

DRAFT

Technical Analysis of the
Emery Deep Mining and Reclamation Plan

BIO/WEST, Inc.

*Resource Management
and Problem Solving Services*



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Technical Analysis of the
Emery Deep Mining and Reclamation Plan

Submitted to

Utah Department of Energy and Natural Resources
Division of Oil, Gas, and Mining
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Salt Lake City, UT 84111

Submitted by

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**DIVISION OF
OIL, GAS & MINING**

December 16, 1983

817.21 TOPSOIL PROTECTION

A. Description of Existing Environment

The soil resources are discussed in Volume 6, Chapter 8 of the MRP. Approximately 1670 acres were mapped to approximate an order I intensity soil survey, as shown on Plate 8-1 (Detailed Mapping Area). Soil Conservation Service (SCS) mapping of an additional 4500 acres is shown on Plate 8-2 (Permit Area). The permit area lies within T22S, R06E, in Emery County, Utah. Principle drainages are Christiansen Wash and Quitchupah Creek. The soil series are classified in Table 8-12 (page 8-95). All soils are a result of five soil forming factors: relief, parent material, climate, organisms, and time. Relief, or geomorphic position, has influenced the soil of the Emery Mine area to a great degree. Soils have been developed on the piedmont surfaces, below rock outcrops, in deep stream valleys, on broad alluvial terraces, and on rolling landscapes formed in marine shale or soft sandstones. Soil parent material is determined by geologic bedrock. The finer textured soils are formed in shale residuum or alluvium washed from marine shale. The moderately fine to coarse textured soils are formed in sandstone residuum, glacial outwash material, and colluvium and alluvium derived from sandstone or quartzite. The dominant formations are the Ferron sandstone and the Mancos and Bluegate shales. The climatic factor of the soils is mainly a result of temperature and moisture. The climate is continental and dry; moisture regimes are aridic, ustic, and xeric. The organism factor is primarily the influence of vegetation, but there

are also faunal effects. The time factor is a variable element in soil formation evidenced by the degree of horizonation and soil development.

Soils previously disturbed by mining activities occur at the mine portal and facilities area. The disturbed land (Mapping Unit DL) is composed of various soils with 0 to 15 percent slopes. Surface soils have either been salvaged, buried under coal dust, or heavily mixed with subsoils (Page 8-37). Excluding the top 11 inches, the soils to a 40 inch depth have only a fair rating as topsoil (Table 8-7, Page 8-75).

Future disturbances will occur mainly on the Ravola-Bunderson Complex (Map Unit RaB2), Persayo-Chipeta Complex (Map Unit PCE2), and the Chipeta-Badland Association (Map Unit CBE2). The Ravola-Bunderson Complex (Page 8-50) is on nearly level to level alluvial fans, floodplains, and bottomlands. The landscape is hummocky in some areas. The slopes range from 1 to 3 percent. The vegetation is mainly the Greasewood Shrubland type. The Persayo-Chipeta Complex (Page 8-46) is on nearly level to steep fans, terraces, uplands, and shale knolls. The slopes range from 1 to 20 percent. The vegetation is principally the Mixed Desert Shrubland Type. The Chipeta-Badland Association (Page 8-35) is on steep to strongly sloping broad fans, ridges, and sandstone and shale hills. The slopes range from 3 to 30 percent. The native vegetation is principally the Mixed Desert Shrubland and Matscale Shrubland Types. These soils have a poor to fair rating as topsoil.

(Note: The above information was excerpted and paraphrased from Vol. 6, Chapter 8)

B. Description of the Applicant's Proposal

1. Soil investigations conducted and information supplied. Method used.

The above described soils investigation was conducted according to the standards of the National Cooperative Soil Survey. Mapping was conducted on foot using hand augers. Within the Detailed Mapping Area, one profile for each major soil was sampled and described. Soil pits were excavated to a depth of 60 inches or more, and pedons were described and sampled according to the standards of the National Cooperative Soil Survey. For the soils occurring outside the Detailed Mapping Area, but within the Permit Area, SCS soil descriptions were used. The methods used are acceptable and in line with current and recognized practices.

2. Suitability of soil for reclamation.

There has been a mine at the site of the current day Emery Deep Mine since the 1890's. For this reason, no topsoil has been removed and stored, nor is any topsoil currently available for reclamation. The applicant has committed to removing and storing any available topsoil at the site of any future disturbance (Page 3-56). In lieu of topsoil, the applicant has proposed using material from roads which will be reclaimed and from a "borrow" area. Table 8-7 (Page 8-74) indicates that only the Abbott (0 to 60 inches) and Sanpete (0 to 30 inches) have a fair-good or good-fair rating as topsoil, respectively. For this reason, it is imperative that additional chemical and physical information be supplied in order to determine the suitability of the proposed substitute

material. The applicant has proposed a revegetation demonstration site be established, and has committed (Page 4 of the DOC Response) to physical and chemical soil testing of the topsoil substitute as part of the demonstration site data gathering program. Even though this information will help plan future reclamation, there is insufficient data to affirm the possibility of successful revegetation.

3. Calculations of the amount of suitable soil available.

The applicant indicates that about six acres will be covered with approximately four feet of material; thus requiring about 39,000 cu. yards of material (Page 4 of the DOC Response). About 11,000 cu. yards would come from the road near the bridge across Quitcupah Creek; about 6,000 cu.yards would come from removal of other mine roads; and the remaining 22,000 cu. yards would come from the borrow area. Since the borrow area covers about one acre, a depth of 14 feet would be required. The borrow area contains sufficient material, being 100 feet in depth. The evaportation lagoon (approximately 1 acre) will be reclaimed by excavating toxic materials (approximately 1000 cu. yards). The excavated area will be backfilled with material from the embankment. The remaining embankment will be removed down to the original soil surface.

4. Removal procedures.

The applicant states (Page 3-56) that no future surface disturbances are planned that would require the removal and storage of topsoil.

5. Redistribution procedures.

The applicant has not detailed the redistribution procedure to the extent that it is possible to determine the precise handling procedures. The applicant has committed (Page 3-59) to chemical testing of disturbed area soils and fertilization as needed based on the chemical test; however, the testing procedures have not been detailed to the extent that it is possible to determine the adequacy of the testing procedure.

6. Stockpile protection procedures.

As discussed above, no topsoil has been stockpiled. The applicant states (Page 3-56) that no surface disturbances are proposed that would require the removal and storage of topsoil. The applicant is also committed (Page 3-56) to remove and stockpile suitable topsoil should they at some future time, propose surface disturbance.

7. Area disturbed at any one time.

Presently, there are 85.9 acres of disturbed area (Table 9-2, Page 9-9). This area is presently occupied by roads, mine facilities, and the evaporation lagoon. No additional disturbance is proposed (Page 3-56).

C. Evaluation of Compliance

1. 817.21 General requirements.

Since no additional disturbance is planned, no topsoil will be removed, segregated, stockpiled, or redistributed. Thus, they are in compliance.

2. 817.22 Removal.

(a) - (d), (f), (g). As stated above, no topsoil removal is proposed. Thus, they are in compliance.

(e). Topsoil substitutes and supplements.

The applicant proposes to use, as topsoil substitutes, materials from a borrow area (22,000 cu. yards), roads (17,000 cu. yards), the evaporation lagoon embankment (1,000 cu. yards) and the original soil surface. There is presently insufficient information on the physical and chemical characteristics of these substitutes to determine their suitability as topsoil substitutes. When the applicant adheres to the stipulation requiring additional physical and chemical testing, they will be in compliance.

3. 817.23 Storage.

As stated above, no topsoil storage is proposed. Thus, they are in compliance.

4. 817.24 Redistribution.

The applicant proposes redistribution of approximately 40,000 cu. yards of materials. The applicant has not detailed the redistribution procedures to the extent that it is possible to determine the precise handling procedures. However, when the applicant adheres to the stipulation requiring a detailed redistribution program, they will be in compliance.

5. 817.25 Nutrients and soil amendments.

The applicant is committed (Page 3-59) to the addition of soil amendment as needed based on a soil testing program. When the

applicant adheres to the stipulation requiring a description of the program, they will be in compliance.

D. Revisions to Applicant's Proposal

None.

E. Reanalysis of Compliance

None.

F. Proposed Special Stipulations and Justification

817.22

Stipulation:

The applicant will conduct physical and chemical soil testing of the materials proposed as topsoil substitutes. The testing will be conducted using methods and procedures that are acceptable and in line with current and recognized practices. The applicant will submit a sampling and testing plan to the Division of Oil, Gas, and Mining for approval within 60 days of approval of the application.

In order to comply with the regulation, physical and chemical analysis of topsoil substitutes are required in order to determine their suitability as topsoil.

817.24

Stipulation:

The applicant will submit to the Division of Oil, Gas, and Mining a detailed topsoil substitute redistribution plan within 60 days of approval of the application. The plan will include the type of equipment to be used, procedures to ensure an even distribution of materials, procedures to minimize physical deterioration of soil

structure, and procedures to protect the topsoil from wind and water erosion.

In order to comply with the regulations, topsoil must be redistributed in a manner which ensures even distribution, prevents physical deterioration, and protects the topsoil from erosion.

817.25

Stipulation:

Within 60 days of application approval, the applicant will submit for approval by the Division of Oil, Gas, and Mining, a description of the soil testing program.

In order to determine the adequacy of the soil testing program, the sampling methods and soil tests (and who will perform the tests) must be known.

G. Summary of Compliance

If the proposed stipulations are implemented, this section will be in compliance.

SURFACE WATER HYDROLOGY

A. Existing Environment

Surface facilities for the Emery Mine are located at the confluence of Quitchupah Creek and its tributary, Christiansen Wash. The mine complex has been established in a relatively small area that is constricted by the stream channels and their valley walls. Flooding from both these streams in the past has necessitated the placement of riprap ^{size} along the stream channels to prevent the erosion of dikes that comprise part of the surface water control system at the mine. While Quitchupah Creek is impacted by both the surface facilities area and the discharge pumped from the mine, Christiansen Wash is affected solely by its proximity to the facilities site. *subsidence*

Quitchupah Creek, with a drainage area of 430 square miles, flows to the southeast from the mine complex, converging with Ivie Creek immediately above the confluence of that stream with Muddy Creek at Highway I-70. Muddy Creek, with a drainage area of 1450 square miles, is one of the major streams in the Dirty Devil River watershed, a significant tributary to the Upper Colorado River. Flows in Quitchupah Creek and Christiansen Wash derive from three sources: direct runoff, ground water recharge from the upper and lower Ferron Sandstone and returning irrigation flows that are diverted out of Muddy Creek. Monthly measurements of stream flow collected during the year beginning in October 1979 revealed that Quitchupah Creek has a mean flow of 8.6 cubic feet per second (cfs) below the mine, and

Christiansen Wash has a mean flow of 2.28 cfs above its confluence with Quitchupah Creek.

Water quality in these two streams is characterized by high total suspended solids (TSS), total dissolved solids (TDS), sulfate, and sodium. Calcium, magnesium and chloride are also present in high quantities, although these parameters exceeded the water quality standards of 250 milligrams per liter (mg/l) (NAS, 1973), much more frequently in earlier monitoring programs than during the samples taken in the most recent effort in 1979. Calcium, chloride, sodium and sulfate are picked up from the coal and rock dust in the mine, and are responsible for the increased TDS levels in the mine discharge.

Another constituent that characterizes the streams is bicarbonate, which can be used as a predictive value for ion balances. Monitoring data indicates that the water in both streams tends to become more saline in the downstream direction (permit application, page 7-149). TDS values in Christiansen Wash are higher than those in Quitchupah Creek, as demonstrated by the 1979 data that showed means of 3871 and 2233 mg/l for Christiansen Wash as opposed to means of 1947, 1429, and 1424 mg/l for Quitchupah Creek. TSS values are higher in Quitchupah Creek, hovering between means of 1094 and 1447 mg/l, while Christiansen Wash is characterized by TSS means of 848 and 620 mg/l. Above the mine complex, TDS in Quitchupah Creek seems to increase in the fall and winter, and decrease in the spring and summer. It remains fairly constant below the mine, which may be an effect of the constant mine discharge and

*depleted
in spring*

reduced impacts from irrigation. The concentration of TSS in Quitchupah Creek is proportional to discharge, increasing in the spring and decreasing in the fall. Trends in Christiansen Wash are strongly tied to irrigation within its watershed north of the mine. Upstream, TDS is high as a result of the irrigation, while downstream, the dissolved constituents decrease as the stream receives flow from the Ferron Sandstone (permit application, page 7-133).

Both Quitchupah Creek and Christiansen Wash receive a minimal amount of flow from springs that occur immediately north of their confluence. The springs are issuing from the pediment gravels above the Bluegate Shale. To some extent, these springs are contributing additional dissolved solids to the streams because they appear to be recharged by irrigation water. The discharge, however, approaches a maximum flow of only 10 gallons per minute, so any impacts on the stream quality are actually small (permit application, Plate 7-1, page 7-158).

Precipitation at the mine site is low, and is diminished by the high rate of evaporation, approximately 60 inches a year (USDA, SCS). The 10-year, 25-year and 100-year, 24-hour storm events yield 1.5, 1.9 and 2.5 inches, respectively.

There are no surface water rights in the vicinity of the Emery Mine that could be impacted by this operation. A check of information available in the Utah State Engineer's Office indicates that there are no water rights on Quitchupah Creek and Christiansen Wash near the mine, nor are there any on Quitchupah Creek downstream

of the mine (permit application, page 7-163). Additionally, there are no water rights on Ivie Creek below its confluence with Quitchupah Creek (page 38, October 7, 1983 submittal). A further check indicates that there are no surface water rights on Muddy Creek for a distance of at least 15 miles downstream of its confluence with Ivie Creek (page 10, November 11, 1983 submittal). The only water use identified by the Utah Division of Water Rights pertained to cattle that drink from Muddy Creek when adjacent BLM lands are used for grazing.

B. Description of the Applicant's Proposal

The applicant has provided the surface facilities area with a sediment control plan that utilizes two sedimentation ponds, berms around the disturbed areas and collector ditches. A third sedimentation pond has been constructed solely to treat mine discharge as it is pumped from the underground workings. This pond is located west of the facilities complex and outlets into a tributary of Quitchupah Creek. These structures are all currently existing.

The facilities area is located immediately adjacent to two streams, therefore, it was necessary to construct berms along the stream channels to prevent the uncontrolled discharge of runoff from disturbed areas. These berms have been stabilized and riprapped or revegetated to withstand flooding. The primary control berm along Quitchupah Creek has a 10-foot crest width, and has almost 4 feet of freeboard above the 10-year, 24-hour design flood. Side slopes are a

minimum of 2h:1v. The berms work in concert with the two sediment ponds to capture all runoff from the facilities area. To date, there has been no discharge from the sediment pond system, probably as a result of the high evaporation rates that characterize this region.

Pond No. 2, an embankment structure, is referred to as the main pond, and Pond No. 3, an incised structure, is a secondary pond because all of its discharge passes to Pond No. 2. The ponds are connected via a buried six-inch pipe equipped with a clean-out section. The rate of discharge expected from a 25-year, 24-hour storm event at Pond No. 3 is 0.98 cfs, and the pipe has been sized to carry this to Pond No. 2. The area contributing to Pond No. 2 is 31.2 acres, which includes coal stockpiles, tipple, service buildings, roads and access areas to the underground workings. Some of the contributing area above the portals is undisturbed. Pond No. 3 was designed to receive runoff from 6.4 acres that includes a coal stockpile, an explosives storage area and a scrap yard.

Sediment pond volume is calculated from the 10-year and 25-year, 24-hour peak flows and the sediment volume that can be expected from the disturbed area. Sediment values are derived from the Universal Soil Loss Equation. A soil erodibility factor (K) of 0.35 was utilized, which is weighted between the gravels covering much of the facilities area, and the soils present at the site (page 42, October 7, 1983 submittal). A rainfall factor (R), of 0.20 was used (Barfield et al, 1982, page 314). A cover factor (C) of 1.0 was used for coal storage

areas, 0.3 was used for vegetated areas and 0.39 was utilized for other disturbed areas. An erosion control practice factor (P) of 1.0 was chosen, in accordance with guidelines presented in Preliminary Guidance for Estimating Erosion on Areas Disturbed By Surface Mining Activities in the Interior Western United States. Soil weight factors varied from 66.8 pounds per cubic foot for the Pond No. 2 watershed, and 68 pounds per cubic foot for the Pond No. 3 watershed. These are weighted figures based on the values for coal and soil and the relative percentage of each occurring in the watershed. A sediment pool volume of 1.22 acre feet was designated for Pond No. 2, which represents five years of accumulation from 31.2 acres. Similarly, a sediment pool of 0.88 acre feet was provided, based on five years of accumulation from 6.4 acres. Sediment is removed from the pond when it reaches sixty percent of the design sediment storage volume as measured from a permanently-installed staff gauge. (permit application, page 7-164). Any sediment removed from the ponds is stored within the watershed of Pond No. 3. This material will be used for reclamation of that pond and excess material will be transported to the coal storage area in the mine yard where it will be placed in uniform layers and compacted (page 42, October 7, 1983 submittal).

Above the sediment pool elevation, the ponds have been designed to store runoff from a 10-year, 24-hour storm event while permitting dewatering within 10 days. Since Pond No. 3 outlets only into Pond No. 2, the spillway system in that pond serves both structures.

The principal spillway is a 12-inch diameter corrugated metal pipe (CMP) with inlet invert elevation set at 5906 feet, msl. This is one foot below the elevation of the 10-year, 24-hour runoff storage volume. The pond is equipped with a slide gate that is closed to provide adequate detention times except in the event that decanting is required to dewater the pond within 10 days (page 43, October 7, 1983 submittal) The emergency spillway is a riprapped trapezoidal channel with 2h:1v side slopes. A check of the spillway capacity using the broad-crested weir equation demonstrated that the channel could easily carry the discharge from a 25-year, 24-hour storm event, which is 2.14 cubic feet per second (cfs). These discharges were calculated using a flood hydrograph program, and were checked against peak discharges derived from the SCS-TR55 method (Barfield et al, 1981). The pond is designed so that the 25-year, 24-hour runoff storage volume has a depth of 0.7 feet in the emergency spillway. This leaves 1.3 feet of freeboard to the top of the dam. The embankment, as shown on Plate 13-4, has a crest width of 10 feet, a height of 11 feet and 3h:1v side slopes. The downstream slope is riprapped.

In order to efficiently channel flow to Pond No. 2 from the portal area, ditches and culverts have been installed. This drainage plan is shown on Plate 3-3 of the permit application. A ditch has been provided adjacent to the east side of the auxiliary intake portal to divert flow around that area and route it into a 150-foot length of culvert placed beside the mine yard road. This culvert is located in the

berm between the road and Christiansen Wash. The ditch and culvert are both sized to carry a 10-year, 24-hour design flow from 3.9 acres, or 4 cfs. The culvert is a 12-inch diameter CMP which can easily carry the required discharge (Bureau of Public Roads, 1965). The ditch is a riprapped triangular ditch with 3h:1v side slopes and sufficient depth to provide 0.3 feet of freeboard. The culvert outlets into a roadside ditch that carries the flow to Pond No. 2. This ditch is also triangular, with 2h:1v and 12h:1v side slopes. The depth is a minimum of 0.75 feet.

Flow from other areas of the facilities complex is directed to the pond by the berms and through swales constructed at road crossings and at other areas to provide positive drainage. The western section of the complex does not drain into the pond, although it appears that the acreage was included in the pond design. This 4.7-acre area drains into a catchment basin adjacent to the berms along Quitcupah Creek and includes a portion of the coal stockpile, service buildings, a scrap yard and roads.

The mine discharge sedimentation pond, Pond No. 1, is located away from the main facilities area and serves only to provide an adequate settling basin for discharge pumped from the mine, although the reverse osmosis process has also contributed brine to the pond in the past at a rate of 6,000 gallons per day (permit application, page 13.2). A berm completely surrounds the structure, thereby preventing any runoff from adjacent areas from entering. Contribution from direct precipitation is minimal; the surface area of the pond

is 2.2 acres, and 1.5 inches of rainfall falling on that area yields 0.27 acre feet.

The discharge pumped from the mine flows through an 8-inch pipeline that inlets into the rectangular pond at the end opposite the outlet. The amount of discharge has varied over the seven years that the pond has existed. Currently, the discharge is averaging 800,000 gallons per day (gpd) although the pond was sized with a design discharge of 2,655,265 gpd (permit application, page 13-3). A detention time of 36 hours has been provided in the pond design pursuant to a laboratory analysis of the total suspended solids contained in the influent. Pond volume at the outlet is 19.3 acre feet, and under current discharge conditions (800,000 gpd) only 3.68 feet of that is required for settling. According to recent measurements, approximately 3.2 acre feet of sediment has accumulated in the pond. Consequently, 12.2 acre feet is available as sediment storage volume. The pond will not be cleaned for approximately 16 years at the current rate of discharge, therefore, no plans have been made for handling the sediment.

The pond outlet is a rectangular channel with a wingwall and concrete bottom. Spillway capacity is designed to allow the maximum water surface elevation to remain 3 feet below the top of the berms. An NPDES permit has been issued for this pond, as well as Pond No. 2, and samples are taken at the outlet twice each month. Daily maximums for effluent are 70 mg/l for total suspended solids, 2.0 for iron and 5,000 mg/l for total dissolved solids. Oil and grease cannot exceed 10

mg/l and pH must range between 6.5 and 9.0. Samples collected at the pond outlet since 1976 have shown great variation. Average quarterly discharge has varied from 0.01 to 0.41 cfs and TDS has varied from 5298 to 3763. Iron was measured in relatively high quantities of 4.5 mg/l in 1976, but has since been present in only low concentration. TSS, oil and grease and pH have all been well within an acceptable range.

The surface water monitoring plan proposed by the applicant involves 10 sites. Two sites will be maintained on Christiansen Wash, one above the mine, and one at its confluence with Quitchupah Creek. Two NPDES sites are included, at Pond No. 2 and the mine discharge pond. Three sites are located on Quitchupah Creek, one above the mine, one below the mine complex, and one below the mine discharge pond. To determine the relative impacts from that pond, one site will be maintained on the tributary above the pond outlet. Two sites are located away from the impact area for the mine, but may be utilized in the future for potential mine expansion. These sites are located on Ivie Creek above its confluence with Quitchupah Creek, and one is located on Ivie Creek above its confluence with Oak Spring Creek. Samples will be taken from these sites on a monthly basis and analyzed for the parameters listed on page 7-183 of the permit application. Parshall flumes and/or crest-stage gages have been provided at several of the monitoring sites, and bubble gage type continuous recorders are installed at two sites, one on Christiansen Wash and one on Quitchupah Creek where the U.S. Geological Survey established monitoring stations.

C. Evaluation of Compliance

Design data for the surface water control structures were checked and found to be adequate with only minor exceptions that will not affect the performance of the structure. Pond No. 3 designs, for example, do not provide freeboard between the 25-year, 24-hour runoff and the top of the pond. While this is generally not a desirable situation, the pond is incised, therefore, there is no danger that an embankment will fail if the pond is overtopped. Additionally, a conservative sediment pool was factored into the design, allowing for five years of accumulation. In reality, much of this volume is usually available for runoff storage. If sediment is cleaned out of the pond at sixty percent accumulation, the 25-year, 24-hour runoff storage elevation will be at a lower elevation, thereby providing freeboard to the top of the pond.

Pond No. 2 has been designed to receive sediment and runoff from 31.2 acres, which includes the entire mine yard complex. Plate 13-3 of the permit application, however, illustrates that not all the drainage from the facilities area flows into the pond. Runoff from the western part of the yard, which includes a portion of the coal stockpile and service areas, flows into the catchment basin above the berms along Quitchupah Creek. This area comprises approximately 4.7 acres as measured from Plate 15.8. Consequently, Pond No. 2 has been conservatively designed to include runoff and sediment from areas that actually are not contributing to it. The applicant has taken advantage of the topography and provided dikes to form an evaporation

lagoon. The catchment basin is, in effect, serving as a sediment basin for the western part of the yard. These dikes, or berms, have a crest elevation of 5920 and 5915 feet msl, providing a minimum of 2 feet and as much as 10 feet of height above the natural ground surface elevation. Since these berms are not allowing any flow to enter Quitchupah Creek (page 41 and Plate 3 October 7, 1983 submittal), the runoff is isolated in this part of the mine yard, which is still considered to be within the Pond No. 2 watershed. Given the limited amount of acreage involved and the height of the berms, the existing drainage plan is in compliance.

A check of the design sediment storage volume for the mine discharge pond revealed that, at 800,000 gallons per day, the sediment accumulation over seven years should have been 2.09 acre feet. The applicant has stated that the actual accumulation is 3.2 acre feet. It appears that sediment may be collecting in the pond more quickly than anticipated, but the only consequence of that will be a more frequent clean-out. Currently, pond clean-out is not anticipated for another 16 years, therefore, this difference will not affect the plans for the pond. The applicant is in compliance with this section.

The ditches, culvert system and swales that route flow to Pond No. 2 were checked and are generally adequate with the exception of the roadside ditch. While this ditch is certainly adequate to handle flow off the road, it is undersized for carrying flow from the culvert. At a design minimum depth of 0.75 feet, it can carry the required 4 cfs,

but does not provide freeboard. In order to improve the carrying capacity of the roadside ditch, the ditch should be deepened to provide the 0.3 feet of freeboard where it does not exist. This is a minor procedure that can be undertaken during routine maintenance of the road. The applicant is in compliance with these sections of the regulations. The surface water monitoring program will provide a continuum of data at the mine site that will add to the collection of previous water quality data to provide valuable insight on the impacts of mining and its significance in areas where irrigation contributes high amounts of dissolved solids to the streams. The monitoring sites are located in areas where degradation from mining activities will be detected. The applicant is in compliance with this section of the regulations.

MISCELLANEOUS COMPLIANCE

Signs and Markers

Consolidation Coal Company has provided information on the signs and markers to indicate their size, lettering and location (see Page 19 of the ACR Response, October 7, 1983). Provisions have been made for mine and permit identification signs, which will be displayed at all points of access from public roads. Perimeter markers will designate the permit area boundary. Blasting signs, buffer zone markers and topsoil markers will be placed as required at the site. The applicant is in compliance with this section.

Disposal of Non-coal Wastes

Non-coal wastes such as trash, oil cans, and timbers are temporarily stored at the mine site in two pits which measure 20 x 40 x 10 feet on a side. The material is periodically hauled by Consol to a local landfill not controlled by Consol. The pits are located within the drainage system for the facilities area. The applicant is in compliance with this section.

Cessation of Operations - Temporary

Provisions for temporary cessation were stated on page 19 of the ACR Response. The operator will submit a notice of temporary cessation to the Department of Oil, Gas and Mining if operations will be shut down for more than thirty days. The applicant is in compliance with this section.

Cessation of Operations - Permanent

At the permanent conclusion of surface mining activities, all affected areas will be closed, backfilled and permanently reclaimed. All equipment, structures and other facilities will be removed. These areas shall then be reclaimed. The applicant is in compliance with this section.

Other Transportation Facilities

An existing conveyor at the mine site is used to transport coal from the mine to a crusher and hopper on the portal bench. The coal on the belt and at all transfer points is sprayed with water to control dust. Any coal escaping into the water system from this conveyor is routed into the sediment pond. This facility will be removed and reclaimed when mining is complete. The applicant is in compliance with this section.

Support Facilities and Utility Installation

Support facilities at the Emery mine consist of water tanks, an office, bath house, fan, substation, sediment ponds, conveyor, roads and other facilities as identified on Plate 3-2 in the permit application. Drainage and sediment control plans have been provided for all surface facilities. All structures will be removed and reclaimed upon completion of mining. The applicant is in compliance.

817.97 PROTECTION OF FISH AND WILDLIFE

A. Description of Existing Environment

Fish and wildlife information was provided by field studies of the permit area and consultation with the Utah Division of Wildlife Resources (UDWR). A total of 170 vertebrate species have been documented for the permit area (26 mammals, 133 birds, 6 reptiles, 1 amphibian and 4 fish). This includes 110 species (17 mammals, 5 reptile, 1 amphibian, 4 fish, and 83 birds) recorded during field investigations of the permit area and 60 species listed by the UDWR as occurring in the Castle Valley.

Riparian habitat is the only type which occurs on the permit area that is classified as crucial/critical to wildlife by UDWR. No threatened or endangered wildlife species are known to breed or otherwise extensively use the permit area. One Federally Listed (July 27, 1983) plant specie, Wright's fishhook castus (Sclerocactus wrightiae), is reported from the area; however, none have been located within the permit area. Golden eagles make considerable use of the area for hunting, but no nests were located within 1 km. of areas to be affected. There is a potential for peregrine falcons and bald eagles to briefly visit or pass through the area during certain seasons. Blackfooted ferret habitat (prairie dog colonies) exists on the permit area. Nine active and 2 inactive prairie dog colonies are located entirely within the permit area boundary and two other active colonies lie on the boundary. The colonies vary in size from 2 to 49 ha. A

total of 982 prairie dog observations were recorded during field surveys.

Wildlife habitat types on the permit area include pinyon-juniper, agricultural land, riparian-wetlands, semi-desert shrub, rocky outcrops, and mat saltbush.

Mule deer is the only big game species which utilizes the permit area throughout the year. Use is concentrated mainly on the agricultural lands and riparian-wetlands habitat types. The area could be considered of relatively low value to deer because the UDWR has determined that the native vegetation found on the permit area can support only .003 deer per hectare. Only two deer were observed on the study area during field surveys. The nearest designated crucial/critical habitat for deer is winter range located about 2.4 km. north of the permit area.

Upland game species that use the permit area are the ring-necked pheasant and mourning dove. A majority of the mine permit area is within yearlong pheasant habitat that has been designated as crucial/critical by UDWR. Pheasants are common within the permit area and were frequently observed during surveys.

A total of thirteen raptor species were observed on the permit area. The only nests found were those of the American kestrel and burrowing owl. The burrowing owl is a species of "high interest" to both the State of Utah and the federal government.

B. Description of Applicant's Proposal

1. The surface land disturbance will be a total of 79 acres. No crucial/critical big game habitat will be disturbed nor will any prairie dog colonies be affected in any way (Vol. 7 Ch. 10 pages 10-114 to 10-119). The burrowing owl nest site is far enough from proposed activities that no disturbance would occur.

The permit areas contain crucial/critical yearlong pheasant habitat but the areas of proposed disturbance receive minimal use by pheasant. In addition, no agricultural lands will be disturbed.

Minimal disturbance to crucial/critical riparian habitat will result from the proposed activities. Adequate buffer strips should be provided to help protect these sensitive areas. Consultation with the UDWR would establish the appropriate widths. Roads or other facility development should not impact these areas. Further, these areas should be protected from contamination by fugitive dust from the mine and haul roads.

Water quality monitoring will be done to assure protection against harmful effects to ecosystems (Page 10-121). Monitoring will include both streams and ponds. Monitoring of terrestrial wildlife will also be conducted. The applicant will consult with DOGM and UDWR to determine the methods and extent of monitoring that should be implemented.

Employees will be advised not to harass or illegally take any wildlife. The applicant will cooperate with the UDWR to reduce or eliminate the illegal or unwarranted killing of animals by both mine employees and other individuals. Employees will be advised of the probabilities of vehicle-wildlife collisions to increase their awareness

of that possibility. Employees will also be instructed to avoid stopping and observing wildlife as it may disrupt their natural activities.

Topography, if significantly altered, will be contoured to premining conditions to the extent possible. Rock piles will be established to provide perches and cover for predators, prey species, reptiles, and amphibians (Page 10-124).

2. Construction of electric powerlines.

No new powerline construction is proposed.

3. Location and fencing of roadways and fencing of ponds containing toxic materials.

All hazards to wildlife that are associated with mining activities will be appropriately fenced. Fences will be designed to minimize hazards to big game (Page 10-120).

4. Minimal disturbance to riparian habitat is expected. No other habitats of unusually high value will be altered.

5. Applicant presents a discussion on the species of plants, their value as food and cover for wildlife, and how they will be selected and used to duplicate or enhance premining habitat values (Page 10-119).

C. 817.97 Evaluation of Compliance

Will comply for reasons stated below.

The structure of the applicants proposal is such that minimal impacts to wildlife will occur. No habitat of threatened or endangered species nor any crucial/critical winter big game habitat will be affected in any way. A small amount of yearlong pheasant habitat

designated as crucial/critical will be disturbed. Field surveys, however, indicated that the specific areas of disturbance receive minimal use by pheasant and no significant impact would be expected. Applicant will minimize human disturbance to wildlife by advising employees against harrassment (Vol. 7, Page 10-120).

An adequate survey of threatened and endangered plants and wildlife was completed.

No new powerlines are proposed.

Riparian habitat has been identified. The small amount that will be disturbed will be restored.

The applicant presents a discussion of how revegetation will be accomplished to provide food and cover for wildlife (Vol. 7, Page 10-119). A list of plant species that are beneficial to wildlife and sources of seed is included (Vol. 7, Appendix C).

D. Revisions to Applicant's Proposal

None.

E. Reanalysis of Compliance

None.

F. Proposed Special Stipulations and Justification

None.

G. Summary of Compliance

Will comply.

BACKFILLING AND GRADING

A. Description of the Existing Environment

The facilities area for the Emery Mine is primarily located at the base of a cliff formed by the Ferron Sandstone at the junction of Quitchupah Creek and Christiansen Wash. The area has been mined for over 80 years when the old Browning mine was started. There are no available maps showing the premining topography of the site, however, it is likely that the original land configuration was not much different than it is now. The portals drift into the I-Zone coal seam which is naturally located at the base of the cliff. Four portals are utilized and consist of a coal haulage portal, mine access portal, auxiliary intake portal and return air portal. Other facilities in the mine area are identified on Plate 3-2 in the permit application.

B. Description of the Applicant's Proposal

Facilities which would require grading in the mine area are the berms and dikes, sediment ponds, roads and outside of the facilities area the evaporation lagoon and the mine discharge sediment pond. All roads outside of the facilities area have been permitted in the modifications, however, the applicant has included an estimate in the bond amount for their reclamation. Except for the evaporation lagoon and the mine sediment pond, this grading will not require extensive effort. At the evaporation lagoon, 1000 cubic yards of material will be removed from the bottom of the pond where salts have accumulated and hauled to the refuse disposal site. The berm

around the lagoon will be use to backfill the depression. The rest of the berm will be used to construct the foundation for the preparation plant. The mine sediment pond will be graded to approximate original contours, however the amount of material which must be handled is 11,400 cubic yards which is a fairly large amount for this operation.

In the facilities area, the coal fines will be removed and backfilled into the mine upon closure. The applicant has figured that an average of one foot of material will have to be removed over 24 acres in the facilities area. This will require that 39,527 cubic yards be placed in the mine. In addition, it will require 500 cubic yards to backfill the portals with a 1v:3h outslope. In a November 22, 1983 letter from the BLM to OSM, it was requested that the applicant also backfill into the mine a certain distance. Since the applicant is proposing to place over 39,000 cubic yards of material into the mine, this most likely will occur. However, in the bond estimate to ensure that this is the case, an additional volume of material has been added to the portal closure estimate.

The applicant has submitted a postmining contour map in the ACR Response. This map shows that there will not be substantial amounts of grading required to return the disturbed area to a suitable postmining topography which is most likely the approximate original contours. Due to the small amount of material being handled, it was not considered appropriate to determine a swell factor for handling or final swell. During reclamation, grading along

the contours will occur where possible. A positive drainage away from the cliff will be maintained to prevent impoundment of water. Regrading of rills and gullies has been provided for in the bond estimate. However, a specific plan cannot be found which shows how often the site will be inspected for rills and gullies and at what depth of gullying the applicant will commence grading.

C. Evaluation of Compliance

A plan has been submitted which shows that the mine area will be graded to a suitable postmining topography. All facilities will be removed, and the portals will be backfilled. Drainage will be established away from the cliff face, and grading will occur along the contour. All coal material will be removed and backfilled into the mine. The applicant is in compliance with the regulations concerning these requirements. The applicant has not provided a specific plan for the regrading of rills and gullies. Therefore the applicant is not in compliance with this regulation.

D. Revisions to the Applicant's Proposal

None

E. Reevaluation of Compliance

None

F. Proposed Special Stipulations with Justification

Within 30 days of permit approval, the applicant must provide a specific plan for the regrading of rills and gullies. This plan must show an inspection interval and identify when the applicant will regrade the rills and gullies. This information is required to show

compliance with UMC 817.106.

G. Summary of Compliance

With the proposed stipulations, the applicant is in compliance with this section of the regulations.

817.111 REVEGETATION

A. Description of the Existing Environment

The Emery Deep Mine located in Emery County, Utah is characterized by a semiarid, continental type of climate. Daily and seasonal temperatures vary over a wide range, and there is a large amount of sunshine. The growing season is 110 to 130 days. Climate records show that the average monthly precipitation is about 0.5 of an inch during the period October through June, and that it is about 1 inch in July, August, and September. The total yearly average precipitation is about 8 inches. During March, April, and May, frequent winds of moderate to high velocity dry the soils and increase rates of evaporation and transpiration.

The vegetation presently affected by the Emery Deep Mine lies in an area that has been termed the Atriplex province of the Northern Desert Shrub Formation or, more descriptive, the Shadscale Zone. The label Salt Desert Shrub indicates the prevalence of this vegetation type on halomorphic soils. The physical environment, therefore, is not only climatically harsh, but is characterized by "physiological" drought as well.

Grazing in the past 60 or 70 years is believed responsible for considerable change in the vegetation in the salt deserts. Some perennial native species have decreased and annuals often have become established. The naturally sparse plant cover when thinned and weakened by unrestricted heavy grazing has permitted wind erosion and, in some of

the worst areas, the beginning of dune formation. Recovery can be very slow. Severe drought markedly lowers the productivity to only a third to a half of average. Many species become weakened and mortality occurs. The effects of drought are often apparent for two to three years.

(Note: The following information is excerpted and paraphrased from Volume 6, Chapter 9.)

The majority of presently affected areas lie within four vegetation types and disturbed areas (Table 9-2, Page 9-9): Annual Forb Community (13 Acres), Mixed Desert Shrubland (15 acres), Greasewood Shrubland (28 acres), Rock Outcrop/Talus (15 acres), and Disturbed Area (12 acres). The total affected area represents only about 2% of the total permit area.

The Greasewood Shrubland type comprises about one-third of the affected area and about one-fourth of the total permit area. This community occurs in and along the bottom of drainages in saline, clay soils. The dominant species is greasewood (Sarcobatus vermiculatus). Common associated species include: greemolly summercypress (Kochia americana), fireweed summercypress (Kochia scoparia), African mustard (Malcolmia africana), and common halogeton (Halogeton glomeratus). Diversity is low, and total herbaceous cover is about 24%. The estimated annual production is about 1400 lbs/acre, the majority of which is greasewood. Tables 9-20 through 9-23 (in Appendix 9-1) contain data on the species present, cover, and productivity of this community.

Rock Outcrop/Talus comprises about 18% of the area now affected and about 2% of the permit area. This type is largely non-vegetated and is composed of sandstone cliffs and associated talus along Christiansen Wash and Quitchupah Creek. Species include skunkbush sumak (Rhus trilobata), Harriman yucca (Yucca harrimaniae), desert princesplume (Stanleya pinnata), thickstem wildcabbage (Caulanthus crassicaulis), and scattered perennial grasses. No data were collected in this type.

The Mixed Desert Shrubland type comprises about 17% of the area now affected and about 19% of the total permit area. This type is found on soils ranging from sandy, well-drained soils to saline, dry soils. The conspicuous feature of this community is the shrub species dominated by shadscale saltbush (Atriplex confertifolia). Pricklepear cactus (Opuntia polyantha), rubber rabbitbrush (Chrysothamnus nauseosus), and big sagebrush (Artemisia tridentata) are subdominant shrub elements. Important understory species include: galleta grass (Hilaria jamesii), Indian ricegrass (Oryzopsis hymenoides), western stickseed (Lappula occidentalis), and nodding buckwheat (Eriogonum cernuum). Total cover is about 10%, and total production about 340 lbs/acre. Tables 9-1 through 9-4 (Appendix 9-2) contain data on the species present, cover, and production of this type.

The Annual Forb Community comprises about 15% of the area presently affected and about 11% of the total permit area. This sparsely vegetated community is found on Bluegate shale outcrops and dry slopes. The community is dominated by desert trumpet wildbuckwheat (Eriogonum inflatum), common halogeton, orach (Atriplex powellii), and western

stickseed. Shrub species are of secondary importance and are generally stunted and of low stature. Total vegetative cover is only about 6%, and estimated annual production is about 183 lbs/acre. Tables 9-8 through 9-11 (Appendix 9-1) contain data on the species present, cover, and production of this type.

Disturbed land comprises about 14% of the area now affected and about 2% of the total permit area. Most of the disturbed areas have resulted from current mining operations and associated facilities. These areas are not vegetated and were not sampled.

Although the above described vegetation types are used as wildlife habitat and rangeland, their value to either wildlife or livestock is limited.

B. Description of the Applicant's Proposal

In June 1980, vegetation studies were conducted within the permit area. Vegetation types were delineated based on the dominant species with the aid of color aerial photography (Page 9-1). Reference areas were randomly located using a grid system overlaid on the vegetation map (Page 9-2). These areas were then located in the field and 40 X 40 feet exclosures were fenced with barbed wire. The location of reference areas is shown on Plate 9-1. Herbaceous cover was estimated visually within randomly located circular quadrats (Page 9-2). Both total and relative cover were estimated. Shrub cover and density were obtained using the Lindsey line-strip method. Cover was measured along a randomly located 10 meter tape, while density was measured within a randomly located 2 X 10 m rectangular quadrat. All individuals were

measured and separated on the basis of height class (Page 9-3).

Tree species were sampled using nonoverlapping 100 m². circular quadrats (Page 9-3). the diameter at breast height was measured for each stem greater than 2 in. in diameter. Productivity estimates were obtained by clipping current years growth within randomly located 1.0 m² circular plots (Page 9-4). Samples were oven dried at 105 C for 24 hours.

Sample adequacy was determined using the formula:

$$m = \frac{t^2 s^2}{D^2}$$

where: m = minimum number of observations needed
t = student's t value for a given level of confidence
s² = estimate of sampling variance
D = level of accuracy desired

The level of confidence was 80% and 90 % for shrublands and grasslands, respectively. The level of accuracy was 10% of the mean. Not all sampling in all vegetation types was adequate.

Revegetation will follow four basic steps (outlined in section 9.6 of Chapter 9, Page 9-34):

1. Soil tests will be conducted and soil ammendments added as necessary.
2. The seed bed will be prepared by ripping, disking, harrowing, and other conditioning practices that are necessary.
3. Seeding will be performed using a drill specifically designed for handling seeds of varying sizes and weights. The seed mixes to be used are shown here in Table 1, and are found in the DOC Response, page 6.

Table 1. Permanent seed mixes for revegetation of disturbed areas at the Emery Deep Mine (From DOC Responses, Page 6)

<u>Seed Plan A</u>		
<u>Species</u>	<u>Lbs. of PLS*/Acre</u>	<u>PLS*/Sq. Ft.</u>
Indian ricegrass	3.0	13
alkali sacaton	0.5	20
galleta	2.5	9
western wheatgrass	3.0	9
winterfat	4.0	5
4-wing saltbush	4.0	6
rubber rabbitbrush	1.0	8
yellow sweetclover	1.5	9
desert globemallow	0.5	6
blueleaf aster	0.5	6
	<u>20.5</u>	<u>91</u>

*Pure Live Seeds

<u>Seed Plan B</u>		
<u>Species</u>	<u>Lbs. of PLS/Acre</u>	<u>PLS/Sq. Ft.</u>
blue grama	0.75	12
streambank wheatgrass	3.0	11
sand dropseed	0.25	28
winterfat	4.0	5
4-wing saltbush	4.0	6
rubber rabbitbrush	1.0	8
big sagebrush	0.25	14
greasewood	2.5	16
yellow sweetclover	1.0	6
blue flax	1.0	7
evening primrose	0.5	6
	<u>18.25</u>	<u>119</u>

<u>Seed Plan C</u>		
<u>Species</u>	<u>Lbs. PLS/Acre</u>	<u>PLS/Sq. Ft.</u>
western wheatgrass	5.0	13
slender wheatgrass	3.0	11
alkali sacaton	0.25	10
Spike Muhly (only one available)	0.25	9
alkalagrass	0.5	13
yellow sweetclover	1.5	9
blueleaf aster	0.5	6
Indian blanket	1.0	4
	<u>12.0</u>	<u>75</u>

4. Straw mulch will be blown onto reclaimed areas and anchored by a straight disk crimper.

Following redistribution of topsoil substitutes, the seedbed will be prepared by ripping (areas which have become compacted as a result of mining activities), disking, and harrowing. Fertilizer (as needed based on soil tests) will be broadcast and worked to a depth of 3 to 6 inches. The seed mixes and rates shown in Table ? will be drilled such that: Seed Plan A will be seeded in the more arid sites of the Mixed Desert Shrub, Annual Forb, and Rock Outcrop/Talus vegetation types; Seed Plan B will be seeded in the more mesic sites of the Greasewood Shrubland vegetation type, and Seed Plan C will be seeded in the Riparian Meadow type. These seed mixes have been developed subsequent to discussion with the Division of Oil, Gas, and Mining. Seeding will be during the early spring or late fall (Page 3-55 and 3-59) to take advantage of the more favorable physical environment for germination. The applicant has indicated that more shrub transplanting of native species may be performed (Page 3-59). The applicant is committed to mulching all reclaimed areas (Page 32 of the ACR Responses). Straw mulch will be blown onto the reseeded area at a rate of 2000 lbs per acre on most areas and 4000 lbs per acre on areas with higher erosion potential (Page 33 of the ACR Response). The straw will be anchored by a straight disk crimper. Hydromulching with wood fiber (2000 lbs/acre) and curlex blanketing will be used to stabilize especially difficult erosion areas.

Noxious plants will be controlled by selective hand spraying with approved herbicides. Any herbicide used will be those approved by state and federal agencies responsible for such agents (Page 31 of the ACR Response).

Vegetation cover, density, and frequency by species and group will be monitored periodically (years 2, 3, 5, and 7) (Page 7 of the DOC Response). Reference areas will be managed in a manner similar to the revegetated areas (Page 30 of the ACR Response). Success of revegetation will be measured by comparison to the cover and productivity of the reference area (Page 8 of the DOC Response). Final comparisons will be based on random sampling of both the reference and reclaimed areas. The applicant states that comparisons will be performed at the 90% statistical confidence limits (Page 8 of the DOC Response).

C. Evaluation of Compliance

1. 817.111 General requirements.

The applicant has submitted a revegetation plan which, when the applicant adheres to the stipulation requiring additional seeding and/or transplanting of shrubs, will establish a diverse, effective, and permanent vegetative cover on all affected lands. The plan encourages a prompt vegetative cover and recovery of productivity levels compatible with a postmining land use of wildlife habitat and rangeland. The established vegetation should be capable of self-regeneration and plant succession, and be at least equal in extent of ground cover to the natural vegetation of the area. Thus, they are in compliance.

2. 817.112 Use of introduced species.

The seed mixes proposed have been developed in consultation with the Division of Oil, Gas, and Mining. Thus, they are in compliance.

3. 817.113 Timing

Seeding will be conducted during the early spring or fall, the most favorable planting seasons. When the applicant adheres to the stipulation requiring seeding immediately after final soil preparation for planting they will be in compliance.

4. 817.114 Mulching and other soil stabilizing practices.

The applicant has committed to mulching all reclaimed areas. Straw mulch, wood fiber mulch, or curlex blanket mulch will be used, depending on the potential for erosion and difficulty of erosion control. Thus, they are in compliance.

5. 817.116 Standards for success.

The applicant proposes to measure revegetation success by comparison to reference areas. The applicant has committed to comparison of cover and productivity at the 90% confidence level. When the applicant adheres to the stipulation requiring comparison of woody plant density and diversity, and success being considered at least 90% of the cover, productivity, diversity, and woody plant density of the reference area, they will be in compliance.

D. Revisions to Applicant's Proposal

None.

E. Reanalysis of Compliance

None.

F. Proposed Special Stipulations

817.111

Stipulation:

Within 60 days of application approval, the applicant will submit to the Division of Oil, Gas, and Mining a plan for seeding and/or transplanting additional shrub species in the areas to be reclaimed as shrubland.

The proposed seed mixes are inadequate to insure sufficient establishment of shrub species needed for a diverse cover and to meet the revegetation success standard for woody plant density.

817.113

Stipulation:

Within 60 days of application approval, the applicant will submit a schedule for reclamation which includes seeding immediately after final site preparation for planting and during the first favorable planting period.

It is important to seed immediately after site preparation in order to encourage a prompt vegetative cover necessary to control erosion.

ROADS/TRANSPORTATION

A. Description of the Existing Environment

There are several existing roads in the Emery Mine area. Three of these, the pump road, tank road and pond road, are outside of the immediate facilities area and have been approved under previous actions (permit application, page 13-80). The pond road is currently being reclaimed. The major crossing over Quitchupah Creek within the mine complex has also been approved. This multiplate pipe arch bridge is immediately above the confluence with Christiansen Wash. The mine yard roads within the facilities complex are accessed along the mine access road which connects to Highway 10 northwest of the mine.

B. Description of the Applicant's Proposal

The mine yard roads traverse the length of the facilities complex and are used to haul coal from the various stockpiles located there. The majority of roads are constructed of materials located in the mine area, however, approximately 700 feet from the gate up to the mine yard is paved with asphalt. The mine yard itself has about a 6-inch lift of gravel and the road crossing Quitchupah Creek has a sand and gravel base. The road leading to the portals has no base and was built from materials in that area.

The roads are essentially flat, although the entrance to the yard, approximately 150 feet, has a grade of 5.5 percent, and approaches to the Quitchupah Creek crossing have grades of 4.6 to 7.5 percent over a 400-foot section (permit application, Plate 13-3).

Stability of the roads is adequate because they are, for the most part, at a flat grade, and all are built on a rock subbase.

Given that the roads are not cut-and-fill structures and are generally at a flat grade, there are very few drainage structures required. The only roadside ditch associated with the mine yard roads is near the portal area where it catches flow from the culvert system and routes it to sediment pond No. 2. That ditch is a minimum of 0.75 feet deep and has 2h:1v and 12h:1v side slopes. Swales are provided at sections of the road to allow flow from above the mine yard to enter the sediment pond. In fact, it is evident from Plate 13-3 that the 6-inch road base serves as a berm to direct flow to the pond.

C. Evaluation of Compliance

Roads in the surface facilities area are stable and require few drainage structures to allow unrestricted flow to the sediment control system. Since the roads are in effect utilized as diversions to direct flow to Pond No. 2, it is recommended that the area adjacent to the north side of the roads be maintained so that a minimum of 6 inches of depth is always available for runoff to be channeled to the sediment pond. The amount of discharge involved is very small, less than 4 cubic feet per second (see Surface Water section of this Technical Analysis). Therefore, adequate maintenance will be sufficient to provide the required drainage configuration. The applicant is in compliance with this section of the regulations.

D. Revisions to the Applicant's Proposal

None

E. Reevaluation of Compliance

None

F. Proposed Special Stipulations with Justification

None

G. Summary of Compliance

The proposed operation will comply with this section of the regulations.

823.11 - 823.15 PRIME FARMLAND

A. Description of the Existing Environment

The permit area lies within T22S, R06E, in Emery County, Utah. The area is semiarid with estimated precipitation of about 8 inches per year. The growing season is about 120 days. Table 8-1 outlines expected yields for a number of crops and pasture potentials for the major soils mapped in the permit area. Table 8-2 lists land capability classes and subclasses. Most soils in the area have limitations which include shallowness, erosion hazard, wetness, or climatic features. Prime farmlands occur within the permit area, but outside the area now affected by surface operations. These areas are irrigated fields used as cropland, pastureland, or for hay production. Mapping units considered prime farmland by the SCS include: Bebe Fine Sandy Loam, Billings Silty Clay Loam, Huntington Clay Loam, Michney Loam, Palisade Loamy Sand, Penoyer Loam, Ravola Loam, and Woodrow Silty Clay Loam (Page 8-57). The areas of prime farmland within the Detailed Mapping Area are shown on Plate 8-3.

B. Description of the Applicant's Proposal

There is no prime farmland in the areas now affected by surface operations, nor is any prime farmland proposed to be disturbed by surface operations in the future. There is, however, prime farmland overlaying present and proposed underground mining. Considering the subsidence (a surface affect) that has occurred to date and the concern discussed in the Subsidence section of this report, there are

indications that prime farmland may be adversely impacted in the future. Prime farmland that may be impacted is located in the following sections of T22S,R06E: section 20, section 22, section 29, section 30, section 31. These areas were identified by matching areas of prime farmland to areas of present or future underground mining. The applicant has committed to mitigate any adverse impacts (Page 12-16). The mitigation proposed is grading to restore the natural drainage. Since the extent of future subsidence is unknown, the impacts are, at present, indeterminable. There will be, however, an allowance for the mitigation of adverse impacts in the Bonding section of this report.

C. Evaluation of Compliance

823.11 - 823.15

Will comply for the following reasons:

- 1) The applicant does not intend to conduct surface operations on prime farmland.
- 2) The applicant has committed to mitigate any adverse impacts that result from subsidence (Page 12-16).

D. Revisions of Applicant's Proposal

None.

E. Reanalysis of Compliance

None.

F. Proposed Special Stipulation and Justification

None.

G. Summary of Compliance

Will comply.

817.133 POSTMINING LAND USE

A. Description of the Existing Environment

The land use within the mine disturbance area is classified as native rangeland and is used primarily for livestock grazing and wildlife. The rangeland within this area is in fair range condition (Letter from the Soil Conservation Service, November 9, 1983). Six vegetation types and disturbed land are found on the permit area. These types are discussed in Volume 6, Chapter 9. The production and cover of the six vegetation types is:

Vegetation Type	Production (lbs/acre)	Total Cover (%)
Greasewood Shrubland	1400	24
Mixed Desert Shrubland	340	10
Annual Forb	183	6
Rock Outcrop/Talus	insignificant	insignificant
Riparian Shrubland	322	20
Riparian Meadow	1152	45

Only the Riparian Meadow type is considered to be of much quality for grazing livestock. Only 0.8 acres of this type have been disturbed, and no additional disturbance is proposed.

Within the permit area, land use includes pastureland, irrigated farmland and pasture. Most farmland consists of alfalfa and improved pasture. Table 4-1 shows the extent of the various land use categories within the permit area.

At present, only the land uses in the vicinity of the surface facilities have been affected. There has been a mine at the present-day Emery Mine site since the 1890's. The continuation of mining is not

expected to cause any further degradation of land use or land use potential (Page 4-13).

B. Description of the Applicant's Proposal

The postmining land use is described in Chapter 4, page 4-13. The applicant's proposed postmining land use is rangeland and wildlife habitat.

C. Evaluation of Compliance of Proposal

Reclamation of disturbed land to premining land use will be accomplished by implementation of the reclamation plan. This will be accomplished by regrading the land to its approximate original contour, application of topsoil substitutes, and seeding with the appropriate seed mixture for the designated vegetation type. The reclaimed area will be protected from noxious weeds.

Returning the site land use to premining capability is dependent upon successful implementation of the reclamation plan, especially successful revegetation of the site.

D. Revisions to Applicant's Proposal

None.

E. Reevaluation of Compliance

None.

F. Proposed Special Stipulation with Justification

None.

G. Summary of Compliance

Will comply.

AIR RESOURCES PROTECTION

A. Description of the Existing Environment

The vicinity of the Emery Mine experiences a semi-arid steppe climate characterized by low relative humidity, abundant sunshine, generally low precipitation, and warm summer temperatures. Average annual precipitation in the area is less than 10 inches. The town of Emery receives 7.55 inches annually. Normally, 75 percent of the precipitation enters the soil, two-thirds of which is lost due to evapotranspiration. Temperature variations can be extreme, ranging from -16 to 85 degrees F in winter and from 11 to 98 degrees F in the summer, as measured over the period 1960-1978. Prevailing winds over the permit area are from the west and southwest. Winds are generally calm, but can gust to 25 miles per hour. Winds are strongest during spring months. Air quality is generally good.

B. Description of the Applicant's Proposal

Monitoring -- The applicant does not propose to conduct any air quality monitoring program.

Fugitive Dust Control -- Emissions from the coal handling and loading are controlled by spraying the coal with water as it is mined at the face and at all the transfer points in the underground conveyor system. When the coal exits the mine and enters the tiple, it is thoroughly wetted. Road traffic dust is controlled by regularly spraying the unpaved areas with water (in the summer

at least three times a day, and in the winter about two times each week).

C. Evaluation of Compliance

The climatological data is acceptable. The fugitive dust control plan is adequate. No air quality monitoring is required and the applicant is in compliance.

D. Revisions to Applicant's Proposal

None

E. Reevaluation of Compliance

None

F. Proposed Stipulations with Justification

None

G. Summary of Compliance

The applicant is in compliance.

BONDING

A. Description of the Applicant's Proposal

The applicable period of liability for the proposed permit is ten years. The applicant has identified only one bond increment. The applicant has prepared and submitted to DOGM an Estimated Bond Amount as shown on pages 20 to 27 of the ACR Response and shown as Attachment II to this section. A total bond amount of \$430,353 was originally determined by the applicant.

A form was submitted showing the conditions of the liability insurance. The form showed 1,000,000 of liability insurance for each occurrence, but no information was supplied on the limits for each aggregate. The rider showed that the DOGM would be notified if the applicant cancelled the policy, but made no mention of what would happen if any substantive changes were made including failure to renew. Finally, the certificate supplied was expired and it is not known if a renewal has been obtained.

B. Evaluation of Compliance

The DOGM has analyzed the bond estimates and supporting calculations provided by the applicant. Estimates were based upon the 1981 Means Building Construction Cost Data, engineering estimates, and unit costs submitted to DOGM for a recent preparation plant bond estimate. DOGM has found the bond estimate to be adequate with the following exceptions:

- o The applicant made two errors in the shown calculations in response to UMC 784.13(b)(3). First, the calculated "total material for Roads, Pond and Berms" should read 42,427 cu. yd., rather than the applicant's 42,472 cu. yd. Second, the 42,427 cu. yd. figure should have been shown in the subsequent "total cost for regrading the roads, pond and berms" calculation, rather than the applicant's 38,360 cu. yd. figure. These two errors are included here only for completeness; the applicant apparently did not use these figures in calculations and the applicant correctly calculated the end result of this subpart (\$72,126). After calculating the \$72,126 estimate, the applicant made a transcription error in showing the calculated amount in the estimated bond summary table. The correct figure for Part II - A. (Pond, Road and Berm Removal) in the summary table should read \$72,126 rather than the applicant's \$65,212 figure.
- o The applicant incorrectly calculated the response to UMC 784.13(b)(2) concerning backfilling and grading costs. Based upon information provided, the calculation should be:
$$24 \text{ acres} \times 43,560 \text{ sq. ft./acre} \times 1 \text{ ft.} \times 1 \text{ cu. yd./27 cu. ft.}$$
$$= 38,720 \text{ cu. yds.}$$
$$38,720 \text{ cu. yds.} \times \$1.70/\text{cu. yd.} = \$65,824.$$

This \$65,824 figure will replace the applicant's \$72,126 in Part II - B. (Backfilling and Grading) in the summary table. Also, this cost was determined for removal of coal fines and subsequent

haulage into the underground workings. The \$1.70 /cubic yard was identified as the cost for a scraper. This may be the appropriate equipment for removal of the material, but it will not suffice to place the material in the underground workings. The applicant must reevaluate this cost and add costs associated with haulage and placement into the underground workings. It should be realized that the equipment which will be used must be available to local contractors.

- o The maintenance cost for rills and gullies is inadequate. The applicant has proposed a \$934 figure. A more appropriate figure is calculated as follows:

$$10 \text{ yrs.} \times [(8 \text{ hrs/day} \times 2 \text{ days/yr} \times \$35/\text{hr. for inspection}) \\ + \$600 \text{ for miscellaneous equipment}] = \$11,600$$

Therefore, the \$934 figure will be replaced for the bond estimate by the \$11,600 figure in Part V - C. (Rills and Gullies - Monitoring and Maintenance) of the summary table.

- o The seeding unit cost estimate of \$170.59/acre is inadequate. It will be replaced by the same figure used in the applicant's previous preparation plant bond estimate (\$600/acre). This will yield a total seeding cost of \$19,620, replacing the applicant's estimated total for seeding of \$5,578. This change in unit costs will also change the reseeding cost, with a \$4,920 figure (8.2 acres x \$600/acre) replacing the applicant's \$1,399 figure in Part V - B. (Reseeding - Monitoring and Maintenance) of the summary table.

- o Fertilizer costs should be included. We will use a unit cost of \$100/acre plus a lump sum of \$4000 for soil testing. This yields a total new cost of:

$$[(32.7 \text{ acres} \times \$100/\text{acre}) + \$4000] = \$7,270$$

to be included in the revegetation cost estimate.

- o Inflation factors must be added to those costs estimated with the 1981 Means reference. Bureau of Labor Statistics inflation factors of 1.07 (for 1981) and 1.01 (for 1982) will be used to bring those 1981 costs to 1983.
- o A 30 percent contractor fee and 10 percent contingency fee must be added to the total estimated reclamation cost. For discussion of these fees, see OSM's "Reclamation and Bond Estimates for Mine Plan Review."
- o A cost for mitigation of subsidence impacts must be added to the bond estimate. Since the bond would only be utilized if the applicant was no longer financially solvent, it can be assumed that the liability insurance will expire at some point in time during the bond period. As such, during the 10 year liability period, DOGM will become responsible for reclamation and maintenance of the site and this would include mitigation of subsidence impacts. The applicant should propose a method for mitigation of probable subsidence impacts that could occur during the permit term. This could include some amount of money to ensure that the liability insurance would be maintained. Or an

approximate acreage of disturbed area could be estimated and an average cost of grading and revegetation of the areas attached. It should be noted that in this area, grading may not be the most appropriate method for mitigation of subsidence impacts in the farm areas. If the fields were graded to establish a suitable drainage, this would cause "thin" spots in the soil where material was pushed in to fill the depression. As such, it may be more appropriate to obtain soil material from an area where the soil layer was "thick" and transport that material to the low spots. It is understood that this estimate will be very rough, but an effort should be made to determine a "reasonable" amount for mitigation.

- o Costs for the replacement of topsoil material have not been included in the bond estimate. According to recent information supplied in the Determination of Completeness Response (see the discussion in the Topsoil Section of this analysis), the applicant will be placing a topsoil substitute material over portions the facilities area. Therefore, there should be a cost associated with this in the bond estimate.

A Revised Summary Table (paralleling the applicant's original table) incorporating the above changes is included as Attachment I. The new estimated total bond amount is \$618,403. However, some additional amounts will be added once the applicant responds to the proposed stipulations. Therefore the applicant is not in compliance with this section of the regulations.

The applicant has not submitted sufficient information to be able to evaluate the adequacy of the liability insurance. The applicant is not in compliance with UMC 806.14.

C. Revisions to Applicant's Proposal

None

D. Reevaluation of Compliance

None

E. Proposed Special Stipulations with Justification

Within 30 days of permit approval, the applicant must provide information on the liability insurance to be able to evaluate compliance with UMC 806.14. This information would include identification of the amount of coverage for each aggregate, revision of the rider, and an updated copy of the certificate showing that the policy has been renewed.

Within 30 days of permit approval, the applicant must revise the bond estimate, as modified in the Technical Analysis, to show how mitigation of subsidence impacts during the 10 year responsibility period will be achieved. An appropriate cost must be added to the bond amount to cover these mitigation costs. In addition, the applicant must reevaluate the costs associated with placement of the coal contaminated material underground and placement of soil material as described in the Topsoil Protection section of the Technical Analysis. The method to be utilized must be identified and the type of equipment which will be utilized.

F. Summary of Compliance

With the proposed stipulations, the applicant is in compliance with this section.

Attachment 1

Revised Reclamation Bond Summary

Part I - Removal of Structures	
A. Building Removal	\$ 72,520
B. Portal Closure	\$ 13,768
Subtotal	\$ 86,288
Part II - Regrading	
A. Pond, Road and Berm Removal	\$ 72,126 *
B. Backfilling and Grading	\$ 65,824 *
Subtotal	\$137,950 *
Part III - Revegetation	
A. Seedbed Preparation	\$ 934
B. Seeding	\$ 19,620 *
C. Mulching	\$ 3,989
D. Fertilizing	\$ 7,270 *
Subtotal	\$ 31,813 *
Part IV - Well Replacement	\$140,000
Part V - Monitoring and Maintenance	
A. Sediment Ponds	\$ 10,000
B. Reseeding	\$ 4,920 *
C. Rills and Gullies	\$ 11,600 *
D. Erosion Control	\$ 1,231
E. Vegetation Monitoring	\$ 3,539
Subtotal	\$ 31,290 *
Total Reclamation Cost	\$427,341 *

Inflation Factor (applied to Parts I and II)	\$ 18,096 *
10 % Contingency Fee	\$ 42,734 *
30 % Contractor Fee	\$128,202 *
GRAND TOTAL BOND AMOUNT	\$616,373 *

* Indicates change from applicant's proposal

ATTACHMENT II
APPLICANT'S BONDING ESTIMATE

Comment: UMC 784.13(b)(2)

(b)(2) The applicant should provide a detailed breakdown of the costs which were developed for the bond estimate. The bond must be estimated assuming that a contractor would be required to do the work. As such contractor fees would have to be added to the bond amount. This estimate should incorporate the following concerns: [listed by item below]

Response:

The following is a detailed breakdown of the costs of the bond estimate. Between the time this application was submitted and the ACR deficiency list, an approval to construct the Preparation Plant and an approval to construct a coal stockpile were obtained from the DOGM. As a part of these approvals, separate performance bond amounts were approved and performance bonds were sent to the DOGM. To avoid double bonding of the prep plant and coal stockpile area, only those areas not bonded in the prep plant and coal stockpile areas have been included in this bond estimate. A separate instrument will be furnished for the approved amount for that portion of the total disturbance area not included in the prep plant bond and the coal stockpile bond. To maintain consistency, the reclamation unit costs used for the previously approved bonds have been used wherever possible. A new map (Plate 15-21) has included which shows the area bonded by the two previously approved bonds and the area included in this bond estimate.

Reclamation Bond Summary

Part I - Removal of Structures

A.	Building Removal	\$ 72,520
B.	Portal Closure	<u>\$ 13,768</u>
	Subtotal	\$ 86,288

Part II - Regrading

A.	Pond, Road and Berm Removal	\$ 65,212
B.	Backfilling and Grading	<u>\$ 72,126</u>
	Subtotal	\$137,338

Part III - Revegetation \$ 10,501

Part IV - Well Replacement \$140,000

Part V - Monitoring and Maintenance

A.	Sediment Ponds	\$ 10,000
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B. Reseeding	\$ 1,399
C. Rills and Gulleys	\$ 934
D. Erosion Control	\$ 1,231
E. Vegetation Monitoring	\$ 3,539
Subtotal	\$ 17,103

Total Reclamation Cost	\$391,230
10% Administrative and Contractual Cost	\$ 39,123
Total Bond Amount	\$430,353

Comment: UMC 784.13(b)(2)

A detailed breakdown of structures removal costs similar to what was presented in the response to the preparation plant ACR. In addition, the reference(s) utilized to develop these costs should be noted.

Response:

The following is a detailed breakdown of the structure removal cost. The unit costs are from 1981 Means Building Cost Data and were the same used in estimating the prep plant bond amount.

Detailed Breakdown of Bond Estimate

Structure Removal Cost

1. Stacker - Reclaim System
200 Ft. x 180 Lb./Ft. x Ton/2000 Lb. x \$92/Ton = \$ 1,656
2. Tipple
54,000 c.f. x \$.14/c.f. = \$ 7,560
175 Ft. x 180 Lb./Ft. x ton/2000 Lb. x \$92/Ton = \$ 1,449
3. Tipple Control Station
1000 c.f. x \$.14/c.f. = \$ 140
4. Stoker Oil Heater
1500 c.f. x \$.14/c.f. = \$ 210
5. 100,000 Gallon Water Tank
13,267 c.f. x \$.14/c.f. = \$ 1,857
6. Fresh Water Treatment Building
4500 c.f. x \$.14/c.f. = \$ 630
7. Warehouse/Office Building
120,000 Cu. Ft. x \$.14/Cu. Ft. = \$16,800
8. Bathhouses (3)
12,000 Cu. Ft. x 3 x \$.14/Cu. Ft. = \$ 5,040

9.	Foreman's Office Building 8,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 1,120
10.	Sampling Trailer 5,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 700
11.	Storage Building 1,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 140
12.	Storage Trailers (2) 5,000 Cu. Ft. x 2 x \$.14/Cu. Ft.	= \$ 1,400
13.	Shift Change Building 6,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 840
14.	Tipple Shop 5,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 700
15.	Spare Office Trailer 5,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 700
16.	PCB Storage Building 1,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 140
17.	Mine Fan Building 18,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 2,520
18.	Mine Substation 1,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 140
19.	Borehole Pump Facility 10 tons x \$92/ton	= \$ 920
	Sealing Hole	= \$ 500
20.	Truck Scales 1,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 140
	20 tons x \$96/ton	= \$ 1,920
21.	Explosive Storage 300 Cu. Ft. x \$.14/Cu. Ft.	= \$ 42
22.	Gaging Stations (2) 175 Cu. Ft. x 2 x \$.14/Cu. Ft.	= \$ 49
23.	Sewage Treatment System 1,000 Cu. Ft. x \$.14/Cu. Ft.	= \$ 140
24.	Bridge On Quitchupah Creek Structure Removal 50 Cu Yd x \$92/Cu Yd	= \$ 4,600
	Road Removal - 650 LF x 450 Sq Ft/LF x 1 cy yd/27 Cu Ft	

	x \$1.70/Cu Yd	= \$18,467
25. Buried Tank Cleaning and Sealing		
Lump Sum		= \$ 2,000
Total For Structure Removal		= <u>\$72,520</u>

Comment: UMC 784.13(b)(2)

The costs for backfilling and grading should show the volume of material to be handled, haul distances, equipment to be utilized and productivity of that equipment, and unit costs on a per yard or per hour basis. References utilized to develop this estimate must be documented.

Response:

A postmining topography map (Plate 15-19) for the total surface disturbance area is included with this submittal. Since the grading work for the prep plant area is included in a separate bond, it is not included in this estimate.

Very little grading will be required in the facilities area to achieve the post-mining topography since the area will remain virtually the same as it now exists. Grading quantities for the removal of the berms, dikes, ponds and roads are shown in the response for item (b)(3). The only other grading which will be required is the removal of the surface material in the facilities area. This will be necessary because during the period of active mining, a portion of the surface has become covered with coal fines. This material will be removed and hauled into the underground mine prior to revegetation. While much of the area will be ready for seedbed preparation after the facilities have been removed, it may be necessary to remove up to four feet of material in some other areas. In the 4 foot removal areas, material will be backfilled to about the existing elevation. The backfill material will come from material excavated from the road fills or from previously disturbed borrow areas. In order to determine a quantity for bond purposes, it is assumed that it will be necessary to remove 1 foot of material from the 24 acre facility area.

A grading unit cost of \$1.70/cu. yd. is taken from 1981 Means Building Construction Data. It is assumed that the work will be performed by self-propelled scrapers with an average haul distance of 1,000 ft. at a rate of 95 cubic yards per hour.

24 acres x 43,560 sq.ft./acre x 1 ft. x 1 cu.yd./27 cu.ft.
= 39,527 cu.yds.

39,527 cu.yds. x \$1.70/cu.yd. = \$67,195

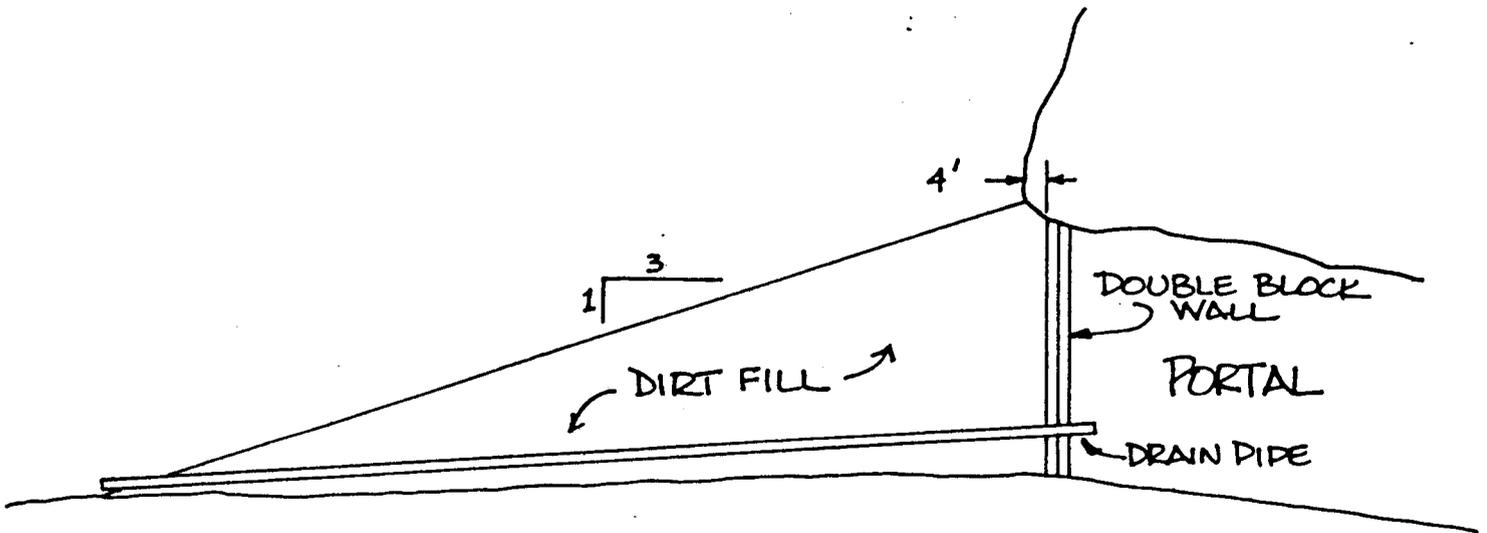
Comment: UMC 784.13(b)(2)

A breakdown of the cost related to closure of the portals must be provided.

Response:

The portals will be sealed with a double concrete block and mortar wall and backfilled with a minimum of 4 feet of fill material. For bond calculation, it is assumed that the wall would be constructed four feet inside the portal opening and the fill material would fill the opening and be sloped at 3:1 from the canyon wall. The concrete block and mortar wall will cost about \$6.48/sq. ft. of portal opening and the backfill will cost about \$1.70/cu. yd. The portal openings are about 400 sq. ft.

Blockwall; 400 sq. ft. x \$6.48/sq. ft.	=	\$ 2,592
Backfill 500 yd ³ x \$1.70/yd ³	=	\$ 850
Total Reclamation Cost Per Portal	=	\$ 3,442
4 Portals \$3,442 x 4	=	\$13,768



Comment: UMC 784.13(b)(2)

The cost which were utilized for each stage of revegetation should be referenced.

Response:

The total area included in this estimate is 32.7 acres. The unit costs were taken from the costs provided by the OGM in the approval of the preparation plant.

Revegetation Costs (32.7 acres)

<u>Seedbed Preparation</u>		
32.7 acres x \$28.56/acre	=	\$ 934
<u>Maintenance Costs</u>		
32.7 acres x \$28.56/acre	=	\$ 934
<u>Seeding Cost</u>		
32.7 acres x \$170.59/acre	=	\$ 5,578
<u>Mulching Cost</u>		
32.7 acres x \$122.00/acre	=	\$ 3,989
<u>Erosion Control</u>		
32.7 acres x \$37.63/acre	=	\$ 1,231
<u>Reseeding</u>		
8.2 acres x \$170.59/acre	=	\$ 1,399
<u>Monitoring</u>		
32.7 acres x \$108.23/acre	=	\$ 3,539
<u>Total Revegetation Cost</u>	=	\$17,604

Comment: UMC 784.13(b)(2)

Maintenance costs should be included which consider such costs as repair of rills and gullies, monitoring of sediment pond discharge to determine when the ponds could be removed, maintenance of the ponds if they are to be left in place for a substantial period of time. If these costs are included in the monitoring costs, a detailed breakdown of that cost is needed.

Response:

The unit cost for seedbed preparation has been doubled to allow for the maintenance and repair of rills and gullies. An additional 25% of the seeding cost has been added to allow for any necessary reseeded. Vegetation monitoring costs of \$108.23/acre are included with bond estimate.

After mining has been completed it is anticipated that the sedimentation ponds would require rather infrequent discharge sampling and maintenance because of the infrequent precipitation. A lump sum amount of \$10,000 has been included for pond sampling and maintenance.

Comment: UMC 784.13(b)(2)

Costs for mitigation of impacts to water wells and impacts resulting from subsidence, if appropriate, must be included in the bond estimate (see comments under UMC 784.14 and 784.20).

Response:

Two water wells may be impacted by mining during this permit term. It is estimated that replacement of the wells will cost about \$70,000 each therefore \$140,000 has been included in the bond estimate for well replacement.

Comment: UMC 784.13(b)(3)

(b)(3) The applicant must supply contour maps or cross-sections sufficient to show the anticipated final surface configurations required by this part. The amounts of material to be backfilled to close portals and the amount of material to be graded in the sediment pond areas and the roads must be quantified and supporting calculations supplied. This information should be utilized to substantiate the bond amounts.

Response:

A post-mining contour map is included in this submittal (Plate 15-19). The amount of material to be used to close the portals was calculated to be about 500 cubic yards. The amount of material required for regrading the ponds and roads is itemized below.

1. Roadside Berms
3700 LF x 12 sq ft/LF x 1 cu yd/27 cu ft = 1,644 cu yd
2. Dike Improvement
400 LF x 600 sq ft/LF x 1 cu yd/27 cu ft = 8,889 cu yd
3. Main Sedimentation Pond
400 LF x 500 sq ft/LF x 1 cu yd/27 cu ft = 7,407 cu yd
4. Secondary Sedimentation Pond
100 LF x 150 LF x 5 ft depth x 1 cu yd/27 cu ft = 2,778 cu yd
5. Mine Discharge Sedimentation Pond
1900 LF x 162 sq ft/LF x 1 cu yd/27 cu ft = 11,400 cu yd
6. Evaporation Lagoon
775 LF x 93 sq ft/LF x 1 cu yd/27 cu ft = 2,675 cu yd
Material from bottom of lagoon = 1,000 cu yd
7. Pond Road
1200 LF x 15 sq ft/LF x 1 cu yd/27 cu ft = 667 cu yd

8.	<u>Pump Road</u>		
		1100 LF x 22.5 sq ft/LF x 1 cu yd/27 cu ft	= 917 cu yd
9.	<u>Tank Road</u>		
		2100 LF x 7.5 sq ft/LF x 1 cu yd/27 cu ft	= 583 cu yd
10.	<u>Mine Yard Roads</u> (except road across the bridge)		
		3,350 LF x 36 sq ft/LF x 1 cu yd/27 cu ft	= 4,467 cu yd
		Total Material for Roads, Ponds & Berms	= 42,472 cu yd
		Total Cost for Regrading the Roads, Pond & Berms	
		38,360 cu yds x \$1.70/cu yd	= \$72,126

Comment: UMC 784.13(b)(3)

Specific plans for the handling of the material coming from the reclamation of the lagoon must be provided. These plans should show where the material is to be placed, how it will be stabilized and what the water control structures will be.

Response:

See Response to Comment UMC 784.11 (b)(1).

Comment: UMC 784.13(b)(3)

Though the area is fairly flat lying, it may be to the applicant's benefit to grade along the contour where possible to prevent erosion in an area that will be difficult to revegetate. If this is not required, the applicant should provide information as to how grading will occur.

Response:

Slope grading will be performed along the contour where possible in order to minimize soil erosion in reclaimed areas.

Comment: UMC 784.13(b)(4)

(b)(4) Since no topsoil is available from the disturbed areas, the applicant needs to propose substitute material. As per UMC 817.22(e), the applicant must demonstrate that the substitute material is equal to or more suitable for sustaining the vegetation that is the available topsoil and the substitute material is the best available to support the vegetation.

SUBSIDENCE CONTROL PLAN

A. Description of the Existing Environment

The Emery Coal Mine is located in the Emery Coal Field in the Mancos Shale Formation. A generalized stratigraphic column of the geology in the mine area is shown on page 6-2 of the permit application. The Ferron Sandstone is the coal bearing unit in the Emery field. It averages 400 feet thick and is composed of interbedded layers of sandstone, siltstone, shale, clay and coal. The coal seam which is now being mined by Consol, the I Zone, occurs in the Upper Ferron. The base of the Ferron is located below any currently proposed mining. Above the Ferron is the Bluegate Shale Formation. The Bluegate is a soft, blue-gray shale unit of marine origin. In the Emery area, where this formation outcrops, it forms barren shale hills. It is approximately 700 feet thick in the mine area. Above the Bluegate, Quaternary alluvial deposits occur along with gravel deposits.

The portals for the Emery Mine are drift openings at the coal outcrop and are located at the base of a natural cliff formed by the Ferron Sandstone. The coal seam dips to the west-northwest at three to four degrees. The depth of cover ranges from less than 100 feet near the portal area to 800 feet near the northwestern boundary. The western boundary of the site is the location of the Joe's Valley Fault Zone. Mining is limited by this fault.

Renewable resources and structures exist in the vicinity of the mine. The Upper Ferron Sandstone located almost directly above the I-Zone which is being mined is a good quality aquifer. The town of Emery and several residents in the area use this aquifer as a water source. For a detailed discussion on this aquifer, see the Ground Water Section of this Technical Analysis (to be added). The surface above the mine is extensively farmed using flood irrigation practices. Irrigation ditches cross over top of most of the mine area. Several structures were identified overtop of the mine including one occupied structure. The applicant has inventoried the structures and some of the renewable resources, such as the streams, and made a preliminary evaluation of their condition and what effects subsidence would have on these items. This evaluation can be found in Chapter 12, Appendix 12.1 in the permit application. The structures which will be undermined by the proposed operation are listed below.

- occupied ranch house
- culinary well
- utility line
- several corrals
- several ponds
- many irrigation ditches
- mine access road
- log cabin
- several sheds
- gravel roads
- barn

Privately owned surface lands of 15 landowners will be mined under during the proposed permit term.

Cultural Resources exist in the area of the mine. However, the entire area above the mine has not yet been surveyed. The applicant has committed to surveying of sites one year prior to any retreat mining during the permit term. If sites are identified, then the appropriate mitigation measures will be taken.

There exists extensive alluvial valley floor areas above the mine. These features are discussed in the Alluvial Valley Floor section of this Technical Analysis (to be added). It has not yet been determined what the extent of these AVF's is at this point in time, nor which areas are covered by the Grandfather Clause in the regulations. Therefore, there will be no further discussion in this section on subsidence impacts to AVF's until it is more clearly defined what must be protected.

B. Description of the Applicant's Proposal

Consolidation Coal Company is using a room and pillar technique of mining. Main and sub mains are developed during advance mining with development of production panels off of the mains. The company is planning to utilize partial extraction methods to recover coal at the Emery Mine rather than maximum extraction techniques. That is, no attempt will be made to entirely recover pillars, but rather only portions of the pillars will be recovered. The reasons for this is are 1) the stability of the main roof is uncertain; 2) the personnel at the mine are inexperienced in full pillar recovery; and 3) the effect of full pillar extraction upon the Ferron aquifer is uncertain (see the Mining and Reclamation Plan, page 3-25). The pillars will be

split during retreat mining in the production panels leaving irregularly shaped pillar stumps (see Figure 12-2 in the Mining and Reclamation Plan). During final retreat mining, the company will also attempt to recover a portion of the pillars in the mains. However, plans have been made to leave areas entirely underlain by complete pillars to protect the surface from subsidence. This is further discussed below.

The result of the partial extraction operation is that over time, the pillar stumps will deteriorate causing subsidence. This type of subsidence results in an uneven settling of the ground surface because the stumps will fail irregularly. The amount of subsidence which would be expected will depend upon many factors including the depth of cover, the thickness and strength of the strata above the area where the failure occurred, and the width of the opening in the area of the pillar failure. In the revised Chapter 12 of the Mining and Reclamation Plan, November 8, 1983, the company has provided an analysis on the possible extent of the subsidence. Exact prediction of this type of information is impossible due to the many variables that affect subsidence.

The amount of subsidence predicted by the company ranged from 4.5 feet at 200 feet of cover to 1.7 feet at 800 feet of cover. The analysis was based upon failure of a 40 foot pillar; which was considered by the operator to represent the average center to center pillar width left after mining within a panel; percent extraction in the panel, and a method developed by S. S. Peng and S. L. Cheng,

May 1981 was utilized for analysis. The operator stated that this would be a worst-case analysis since failure of the entire panel width was assumed to have occurred in the analysis, and this is highly unlikely. However, recently collected subsidence data refutes this conclusion. At a monitoring point identified as SM-K3 in the recently submitted monitoring data, a vertical subsidence displacement of 5.33 feet was measured. Upon evaluating the location of this point on the mine map and the UIO Seam Structure and Isopach Map, the depth of cover at this point appears to be 320 feet. Therefore, the maximum subsidence predicted by the operator at 200 feet of cover was exceeded in an area where the depth of cover was approximately 320 feet. This points out that the amount of subsidence expected at the mine is not yet understood, and that continued monitoring and revision of the approach used to predict subsidence is needed for this operation.

Additional analyses by the applicant indicated that the pillar stumps could be stable where the depth of cover does not exceed 107 feet. At this depth the pillars would essentially have a safety factor of one with respect to stability and at shallower depths the stability would increase and conversely, at greater depths subsidence would be expected to occur. However, as mentioned above, there are many unknowns in this type of analysis and continued monitoring will provide additional data.

The operator is currently planning to protect the drainages of Christiansen Wash and Quitcupah Creek from subsidence. A buffer zone approximately 500 feet wide is being left along the length of the channels. Within this zone, pillars will not be extracted. Pillars that will be left have been designed by the operator to be stable. The method that the operator used to evaluate the size of the pillars to be left closely follows the method proposed by Holland (1972). In the operators evaluation of the pillar size, it is stated in the November 11, 1983 response that a proposed safety factor of 1.75 will be used to design the smallest pillars to be left in the buffer zone. The size of the pillars will vary with depth of overburden, seam thickness and extraction ratio.

There have been no plans submitted by the operator with respect to protection of any other renewable resources nor any of the structures. The operator states that specific plans will be developed for each section of the mine on a case-by-case basis during the final planning stages for that section of the operation. Due to economic constraints, seam conditions, or mining techniques employed, a specific plan will be developed for each area. This plan will be developed no later than three months prior to undermining the surface areas to be protected (page 15, Chapter 12, November 8, 1983 response). The operator has committed to mitigation of any subsidence impacts as outlined on page 16 of Chapter 12, November 8, 1983 response.

The operator has proposed a subsidence monitoring plan on page 17 of Chapter 12, November 8, 1983 submittal. The plan is to install survey points in advance of mining and monitor at specified intervals. The monitoring will continue during the permit term for all areas which will be undermined during this permit term. At the end of the term, the program will be reevaluated and modified if necessary to reflect the newly obtained data.

C. Evaluation of Compliance

Subsidence Control: Public Notice

The operator has not provided any plans for notification of mining operations to all land owners which could be affected by subsidence. It was the operators original contention that there would be no significant subsidence impacts (page 3-53 of the Mining and Reclamation Plan). As such no plans were made to contact land owners. However, due to the recently detected subsidence above the mine and the significance of that occurrence, it is evident that the original analysis did not encompass the complexity of the subsidence issues at the site. It is certain that subsidence will occur, it is only a matter of time. The significance of the subsidence which might occur will have to be more carefully defined as monitoring data is obtained. Until this is more carefully defined, it should be assumed that there will be subsidence which could be significant. Therefore, the applicant is not in compliance with this part.

Subsidence Control: Surface Owner Protection

The operator has committed to mitigation of subsidence impacts as required by this Part. The operator is in compliance with this Part.

Subsidence Control: Buffer Zones

The operator has stated that a buffer zone will be left under Quitchupah Creek and Christiansen Wash. These buffer zones are approximately 500 feet wide and are wide enough to prevent subsidence impacts to the streams as defined by the angle of draw. Pending a determination of the extent of the AVF's above the mine and the applicability of the Grandfather Clause, a buffer zone has not been proposed nor evaluated for these types of areas.

Impacts to the Upper Ferron aquifer have not yet been fully defined. Once these impacts are determined, then compliance with (b) of this Part will be determined.

According to 761.12 (e), where the surface effects of underground mining would be conducted within 300 feet measured horizontally of any occupied structure, the operator shall submit with the application a written waiver from the owner of the dwelling consenting to these activities. The operator has not submitted such a waiver due to the earlier contention that there would be no surface effects. In addition, there were no plans for undermining the structure until the revised mine plan was submitted on November 11, 1983. Due to these recent developments, the operator must obtain a written waiver from the owner of the structure.

Due to lack of information relating to impacts to the Upper Ferron aquifer and the AVF's above the mine, determination of compliance with this section cannot be made. In addition, the applicant must submit the written waiver requested above and a plan for notification of the public of underground operations.

D. Revisions to the Applicant's Proposal

None

E. Reevaluation of Compliance

None

F. Proposed Special Stipulations and Justification

Due to the lack of information concerning the AVF situation and ground water impacts, a need for stipulations to bring the applicant into compliance with these issues cannot be determined at this time.

Within 30 days of permit approval, the applicant must submit a plan for notification of affected surface land owners over the mine. This plan must identify the landowners which will be contacted and the information which will be sent in the notice as required by 817.122

90 days prior to mining under the occupied structure in Section 30, the applicant must submit a written waiver showing the occupant's concurrence with this activity.

G. Summary of Compliance

A summary of compliance cannot be made at this time until the issues surrounding ground water impacts and AVF's are resolved.



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