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March 17, 1998

TO: File

THRU: Daron Haddock, Permit Supervisor 

FROM: Michael J. Suflita, Reclamation Hydrologist

RE: Technical Analysis, Canyon Fuel Company, LLC, Dugout Canyon Mine, PRO/007/039-97A, Folder #2, Carbon County, Utah

**SYNOPSIS**

On August 1, 1997 the Division provided the Operator with a TA on the subject mine. On September 9, the Operator provided the Division with a response. On October 20, 1997 the Division responded with a TA and, in turn, the Operator sent in a response. On January 6, 1998 the Division sent the Operator a punch list of deficiency items that were responded to in a February 3, 1998 document. In order to expedite the project a meeting was held on February 27, 1998 and a revised document was submitted on March 3, 1998. This document is a Technical Analysis of this latest submittal and is limited primarily to the hydrologic aspects of the submittal.

In the interest of time, this TA is limited to those deficiencies previously pointed out to the Operator and does not include those positive aspects of the document which had been found conforming to the R645 regulations.

**ANALYSIS**

**ADMINISTRATIVE**

Regulatory Reference: R645-301-114, Right-of-Entry Information

Plate 1-1, Surface Ownership replaced Fig. 1-1 and shows the ownership on a Range and Township map. Similarly, Plate 1-3, Surface Ownership Along County Road shows the entire road and property ownership. In addition, an expanded view shows the mine site disturbed area has been reduced to eliminate that which was formerly on BLM land. The expanded view shows which portion of the disturbed area is on Canyon Fuel Co. land, and on State land. The lower 500 feet is on State land. Appendix 1-2 contains the lease documents which give permission for the Operator to conduct operations on State land.

**Findings:**

The plan fulfills the requirements of R645-301-114.100, which specifies "An application will contain a description of the documents upon which the applicant bases their legal right to enter and begin

coal mining and reclamation operations in the permit area....”.

## **PUBLIC NOTICE**

Regulatory Reference: R645-300-121, Filing and Public Notice

### **Analysis:**

In Appendix 1-2, the permit application contains an affidavit of publication and a public notice that has been published once a week for at least four consecutive weeks.

### **Findings:**

The requirements of R645-300-121 have been met. Specifically, 121.100, “ Upon submission of an administratively complete application, an applicant for a permit, .... will place an advertisement in a local newspaper of general circulation in the locality of the proposed coal mining and reclamation operation at least once a week for four consecutive weeks. A copy of the advertisement as it will appear in the newspaper will be submitted to the Division.”

## **HYDROLOGIC RESOURCE INFORMATION**

Regulatory Reference: R645-301-731,

### **Analysis:**

Primarily on page 7-54, but elsewhere also, the plan describes the construction methods to be used and specific methods used to control sediment flow into Dugout Creek. Specifically, a substantial silt fence, referenced as Fig. 5-5, along the upper banks all along both sides of the creek. On Plate 7-5 the plan describes putting silt fences every 200 feet along the culvert, perpendicular to the culvert, to reduce sediment loading. The referenced method, Fig. 5-5, is an appropriate silt fence installation method.

Several places mention the discharge of an estimated 190 gallons per minute of water resulting from mining into the creek. These include pages 7-46, 7-50 and 7-69. Page 7-53 describes the flow being directed into the spillway conduit or into the stream with attendant erosion protection riprap. A commitment is made to obtain a UPDES discharge permit for the flow.

On page 5-38 reference is made to installing four silt fences as shown in Fig. 5-5 which extend across the entire stream below the construction site. During the low flows expected during construction, these should be adequate to minimize silt contributions to Dugout Creek.

### **Findings:**

The plan fulfills the requirements of R645-301-731.121, which requires “Surface water quality will be protected by handling earth materials, groundwater discharges, and runoff in a manner that .... prevents, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow outside the permit area; and otherwise prevents water pollution.”

**Analysis:**

The only primary road to be used by SCM is the county road which will access the mine site. The design and reconstruction of this road will be the responsibility of Carbon County. The road will be maintained by the County to meet its design standards throughout the life of the mining and reclamation activities. SCCC will assist the County to ensure that catastrophic events are repaired as soon as practical after the damage occurs.

An Analysis and Finding on the Dugout Canyon Road was made by the Division on January 28, 1998 which concluded that the "road up to the Dugout Canyon Mine disturbed area boundary does not need to be included in the permitted area for the Dugout Canyon Mine, and is thus exempted from the jurisdiction of the Utah Coal Regulatory Program." Details of this finding can be found in the Analysis and Finding document.

**Findings:**

The applicant has met the minimum regulatory requirements for Primary Roads.

**Buffer Zone Markers**

**Analysis:**

Stream buffer zone markers will be placed adjacent to Dugout Creek within the disturbed area noted on Plate 5-2A. Each buffer zone marker will be a design that can be easily seen and read, will be made of durable material, will conform to local regulations, and will be maintained until after the release of all bonds for the permit area. Page 5-21 further delineates stream buffer zone marker locations and intervisibility between signs.

**Findings:**

The Applicant has met the minimum regulatory requirements.

**Diversions**

**Analysis:**

Diversions are covered in the text of the application on pages 7-64 through 7-66 and 7-77 through 7-82. The criteria for diversions and culverts are summarized in Tables 7-8 and 7-9 on page 7-81 and 7-82, respectively. Plate 7-5 shows the location and drainage patterns throughout the proposed mine site. Appendix 7-9 holds the calculations for diversions and culverts. Appendix 7-10 is the methodology used in making the calculations. Several berms are designed to divert water off of upper pads (Appendix 7-9, page 81a) and road ditches are used to route flow from much of the disturbed area into the ponds (page 5-2 and Table 7-8).

Plate 7-5 shows a simple drainage system. There is one undisturbed ditch that routes water from the southern slopes past the disturbed area. Undisturbed drainages on the northwest side of the disturbed area are treated by the sediment pond. About 40% of the disturbed area is covered by roads and

there are two impoundments in the disturbed area which contain their respective design events. The result is minimum sediment contribution to Dugout Creek itself.

Essentially there are two disturbed area drainage ditches, one on the north side of Dugout Creek and one on the south, that run along the road and route water into a single sediment pond. The southern branch must cross Dugout Creek at the lower Dugout Creek culvert to reach the sediment pond. Drainage on the northern side of the facilities areas is aided to the ditch by a couple berms. Several culverts are used in the disturbed drainage system.

Dugout Creek and its eastern tributary will be routed under the entire disturbed area in a 60-inch corrugated metal culvert. The culvert has been sized giving due consideration to the watershed runoff characteristics, including vegetation types, soil types, and the harvesting of timber above the mine site. DOGM calculations indicate the culvert is conservatively designed using minimum slopes resulting in a capacity 25.3% greater than the design event. There is a hydraulic jump energy dissipator at the downstream end of the culvert which is designed to have a water exit velocity slightly less than the natural stream channel velocity. This should result in minimum erosion problems to the stream channel below the disturbed area.

A stream alteration permit has been granted by the Division of Water Rights.

All ditch diversions and disturbed drainage culverts have been designed to convey the 10-year, 24-hour event as prescribed in the Division Position Paper. The Dugout Creek culverts have been designed to convey the required 100-year, 6-hour storm event.

**Findings:**

The applicant has met the regulatory requirements for diversions and diversion designs.

**Stream Buffer Zones**

**Analysis:**

Stream buffer zones are addressed in the application on page 7-61. A large portion of the surface facilities will be located within 100 feet of Dugout Creek. The runoff and sediment control plan has been designed to ensure the operations within the buffer zone will not cause or contribute to degradation of water-quality or the stream channel quality. There will be a buffer zone designated and maintained between the mine facilities and the stream channel. The buffer zone will be marked.

**Findings:**

The applicant has met the minimum requirements for stream buffer zones.

**Sediment Control Measures**

**Analysis:**

Alternate sediment control measures are designated for two areas which cannot report to the

sediment pond. These are the areas above the lower 600 feet of the Dugout Creek culvert (ASCA-1) and a hillside slope between the sed pond and the lower (southwest) end of the disturbed area (ASCA-2). ASCA-1 will be treated using silt fences perpendicular to the slope on 200 foot intervals. ASCA-2 will be treated with silt fences, straw bales, and berms until vegetation is established. These are typical methods, and although potentially maintenance intensive, they will work.

Page 5-38 describes installation of four silt fences below the energy dissipator which are intended to minimize sediment contributions to Dugout Creek during construction of the disturbed area. Reference Fig. 5-5. This is seen as adequate, however, they need to be left in place until the completion of all construction activities and NOT removed as construction proceeds as described.

**Finding:**

The plan meets minimum requirements, except for retaining the downstream silt fences until ALL construction activities are completed.

**Sedimentation Ponds**

**Analysis:**

There is one sediment pond used in the proposed sediment control plan. This pond is designed in Appendix 7-8 and presented in the text on pages 7-63 and 7-64, and 7-74 through 7-80. The sediment pond will be used throughout the mining operations and reclamation. It is designed to contain more that five years of sediment accumulation based on the Universal Soil Loss Equation (USLE) plus the water volume resultant from the 10-year, 24-hour storm event. Both undisturbed area and disturbed area drainages are treated by the sediment pond. A staff gauge will be used to mark the 60% clean-out elevation for the required clean-out. The pond will be equipped with a dewatering device and a spillway.

The primary spillway is a 24-inch drop inlet corrugated metal pipe (cmp) leading to an 18-inch cmp barrel, at an 8% slope, which leads to the 60-inch culvert containing the Dugout Creek flows. See Plate 7-4. An emergency spillway is provided consisting of an 18-inch drop inlet pipe leading into the primary spillway barrel. This arrangement was questioned initially, however, was deemed adequate since the primary spillway, including the barrel, will carry 42.2 cfs compared to the design event of 3.04 cfs. The appropriate 25-year, 6-hour event was used to size the combined primary and emergency spillways.

**Findings:**

The applicant has met the minimum requirements for sediment ponds.

**Discharge Structures**

**Analysis:**

Discharge structure information is covered in the application on pages 7-68 and 7-84. The applicant says that there will be two discharge structures: the sediment pond spillway and a discharge line from the underground workings. In addition, there is a discharge structure at the outlet of the main culvert.

The primary sediment pond spillway is a 24-inch drop inlet corrugated metal pipe (cmp) leading to an 18-inch cmp barrel, at an 8% slope, which leads to the 60-inch culvert containing the Dugout Creek flows. See Plate 7-4. An emergency spillway is provided consisting of an 18-inch drop inlet pipe leading into the primary spillway barrel. This arrangement was questioned initially, however, was deemed adequate since the primary spillway, including the barrel, will carry 42.2 cfs compared to the design event of 3.04 cfs. The appropriate 25-year, 6-hour event was used to size the combined primary and emergency spillways.

Page 7-53 describes the discharge from underground workings as being an estimated 190 gallons (.42 cfs) per minute which will be discharged into Dugout Creek. The method of handling the discharge is through a pipe into the sed pond spillway or directly into the creek with riprap to prevent erosion.

There is a large hydraulic jump energy dissipator at the downstream end of the Dugout Creek culvert which is designed to have a water exit velocity slightly less than the natural stream channel velocity. The energy dissipator is over 56 feet long and nine feet wide with two- to three-foot thick rock lining. This should result in minimum erosion problems to the stream channel below the disturbed area.

#### **Findings:**

The plan meets the requirements of R645-301-744, "Discharge from .... diversions will be controlled, by energy dissipators, riprap channels and other devices, where necessary to reduce erosion to prevent deepening or enlargement of stream channels, and to minimize disturbance of the hydrologic balance."

#### **Impoundments**

##### **Analysis:**

There are two impoundments as part of this plan and they are described on pages 7-68 & 69 and in Appendix 7-9, pages 113 to 115. The appropriate 10-year, 24-hour design event was used to determine that the impoundments would completely contain the event. In addition, the upstream impoundment is 1.2 times the needed volume and the downstream impoundment is ten times the needed volume, thereby providing a significant safety factor over the design requirements. Since the design event is completely contained, no spillway is required. They are both designated as temporary impoundments.

Regular inspection of the impoundments is described. However, there is no commitment to clean out water and sediment collecting in the impoundments and this is a regulatory requirement.

##### **Findings:**

The applicant has met the minimum requirements for impoundments, except for cleaning them out. The applicant must commit to and perform impoundment clean out.

**Analysis:**

Although the Probable Hydrologic Consequences have already been evaluated, on March 6, 1998 BLM sent a letter to the Utah Division of Water Rights indicating several concerns on the Dugout Mine stream alteration permit. While most of the concerns were administrative in nature, one of the issues raised was the possible interruption of groundwater recharge due to culverting the stream over a 1970 foot length. This has been determined to be not a significant problem for the following reasons.

Examination of the Geologic Map of Pine Canyon Quadrangle shows the formation in the mine disturbed area is the Blackhawk, including sandstone, siltstone, and shale. That is underlain by the Mancos Shale. All of these formations have low water conductivity. There are two faults on the entire quadrangle. One is 300 feet long and the result of cliff face slumping while the other is located two miles northeast of the disturbed area on the outer edge of the Dugout Creek drainage. There are no faults in the disturbed area where the culvert will be placed. There are two vertical joints in the disturbed area, but since there is no displacement, they are not believed to contribute to water infiltrations.

The dip, or slope, of the strata is 6 degrees to the north, while the stream flow is to the southwest. This is consistent with the Castlegate Potentiometric Surface as shown on Plate 7-3 of the mine plan which shows the gradient of the surface sloping to the north-northwest. The Castlegate formation is above the Blackhawk. There are no known regional aquifers in the area.

While there is alluvium in the stream at the mine site, it is thin and not shown on the geologic map. About 1500 feet downstream from the disturbed area Quaternary alluvium and pediment gravels are shown. By way of perspective the Dugout Creek drainage area above its confluence with Grassy Trail Creek (near Utah Highway 6) is over 43 square miles or 27,520 acres, as compared to the mine disturbed area of 10.4 acres. Similarly, the culvert would occupy 1,970 feet of the over 9.5 miles, or 50,160 feet, of stream channel between the mine and Grassy Trail Creek.

Water will not be lost by passing through the culvert. The water will be returned to the natural stream channel at the outlet where the it will continue to recharge the groundwater in the area. There is no evidence to suggest that the reach of stream occupied by the culvert is of special significance to such recharge. Interestingly, other studies, such as Wadell, and Price and Plantz show considerable variation in streams gaining and losing flow with water stage as they cross the Blackhawk formation. Similar variation is found with the base flows contributed to the stream by springs above the mine site.

USGS has monitored a site at the lower end of the disturbed area for several years. Unfortunately, no monitoring was done above the site to define whether the disturbed area is a gaining or losing section. From the initial submission, the Mining and Reclamation Plan has in it, plans to monitor above and below the site to determine a gain-loss hydrograph. One set of observations was made on August 27, 1997 (the driest time of year) which showed the flows above and below the disturbed area to be exactly the same.

**Findings:**

The overall view is that the culverted reach of stream is of very minor consequence when compared to the recharge mechanism for any springs that may issue from the Mancos shale downstream

of the mine disturbed area. Similarly, the streamflow in Dugout Creek is not expected to suffer any significant impacts.

## **RECLAMATION**

### **Diversions**

**Regulatory Reference: R645-301-742.300**

#### **Analysis:**

All corrugated metal culverts are removed during reclamation and the canyon is restored to its approximate original contour. The stream reclamation plan is covered on pages 7-92 through 7-99, and in Appendix 7-11. The basic plan is to line Dugout Creek and its main eastern tributary reclamation channels with riprap to form a stable "macrochannel". The required 100-year, 6-hour design event was used to size the channels. The channels are eight feet wide and three feet deep resulting in 1.9 feet of freeboard. The riprap is two feet thick with filter blankets sized to the underlying soil. Filter design will be finalized at reclamation to base the design on soils present at that time since there will be a mixture of soils during reclamation. Estimated riprap and filter quantities are contained in the appendix.

In addition, there will be a series of 29 "Channel Stability Enhancement Structures", to provide a "microchannel" environment to increase sediment deposition above the macrochannel. These are shown in Fig. 7-12 and are spaced about every 60 feet along the channel. Three types are employed: Low-Stage Check Dams, Bank-Placed Boulders, and Rock or Log Spurs. The overall impact of the stream reclamation will be to provide a channel that is significantly improved over that which was left by pre-SMACRA mining and a channel that will promote riparian revegetation. It should be noted that no fish have been found in Dugout Creek.

Page 3-21 describes a mitigation plan whereby about 7,500 feet of streambank above the mine disturbed area is reseeded and vegetation is planted in the stream. This is consistent with the typical 3:1 mitigation for such projects and will result in immediate and long-term benefit to the stream.

#### **Findings:**

The plan meets the requirements of R645-301-742.313. Specifically, "A permanent diversion or a stream channel reclaimed after the removal of a temporary diversion will be designed and constructed so as to restore or approximate the premining characteristics of the original stream channel including the natural riparian vegetation to promote the recovery and the enhancement of the aquatic habitat."

### **Sediment Control Measures**

#### **Analysis:**

Sediment control measures for the reclamation plan are found on pages 5-55. Alternate sediment control measures are shown in Figure 5-5 on page 5-56.

The sediment pond will be removed near the end of the reclamation process. It will be retained until the regrade process reaches the location of the pond at which time it will be backfilled. When an area no longer properly drains to the sediment pond silt fence will be installed along the base of the slope to create alternate sediment control areas (ASCA). The silt fences will be utilized until vegetation is successfully established to control erosion. The utilization of silt fence is best technology currently available. However, a surface roughening technique would greatly enhance the sediment control measure and the vegetation establishment time would be hastened.

**Findings:**

The applicant has met the minimum requirements for exemptions for sediment control. The utilization of silt fence is best technology currently available.

**Sedimentation Ponds**

**Analysis:**

The operational sediment pond will be utilized in the reclamation process as long as possible. This design criteria for this pond is covered under the Operational Hydrology/Siltation Structures portion of this TA.

**Findings:**

The applicant has met the minimum requirements for exemptions for reclamation siltation structures and sediment ponds.

**Exemptions for Siltation Structures**

**Analysis:**

Areas that will not report to sediment ponds are discussed under the Sediment Control in this section of the TA. Those areas are listed as alternate sediment control areas (ASCA's) and by Division policy they are not "exempt areas".

**Findings:**

The applicant has met the minimum requirements for exemptions for exemptions for siltation structures.

**RECOMMENDATION**

The mine plan can be approved in its present form, EXCEPT for two stipulations:

1. The Operator must commit to and perform clean out of the water and sediment in the two

impoundments as required by regulations to prevent them from filling and reducing their ability to collect and hold runoff water and sediment. The plan presently does not address this issue.

2. The four silt fences placed in Dugout Creek below the construction site must remain in place and be maintained until ALL construction activities are complete. These are necessary to reduce sediment contribution to the stream. The plan presently calls for their removal when construction reaches them.