areas in James Canyon will be done in the fall. The powerline trench was compacted and graded in the fall; no seeding was required. The fall is considered the normal time of seeding for this area.

Mulching and other soil stabilizing practices

Soil preparation will include surface roughening. Extreme surface roughening should stabilize the soil surface or limit sediment runoff to the bottom of each basin. A surface mulch will be used as additional control because of the sensitivity of James Creek. Certified weed-free (usually only noxious weed-free) straw or alfalfa mulch and/or hydromulch will be spread or sprayed on the reclaimed surface. Straw or hay will be applied at the rate of 1500 pounds per acre. Hydromulch, if used, will be applied at a rate of 2000 pounds per acre.

Standards for success

The application provides a reference area for the James Canyon disturbance but since the mine failed to take predisturbance vegetation data a demonstration that the reference area is equal to or exceeds the vegetation cover, diversity, density and/or productivity of the disturbed area cannot be made. The revegetation standard is based on a reference area adjacent to the disturbed area. The 2001 total cover for the reference area was 65 percent. The bond releases standard is total cover, productivity and shrub/tree density. Productivity, cover and shrub density (as measured by methods described in the Division's Vegetation Information Guidelines) of the reclaimed area must equal or exceed 90 percent (using a one sided 90 percent confidence interval) of the productivity of the reference area for two consecutive years prior to bond release.

Findings:

Information provided in the application is considered adequate to meet the minimum Revegetation requirements of the regulations.

STABILIZATION OF SURFACE AREAS

Regulatory Reference: 30 CFR Sec. 817.95; R645-301-244.

Analysis:

Page 2-120 (j) states that the James Canyon road was roughened from the drill site down to Electric Lake with gouges made by a track hoe. Along the pipeline, water bars were re-constructed and silt fences were positioned at the outflow of each water bar (page 3-63 b). The grading was completed by September 14, 2001 and the site was seeded sometime in November 2001 (page 4-30 (b)). The seed mixture is found on page 2-63(e).

Reclamation of the access road and drill pad will also include surface roughening to 18 inches and placement of logs and rocks on the surface. Water bars will not be left on this portion of the road (as per Section 4-20, attached email communication from Carter Reed USDA Forest Service to Chris Hansen Canyon Fuel Company, dated July 3, 2002).

The James Canyon road disturbance is in ASCA #35 and #36 (page 3-72 C). As such, silt fences will be maintained three times a year until vegetation is adequate to control erosion (page 3-64).

Findings:

Information provided meets the minimum requirements of Reclamation Plan Stabilization requirements of the Regulations.

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:

Bonded area map

The bonded area is usually the same as the disturbed area boundaries. Because the disturbed area boundary is long and narrow the Division will wave the usual requirement to have the map at a scale of 1" = 100' of greater.

The disturbed area for the James Canyon site is shown on Plate 3.4-1, James Canyon Disturbed Area Map. The map is at a scale of 1" = 300'.

On Drawing No. 1.6-3, the Permittee list the permitted and disturbed areas and acreages for the Skyline Mine. List on the drawing are the following for the James Canyon acres:

- James Canyon buried pipeline 1.60 disturbed acres.
- James Canyon buried power line 0.30 disturbed acres.
- James Canyon water well and road 2.96 disturbed acres.

Reclamation backfilling and grading maps

Usually the Division requires that the Permittee provide maps and cross sections for the disturbed area boundaries that are at a scale of 1 inch = 100 feet. Because the site is very long and narrow and disturbance will be limited to installation of the pipeline the Division will not require detailed maps and cross sections for the site.

Drawing No. 1.6-3, Skyline Mines Permit Area Map, show the location of the pipeline and the associated trail. On Page 3-80 (b), the Permittee show a typical cross section for the site. Both the cross-sections and map were certified. The maps are adequate for the Division to analyze the reclamation plan

Final surface configuration maps

Because the disturbed area is long and narrow and most of the disturbance is confined to reclaiming the road, the Division will not require any detailed surface configuration maps. In general the road should be reclaimed the pre disturbance topography.

Findings:

The information provided in the PAP is considered adequate to meet the minimum requirements of this section of the regulations. Before approval, the Permittee must provide the following in accordance with:

BONDING AND INSURANCE REQUIREMENTS

Regulatory Reference: 30 CFR Sec. 800; R645-301-800, et seq.

Analysis:

Determination of bond amount

The Division reviewed the reclamation cost estimate submitted by the Permittee. The Division determined that the reclamation cost for the James Canyon area is $7010. The USFS also has a $10,000 bond for the James Canyon area. The Division currently has a $5,076,000 bond for the Skyline mine. The addition bond increase is considered minor enough to be ignored at this time. The Division is in the process of revising the Skyline mine as part of the permit renewal. A complete review of the bond will occur during the renewal process.

Findings:

The Permittee met the minimum requirement for this section.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT (CHIA)

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

Analysis:

The Operator has provided sufficient information to define the Probable Hydrologic Consequences (PHC) due to mining, enabling the Division to compile the CHIA. The CHIA is a separate document which is being revised as a result of the revised PHC. The application to permit the North Lease has also prompted a review of the PHC and issuance of a revised CHIA.

Findings:

The Skyline Mine has been designed to minimize impacts within the permit area and prevent material damage outside the permit area.