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State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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June 25, 1997

TO: File #2

THRU: Daron Haddock, Permit Supervisor

FROM: Steven M. Johnson, Reclamation Hydrologist

RE: Dugout Permit Application, Dugout Mine, Canyon Fuel, PRO/007/039, File #2, Carbon County, Utah.

SUMMARY:

Canyon Fuel has applied for a new permit near their current Soldier Canyon mine. The new mine will be call the Dugout mine and is located east of Soldier Canyon in the Book Cliff. The Division found deficiencies in the first submittal, so Canyon Fuel updated the plan in May 1997. This memorandum is the review of the surface water hydrology, excluding the mine facilities design.

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-720.

Sampling and analysis

Analysis:

Sampling and analysis is addressed on page 7-4, Section 723. This section states that analysis will be completed based on either "Standard Methods for the Examination of Water and Wastewater" or 40 CFR parts 136 and 434.

Findings:

The applicant has met the minimum requirements for surface-water sampling and analysis.

Surface-water information

Analysis:

Surface-water baseline information is addressed in Section 724.200 beginning on page 7-32. Hydrographs of Soldier Creek and Dugout Creek are included on pages 7-34, 7-35, and 7-38, Figures 7-8, 7-9 and 7-10, respectively. Water Quality information begins on page 7-38. Surface water data is presented in Appendix 7-7. Water bodies, sampling location and water rights locations are shown on Plates 7-1 and 7-2.

The major streams in the permit area are Dugout Creek, Fish Creek and Pine Creek. Fish Creek and Pine Creek are tributaries to Soldier Creek. Dugout Creek, Fish Creek and Pine Creek are all perennial streams; however, Pine Creek is only perennial in its upper reaches near the northern border of the permit area.

The application contains information on the flow of Dugout Creek and Soldier Creek and the sources of water that feed each stream. This information can be found in the application on pages 7-32 through 7-38. Analysis on this information is addressed in the surface water portion of the cumulative hydrologic impact assessment (CHIA) as prepared by the Division. No stream flow data are available for the ephemeral drainages in the permit area.

The application states that several small impoundments have be constructed in and around the permit area for watering stock.

Water quality samples have been taken from Soldier Creek, Dugout Creek and Pine Canyon. Sampling locations are shown on Plate 7-1. Chemical makeup of the water is driven by flow. High flow periods are characterized by low TDS, calcium bicarbonate water. Low flow analyses are characterized by higher TDS concentrations with different chemical compositions, dependant on the geologic formation most influential on the stream.

All surface-water quality data presented is from a sampling plan carried out in the last 10 years. There is not surface-water quality data from the past two years. The amount of data and timing of data is sufficient to describe the seasonal water quality and quantity variations. The proposed disturbed area and the permit area have be modified by land use practices since the bulk of the available data have been received. The available data shows a more natural characterization for the hydrologic system of the area. It may be desirable for the applicant to collect more current data, reflecting the current system, as a means for showing that the proposed mining activities has not caused degradation to the water quality or quantity. Without any other, more current data, all water degradation observed in the period that the proposed mine is operated and reclaimed will be attributed as being caused by the mining and reclamation activities.

Findings:

The application is complete and accurate in the area of surface-water information.

Climatological information.

Analysis:

According to Section 724.400 climatological data are summarized in Appendix 4-2. The summary begins on page A4-2-1 about 23 pages from the front of the appendix. Information covered includes suspended particulates, wind speed, wind direction, ambient temperature, precipitation and relative humidity. Depth-duration-frequency information is provided on page 1 of Appendix 7-9.

Findings:

The climatological information is complete and accurate.

Baseline cumulative impact area information.

Analysis:

Section 725, page 7-41 says that information necessary for the Division to develop a Cumulative Hydrologic Impact Assessment (CHIA) is presented in Chapters 6 and 7. The Probable Hydrologic Consequences (PHC), Section 728 beginning on page 7-41, Appendices 7-2, 7-3, 7-4, 7-5, and 7-7 contain the necessary data.

Findings:

The baseline cumulative impact area information is complete and accurate.

Modeling.

Analysis:

Page 7-41, Section 726 says that no surface-water or groundwater modeling was directly conducted for this application.

Findings:

The applicant has met the minimum requirements for surface-water modeling.

Alternative water source information.

Analysis:

Section 727 on page 7-41 says that no *surface* mining will be conducted in the permit and adjacent areas. The PHC does not indicate a need for alternative water sources.

Findings:

The applicant has met the minimum requirements for alternative water source information.

Probable hydrologic consequences determination.

Analysis:

The PHC begins on page 7-41. It is included in Section 728 through 728.300 and Appendix 7-3, the Mayo and Associate report, Section 3.0. The determinations of consequences are in Section 728.300 beginning on page 7-42. Impacts of mine are included in the Mayo and Associate report beginning in Section 3.0, page 60.

The following potential impacts are addressed in the PHC.

- Acid and toxic contamination of water;
- Increased sediment yield from the disturbed area and local subsidence;
- Changes in acidity, total suspended solids (TSS) and total dissolved solids (TDS);
- Flooding and streamflow alteration;
- Groundwater and surface-water availability;
- Potential hydrocarbon contamination;
- Road salting.
- Coal haulage.

There is no significant potential for acid and toxic contamination of water because there are no acid- and toxic-forming materials present in the Dugout Canyon Mine. Sediment control methods will be used to minimize the potential for increased sediment yield.

Discharges from the mine are expected to increase the TDS concentrations by as much as double the typical concentrations in Dugout Creek. This creek is classified as a class 2B, 3C and 4 water. Class 4 is the only classification with TDS stands which is set at 1,200 mg/L. The increased TDS levels from mine discharge is not expected to approach those levels. Any discharged water will be much lower in dissolved and total iron and manganese than water-quality standards permit.

Flooding and streamflow alterations will be controlled by routing water off disturbed areas through the sediment pond. Discharges from the mine will be controlled as to not add to flood potential. After mining is discontinued the portals will be sealed so that water from the mines will not readily drain into the creek causing increased potential for flooding. Page 47 explains that increase flow will cause an increase in the quantity of channel vegetation, which will protect the channel from excess erosion.

Evidence from the nearby Soldier Canyon Mine shows that there has been no detected subsidence and the limited available groundwater in the are has made it so the rock fracturing caused by mining will not cause a decreased spring or stream flow. The Blackhawk groundwater systems is the predominant system that will undergo affects from mining and formation fracturing. However, data shows that the water in this system is old water and does not play a significant part in the spring and surface-water flows in the area. Since the surface flows are more significantly influenced by the Flagstaff and North Horn formations, and these formations are not likely to be disturbed by subsidence or fracturing, spring and stream flows are not expected to be disrupted by mining activities.

If water is encountered in the Dugout Mine it will be pumped eventually into Dugout Creek. The PHC includes a high estimate for the amount of water received into the mine of 220 g.p.m. but actual inflows are expected to be much less that this figure. Further some of this water will be consumed in the mine as part of the mining operation. The maximum estimate of 190 g.p.m. (0.42 cubic-feet per second or 306 acre-feet per year)will be received into Dugout Creek. This is a six-percent increase to annual stream flow.

When average over the year this does not appear to be a significant change; however, the amount of flow during the summer and fall months is much greater than in natural stream flow. The baseline data shows that Dugout Creek tends to flow under 0.5 cubic-feet per second during the drier months (usually July through September) and often dries up completely during this time. If water is constantly discharged from the mine throughout the year at or near the average rate it may result in drastic changes to geomorphology and vegetation in the stream channel.

Diesel fuel, oils, greases, and other hydrocarbon products present a potential contamination source from mining activities. Hydrocarbon contamination will be prevented by locating diesel and oil above ground to avoid leakage; spillage in refueling will be minimized; and, in case of spill, a spill prevention control and countermeasure plan has been developed and will be maintained on site.

Road salt will not be use in the permit area so it should not present an environmental concern.

Accidental spills and wind blown coal dust pose a potential effect to the hydrology in the area of the Dugout Mine. However, spillage is unlikely and coal dust should have a minimal effect on the water because of the small amounts of coal lost during transport.

Findings:

The applicant has met the minimum requirements for probable hydrologic consequences.

OPERATIONAL HYDROLOGIC INFORMATION

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

Surface-water monitoring.

Analysis:

The surface-water monitoring plan begins on page 7-58 of the application. Stream monitoring locations are found on Plate 7-1. Table 7-5 on page 7-59 provides the surface water monitoring parameters. The monitor is plan was based on the PHC.

Streams and sediment ponds will be monitored during mining operations. One stations will be established to monitor surface water downstream from the mine site and two site will be established on the forks of Dugout Creek above the mine site. These sites will be monitored quarterly for the parameters listed in Table 7-5. Others sites will be located at the Castlegate Sandstone-Blackhawk Formation contact to provide information about the relationship between the Blackhawk Formation and the base flow of Dugout Creek. These sites, as well as the above mine sites, will be monitored on above normal and below normal precipitation years as described on pages 7-58 and 7-60.

Data will be collected from the sediment pond outflow and mine water discharge as required by the UPDES permit. Data will be collected on these site until mining and reclamation activities are complete.

Surface-water data will be submitted to the Division on a quarterly base, prior to the end of each quarter in which samples are taken.

Findings:

The applicant has met the minimum requirements for surface-water monitoring during mine operations.

Discharges into an underground mine.

Analysis:

Section 731.500, page 7-61 states that there will not be any discharges into the proposed mine.

Findings:

The applicant has met the minimum requirements for discharges into an underground mine.

Gravity discharges.

Analysis:

Section 731.500, page 7-61 states that there will be no gravitational discharges from mine working. However, some water will be pumped from the mine and discharged into the stream channel.

Findings:

The applicant has met the minimum requirements for gravity discharges.

Water-quality standards and effluent limitations.

Analysis:

Water Quality standards and effluent limits are addressed in Section 751, page 7-86. This section states that "all discharges from the disturbed areas will be in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining contained in 40 CFR Part 434." SC3 will be responsible for meeting any applicable water quality regulation that applies to this mine.

Findings:

The applicant has met the minimum requirements for water-quality standards and effluent limitations.

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. Dugout Creek will be routed under the road, in two location, through culverts. A stream alteration permit has been applied for from the Division of Water Rights.

Essentially there is two disturbed branches, 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.

All ditch diversions and disturbed drainage culverts have been designed to convey the 10-year, 6-hour event. The Dugout Creek culverts have been designed to convey the 100-year, 6-hour storm event.

Undisturbed drainage from the slopes northwest of the facilities area will flow into the disturbed drainage area. This extra water must be accounted for in the design of the diversions and the sediment pond. The application does not include diversion designs for the berms on the north side of the facilities.

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 with in 100 feet of Dugout Creek. The runoff and sediment

control plan has been designed to ensure the operations with in 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:

Sediment control measures are addressed in the application on pages 7-62 through 7-64 and 7-70 through 7-77. Appendix 7-8 covers the sediment pond design and Appendix 7-10 is the hydrologic design methodology. A sediment pond will be used as sediment control for the entire disturbed area.

Findings:

The applicant has met the minimum requirements for sediment control measures.

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 7-70 through 7-77. 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. The pond will be equipped with a dewatering device and a spillway.

Findings:

The applicant has met the minimum requirements for exemptions for siltation structures and sediment ponds with the exception of the deficiencies covered under the Operational Hydrology/Discharge Structures.

Exemptions for siltation structures.

Analysis:

The application shows that all surface facilities areas will be treated by a sediment pond. There will be no areas exempt from siltation structures.

Findings:

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

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.

Appendix 7-8 contains the spillway designs and Plate 7-4 shows the detailed for the spillway. The spillway will comprise of a 24-inch steel riser with an oil-skimmer connected to an 18-inch CMP which will discharge into the creek. A figure on page 27 of Appendix 7-8 shows that a second pipe (18-inch diameter) will also empty into the main 18-inch CMP. This second pipe is labeled as the emergency spillway. The second pipe does not qualify as the emergency spillway because it is already restricted by the amount of water flowing out the primary spillway. The second pipe is a second opening to the primary spillway but is not a second spillway. The figure on page 27 of Appendix 7-8 states that the primary spillway will pass the 25-year, 6-hour storm flow and page 13 of the appendix is the calculation which support that statement.

Findings:

The discharge structure information is complete and accurate.

Impoundments.

Analysis:

The only proposed impoundment is the sediment pond. Analysis of the pond is found in the sediment pond section of this TA.

Findings:

The applicant has met the minimum requirements for impoundments.

RECLAMATION HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Surface-water monitoring.

Analysis:

The surface-water monitoring plan begins on page 7-58 of the application. Stream monitoring locations are found on Plate 7-1. Table 7-5 on page 7-59 provides the monitoring parameters for surface water. The monitor is plan was based on the PHC. The reclamation monitoring plan is essentially the same as the operational plan. The analysis for this information is covered under the Operational Surface-Water Monitoring Plan.

Findings:

The applicant has met the minimum requirements for surface-water monitoring during mine reclamation.

Discharges into an underground mine.

Analysis:

Section 731.500, page 7-61 states that there will not be any discharges into the proposed mine.

Findings:

The applicant has met the minimum requirements for discharges into an underground mine.

Gravity discharges.

Analysis:

Section 731.500, page 7-61 states that there will not be any discharges into the proposed mine.

Findings:

The applicant has met the minimum requirements for gravity discharges.

Water quality standards and effluent limitations.

Analysis:

Water Quality standards and effluent limits are addressed in Section 751, page 7-86. This section states that "all discharges from the disturbed areas will be in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining contained in 40 CFR Part 434." SC3 will be responsible for meeting any applicable water quality regulation that applies to this mine.

Findings:

The applicant has met the minimum requirements for water-quality standards and effluent limitations.

Diversions.

Analysis:

Reclamation diversions are discussed in the application on page 5-61 and 7-88. Appendix 7-11 is the design calculations for the reclaimed drainages and Plate 5-3 shows the location of post-mining ditches. The plan states the storm criteria used in designing the reclamation ditches on page 7-47.

Findings:

The reclamation diversion section of the application is complete and accurate.

Stream buffer zones.

Analysis:

Stream buffer zones are addressed in the application on page 7-61. A large portion of the surface facilities reclamation will be with in 100 feet of Dugout Creek. The runoff and sediment control plan has been designed to ensure the reclamation with in 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:

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 unutilized 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 (ASCAs) 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:

Canyon Fuel has completed all necessary surface-water requirements for the proposed Dugout Mine. The application is complete and technically adequate.

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May 30, 1996

TO: File

THRU: Daron Haddock, Permit Supervisor DRH

FROM: Robert Davidson, Soils Reclamation Specialist RAD

RE: Technical Analysis of the Mining and Reclamation, Dugout Canyon, Coastal States Energy Company, PRO/007/039, Folder #2, Carbon County, Utah

SYNOPSIS

The Mining and Reclamation Permit Application Package (M&RP) was received from Coastal States Energy Company on March 15, 1996 for the proposed Dugout Canyon Mine. This Technical Review summarizes the environmental, operational and reclamation soil information presented in the M&RP.

The following are needed before technical approval of the permit plan is granted:

- The name(s) and credentials of the person(s) performing this work should be provided to assess the plan's credibility and authenticity.
- Additional soil-test pits are needed in the water tank and pump house area.
- If disturbance is going to occur in the currently undisturbed soils on hillsides immediately northwest of the facilities area, then the specific Order-I survey needs to include soil-test pits in these areas.
- Current soil productivity needs to be measured on representative vegetation samples using a statistically valid sampling technique.
- Soil salvage plans need to maximize soil recovery volumes for both disturbed and undisturbed soils and should include topsoil, subsoils, and all suitable disturbed soils as substitute topsoil.
- All soil recovery calculations need surface area and soil-depth amounts.

- Need to supply a Soldier Canyon map showing the Dugout Canyon Mine topsoil storage pile. All topsoil stockpiles should include size, dimensions and aspects.

- Finally, based on optimized soil salvage, soil replacement depths should be greater than 3.6 inches.

ENVIRONMENTAL RESOURCE INFORMATION
SOILS RESOURCE INFORMATION

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

Analysis:

Chapter 2, Soils, Section 220, Environmental Description, discusses the soil resources within the proposed Dugout Canyon Mine disturbances. Relevant soils information includes current and published soil surveys, characterizations, and substitute topsoil identification. The disturbed area is located on the northwest side of the canyon at approximately 7000 feet. Since Earthfax gathered the soil resource information it can only be presumed that a qualified Soil Scientist conducted the soil survey and performed the necessary technical analysis. Consistent with R645-301-130, Reporting of Technical Data, credentials of the person and/or persons performing this work need to be provided (e.g., APPENDIX 2-3, Soil Test Pit Logs, does not have the person identified who performed the work).

No prime farmland has been identified within the presently proposed Dugout Canyon Mine permit area. A negative prime farmland determination was concluded by reviewing the 1980 Prime Farmland reconnaissance performed for the Sage Point-Dugout Mine permit (ACT/007/009). During a recent site investigation of the Dugout Canyon mining area, no evidence of past cultivation of the soils could be found. Furthermore, within the immediate mine facilities area, the Soil Conservation Service (SCS) surveyed soil units are listed as non-irrigated sites for both the Comodore-Datino Variant complex and the Rock outcrop-Rubbleland-Travessilla complex. As reported by the SCS, these soils are not considered grazeable by livestock and the soil-unit areas are limited for harvesting wood products because of slope steepness, surface stones and boulders, and abundant rock outcrops.

Soil survey information is provided by both a general-area Order-III and a site-specific Order-I soil surveys. The Order-III survey is reproduced from the SCS "Soil Survey of the Carbon County Area"[1] and is delineated on a general area soils map (Plate 2-1). The Order-I survey was recently conducted for the Dugout Canyon Mine surface facilities area and is illustrated on a site specific soils map (Plate 2-2). A total of 5 pits were excavated and sampled for soil characterization, description and identification in accordance with the standards of the National Cooperative Soil Survey. According to the SCS, soils present on the east facing slopes of Dugout Canyon are part of the Rock outcrop-Rubbleland-Travessilla complex while those on the west facing slopes are part of the Comodore-Datino Variant complex. Generally, soils have formed from sandstone and shale colluvium and are predominantly stoney to gravelly sandy loams. The soils are typically well drained with moderate permeability, are highly susceptible to water erosion and range from shallow soils on the east facing side slopes to very deep soils on the west facing toe slopes.

A large portion of the mine facilities area is covered by overburden and disturbed soils consisting of soil mixed with coal waste and/or waste rock from previous mining operations and are described by soil test pits TP-2 and TP-3. The overburden is a mixture of rock and/or coal waste with Travessilla soils. The Travessilla soils are classified by the SCS soil survey as loamy, mixed (calcareous) mesic, Lithic Ustic Torriorthents. Generally, the overburden is termed as a "gravelly loam" with rock concentrations between 10 and 40 percent and rock size that varies from gravel to boulder. Rock fragments are composed of sandstone with some siltstone blocks. The overburden is found in the flat areas and on most of the steep slopes; is moderately well drained, and supports sage brush, juniper, rabbit brush, and a variety of grasses. Thickness varies from a few feet to more than eight feet. All DOGM soil and overburden field and laboratory test parameters[2] were within specifications. Therefore, these overburden materials should be identified as a suitable substitute topsoil and used as an additional soil resource material.

The remainder of the facilities area has soils that appear to be undisturbed or have been only slightly disturbed. Soils present in the canyon bottom lie within the disturbed and undisturbed areas of the mine. The undisturbed soils were identified by the Order-I survey

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[1]Jensen, E. H., and Borchert, J. W., 1988. Soil Survey of Carbon Area, Utah. Soil Conservation Service, U. S. Department of Agriculture, Washington D. C.

[2]Leatherwood, J., and Duce, D., 1988. Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining. State of Utah Department of Natural Resources, Division of Oil, Gas and Mining.

as part of the SCS listed soil unit of the Datino Variant complex and were given the distinction "Soil Type TS." According to the SCS Carbon County soils survey, the Datino Variant soil complex is characterized as very deep, well drained, moderate permeable soils on mountain slopes being formed in colluvium derived dominantly from sandstone and shale. The SCS survey defines Datino Variant soils as loamy-skeletal, mixed Typic Haploborolls. The typic subgroup of Haploborolls[3] is defined as freely drained soils with a moderately thick brownish mollic epipedon. Typic Haploborolls were formed in alluvium during the late-Pleistocene or Holocene ages, do not have a shallow lithic (stone) contact, and do not have deep wide cracks in most years. The USDA handbook further states that where slopes are suitable, Haploborolls are mostly under cultivation.

Undisturbed TS soils (soil test pits TP-1, 4, & 5) are found on both sides of Dugout Creek in the northeastern portion and in the southwestern portion of the facilities area. The TS soils are found in flat lying areas and on slopes with grades up to 40 percent or more. The soil supports vegetation consisting of sage, cottonwood, gambel oak, grass, pinyon, and fir. Information condensed from soil test pit TP-4 and lower sections of pit TP-1 show soil horizons O1 (1 inch), A1 (1 to 5 inches), B2 (5 to 14 inches), B3 (14 to 28 inches), and C (28 inches to 9 feet). Portions of TP-5 soil profiles and the upper four feet of TP-1 soil profile appeared disturbed. All horizons were sampled and analyzed according to DOGM soil and overburden guidelines; field and laboratory results were within specifications.

Additional soil-test pits are needed in the water tank area, to sample both the OB and TS soils. If disturbance is going to occur in the Rock outcrop-Rubbleland-Travessilla #96-soils on hillsides immediately northwest of the facilities area, then the specific Order-I survey needs to include soil-test pits in these currently undisturbed areas. These additional sample pits are needed to more accurately access soil salvage and to establish background data for soil depth and characteristics.

Current soil productivity needs to be measured on representative vegetation samples using a statistically valid sampling technique. The only reference to soil productivity is given by a general statement - "The undisturbed and/or slightly disturbed soils in the mine area currently sustain good vegetation cover." Undisturbed soils have acceptable physical and chemical characteristic results consistent with requirements outlined by DOGM's soil and overburden guidelines.

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[3]Soil Conservation Service, U.S. Department of Agriculture, Agriculture Handbook No.436, pp 288-289.

The disturbed soils within the mine area have been significantly altered by previous mining activities and have lost their native identities. These disturbed soils, referred to as overburden material, typically contain waste rock and/or coal waste. With the exception of the percentage of rock fragments, these overburden materials have physical and chemical properties that are within DOGM's acceptable range for soil and overburden guidelines and could therefore be considered a substitute topsoil. The Division recognizes that native soils contain high percentages of rock fragments, is inevitable and does not present a reclamation hazard. Indeed, to reclaim and restore the land to premining conditions will require soils with indigenous rock fragment volumes and content. Therefore, it is desirable to salvage soils containing intrinsic rock fragments.

Soldier Creek Coal Company proposes using the overburden material and the B and C horizon soils from the sediment pond area as substitute topsoil during reclamation. Waste and large rocks will be segregated from the overburden material to reduce the coarse fragment percentage. Material heavily contaminated with coal waste will not be used and disposed of properly. The B and C horizon soils from the sediment pond area could be consolidated with the A horizon topsoil material and not segregated out.

Findings:

The permittee must provide the following, prior to approval, in accordance with the requirements of:

1. R645-301-130, Reporting of Technical Data.

   Technical analyses will be planned by or under the direction of a professional qualified in the subject to be analyzed. The name(s) and credentials of the person(s) performing this work should be provided to assess the plan's credibility and authenticity.

2. R645-301-220, Environmental Description.

   The applicant will provide adequate soil survey information for those portions of the permit area affected by surface operations and incident to mining and reclamation activities. Additional soil-test pits are needed in the water tank area. If disturbance is going to occur in the Rock outcrop-Rubbleland-Travessilla #96-soils on hillsides immediately northwest of the facilities area, then the specific Order-I survey needs to include soil-test pits in these

currently undisturbed areas. These additional sample pits are needed to more accurately access soil salvage and to establish background data for soil depth and characteristics.

3. R645-301-222.400, Present and potential productivity of existing soils, and R645-301-321.200, The productivity of the land before mining within the proposed permit area.

   Current soil productivity needs to be measured on representative vegetation samples using a statistically valid sampling techniques.

OPERATION PLAN
TOPSOIL AND SUBSOIL

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

Analysis:

Although much of the mine area is considered disturbed, the two test pits (TP2 & TP3) show that much of the overburden material is an acceptable substitute topsoil and suitable growth medium for reclamation. Soil salvage should therefore include not only the B and C horizons as substitute topsoil, but also much of the overburden as identified in the soil survey. Since most of the mine surface area is disturbed, a deficit of soil material will exist during reclamation as explained in Section 242.100 with a projected average soil replacement depth of 3.6 inches. Soil salvage plans need to maximize soil recovery volumes for both disturbed and undisturbed soils. Recovery should include topsoil, subsoils, and all suitable disturbed soils (disturbed soils are outlined in the MRP section 233, Topsoil Substitutes and Supplements).

Planned surface disturbance includes the undisturbed and previously disturbed areas. Optimum soil salvage needs to be identified in the upper substation/storage pad, fueling station/storage pad, water tanks/pump house area and the explosives magazines/temporary waste rock storage pads. Since topsoil is of insufficient quantity as explained above, soil salvage will not only include the undisturbed soils (TS and #96), but also all suitable previously disturbed soils, overburden material and subsoils. The undisturbed TS soils are deep rich mollisols, with deep subsoils (B and C horizons) of

excellent quality material available for salvage. It is unclear if any undisturbed soils marked #96 will sustain new disturbance since these areas are within the disturbed boundary. These southwest facing, undisturbed soils need to be identified for salvage if disturbance will occur in these buffer zones.

The plan explains that all topsoil thicker than 6 inches will be removed as a separate layer from the subsoil, segregated, and stockpiled separately. The B and C horizons removed will be segregated and stockpiled. Furthermore, topsoil less than 6 inches thick will be removed with the immediately underlying unconsolidated materials and treated as topsoil. However, the SOIL RESOURCE SECTION provides adequate information on the excellent quality of the TS subsoil, B and C horizons. Since actual topsoil quantity is limited, these subsoils need not be segregated from the A horizon. The salvaged soil material can therefore be treated as a "topsoil" mixture and stockpiled without segregation.

Appendix 2-5 includes soil recovery calculations. However, not all calculations include surface area and soil depth amounts. In order to correctly assess soil recovery calculations, all calculations need surface area and soil depth amounts.

As stated in the plan, substitute topsoil will be stored at the Soldier Canyon Mine topsoil storage area with the Dugout Canyon Mine substitute-topsoil piles marked, labeled and kept separate from the Soldier Canyon Mine stored soils. The plan needs to supply a Soldier Canyon soils/surface facility map showing the Dugout Canyon Mine topsoil storage pile(s). All Dugout Mine topsoil-storage piles need to indicate approximate size, dimensions, aspects, etc., based on slated soil salvage volumes.

Physical and chemical analyses of the substitute soil materials will be conducted during salvage operations. The rate of sampling will be one sample per every 500 yd^3 of material generated. If the quality of soils generated is questionable, additional samples may also be obtained. Utilization of substitute topsoil for reclamation will be subsequent to approval using DOGM's Guidelines for Management of Topsoil and Overburden. Any sampling, soil identification, interpretation, and classification of soil and/or overburden material will be done by a qualified Soil Scientist as required in R645-301-130, Reporting of Technical Data.

Findings:

The permittee must provide the following, prior to approval, in accordance with the requirements of:

1. R645-301-232, Topsoil and Subsoil Removal.

   All topsoil will be removed from the area to be disturbed and where topsoil is of insufficient quantity, materials approved by the Division in accordance with R645-301-233.100 will be removed from the area. Soil salvage plans need to maximize soil recovery volumes for both disturbed and undisturbed soils and should include topsoil, subsoils, and all suitable disturbed soils as identified in the environmental soil resource section.

2. R645-301-140, Maps and Plans.

   All maps and plans submitted with the permit application will distinguish among each of the phases during which coal mining and reclamation operations were or will be conducted at any place within the life of operations. The plan needs to supply a Soldier Canyon soils/surface facility map showing the Dugout Canyon Mine topsoil storage pile(s).

RECLAMATION PLAN
TOPSOIL AND SUBSOIL

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

Analysis:

The plan explains that any contaminated surface soil within the disturbed area will be removed and stored during final reclamation. Furthermore, the plan says that if the contaminated soils can not be rehabilitated, the material will be buried along with excess gravels, crushed stone, or other contaminants. These in-place soils should have been salvaged prior to mining activities and would therefore not be subject to contamination. R645-301-232 explains that all topsoil and approved substitute soil materials will be removed prior to mining activity. Protection and salvage of all available soil resource materials within the areas of surface disturbance is paramount for successful reclamation and approval of this plan.

An estimated 7.3 acres within the disturbed area will receive topsoil. Based on the estimated 3550 yd^3 of salvaged topsoil and the area to be covered, approximately 3.6 inches of topsoil will be placed in the reclaimed areas. The 3.6 inches of topsoil will result

in minimal reclamation success. Effective plant rooting depth will be limited which will heighten plant failure during stress. In addition, erosion protection will be limited and will likely result in exposure of backfill and mine waste materials when rills and gullies form with minimal erosion. As explained earlier, soil salvage plans need to maximize soil resource recovery volumes and should include all topsoil, subsoils, and all suitable disturbed soils. If greater volumes of soil salvage is achieved, soil replacement depth should be much greater than 3.6 inches.

Findings:

The permittee must provide the following, prior to approval, in accordance with the requirements of:

1. R645-301-242, Soil Redistribution and R645-301-244, Soil Stabilization.

   Topsoil materials removed and stored will be redistributed in a manner that achieves a stable thickness consistent with the approved postmining land use, contours, and surface-water drainage systems and protects the materials from wind and water erosion before and after seeding and planting. Rills and gullies, which form in areas that have been regraded and topsoiled which disrupt the approved postmining land use or the reestablishment of the vegetative cover, will be stabilized. The 3.6 inches of topsoil will result in minimal reclamation success. Effective plant rooting depth will be limited which will heighten plant failure during stress. In addition, erosion protection will be limited and will likely result in exposure of backfill and mine waste materials when rills and gullies form under minimal erosion conditions. As explained earlier, soil salvage plans need to maximize soil resource recovery volumes and should include all topsoil, subsoils, and all suitable disturbed soils. If greater volumes of soil salvage is achieved, soil replacement depth should be much greater than 3.6 inches.