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BIO/WEST, Inc.

Resource Management
and Problem Solving Services

FINAL DRAFT

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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FINDINGS

Consolidation Coal Company

Emery Mine

Application for Mining and Reclamation Plan)

I. The Utah Division of Oil, Gas and Mining and the Office of Surface Mining (OSM) have determined that the MRP submitted on March 23, 1981 and updated through December 27, 1983 and the permit with conditions are accurate and complete and comply with the requirements of the Utah State Program, the Surface Mining Control and Reclamation Act (SMCRA), and the Federal Lands Program including the Mineral Leasing Act. [786.19(a)]

II. The State of Utah and the Office of Surface Mining have prepared the Technical and Environmental Assessment (TEA) and based on this have made the following findings:

1. Although the information in the permit application package is inadequate (topsoil substitute chemical and physical data have not been provided), reclamation success has been demonstrated immediately adjacent to the mine site. UDOGM and OSM have determined that reclamation, as required by the Act, can be feasibly accomplished under the MRP. [UMC 786.19(b)]

2. Cumulative hydrologic impacts have been assessed for the Emery Mine by the Utah Division of Oil, Gas and Mining (UDOGM) and the Office of Surface Mining (OSM). The surface facilities area is located at the confluence of two perennial streams, Quitchupah Creek and its tributary, Christiansen Wash, which belong to the Muddy Creek watershed. Muddy Creek is one of the major streams in the Dirty Devil River watershed, a tributary to the Colorado River. The mine is extracting coal from the I seam coal bed, in the Ferron Sandstone member of the Mancos Shale. The Ferron Sandstone comprises a principal areal aquifer in the region, and consists of two distinct water-bearing zones; the upper Ferron aquifer and the lower Ferron aquifer. Overlying the Ferron Sandstone is the Bluegate Shale, which acts as a confining bed over the upper Ferron aquifer. Water is contained in the Bluegate Shale, however, it is not considered an aquifer in the regional context. Alluvial terrace deposits overlying

the Bluegate are waterbearing, as are the river bottom deposits which exist beneath and alongside Christiansen Wash and Quitchupah Creek. Of the three mines in the cumulative impact area, including Southern Utah Fuel's Convulsion Canyon mine, only the Emery underground mine and the proposed Emery surface mine present concerns in terms of ground-water and surface-water impacts. No need to mention this mine

Water quality impacts to the upper Ferron aquifer could be increased by having both the surface mine irrelevant and the underground mine operating concurrently. The impacts would be greater than if only the underground mine were present. The surface mine has the capacity to elevate TDS levels in the upper Ferron aquifer via the leaching of dissolved solids in the spoil ridges. Spoil water may increase in TDS levels from 1300 mg/l to over 4000 mg/l. However, this impact would be tempered by the relatively small area of impact. The surface mine is located in the area of outcrop of the upper Ferron Sandstone, which generally defines the downgradient boundary of the aquifer. Given this consideration, there is very little aquifer area remaining between the mine and its lower terminus. Only one water user exists within this small area downgradient of the mine (Christiansen Spring). This potentially impacted user will be included in the ground-water monitoring programs for both mines. Other springs may be impacted by the underground operations and these will also be monitored for diminution. The company has proposed to replace any disrupted water rights. How about proposing not to effect the spring

From the assessment of projected impacts, it is evident that the underground mine produces the greater drawdown impacts to water levels in the upper Ferron aquifer than will be realized by the proposed surface mine. The drawdowns produced by the underground mine will also influence the levels of drawdown induced by the surface mine. As the underground mine expands in the future, increased drawdown will serve to reduce pit inflow and the prediction by the U.S.G.S. of 0.3 cfs can be viewed as a maximum value for pit inflow. In fact, current drawdown projections made for the 5-year permit term of the underground mine indicate that the surface mine may, in fact, become a "dry" mine due to the projected levels of drawdown which may be induced by the underground activities.

The cumulative drawdown effects, therefore, of both mines operating together should not be any more significant than the drawdown effects induced by the underground mine itself. The addition

Will need to know the effects from Emery Deep draw down

of the surface mine to the already existing underground mine complex should not add appreciable impacts to the hydrogeologic regime beyond those already projected for the underground mining disturbances. This does not imply that impacts will not be realized. Rather, the magnitude, duration and timing of site impacts will remain on the order of those projected for the underground mine.

It is apparent that the Emery underground mine will be responsible for an increase in salt-loading to the streams. As discharges from the mine to Quitchupah Creek increase, so will the tons of salt entering the watershed. Worst-case projections for the underground mine demonstrate that it will contribute 37 percent of the salt load picked up in the Emery area. The worst-case scenario involves the surface mine and underground mine operating in 1986 when the two mines will be responsible for 46 percent of the salt picked up in the Emery area. This also will also account for 4.5 percent of the Dirty Devil River salt load. This is an inevitable consequence of the mining operations, and the removal of these salts from mine discharge does not seem to be an economically-viable alternative for the mine. Irrigation and the saline shales prevalent in this area continue to contribute the greatest proportion of TDS to both Muddy Creek and the Dirty Devil River. Despite the water quality degradation ensuing from these operations, there are no surface water rights that will be impacted in the vicinity of the mine.

not good

3. After reviewing the description of the proposed permit area, the OSM has determined that the area is:

a. Not included within an area designated unsuitable for mining operations. [UMC 778.16]

b. Not within an area under study for designating lands unsuitable for coal mining operations. [UMC 764 and 765].

c. Not on any land subject to the prohibitions or limitations of 30 CFR 761.11(a) (national parks, etc.), 761.11(f) (public buildings, etc.), and 761.11(g) (cemeteries). [786.19(d)(3)]

d. Not within 100 feet of the outside right-of-way of a public road. [UMC 786.19(d)(4)]

e. Not within 300 feet of an occupied building. [UMC 786.19(d)(5)]

4. OSM's issuance of a permit and the Secretarial decision on the Mineral Leasing Act plan are in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800). [UMC 786.19(e); see concurrence letter section]

5. The applicant has the legal right to enter and begin mining activities in the permit area. [UMC 786.19(f)] The private mineral estate to be mined has been severed from the private surface estate. The applicant has provided information required by 786.17(c)(1).

6. The applicant has submitted proof and OSM's records indicate that prior violations of applicable laws and regulations have been corrected. [786.19(g): Personal Communication, Lynn Kunzler, UDOGM Reclamation Specialist, January 18, 1984]

7. OSM's records confirm that all fees for the Abandoned Mine Reclamation Fund have been paid. [UMC 786.19(h); Personal communication, Lynn Kunzler, UDOGM Reclamation Specialist, January 18, 1984]

8. OSM records show that the applicant does not control and has not controlled mining operations with a demonstrated pattern of willful violations of the Act of such nature, duration, and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act. [786.19(h); Personal communication, Lynn Kunzler, UDOGM Reclamation Specialist, January 18, 1984]

9. Coal mining and reclamation operations to be performed under the permit will not be inconsistent with other underground mines in the general vicinity of the Emery Mine. [786.19(j)]

10. Analyses have not yet been completed by UDOGM and OSM showing that the bond amount will be adequate. The applicant must post the performance bond required under the Act, the Utah State program, and the Federal Lands Program prior to permit issuance. The bond must be made payable to both the United States and the State of Utah in the approved amount. [30 CFR 742.12(b), 786.19(k)] A finding of compliance with this part cannot be made.

11. The applicant has provided evidence and OSM and UDOGM have found

that there are prime farmlands in the permit area which are being protected as required by 30 CFR 785.17. [UMC 786.19(1)]

12. Alluvial valley floor (AVF) determinations have not been completed as of this time. Therefore, a finding of compliance cannot be made at this time with UMC 786.19(1). need information

13. The proposed postmining land use for the permit area has been approved by UDOGM and OSM. [UMC 786.19(m)]

14. UDOGM and OSM have not made all specific approvals required by the Act, the Utah state program and the Federal lands program. [UMC 786.19(m)] Therefore, a finding of compliance cannot be made.

15. The proposed operation will not affect the continued existence of threatened or endangered species or result in the destruction or adverse modification of their critical habitats. [UMC 786.19(o); Letter from U.S. Fish and Wildlife Service]

16. Procedures for public participation have complied with requirements of the Act, the Utah state program, the Federal lands program, and Council on Environmental Quality regulations (40 CFR Part 1500 et seq). [30 CFR 741.21(a)(2)(ii)]

17. The applicant has complied with all other requirements of applicable Federal laws and either has or has applied for permits from the Environmental Protection Agency. [30 CFR 741.17(d)]

INTRODUCTION

The Consolidation Coal Company (Consol) in joint agreement with Kemmerer Coal Company will be mining at the Emery mine in the Emery Coal Field. The proposed operation during the five year permit term is an extension of the existing underground operation. Over the life of possible mining predicted by Consol in this coal field, three underground operations could be developed along with two surface operations. Currently a plan is being reviewed for a surface mine to be operated by Consol which will be located adjacent to the underground workings. The underground operation is currently not producing coal but prior to this time produced about 700,000 tons per year and had plans to increase to 1.7 million tons per year. The Emery Mine is located near the original workings of the old Browning Mine which was started more than 80 years ago. The area has been disturbed since that time. The facilities area is located at the junction of Quitchupah Creek and Christiansen Wash, both perennial streams, and encompasses approximately 40 acres. In this area are located the mine facilities including, the portals, sediment ponds, storage areas, offices and other buildings, a coal crusher and associated structures, and fuel and explosive storage areas. The entire permit area encompasses approximately 5180 acres under which the operation will undermine appoximately 570 acres.

is Christiansen Wash due to muddy creek diversion only

The mine is located in Emery county near the town of Emery. Emery is approximately 3 miles from the nearest portion of the permit boundary. Four miles south of the area is Interstate 70 and two miles east is Highway 10.

The hydrologic setting of the mine is very complex. A major aquifer exists in the Ferron Sandstone above the seam to be mined and alluvial aquifers exist above the mine which discharge to springs in the area. The effects of mining on these aquifers is not clearly understood. The subsidence impacts to date have not affected the alluvial aquifers, although the sandstone aquifer has shown significant drawdown. Associated with the streams above the mine but not with the alluvial aquifers, are extensive alluvial valley floor areas. These areas are farmed using flood irrigation techniques from water diverted from Muddy Creek to the north and east of the mine, and from Quitchupah Creek.

what type of subsidence will occur

not determined yet.

The Emery Deep Mine area 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. 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 transporation.

The vegetation presently affected by the Emery Deep Mine lies in an area that has been termed the Atriplex province of the Nothern Desert Shrub Formation or, more descrptive, 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. Recovery can be very slow. Severe drought markedly lowers the productivity to only a third to a half of average. The effects of drought are often apparent for two to three years.

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 permit application for the underground operation was originally submitted in March of 1981. At the same time a modification was submitted for construction of a preparation plant and loadout facility. The modification was reviewed and finally approved on September 21, 1982. Construction of this facility has not commenced. This Technical Analysis for the Emery Deep Mine is independent of that review except as relates to cumulative hydrologic impacts. Impacts associated with the coal preparation facility area included in the Technical Analysis for that facility which is attached to this Technical Analysis in Appendix B.

Additional facilities have been planned by the applicant and approved by the Regulatory Authority. These include a coal stockpile outside of the facilities area, the bridge in the facilities area which crosses Christiansen Wash, the pump road, water tank road, and roads associated with access to the preparation facility, and the diversion adjacent to the coal refuse disposal sites. The approval dates for these facilities are listed below.

Borehole Road - Pump Access Road	Oct. 1, 1981
Use of Borrow Area	Feb. 3, 1982
Bathhouse and Power Line	Feb. 12, 1982
New Coal Stockpile	Aug. 3, 1982
Diversion Revision	unknown

The review of the underground operation by the Department of Oil, Gas and Mining commenced May 1, 1983. An Apparent Completeness Review (ACR) was sent to the applicant on June 22, 1983. Response to the ACR was recieved on October 7, 1983. A Determination of Completeness was made on October 27, 1983, and at the same time, additional questions were sent to the applicant subsequent to a preliminary Technical Analysis on the Mining and Reclamation Plan and the ACR response. Information was submitted by the applicant in response to these questions on November 15 and November 22. Significant deficiencies still existed in the hydrology section of the permit application. To clarify the information needed to complete these sections, a meeting was held on December 5, 1983. At that time communications were established between the appropriate persons so that the required information could be conveyed after the meeting. To date, telephone conversations have been held with Consol to attempt to obtain the requried information. The Technical Analysis for the Alluvial Valley Floors in the permit area is being jointly prepared by OSM and DOGM.

Red flag

done

Other Federal and State agencies which have reviewed the mine plan and provided letters of concurrence are listed below. This letters are attached to the Technical Analysis in Appendix A.

Bureau of Air Quality (to be provided)
U.S. Fish and Wildlife Service
Division of Wildlife Resources
Office of Surface Mining (memo to be provided)
Division of State History
Division of Water Rights
U.S. Bureau of Land Management (to be added)

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 suitabiity 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. This information will help plan future reclamation. Although more data is needed to determine the suitability of topsoil substitutes, successful revegetation has been demonstrated on areas immediately adjacent to the mine site (Hodder and Jewell 1979).

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 Quitchupah 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 evaportaion 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 tests; however, the testing procedures have not been detailed to the extent that it is possible to determine the adquacy 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 occuppied 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 ammendments.

The applicant is committed (Page 3-59) to the addition of soil ammendments 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 Regulatory Authority 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 Regulatory Authority 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 (soil moisture must be below field moisture content), and procedures to protect the topsoil from wind and water erosion (timing must be such that a favorable seeding period will follow immediately after final site preparation).

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 Regulatory Authority, 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.

Hodder, D. and R. Jewell, Eds. 1979. Reclaimability analysis of the Emery Coal Field, Emery County, Utah. EMRIA Report No. 16. Bureau of Land Management, Denver, Colorado.

SITUATION ADAPTABILITY EVALUATION

FOR MANAGEMENT PERSONNEL

This test has been designed to evaluate reactions of management personnel to various situations. The situations are based on actual case studies from a well known educational institution and represent a cross section of test data correlated to evaluate both reaction time to difficult situations as well as the soudness of each decision selected.

There are 8 multiple choice questions. Read each question thoroughly. Place an "X" by the answere you feel is most correctly justified by circumstances given. Be prepared to justify your decision.

You have 4 minutes.

(Do not turn this page until told to do so.)

1. You have prepared a proposal for the regional director of purchasing for your largest customer. The success of this presentation will mean increasing your sales to his company by 200%. In the middle of your proposal the customer leans over to look at your report and spits into your coffee. You:

(a) Tell him you prefer your coffee black.

(b) Ask to have him checked for any communicable diseases.

(c) Take a leak in his "out" basket.

2. You are having lunch with a prospective customer talking about what could be your biggest sale of the year. During the conversation a blonde walks into the restaurant and she is so stunning you draw your companion's attention to her and give a vivid description of what you would do if you had her alone in your motel. She walks over to your table and introduces herself as your client's daughter. Your next move is to:

(a) Ask for her hand in marriage.

(b) Pretend you've forgotten how to speak English.

(c) Repeat the conversation to the daughter and just hope for the best.

3. You are making a sales presentation to a group of corporate executives in the plushest office you've ever seen. The hot enchillada casserole and egg salad sandwich you had for lunch react, creating a severe pressure. Your sphincter loses its control and you break wind in a most convincing manner causing 3 water tumblers to shatter and a secretary to pass out. What you should do next is:

(a) Offer to come back next week when the smell has gone away.

(b) Point out their chief executive and accuse him of the act.

(c) Challenge anyone in the room to do better.

4. You are at a business lunch when you are suddenly overcome with an uncontrollable desire to pick your nose. Remembering this is definitely a NO-NO, you:

(a) Pretend to wave to someone across the room and with one fluid motion, bury your forefinger in your nostril right up to the 4th joint.

(b) Get everyone drunk and organize a nose picking contest with a prize to the one who makes his nose bleed first.

(c) Drop your napkin on the floor and when you bend over to pick it up, blow your nose on your sock.

5. You have just spent the evening with a supplier who invited you to an all night boiler-maker drinking party. You get home just in time to go to work. You stagger to the men's room and spend the next half hour vomiting. As you're washing up at the sink, the sales training director walks up, blows his cigar in your face, and asks you to join him for drinks after work. You:

(a) Look him straight in the eye and launch one last convulsion at the front of his Hart Shaffner & Marx suit.

(b) Nail him right in the crotch, banking on the fact he'll never recognize your green face.

(c) Grasp his hand and pump it till he P's his pants.

6. You are at dinner with a customer and his wife, who looks like the regional runner-up of the Marjorie Main lookalike contest. Halfway through dinner you feel a hand on your lap. Being resourceful, you:

(a) Accidentally spill hot coffee in your lap.

(b) Slip a note to the waiter to have your customer paged and see if the hand goes away when he does.

(c) Excuse yourself and go to the men's room. If he follows, don't come out until your shorts rot.

7. You're on your way in to see your best account when your zipper breaks and you discover that you forgot to put your shorts on that morning. You decide to:

(a) Call on the customer's secretary instead.

(b) Explain you were just trolling for queers.

(c) Buy a baggy raincoat and head for the nearest playground.

8. You've just returned from a trip to Green Bay, Wisconsin in January and tell your boss that nobody but whores and football players live there. He mentions that his wife is from Green Bay. You:

(a) Ask what position she played.

(b) Ask if she's still working the streets.

(c) Pretend you're suffering from amnesia and don't remember your name.

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 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.

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 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, 7.55 inches annually, 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. Decription 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 Quitchupah 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. After sealing of the portals, any effluent from the mine will be directed to the sedimentation pond via an 8-inch diameter drain where water quality will be tested.

C. Evaluation of Compliance

UMC 817.41-.42 Hydrologic Balance: Water quality Standards

Surface-water quality at the Emery Mine will not be adversely impacted by an influx of total suspended solids because the sediment control system is adequate to prevent uncontrolled runoff from entering the streams. Furthermore, the mine discharge pond is treating the influent so effectively that in-mine TSS levels of 213 mg/l (permit application, page 13-2) are reduced to concentrations well below 70 mg/l as water is discharged from the pond. The primary concern is the contribution of total dissolved solids to the streams from mine discharge. The average TDS concentration in the mine discharge water has been 4040 mg/l, which has varied, although no discernable patterns of occurrence have been observed. TDS levels in Quitchupah Creek are generally below 2000 mg/l, therefore, the mine discharge will be increasing the salinity levels in that stream.

UMC 817.43 Diversions of Overland Flow

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. With implementation of this condition, the applicant will be in compliance with these sections of the regulations.

UMC 817.44 Stream Channel Diversions

Not applicable.

UMC 817.45-.46 Sediment Control Measures, Sedimentation Ponds

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 with this section of the regulations.

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.

UMC 817.47 Discharge Structures

Sediment pond spillways and ditch channels have been riprapped to prevent erosion in areas where high velocities occur. The applicant is in

compliance with this section of the regulations.

UMC 817.48 Acid-forming and Toxic-forming Spoil

See the discussion on this regulation in the Ground Water Section of this Technical Analysis.

UMC 817.49 Permanent and Temporary Impoundments

The temporary impoundments constructed at the mine site are constructed according to standard engineering practic. There are no permanent structures. The applicant is in compliance with this section of the regulations.

UMC 817.50 Underground Mine Entry and Access Discharges

The applicant has provided a plan to minimize disturbance to the hydrologic balance when the portals are sealed by directing discharge from the mine to the sedimentation pond where it will be tested for quality standards. The applicant is in compliance with this section of the regulations.

UMC 817.52 Surface Water Monitoring

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.

817.54 Water Rights and Replacement

Surface-water quantity will not be adversely affected by the sediment control structures since the runoff that will be stored represents flow from a very small percentage of the Quitchupah Creek and Christiansen Wash watersheds. Underground mining may, however, impact stream flow since both streams are recharged by the upper Ferron Sandstone. The applicant has presented information to the effect that the discharge from the upper Ferron sandstone aquifer to the streams is less than 0.1 cfs. This is based on a U.S.G.S. model used to simulate ground water flow in the

vicinity of the mine (page 10, October 7, 1983 submittal). Currently, the potentiometric surface of the upper Ferron is changing with alterations in the mine plan, and this change will affect the degree to which the stream recharge is impacted.

UMC 817.55 Discharge of Water Into an Underground Mine

Not applicable.

UMC 817.56 Postmining Rehabilitation of Surface Water Control Structures

The reclamation plan provides for the adequate reclamation of surface water control structures. The applicant is in compliance with this section of the regulations.

UMC 817.57 Stream Buffer Zones

The pre-law status of these facilities is such that no buffer zones were provided along Quitchupah Creek and Christiansen Wash.

D. Revisions to Applicant's Proposal

None

E. Reanalysis of Compliance

None

F. Proposed Stipulations

The applicant shall increase the depth of the roadside ditch leading to Pond No. 2 in the surface facilities area to provide 0.3 feet of freeboard where necessary.

G. Summary of Compliance

With implementation of the proposed stipulation, the applicant will be in compliance with the sections of the regulations dealing with the protection of the surface water regim.

GROUNDWATER

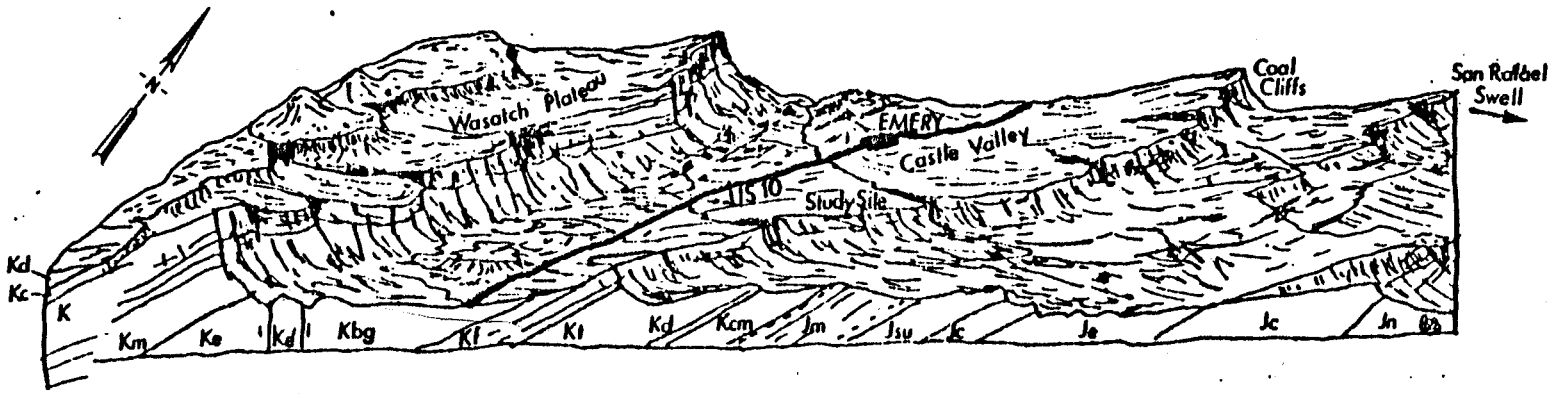
A. Description of the Existing Environment

Regional Geologic Setting

The Emery Mine Plan Area is located in the Castle Valley portion of the Emery coal field in Central Utah. The mine is located about four miles south of the town of Emery, at the confluence of Quitchupah Creek and its major tributary, Christiansen Wash. Figure 1 portrays a cross section of the Emery coal field and surrounding area, while Figure 2 shows the generalized stratigraphic column present in the region. In the area of study, three geologic units are of principal importance; in ascending order these units are: the Upper Ferron Sandstone member of the Mancos shale; the Bluegate shale member of the Mancos Shale; and the Quaternary colluvial and alluvial deposits present in the area. The coal seam to be mined at the Emery mine, known as the I - J zone, occurs in the Upper Ferron Sandstone. As can be seen from Figure 1, the geologic formations in the region all dip to the west, towards the escarpment of the Wasatch Plateau. At the base of the escarpment, the formations are truncated by the Joe's Valley-Paradise Fault Zone, located immediately northwest of the Emery mine permit area. Figure 3 portrays the general surficial geology of the study area, and Figure 4 shows a generalized geologic cross section of the same.

The applicant's description of the geology of the area with accompanying maps and cross sections, is contained in Chapter 6 of the permit application, and a description of the hydrogeology is contained in Chapter 7. The salient physical and hydrogeologic characteristics of the geologic formations of interest in the mine area are summarized here; for more detail, the reader is referred to the appropriate sections referenced above.

Quaternary Deposits. Colluvium and alluvium occur on toe slopes, along the drainages, and on the high terraces present in the area. The alluvium occurs as unconsolidated deposits of partly stratified silt, sand, and gravel deposits in and adjacent to Quitchupah Creek and Christiansen Wash. A maximum thickness of 75 feet of this material was reported in the study area, along Quitchupah Creek above its confluence with Christiansen Wash. Along benches above the Quitchupah Creek channel, sand and gravel deposits up to 40 feet in depth are reported. The colluvium in the area is reported as bouldery, loamy sand below sandstone outcrops in the area, and as a silty clay below the shale hills in the area.



K - Cretaceous (undifferentiated
Kc - Castlegate Sandstone
Km - Masuk Shale (member of Mancos Shale)
Ke - Emery Sandstone (member of Mancos Shale)
Kbg - Blue Gate Shale (member of Mancos Shale)
Kf - Ferron Sandstone (member of Mancos Shale)
Kt - Tununk Shale (member of Mancos Shale)
Kd - Dakota Sandstone
Kcm - Cedar Mountain Formation
Jm - Morrison (?) Formation
Jsu - Summerville Formation
Jc - Curtis Formation
Je - Entrada Formation
Jn - Navajo Sandstone

Figure 1. East-west cross-section and physiographic diagram of Emery Coal Field and surrounding areas. (Permit Application, Chap. 7)

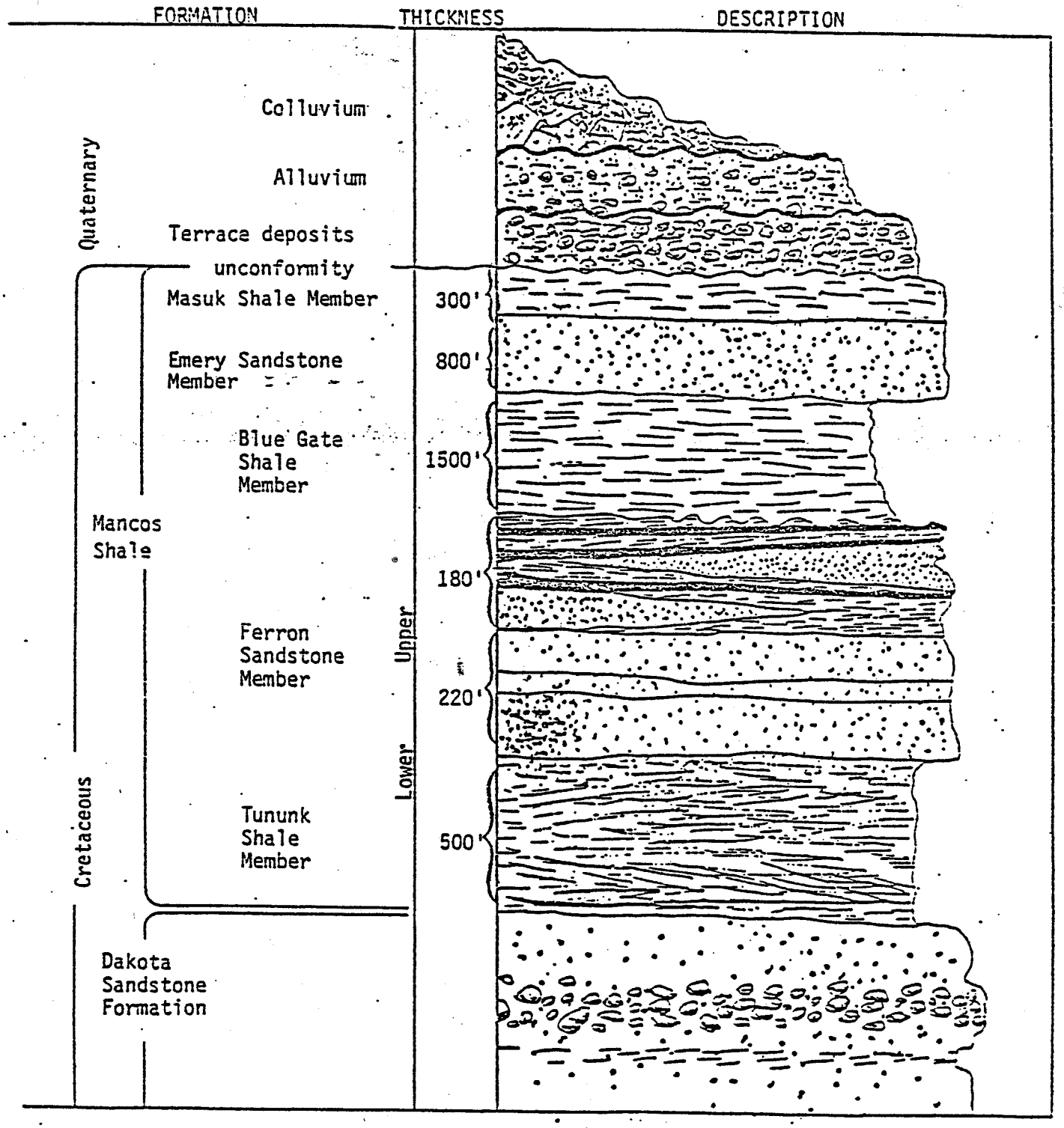


Figure 2. Generalized stratagraphic column. (Permit Application, Chap. 2)

Explanation

Qal: Alluvium
Qt : Terrace Deposits
Kme : Emery Sandstone
Kmbg : Blue Gate Shale
Kmf : Ferron Sandstone

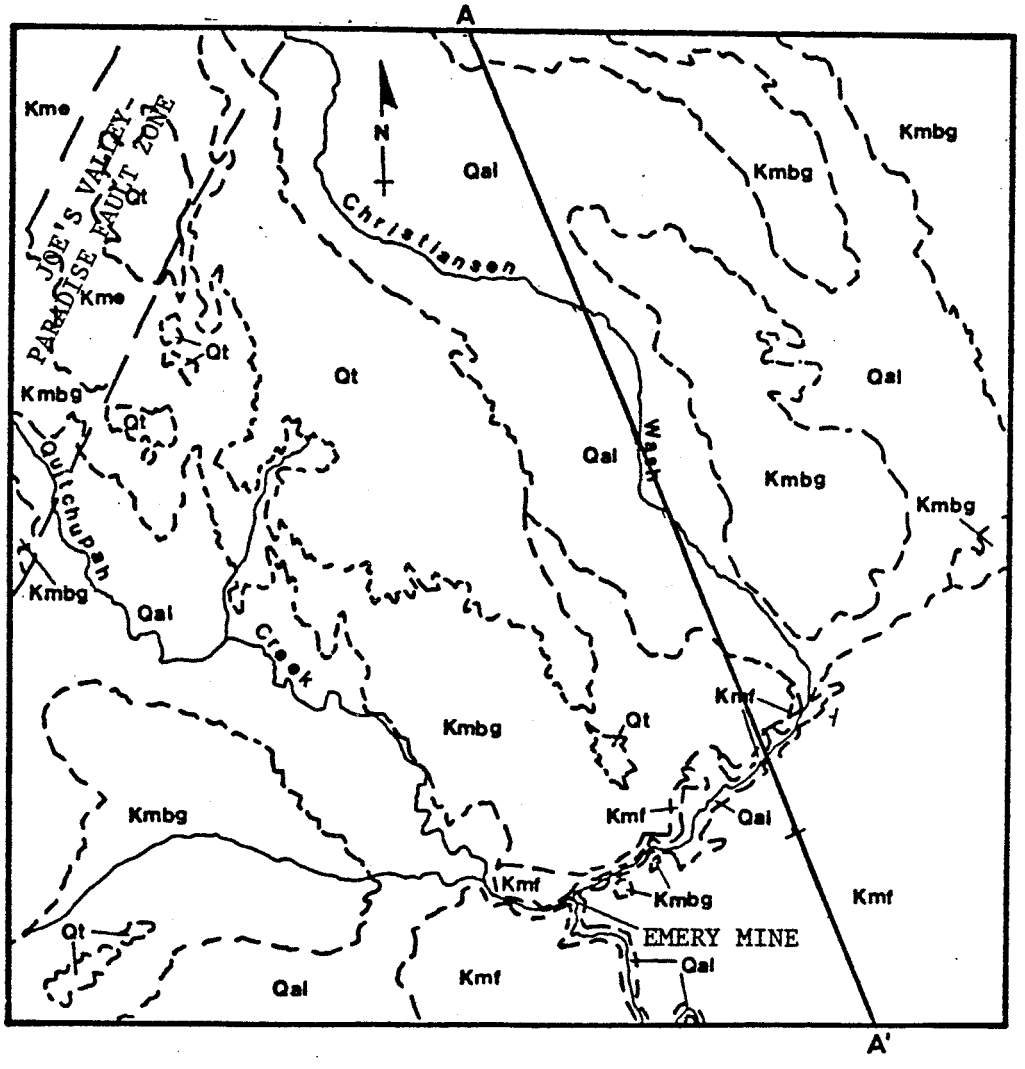


Figure 3. Geologic map of the Emery Mine area. (Permit Application, Chap.7)

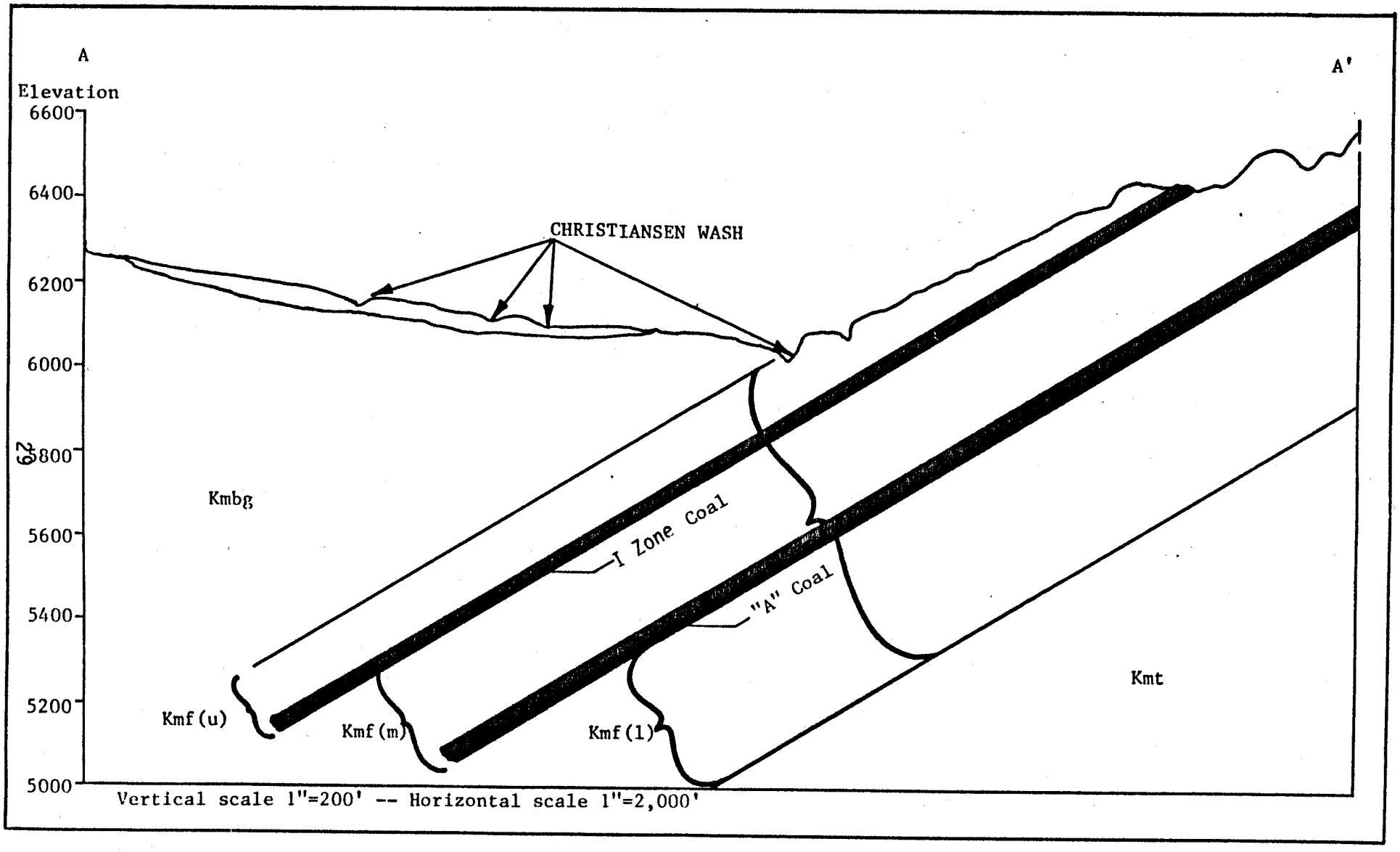


Figure 4. Geologic cross-section (diagrammatic) through A-A'. (Permit Application, Chap.7)

Bluegate Shale. The Bluegate Shale outcrops west of Christiansen Wash and west of Quitchupah Creek, south of the Emery mine office. The Bluegate also underlies most of the alluvial deposits present in the central and western portions of the permit area. The Bluegate is a soft blue-gray shale unit of marine origin, composed of irregularly bedded mudstone and siltstone. Rare thin sandstone lenses occur in the formation. Where the Bluegate Shale is exposed at the surface, it forms barren shale hills. In the vicinity of the Joe's Valley Paradise fault zone, the Bluegate shale is approximately 700 feet thick; across the permit area, the Bluegate varies from zero to 700 feet in thickness.

Ferron Sandstone. The Ferron Sandstone is divided for descriptive purposes into three units: the Upper Ferron, the middle Ferron, and the lower Ferron. Collectively, the three units average about 400 feet in thickness. The portion of the Ferron Sandstone including the I - J zone and above is designated the Upper Ferron. The portion lying stratigraphically below the base of the I - J zone and the base of the A zone is designated the middle Ferron. The remaining portion of the Ferron Sandstone below the A zone coal is designated the lower Ferron. The upper Ferron is of primary importance, as it contains the coal zone being mined and is also responsible for the majority of the water made within the mine. The Ferron Sandstone occurs generally less than 1000 feet below the land surface in the Emery area. Due to the westward dipping nature of the beds, the Upper Ferron outcrops within and also just east of the permit area, near the channels of Quitchupah Creek and Christiansen Wash. The Upper Ferron also subcrops beneath the veneer of alluvium which exists in the Christiansen Wash and Quitchupah Creek valleys towards the southeastern margin of the permit area. Further eastward from the permit area, towards Muddy Creek, the middle and lower units of the Ferron outcrop. Figure 7-2 and Plate 6-30 of the permit application denote the generalized outcropping and subcropping of the Ferron Sandstone.

The Upper Ferron consists of lenticular beds of fine to coarse sandstone, and lenses and intercalated beds of shale, siltstone, and coal. The middle and lower units of the Ferron consits of medium to fine grained calcareous sandstone. In some areas, tests indicate that fractures may be present in the Ferron sandstone; however, on a large scale the formation is thought to act as a porous medium (USGS, 1980).

Hydrogeology of the Study Area

Groundwater is present in all three principal formations of interest at the study area, although the Ferron sandstone is the principal aquifer in the region. The aquifer and water quality characteristics of each of the three geologic units are highlighted below.

Quaternary Deposits. The alluvium along the principal drainages and on the sediment terraces contains shallow, unconfined aquifers which are generally less than 50 feet thick. Their boundaries are defined by the limits of the Quarternary deposits. Recharge to the Quarternary pediment terrace aquifers occurs via the almost constant irrigation and leaching applications by local farming operations, using water diverted predominantly from Muddy Creek east of the permit area. Recharge to the alluvial aquifers along Christiansen Wash and Quitchupah Creek occurs via irrigation return flow, and also via discharge from the Upper Ferron Sandstone aquifer. Where the Quaternary pediment deposits overlie the Bluegate Shale, water moves through the deposits and exits from numerous springs at the contact with the relatively impervious Bluegate Shale. Water flowing from some of these springs becomes trapped in swales, forming alkali swamps. The springs which had measurable flow were found to be issuing at less than 10 gpm. At the time the permit application was submitted, there were no wells completed exclusively in the Quaternary deposits. Water quality was therefore determined from data collected during a spring and seep inventory conducted during October 1979 and June, 1980. The conductivity of the spring waters ranged from 658 to 2015 Mhos/cm at 20 degrees C; pH ranged from 6.3 to 8.3 with an arithmetic average of 7.6 reported. With the exception of one small irrigation diversion, water from the springs is used for stockwatering purposes only.

Bluegate Shale. Although the Bluegate Shale is waterbearing, it is considered an aquitard, separating the Quaternary and Ferron Sandstone aquifers. Water in the Bluegate Shale is possibly contained in fractures and may be localized. The ability of the Bluegate Shale to act as a confining layer is evidenced by the existence of flowing artesian wells which are completed in the Upper Ferron aquifer. For example, monitoring wells AA and R2 both flow at the land surface, and are completed in the Upper Ferron.

The groundwater within the Bluegate Shale is saline, with high amounts of sodium, sulfate, and chloride , as evidenced by a sample collected from the Bluegate #3 well. Gypsum crystals have also been observed in hand

samples. Water levels in Bluegate wells showed seasonal variations during the 1979-1980 baseline monitoring records.

Ferron Sandstone Aquifers. The waterbearing Ferron Sandstone formation is the principal groundwater body in the area of the Emery mine. Data assembled from field investigations at the site indicate that within the Ferron Sandstone, two aquifer zones exist: the Upper Ferron aquifer and the lower Ferron aquifer. Multiple completion wells installed at the site indicate a difference in hydraulic head between the lower Ferron (below the I - J zone coal) aquifer and the upper aquifer. Also, water levels in the upper aquifer appear stressed as a result of present mining, while those in the lower aquifer do not, indicating a degree of hydraulic isolation.

Groundwater movement throughout the Ferron Sandstone is in an updip direction, towards the mine and areas of outcrop. Generally this is to the southeast. Recharge to the Ferron Sandstone is believed to take place to the west, on the Wasatch Plateau and along the Joe's Valley - Paradise fault zone. Discharge of the two aquifer zones in the area is to Muddy, Ivie, and Quitchupah Creeks, Christiansen Wash, and Miller Canyon. In the immediate mine site area, the upper Ferron aquifer is primarily responsible for subsurface outflow to Christiansen Wash and Quitchupah Creek.

The USGS has modeled the Ferron Sandstone aquifers, within and adjacent to the study area, using the USGS 3-dimensional computer model (USGS, 1980). The model was used to estimate hydraulic head relationships and subsurface outflow of the Ferron Sandstone waterbearing zones. The results indicate that the Ferron Sandstone, in its entirety, discharges approximately 0.4 cfs of outflow to streams in the general mine area. The modeled area investigated by the USGS involved an approximate 2.5 mile segment of Muddy Creek (north of Miller Canyon), a 1.75 mile segment of Ivie Creek (west of its confluence with Quitchupah Creek), a 1.5 mile reach of Christiansen Wash (above Quichupah Creek) and an approximately 0.5 mile segment of Quitchupah Creek near and below the Christiansen Wash. The thickness of the Upper Ferron aquifer is approximately 1/5 that of the total Ferron Sandstone; on this basis, it is reasonable to assume that the upper Ferron discharges less than 0.1 cfs to the streams in the modeled area. Alternatively, if it is assumed that the upper Ferron discharges to the Christiansen Wash-Quichupah Creek segment of the modeled streams (as indicated by geologic relationships) and the lower Ferron is responsible for discharges to the remaining segments modeled, it would appear that the upper Ferron aquifer accounts for slightly less than 0.2 cfs of subsurface outfow in the modeled area.

Both the upper Ferron aquifer and the lower Ferron aquifer exhibit confined aquifer characteristics. Wells completed in both the upper and lower Ferron Sandstone aquifers, in many locations throughout the study area, exhibit the ability to flow at the land surface. This is especially true for areas upgradient of the existing mine operations. The hydraulic head relationships between the upper and lower Ferron aquifers indicate that under undisturbed conditions, groundwater generally has the hydraulic potential to migrate upward, from the lower aquifer zone to the upper.

A similar hydraulic relationship is generaly thought to exist between the upper Ferron aquifer and the Bluegate shale in the area, although in some locales the upper Ferron has been depressurized as a result of mining, reversing the upward relationship.

Transmissivity values were determined for the Ferron Sandstone aquifers at the site, and values of about 3030 gpd/ft. and 3812 were reported for the upper and lower aquifers, respectively.

Groundwater Quality. The groundwater quality of the Ferron Sandstone aquifer (undifferentiated), as measured in baseline investigations prior to 1979 from 21 wells in the area, indicates a TDS level of approximately 2300 ppm. Published information by Price (1972) indicates TDS levels of 250-1000 ppm for Ferron Sandstone aquifer waters in the Castle Valley area. The baseline well samples may reflect saline waters from the overlying Bluegate shale (and terrace gravels, which experience saline irrigation return flow). The lower values stated in the Price study above may therefore be more representative. Further support for the lower levels is given by the fact that TDS levels in 5 samples collected immediately from roof falls in the existing mine are on the order of 1100 ppm, considerably less than the values cited for the groundwater wells. A background TDS level of 1100 ppm is therefore thought to be most representative of Ferron Sandstone waters.

Groundwater Use

Two private wells, the Bryant well and the Lewis well, are registered in the permit area. Both withdraw water from within the Ferron Sandstone, presumably from the upper aquifer. The town of Emery also maintains a supply well, approximately 2.5 miles north of the permit area. The Lewis and Brayant wells withdraw about 30 gpm, while the Emery town well withdraws about 50 gpm. In addition to the numerous springs which exist in

the terrace gravels overlying the Bluegate shale (discussed earlier), two springs were identified as issuing from the Ferron Sandstone. The Christiansen spring, located at the head of Miller Canyon (spring #SP-16), discharges from the upper Ferron Sandstone. The spring flows at a rate of 6 gpm and is appropriated at 0.1 cfs for stock-watering purposes. Spring SP-16 is believed to discharge from the lower Ferron aquifer and is unappropriated. The spring is located about one mile northeast of SP-15, in the Muddy Creek Valley. The SP-16 spring issues at 5 gpm.

B. Description of the Applicant's Proposal

Existing Impacts

The applicant has been mining coal at the site since prior to 1977. Presently, approximately 1/3 of the permit area has been mined. Measurable disturbances to the groundwater regime have already been realized. Most notably, between 0.6 cfs and 1.2 cfs of groundwater is removed from the mine, conveyed to the existing sediment pond, and discharged to a tributary of Quitchupah Creek. Between 1980 - 1982 the flow was measured at 0.6 cfs, and between 1982 - 1983 the flow was measured at 1.2 cfs.

Significant drawdown has also occurred within the upper Ferron aquifer, although only minor effects in the lower Ferron aquifer have been realized, based on current water level measurements. Most of the water make in the mine occurs via three major roof-falls; very little flow into the mine through the mine floor has been realized. Both the Bryant well and the Lewis well have been affected by mining; the depressurization of the upper Ferron aquifer has resulted in the two wells no longer flowing at the land surface. Consol has furnished and installed pumps in these wells to mitigate the present effects of mining.

The existing drawdown level in the upper Ferron aquifer is shown by the applicant on a potentiometric surface map, produced in the Fall of 1983. The map indicates that a cone of depression exists adjacent to the mine, centered in Section 29, Township 22S, Range 6E. The cone radiates outward for at least one mile. Approximately 300 feet of water level decline has been realized in Section 29 since 1979, when a similar potentiometric map was prepared by the applicant. The 1979 map also represented disturbed conditions; the amount of decline relative to conditions prior to any disturbance is unknown, as mining has occurred in the permit area since the turn of the century, before any site-specific water level monitoring actions were initiated.

The water quality of intercepted water has also been demonstrated to degrade in the mine. TDS levels of intercepted waters accumulating in the mine average 4000 ppm, with values as high as 5840 ppm reported. The principal constituents of the additional load of dissolved solids include magnesium, sodium, sulfate and chloride. SAR values of mine waters range from 4.6 to 64 units, with an average of 22 units reported.

Projected Impacts - Future Mining

The applicant proposes the following real or potential groundwater impacts to the hydrologic balance resulting from future mining during the permit term:

1. Additional groundwater declines in the upper Ferron aquifer as mining progresses in the permit area.

2. Disruption of groundwater quality within the Ferron Sandstone, owing to possible downward leakage of saline Bluegate Shale waters and irrigation return flows if subsidence cracking to the surface occurs.

3. Additional lowering of water levels in the Lewis and Bryant wells.

4. Potential dewatering of portions of the alluvial terrace aquifer (and accompanying springs) which overlie the Bluegate Shale.

5. Loss of subsurface outflow to Christiansen Wash and Quitchupah Creek within the area of disturbance.

To date, approximately 800 acres of land area have been mined by the applicant. Within the permit term, approximately 570 additional acres will be mined. The applicant has prepared an estimate of the amount of drawdown which can be expected to occur in the upper Ferron aquifer as a result of the next phase of mining. The drawdown is shown on Plate 7-5 in the permit application, submitted in December 1983. The 5-year water level decline can be expected to be on the order of a maximum 350 feet below 1983 measured water levels. This corresponds to about 750 feet of drawdown below 1979 levels. This maximum drawdown level occurs in two areas: over the existing mine, in Section 28, R 6E, T 22S, and over the new segment of mining in Section 29, R 6E, T 22S. In some instances, this maximum

drawdown exceeds the saturated thickness of the upper Ferron aquifer, and the aquifer will be completely dewatered. Near the edges of the permit boundary, drawdown of about 50 feet can be expected.

The applicant proposes that only the Lewis well and Bryant will be impacted. The drawdown effects are not proposed by the applicant to reach as far as the Emery town well (2.5 miles north of the permit area) nor as far east as the Christiansen Spring.

In regard to diminuition of subsurface outflow to Christiansen Wash and Quitchupah Creek, the applicant proposes that the amount of water predicted to outflow to these streams in the study area, via the USGS computer model, is relatively minor. If the amount predicted by the model (0.2 cfs or less) is intercepted by the mine, it is proposed to have very little effect on the flow regime of either stream.

In addition to the projected groundwater level declines, the applicant prepared projections of the anticipated levels of mine inflow over the permit term. The values are as follows:

Year	Level
1984	1.7 cfs (763 gpm)
1985	2.1 cfs (943 gpm)
1986	2.6 cfs (1167 gpm)
1987	2.3 cfs (1033 gpm)
1988	2.0 cfs (898 gpm)

As mining progresses downdip towards the recharge zone, higher levels of hydraulic head are encountered, resulting in an increase in intercepted flow. The rate will increase from 1.2 cfs (the current average rate) to 2.6 cfs in 1986. From there, the applicant projects that the rate will steadily decline to about 2.0 cfs, as the hydrostatic pressure is reduced following the removal of water from storage.

The applicant also identifies a potential impact to the terrace alluvial aquifer above the mine. Cave zones above the mined-out seam are expected to produce fracturing and rubblization of strata up to as much as 200 to 300 feet above the mined-out zone. It is possible that in areas where the depth of cover is less than 300 feet, the fracturing and rubblization could extend through the Bluegate shale and produce some potential for downward movement of alluvial water through the rubblized

zone into the mine. This could serve to lower alluvial groundwater levels in the terrace alluvial aquifer. The applicant proposes that for the most part, areas which are subject to this condition have already been mined, and no serious consequences have been observed to date. The applicant further proposes that continued monitoring will be necessary to fully evaluate this potential.

A related impact to that above was identified by the applicant: the potential for saline Bluegate shale waters to mix with higher quality, upper Ferron Sandstone waters. This phenomenon could be induced by two mechanisms: 1) reversal of hydraulic potential between the waterbearing zone in the Bluegate shale and the upper Ferron aquifer. Under undisturbed conditions, piezometric levels in the upper Ferron are generally above those in the Bluegate shale. Mining could reverse this relationship; 2) rubblization and fracturing of the Bluegate shale, leading to increased hydraulic communication between the upper Ferron aquifer and the Bluegate shale over that which existed prior to disturbance. The applicant proposes that the amount of upper Ferron aquifer which exists between the disturbed area and the outcrop area to the east (where it pinches out) is small in extent. No groundwater water users, other than the appropriated Christiansen spring 3/4 mile east of the permit area, exist in this zone.

Postmining Effects

The applicant proposes that in the post-mine environment, groundwater levels in the upper Ferron aquifer will re-establish themselves to levels that existed in the premining condition. Hydraulic head within the upper Ferron aquifer would be expected to rise above that of the Bluegate to its premining condition, precluding the downward leakage of poor quality Bluegate water in the long term. The rubblized sections of the upper Ferron Sandstone and Bluegate shale would have higher permeabilities in the post-mine environment, and groundwater flow rates would be expected to be higher than existed prior to disturbance. The original potentiometric surface may, in turn, be slightly altered on a local scale. However, direction of flow, recharge characteristics, and points of discharge are proposed by the applicant to generally be uneffected in the long term.

Following mining, groundwater can be expected to accumulate in the mine as the pressure regime in the upper Ferron aquifer attempts to re-establish itself. The applicant has proposed a plan for sealing mine entrances and for placement of a discharge pipe in the portals. If pressures in the mine rise to the level where discharge from the portal is

possible, the applicant plans to route the discharge to the existing sedimentation pond and manage the discharge under the NPDES discharge requirements. Following complete cessation of mining at the site and removal of the sediment pond, the applicant proposes to allow the portal drainage to flow unmanaged.

C. Evaluation of Compliance

817.41 Hydrologic Balance - General Requirements

The applicant has provided sufficient information to identify the probable hydrologic consequences (PHC) of mining on groundwater resources, and the uncertainties which exist therein. Additional information regarding hydrogeologic conditions, water use, and surface water-groundwater relationships is not necessary or requested at this time.

The applicant prepared the estimate of groundwater level decline and mine water inflow using an in-house computer model identified as CONOSIM. The CONOSIM model was examined and found to be appropriate for the projections made by the applicant. The model has the capability to handle flow in porous media as well as fracture flow, which occurs at the site in areas of roof caving. The model has been verified at the site and has successfully predicted past inflows for which actual flow records are available. A description of the applicant's model appears in Owili-Eger (1980), submitted as part of the permit application.

The uncertainties which exist in the definition of the PHC on groundwater, can be identified as follows:

- The possibility for, and overall effects of, the mixing of Bluegate shale waters with upper Ferron aquifer waters is imperfectly understood. As a result, ongoing monitoring efforts must be targeted at this potential.

- The potential for drawdown effects reaching the Christiansen Spring (SP-15 on Map 6-30) remains unclear. The applicant proposes that drawdown will not extend to that distance; however, the PHC information indicates that this spring may still be within the radius of influence. It is therefore imperative that this spring be included in the monitoring program at the site.

- An additional uncertainty exists in the potential for roof and cover fracturing extending upwards through the cover and affecting the alluvial terrace aquifer. The applicant has presented supportive evidence for the fact that the most critical areas where this phenomenon might occur have already been mined in the past. However, given that the effect on the terrace aquifer may be time dependent (e.g., the impacts may not yet have been realized) it is important that the applicant pay particular attention to this potential in his monitoring efforts. Fourteen springs were identified by the applicant as issuing from the terrace aquifer, resulting primarily from irrigation return flow. Two of these springs, the Anderson spring and the Jensen spring, are shown in Table 7-8 of the permit application as appropriated. Both of these springs must be included in the monitoring program, so that the potential for diminuition of flow can be examined.

The applicant has demonstrated that if further impacts to the Lewis and Bryant wells are realized during this permit term, an alternative water supply is available. It is possible that both wells may be fully dewatered, based upon the drawdown projections made. The applicant has included in his bond amount an allowance for drilling two wells deeper into the lower Ferron Sandstone formation. The applicant is in compliance.

The applicant has presented supportive calculations to show that flow depletions to Quitchupah Creek and Christiansen Wash, as a result of intercepted groundwater, should not be significant to the drainages. The amount of intercepted flow (0.2 cfs or less) is about 3 percent of the mean discharge of the Quitchupah Creek - Christiansen Wash drainage system above Ivie Creek. Additionally, the water will be routed through the mine and discharged back to the Quitchupah Creek watershed, albeit at lesser quality (this topic is treated in the Surface Water section). From a quantity perspective, however, the disturbance is not significant. The applicant is in compliance.

817.48 Hydrologic Balance - Acid Forming and Toxic Forming Materials

The applicant has not identified any materials which could be considered acid or toxic forming with respect of groundwater contamination in the facilities area. Material, such as coal, which will not support vegetation, is to be removed from the facilities area and backfilled in the mine. This will not cause any further degradation to the groundwater due to the coal which will remain in the mine once the operation is complete.

In addition, the volume of material to be backfilled is extremely small compared to the volume of coal material which will remain in the mine.

There are no plans for disposal of underground development waste. For a discussion of coal refuse disposal, see the Technical Analysis for the Emery Preparation Plant/Loadout Facilities.

817.50 Hydrologic Balance - Underground Mine Entry and Access Discharges

The applicant has prepared a plan for controlling discharge from the portals in the event re-established pressures in the upper Ferron aquifer generate such discharge. The portal closure plan includes the placement of a pipe of sufficient size in the portal backfill which will allow for the discharge of 0.4 cfs from the mine. This water will be routed through a sediment pond during reclamation. Subsequently, the pond will be removed and the discharge will flow unmanaged. For a discussion of the effect of mine discharges on the surface water, see the Surface Water section of this Technical Analysis.

817.52 Hydrologic Balance - Groundwater Monitoring

At present, the groundwater monitoring plan is not sufficient to satisfy the requirements of 817.52. As mentioned in Section 817.41 of this TA, three springs must be added to the program. The Christiansen spring, issuing from the upper Ferron aquifer down-gradient from the mine, shall be monitored for flow and water quality as part of the quarterly operational monitoring program. The Anderson and Jensen springs, located in the alluvial terrace aquifer overlying the mine, shall be monitored for flow only on the same quarterly basis.

Wells. There are at least 41 wells in the study area, referenced in the permit application. It is unclear, however, if the existing well network present at the site is sufficient in scope to adequately monitor the real and potential disturbances discussed in this TA. Recent personal communication with the applicant (Hydrologist L. Meschede, January 13, 1983) has indicated that several of the wells present at the site may be unreliable. Wells EMRIA #2 and USGS-1-1 may both be providing unreliable data. Other wells at the site which were used to gather baseline information have either been destroyed by mining or possibly could be destroyed in the permit term.

Information in the application submittal also indicates that a number

of the wells are completed within several formations, and hence data generated from these wells represents "composite" water-level or water quality information. For example, a number of the wells referenced in the application submittal are completed in both the Bluegate shale and the upper Ferron aquifer. Others are completed in the Ferron Sandstone (undifferentiated) and therefore may be providing information which is a composite of both upper and lower Ferron conditions. Although these "composite" wells may have provided useful initial information about site hydrogeologic conditions during the initial baseline conceptualization of the hydrogeologic regime, the current level of understanding of site conditions and potential hydrologic consequences indicates that their further usefulness is limited. The applicant has made much progress towards defining the complex hydrogeologic conditions present at the site, and much information has been gleaned in recent years about the effects of existing mining on the groundwater regime. It is important that operational monitoring efforts at the site fully reflect this current level of understanding. A stipulation is therefore attached below, requiring the applicant to re-define his groundwater monitoring network.

817.53 Hydrologic Balance - Transfer of Wells

Not applicable.

817.54 Hydrologic Balance - Water Rights and Replacement

The applicant has provided mitigative measures for existing impacts to two domestic wells - the Bryant well and the Lewis well. A mitigative plan for future impacts has also been provided. The applicant is in compliance.

817.55 Hydrologic Balance - Discharge of Water into an Underground Mine

Not applicable.

817.13 - 817.15 Casing and Sealing of Exposed Underground Openings

The applicant has provided sufficient information regarding the sealing of exploration holes and monitoring wells. Past actions and statement of intent regarding future actions are adequate. The applicant is in compliance.

The portal closure plan proposed by the applicant is not adequate. The portals must be backfilled at least 25 feet from the opening. The

applicant is not in compliance.

D. Revisions to the Applicant's Proposal

None

E. Reevaluation of Compliance

None

F. Proposed Stipulations with Justification

The applicant must furnish to the regulatory authority information regarding the present status of all monitoring wells in the study area. Those wells which are speculated to be improperly constructed and/or providing misleading data should be identified. Those wells which have been destroyed by mining, or are planned to be destroyed, shall also be identified. Those wells which do not monitor a single "target zone" in the hydrostratigraphic regime shall also be identified and evaluated. The applicant must also review the properly functioning wells and demonstrate to the regulatory authority that the real or potential mining impacts on groundwater identified in the TA can be adequately monitored. Based on the evaluation of the present status of the wells, the applicant shall submit to the regulatory authority a revised plan showing the locations and completion specifics of all the proposed acceptable stations. The applicant's proposed list of analytical parameters (Table 7-11 of the permit application) and quarterly sampling frequency was found to be adequate. This information and plan shall be submitted to the regulatory authority within 30 days of permit approval.

The applicant must provide a revise portal sealing plan which shows that the portals will be backfilled at least 25 feet from the opening. This plan shall be submitted within 30 days of permit approval.

G. Summary of Compliance

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

REFERENCES

USGS, (1980), Three Dimensional Digital Computer Model of the Ferron Sandstone Aquifer Near Emery, Utah. WRI 80-62.

Price, Donald (1972), Map Showing Ceneral Chemical Quality of Grand Water in the Salina Quadrangle, Utah: USGS Map I-591-K, 1:250,000.

Owili-Eger, A. (1980). Modeling Immiscible Gas-Water Flow in Deforming Mining Environments, Conoco Inc., Ponca City, Okla., Presented at the SME-AIME Fall Meeting, Oct 22-24, 1980.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

DEFINITION OF CUMULATIVE HYDROLOGIC IMPACT AREA (CIA)

Cumulative hydrologic impacts have been assessed for the Emery Mine by the regulatory authority. This assessment weighs the impact of mining activities proposed in the permit application along with those of existing and proposed mining operations in proximity of the permit area against the existing hydrologic regime, and existing water rights.

The Emery underground mine is located in the Quitchupah Creek watershed, near Emery, Utah. The surface facilities area is located at the confluence of two perennial streams, Quitchupah Creek and its tributary, Christiansen Wash. 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 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. Quitchupah Creek is also directly impacted by discharge from the mine as all inflow pumped from the underground workings is directed to a single treatment pond that discharges into a small tributary of that stream.

The mine removes coal from the I-J zone coal bed, in the Ferron Sandstone member of the Mancos Shale. The Ferron Sandstone comprises a principal areal aquifer in the region, and consists of two distinct water-bearing zones; the upper Ferron aquifer and the lower Ferron aquifer. Both zones exist under confined conditions, the lower Ferron unit showing higher hydrostatic pressure under undisturbed conditions than the upper unit. The I-J zone coal bed defines the bottom of the upper Ferron aquifer.

Overlying the Ferron Sandstone is the Bluegate Shale, which acts as a confining bed over the upper Ferron aquifer. Water is contained in the Bluegate Shale; however, it is not considered an aquifer in the regional context. Water is generally thought to exist and move via localized fracturing in the formation.

Unconsolidated alluvial aquifers also exist at the mine. Alluvial terrace deposits overlying the Bluegate are waterbearing, as are the river bottom deposits which exist beneath and alongside Christiansen Wash and Quitchupah Creek.

The cumulative impact area (CIA) as defined above encompasses two other mining operations in addition to the Emery underground mine: the existing Convulsion Canyon underground mine complex, located approximately northwest of the Emery Mine in the Wasatch Plateau; and the proposed Emery Strip Mine, with a proposed location within and adjacent to the existing Emery underground mine. Both are in the Quitchupah Creek watershed.

The Convulsion Canyon Mine will not adversely impact surface and ground-water resources, and is therefore not viewed as a factor in the cumulative impact assessment. This is made on the basis of geologic and hydrostratigraphic findings for that mine. At the Convulsion Canyon complex, mining will take place within the Blackhawk Formation. The areal aquifer to be affected at the Convulsion Canyon Mine consists of sandstone units within the Blackhawk; at the Emery Mine, the Blackhawk Formation is not present. The Bluegate Shale comprises the surface geology formation at the Emery mine, and if present, the Blackhawk would be situated several thousand feet stratigraphically above the Bluegate Shale. The Convulsion Canyon Mine is located in the highlands of the Wasatch Plateau, whereas the Emery complex is located on the outwash plain east of the Wasatch Plateau; there is several thousand feet of elevation difference between the two mines.

In regards to surface water concerns, the quality of water being

discharged from the mine is comparable to the natural outflow from the areal aquifer, therefore, there will be no measurable increase in downstream total dissolved solids levels. Sediment controls utilized by the mine have been found to be adequate to prevent any influx of total suspended solids to Quitchupah Creek.

Of concern therefore, for potential cumulative ground-water and surface-water impacts in the Emery area, are the existing Emery Mine underground complex and the adjacent proposed Emery strip mine.

Current Federal and State regulations call for an evaluation of both permit term and life-of-mine impacts of all anticipated mining in the cumulative impact area. The disturbance associated with the Emery underground mine includes a 33-acre surface facilities area comprising portals, coal stockpiles, service buildings, storage yard, roads and surface water control structures. A preparation plant facility, comprising 206 acres, and a mine discharge treatment pond are located near the mine yard. Proposed underground workings include 570 acres to be mined in the 5-year permit term, and mining will occur in the I-J zone at a depth of 100 to 800 feet. To date, approximately 800 acres have already been mined. The Resource Recovery and Protection Plan for the Emery Underground Mine is defined by the permit boundary shown on Map 3-7 in the applicant's permit application. This area, which can be considered the life-of-mine for the I-J zone, encompasses approximately 5200 acres. This area includes the land area occupied by the 5-year permit term boundary and is approximately three times the area which has been mined to date and which is planned to be mined over the next 5 years. At proposed production levels this area could allow for an additional 10-20 years of mining in the I-J zone. The exact duration of mining cannot be determined due tot he uncertainties in production levels at the mine.

The proposed Emery surface mine will have an anticipated life of 15 years. Approximately 1160 acres of land area will be affected by the mine complex, 320 of which will be actually mined. The remaining 840 acres will not be mined, but will be affected by ancillary mining support functions.

The surface mine will be located immediately adjacent to the underground mine, on the east side of Christiansen Wash about 0.75 miles above Quitchupah Creek. Mining will proceed northwestward from that location. The mine will remove coal from the I-J zone, with most of the coal coming from the I seam. Similar geologic conditions exist at the surface mine that affect the underground mine; the same water-bearing zones (alluvium, upper and lower Ferron sandstones, and waterbearing segments of the Bluegate Shale) are present as are the same hydrogeologic relationships between the zones. In the area of the surface mine, however, the thickness of the overburden cover, and the saturated thickness of the upper Ferron Sandstone, is much less. The Bluegate Shale also pinches out in this area and the upper Ferron Sandstone comprises the principal exposed geologic unit. In the area where the Bluegate Shale is exposed, it is highly weathered, allowing for communication between the Christiansen Wash alluvium and the upper Ferron sandstone aquifer.

The Bluegate Shale ranges in thickness from 0 to 70 feet in the surface mine permit area. The Ferron Sandstone aquifer has an average saturated thickness of 60 feet, and the alluvium along Christiansen Wash varies from a few feet to 25 feet in thickness. Overburden depths range from 20 to 140 feet over the coal.

DISCUSSION OF PROJECTED IMPACTS - GROUND WATER

Underground Mine

The Emery underground mine was found in the Technical Analysis to have the following projected real or potential ground-water impacts during the next 5 year permit term.

- predicted upper Ferron aquifer drawdown on the order to 350 feet over the mine

- predicted upper Ferron aquifer drawdown of 50 feet near the

permit boundary

- o potential for downward migration of saline Bluegate Shale waters into the upper Ferron aquifer, due to a reversal of hydraulic pressure gradients and fracturing of up to 300 feet of mine cover

- o diminution of up to 0.2 cfs subsurface outflow collectively to Quitchupah Creek and Christiansen Wash via mine interception

- o potential for diminution of spring flow to three appropriated springs: two springs issuing from the terrace gravels overlying the Bluegate Shale, and one spring issuing from the upper Ferron Sandstone at the head of Miller Canyon. These springs are the Anderson, Jensen, and Christiansen Springs

- o interception of up to a maximum of 2.6 cfs (1170 gpm) of upper Ferron aquifer water by the mine.

Life-of-mine impacts, beyond the 5-year projected disturbances, are uncertain at this time. Computer simulations of the anticipated 5-year drawdown and inflow levels indicate that a maximum value for inflow may be reached during the permit term, as inflow was found in the projection to drop after 3 years. However, it is uncertain whether this trend will continue beyond the modeled five year permit term.

As the mine expands into the larger life-of-mine area, it can be expected that the drawdown cone predicted for the permit term will advance outward. However, it is probably <u>not</u> a reasonable assumption to conclude that inflows and drawdown will triple as a result of tripling the mine area. The basis for this statement is that during the 5-year permit term, much of the water make in the mine arises from the initial dewatering of the aquifer above the mine. Water is therefore being removed from aquifer storage. Once this storage is depleted and the cone of depression takes its fundamental shape, the amount of inflow will be reduced. Further

increases in the area mined will project the drawdown cone outward; however, the ultimate depth of drawdown, as limited by the thickness of the aquifer, will probably be reached during the permit term.

The uncertain nature of mining conditions preclude an accurate estimate of life-of-mine drawdown and inflow. The model utilized by the applicant takes into account subsidence, fracturing, and cave-height considerations. At this time, these factors are unknown in the life-of-mine areas. Therefore, the most reasonable estimate of mine impacts in the area may be to consider the "worst-case" projected for the permit term: e.g. drawdown on the order of 350 feet adjacent to mined areas, and inflows as great as 1170 gpm.

Surface Mine

The adjacent surface mine is proposed to have the following ground water related impacts.

- o interception of up to 0.3 cfs of upper Ferron aquifer water by the mine, after 15 years of operation

- o predicted upper Ferron aquifer drawdown of up to 60 feet at the mine, after 15 years of operation

- o predicted upper Ferron aquifer drawdown of up to 5 feet, radiating up to 2.5 miles from the mine

- o potential for leaching of dissolved solids from displaced overburden, as water levels in the area re-establish themselves. U.S.G.S. leaching experiments with site overburden samples and de-ionized water indicated a range in TDS of 539 mg/l to 2,536 mg/l, with a mean of 1,160 mg/l. Iron concentrations were elevated in two samples, and pyrite has also been observed in the overburden. It is predicted, on the basis of the U.S.G.S. studies, that contact waters of the upper Ferron

could be elevated from a baseline of 1300 mg/l to over 4000 mg/l

- o potential for diminution of flow to the Christiansen Spring at the head of Miller Canyon. This appropriated spring issues from the upper Ferron aquifer

FINDINGS - CUMULATIVE HYDROLOGIC IMPACTS: GROUND WATER

It can be seen that the underground mine produces the greater drawdown impacts to water levels in the upper Ferron aquifer. The drawdowns produced by the underground mine will also influence the levels of drawdown induced by the surface mine. As the underground mine expands in the future, increased drawdown will serve to reduce pit inflow and the prediction by the U.S.G.S. can be viewed as a maximum value for pit inflow. In fact, current drawdown projections made for the 5-year permit term of the underground mine indicate that the surface mine may, in fact, become a "dry" mine due to the projected levels of drawdown which may be induced by the underground activities.

The cumulative drawdown effects, therefore, of both mines operating together should not be any more significant than the drawdown effects induced by the underground mine itself.

Based on current drawdown projections reviewed in the underground mine Technical Analysis, Christiansen Spring in Miller Canyon can be impacted by the mine. The spring has been included in the applicant's monitoring plan to foresee such impacts. In the absence of drawdown from the underground mine, the proposed surface mine would also have the potential to dewater the spring. Therefore, it is uncertain which mine would be ultimately responsible for impacting the spring, should diminution of flow be realized. It is important to note that a cumulative drawdown from both mines is not necessary to affect the spring; either mine has the predicted capacity to potentially cause the impact while operating independently.

The amount of inflow which the surface mine would ultimately encounter depends entirely on when it comes on-line. Currently, the projected start-up date for the mine is behind schedule. The longer the time period before the mine comes on line, the greater the possibility that the drawdown effects will be muted by the underground mine.

In the post-mine sense, water quality impacts to the upper Ferron aquifer could be increased by having both the surface mine and the underground mine operating concurrently. The impacts would therefore be greater than if only the underground mine were present, as the surface mine has the capacity to elevate TDS levels in the upper Ferron aquifer via the leaching of dissolved solids in the spoil ridges. Spoil water may increase in TDS levels from 1300 mg/l to over 4000 mg/l. However, this concern would be tempered by the relatively small area of impact. The surface mine is located directly in the area of outcrop of the upper Ferron Sandstone, which generally defines the downgradient boundary of the aquifer. Given this consideration, there is very little aquifer area remaining between the mine and the aquifer's lower terminus. This down gradient area is less than one half mile long. Only one water user exists within this small area downgradient of the mine (Christiansen Spring). This potentially impacted user will be included in the ground-water monitoring programs for both mines.

In summary, the addition of the surface mine to the already existing underground mine complex should not add appreciable impacts to the hydrogeologic regime beyond those already projected for the underground mining disturbances. This does not imply that impacts will not be realized. Rather, the magnitude, duration and timing of site impacts will remain on the order of those projected for the underground mine. A complete discussion of those impacts can be found in the Technical Assessment for the underground mine.

DISCUSSION OF PROJECTED IMPACTS - SURFACE WATER

Underground Mine

The Emery mine is located in an area that contributes 20 percent of the total salt load carried by the Dirty Devil River into the Colorado River. This accounts for an increase of 14 milligrams per liter (mg/l) of total dissolved solids (TDS) in the Colorado, with its consequent monetary and environmental costs. Mine discharge contributes to this total, but the majority of TDS entering Muddy Creek in the Emery area derives from surface runoff and ground water flowing over and through saline shales. Irrigation drainage, including canal seepage, contributes to the saline ground water (Bureau of Reclamation, July, 1983).

The significance of contaminants discharging from the mine to the streams must be viewed in light of the existing environment. Water quality samples taken in Quitchupah Creek and Christiansen Wash are characterized by high total suspended solids (TSS), total dissolved solids, sulfate, and sodium. The mine is not contributing an undue amount of TSS to the streams because the mine discharge pond and the sediment control structures in the surface facilities area are performing adequately. Mine discharge is, however, increasing the salt load of the streams.

Salt loading in Christiansen Wash is higher upstream of the mine where irrigation return flows contribute salts, while TDS concentrations decrease downstream where the stream receives flow from the Ferron Sandstone. TDS values in Christiansen Wash are higher than those in Quitchupah Creek, with means of 2233 to 3871 mg/l as opposed to means of 1429 to 1947 mg/l. Calcium, chloride, sodium and sulfate are picked up from the rock dust in the mine, and are responsible for the high TDS levels in mine discharge. The quantity of mine discharge has fluctuated over the years due to roof falls, and is currently at a level of 1.2 cubic feet per second (cfs). The present concentration of TDS is approximately 4000 mg/l.

Data collected between July, 1980 to April, 1983 indicates that the concentration of TDS decreases with an increase in discharge. More specifically, TDS concentrations are reduced by one-quarter when discharge values double. Ground-water inflow projections formulated by the applicant

for the years 1984-1988 have been used to generate the following TDS values. It should be noted, however, that the Ferron Sandstone, even under natural conditions, was contributing TDS to the streams. Since those natural contributations are not known, they have not been factored into this analysis. This analysis, therefore, is a worst-case projection since it assumes that the mine is responsible for the entire TDS concentration in the discharge.

Table 1: Total Dissolved Solids Projections)

Year	Q	TDS (mg/l)	TDS (tons/year)
1984	1.7	2500	4200
1985	2.1	2350	4850
1986	2.6	2200	5600
1987	2.3	2300	5200
1988	2.0	2400	4700

The estimated salt load entering the Emery area is 15,800 tons per year and measurements taken at Muddy Creek below I-70 indicate that 26,700 tons per year are leaving that area. (Bureau of Reclamation, July, 1983). Mine discharge values during the period April, 1982 to April, 1983 showed that the Emery mine was contributing 3632 tons to the 26,700 tons in Muddy Creek below the mine. This accounts for 13 percent of the salt pick-up above I-70 and 27 percent of the salt specifically contributed within the Emery area. Using the mine inflow projections, the following table illustrates the percentages of salt contribution to the watershed from the mine:

Table 2: Percentage of TDS From the Emery Mine

Year	Tons/Year	%Muddy Creek at I-70	%Emery Area
1984	4200	15%	30%
1985	4850	17%	34%
1986	5600	19%	37%
1987	5200	17.5%	35%
1988	4700	16%	33%

Given that the salts measured at Muddy Creek at I-70 are 20 percent of the Dirty Devil River salt load, the maximum 1986 projection for TDS from the mine is 4 percent of the Dirty Devil salt load.

On-going subsidence impacts to the surface-water regime from underground mining will be minimal. A buffer zone of 500 feet will be left between underground workings and Quitchupah Creek and Christiansen Wash in order to prevent any damage to those streams. It is anticipated, however, that surface subsidence will create localized depressions that will alter the drainage patterns of overland flow. Similar depressions have already occurred, creating alkali swamps in flood-irrigated fields. Mitigative measures have been proposed by the applicant to restore positive drainage in these areas.

Life-of-mine impacts deriving from underground mining will continue to load the streams with TDS, since it is thought that discharge values and TDS concentrations will remain approximately the same when the I-J zone is extracted in that portion of the permit area that will be mined after 1988. Discharge values may fluctuate, as they have in the past, with varying

permeability and roof conditions. These values may also change with utilization of a mining method that differs from the current room and pillar approach. At the close of operations, the portals will be sealed and equipped with a bleeder drain. While it has not been conclusively demonstrated that the Ferron aquifer will be re-established to baseline levels after pumping of the mine has ceased, this drain will serve to mitigate hydraulic pressures on the seal if they occur, and direct the mine discharge to the sediment pond, where it will be treated and sampled. Once the pond is removed, any drainage will be essentially uncontrolled. It can be anticipated that the discharge, which will be approximately 0.4 cfs through the pipe, will carry TDS concentrations similar to those occurring during operations.

Surface Mine

The proposed Emery surface mine is expected to increase the levels of discharge to Christiansen Wash, and this additional discharge will have TDS concentrations of 2000 to 5000 mg/l. Using a worst case scenario of 5000 mg/l, an additional 1500 tons per year of TDS will be added to the CIA. The percentages of salts that will be contributed by both mines is illustrated in the following table.

Table 3: TDS Percentages - Emery Deep and Emery Surface

Year	Mine TDS Tons/Year	%Muddy Creek Below I-70	%Emery Area
1984	5700	19%	37%
1985	6350	21%	40%
1986	7100	22%	42%
1987	6700	21.5%	41%
1988	6200	20%	39%

When the surface mine becomes operable, the combined TDS contribution from both mines will equal approximately 4.5 percent of the Dirty Devil River salt load. It is conceivable that adjacent underground mining will drawdown ground-water levels to an such an extent that there will be no inflow to the surface mine pit. If such is the case, TDS concentrations may be decreased because the water will not come in contact with the overburden spoil piles, however, that 0.3 cfs will be discharged through the underground mine and the TDS concentration will remain at levels comparable to those currently being discharged.

FINDINGS - CUMULATIVE HYDROLOGIC IMPACTS: SURFACE WATER

It is apparent that the Emery underground mine will be responsible for an increase in salt-loading to the streams. The worst-case scenario involves the surface mine and underground mine operating in 1986 when the two mines will be responsible for 46 percent of the salt picked up in the Emery area. This also will also account for 4.5 percent of the Dirty Devil River salt load. Irrigation and the saline shales prevalent in this area continue to contribute the greatest proportion of TDS to both Muddy Creek and the Dirty Devil River. Despite the water quality degradation ensuing from these operations, there are no surface rights that will be impacted in the vicinity of the mine. No water rights exist on Quitchupah Creek and Christiansen Wash near the mine, nor are there any on Quitchupah Creek downstream of the mine. Additionally, there are no water rights on Ivie Creek below its confluence with Quitchupah Creek, nor do any exist on Muddy Creek for a distance of at least 15 miles downstream of its confluence with Ivie Creek. The only identified surface water use that could be impacted in the cumulative hydrologic impact area pertains to cattle that drink from Muddy Creek when adjacent BLM lands are used for grazing.

SUMMARIZATION

The Emery underground mine, and to a lesser extent, the surface mine, will contribute additional salt loading to the streams within the

cumulative impact area. This is an inevitable consequence of the mining operations, and the removal of these salts from mine discharge does not seem to be an economically-viable alternative for the mine. There are no surface water rights downstream of the mine, therefore, this additional salt load will not adversely impact a water user in proximity of the mine.

The underground mining operation has the potential to decrease groundwater levels, thereby disrupting springs in the vicinity of the mine. The surface mine may contribute to this disruption if it begins operation before the underground mine has already lowered water levels in that area. Otherwise, it is possible that the surface mine will be constructed in an already-dry formation if the aquifer has been drawn down by the adjacent underground workings. The springs that may be impacted by the operations will be monitored for diminution, and the company has proposed to replace any disrupted water rights.

MISCELLANEOUS COMPLIANCE

817.11 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.

817.89 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.

817.131 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.

817.132 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.

817.180 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.

817.181 Support Facilities and Utility Installation

Support facilities at the Emery Deep Mine consist of water tanks, an office, bath house, fan, substation, sediment ponds, conveyor, roads and other facilites 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.

Additional facilities have been planned by the applicant and approved by the Regulatory Authority. These include a preparation plant and associated refuse disposal sites, a coal stockpile outside of the facilities area, the bridge in the facilities area which crosses Christiansen Wash, the pump road, water tank road, and roads associated with access to the preparation facility, and the diversion adjacent to the coal refuse disposal sites. The approval dates for these facilities are listed below.

Preparation Plant and Loadout Facility	Sept. 21, 1982
Borehole Road - Pump Access Road	Oct. 1, 1981
Use of Borrow Area	Feb. 3, 1982
Bathhouse and Power Line	Feb. 12, 1982
New Coal Stockpile	Aug. 3, 1982
Diversion Revision	unknown

The Technical Analysis for the Preparation Plant and Loadout Facilities is included in Appendix B of this Technical Analysis.

B. Revisions to the Applicant's Proposal

None

C. Reevaluation of Compliance

None

D. Proposed Special Stipulations with Justification

None

E. Summary of Compliance

The applicant is in compliance with all sections of these regulations.

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 then 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

UMC 817.99 Slides and Other Damages

There are no steep slopes in the facilities area other than the cliff face above the portals which is a sandstone outcrop of the Ferron Sandstone. It is not expected that there would be any problem with slides in the facilities area. The applicant has commited to reporting slides in response to stipulations in the Technical Analysis for the Preparation Plant and Loadout Facility.

UMC 817.100 Contemporaneous Reclamation

The applicant has committed to reclamation of the mine site immediately upon completion of mining. In addition, reclamation activities at the site are an ongoing operation to stabilize the area. The applicant is in compliance with this section.

UMC 817.101 Backfilling and Grading: General Requirements

A plan has been submitted which shows that the mine area will be graded to a suitable postimining 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. The applicant is in compliance with the regulations concerning these requirements.

UMC 817.103 Backfilling and Grading: Covering Coal and Acid- and Toxic-Forming Materials

The applicant has provided plans for the removal and disposal underground of all coal material, and the removal of saline material from the evaporation lagoon to the coal refuse disposal site. The applicant is in compliance with this section.

UMC 817.106 Regrading or Stabilizing Rills and Gullies

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 stipulation, the applicant is in compliance with this section of the regulations.

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 fishook cactus (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 but none are located within areas of proposed disturbance. The colonies vary in size from 2 to 49 ha. A total of 982 prairie dog observations were recorded during field surveys. No black-footed ferrets or sign of their presence was recorded within the permit area.

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 0.003 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 abut 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. It should be noted that the area of disturbance associated with the Preparation Plant are discussed in Appendix A and are not included here. 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.

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.

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. No new powerline construction is proposed. It should be noted that powerline construction associated with the Preparation Plant is discussed in Appendix A and is not included here. The U.S. Fish and Wildlife Service (letter dated April 8, 1982) has not recommended any modification of the Emery Deep Mine site powerlines.

3. 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. The 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. Evaluation of Compliance

817.97 Protection of Fish, Wildlife, and Related Environment Values

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). The applicant states that they will consult with the Regulatory Authority to develop a terrestrial wildlife monitoring program. When the applicant adheres to the stipulation requiring them to provide a time frame as to when the program will be developed and implemented, they will be in compliance.

An adequate survey of threatened and endangered plants and wildlife

was completed. No disturbance of any threatened or endangered plant or animal species is anticipated (Biological Assessment for the Emery Deep Permit Application, Office of Surface Mining, attached).

No new powerlines are proposed, and no modification of existing powerlines is recommended.

Riparian habitat has been identified. The small amount that will be disturbed will be restored. When the applicant adheres to the stipulation requiring the establishment of an adequate buffer (in consultation with the Regulatory Authority) around riparian areas and protecting them from fugitive dust from the mine and haul roads, they will be in compliance.

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

Stipulation 1

Within 60 days of application approval, the applicant must submit to the Regulatory Authority a plan describing the dates (time frames) as to when the wildlife monitoring plan will be developed (in consultation with the Regulatory Authority) and implemented.

Stipulation 2

Within 60 days of application approval, the applicant will submit to the Regulatory Authority a plan describing the dates (time frames) as to when a plan for maintenance of riparian areas through the establishment of buffer zones and protection from fugitive dust from

mine and haul roads will be developed (in consultation with the Regulatory Authority) and implemented.

G. Summary of Compliance

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

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 abut 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 transporation.

The vegetation presently affected by the Emery Deep Mine lies in an area that has been termed the Atriplex province of the Nothern Desert Shrub Formation or, more descrptive, 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 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). Prickleypear cactus (Opuntia polycantha), 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 cernum). 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 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.

β. 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
s^2 = 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: however, adequacy was close and sufficient to characterize the communities. Resampling will occur at the time of bond release.

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 4, and are found in the DOC Response, page 6.

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 4 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

Table 4. Permanent seed mixes for revegetation of disturbed areas at the Emery Deep Mine (From DOC Responses, Page 6)

Seed Plan A

Species	Lbs. of PLS*/Acre	PLS*/Sq. Ft.
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
	20.5	91

*Pure Live Seeds

Seed Pland B

Species	Lbs. of PLS/Acre	PLS/Sq. Ft.
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
	18.25	119

Seed Plan C

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

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 Regulatory Authority. 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 Regulatory Authority. Yellow sweetclover (Melilotus officinalis) is easily established though not persistent, provides erosion control, and is important as a nitrogen fixer. 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 proproses to measure revegetation success by comparison to reference areas. The applicant has committed to comparison of cover and productivity at the 90% confidence level. Providing that 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 Appilcant'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 Regulatory Authority a plan for seeding and/or transplanting additional shrub species should monitoring data show insufficient woody plant establishment from initial seeding.

The proposed seed mixes may not result in 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 to the Regulatory Authority a schedule for reclamation which includes seeding immediately after final site preparation for planting and during the first favorable planting period (see stipulation under 817.24 also).

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

817.116

Stipulation:

Within 60 days of application approval, the applicant will submit to the Regulatory Authority a plan for measuring revegetation success which includes comparison of woody plant density and diversity. The plan will indicate how diversity will be measured, and will state that revegetation success is considered to be at least 90% of the cover, productivity, woody plant density, and diversity of the reference area.

Although the applicant's plan is to compare cover and productivity at the 90% confidence level, in order to comply with the regulations, comparisons must include woody plant density and diversity, and all comparisons must be at least 90% of the reference area in order to be

considered successful.

G. Summary of Compliance

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

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 from 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:1 and 12h:1 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

UMC 817.150-.176

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 in the amount of approximately 4 feet per second to Pond No. 2, it is required 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. (See proposed stipulations.) With implementation of this requirement, the applicant will be in compliance with this section of the regulations.

D. Revisions to the Applicant's Proposal.op

None

E. Reanalysis of Compliance

None

F. Proposed Stipulations

The applicant shall maintain a channel with a minimum depth of 6 inches along the north side of the roads in the surface facilities area in order that runoff can be channeled to Pond No. 2.

G. Summary of Compliance

With implementation of the proposed stipulation, the applicant will be in compliance with the sections of the regulations dealing with roads.

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 oultines 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.

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; thus, premining land use will not be changed.

C. Evaluation of Compliance of Proposal

1. 817.133 Postmining Land Use

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 it's 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 tipple, 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).

A letter of approval from the Bureau of Air Quality has been obtained for the preparation plant facility and is attached to the Technical Analysis for that facility. In addition, in Appendix A, a letter of approval from the Bureau for the mining operation is attached.

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 has obtained a letter from the Bureau of Air Quality. Therefore, the applicant is in compliance with 817.95.

D. Revisions to Applicant's Proposal

None

E. Reevaluation of Compliance

The applicant is in compliance.

F. Proposed Stipulations with Justification

None

G. Summary of Compliance

The applicant is in compliance.

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-J 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-J 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. 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. The applicant has not identified when such plans would be submitted to the regulatory authority.

There exists extensive alluvial valley floor areas above the mine. These features are discussed in the Alluvial Valley Floor (AVF) section of this Technical Analysis (to be added). The extent of the AVF's at this point in time has been generally defined by the areal extent of the alluvial material in the drainage of Quitchupah Creek. The extent of active farming in the AVF's is not known. All of the agriculture associated with the AVF's is conducted using flood irrigation practices. Water is diverted either from Muddy Creek or Quitchupah Creek.

In conjuction with the AVF's, and in other areas over the mine, there are prime farmlands which will be mined under. Most of these areas are being actively farmed.

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 <u>average</u> 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 Quitchupah 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.

The buffer zone for the drainages does not address the protection of AVF's. The alluvial deposits in Quitchupah Creek extent beyond the buffer zone and would be impacted by mining. The regulatory requirements protecting AVF's state that farming cannot be interupted on an AVF. If subsidence occurred, and ponding of water resulted, then farming would be disrupted. Therefore, the applicant must identify the extent of active farming on the AVF's to be protected and provide for leaving of pillars in those areas.

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). No specific date for submittal of these plans to the regulatory authority has been provided. The operator has committed to mitigation of any subsidence impacts as outlined on page 16 of Chapter 12, November 8, 1983 response.

The operator does carry liability insurance which covers mining impacts associated with subsidence. The total amount of coverage that is carried is $1,000,000 for each occurance. This amount of coverage would allow for purchasing or repair of structures, or mitigation of impacts to farmlands. The structures above the mine would be able to be completely rebuilt with this amount of coverage. With respect to farming, if depressions in the surface occur creating an area of ponding, the area could be graded out or topsoil brought in if there was not enough material available in the immediate vicinity. Since the AVF's are flood irrigated, regrading of these farm areas could also occur as a mitigation measure if mining is allowed under the AVF's.

Protection of structures and renewable resources will also be provided for in the bond posted by the applicant. During the 10 year responsibility period, the insurance coverage will be extended with money from the bond to ensure that subsidence impacts will be mitigated.

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. The applicant has not committed to a time frame for submittal of the subsidence surveying information to the regulatory authority nor identified the content of that submittal.

C. Evaluation of Compliance

UMC 817.121 Subsidence Control: General Requirements

The applicant has provide information on the possible extent of subsidence impacts at the Emery Deep Mine. The analysis provided by the applicant does not fully characterize the amount or type of subsidence that might be expected by the proposed operation as evidenced by recently collected subsidence data. The applicant has proposed to continue monitoring subsidence at the mine. This should provide additional

information to be able later more clearly define the type of impacts from subsidence expected at the mine. The applicant has committed to development of mitigation plans for control of subsidence impacts as mining progresses. The applicant has not stated when subsidence monitoring data nor when plans for subsidence mitigation will be submitted to the regulatory authority. Therefore, the applicant is not in compliance with this section.

UMC 817.122 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 occurrance, 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.

UMC 817.124 Subsidence Control: Surface Owner Protection

The operator has committed to mitigation of subsidence impacts as required by this Part. However, the applicant has not provided information on when plans for mitigation of impacts resulting from subsidence would be submitted to the regulatory authority. The applicant is not in compliance with this section.

UMC 817.126 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. Information has not been submitted on protection of AVF's. The applicant must provide a determination of the extent of the AVF's above the mine currently being farmed and provide for a buffer zone for protection of these areas. Areas covered by the Grandfather Clause are exempt from this requirement,

although the subsidence impacts must still be mitigated.

Impacts to the Upper Ferron aquifer will be substantial (see the Ground Water Section of this analysis). The regulatory authority must decide if measures should be taken to protect this aquifer as required by 817.126(b).

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.

A determination of compliance with this section cannot be made until the regulatory authority determines if protection of the Ferron aquifer is required.

D. Revisions to the Applicant's Proposal

None

E. Reevaluation of Compliance

None

F. Necessary Stipulations - With Justification

The applicant must submit a plan for notification of affected surface land owners over the mine. This plan shall (1) identify all landowners which shall be contacted, (2) contain a commitment to notification by mail six months prior to mining beneath or adjacent to his or her property or residence, and (3) consist of a notification which will identify specific areas in which mining will take place, dates of underground operations, and measures to be taken to prevent or control adverse surface effects as the result of subsidence. This is required in response to the recent significant subsidence event which occurred above the mine and as a result of the complexity of the subsidence issue at the mine.

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

The applicant must commit to provide the regulatory agency a specified number of copies of the resluts of any cultural resources survey within a specified time frame (preferably in terms of weeks, not months) upon completion of such a survey and incorporating such a survey in the applicant's mine permit.

The applicant must provide a brief discussion on fracture zones, joints, etc., especially those over the west mains and how he/she shall mitigate subsidence effects as the result of mining under such geologic features. This discussion shall include a narrative delineating the areal extent, trend, vertical extent and other characteristics of such features.

The applicant must commit to providing the regulatory authority with a specified number of copies of the subsidence survey report as the result of any subsidence survey within a specified number of weeks of completing such surveys. These shall include at a minimum:

- o Mine maps showing where pillars have been pulled and the month and year that such mining occured.

- o Maps showing the location of survey monitoring stations, subsidence contours, tension cracks and/or compression features.

- o The differential level and horizontal survey summary.

- o Brief narrative explaining any "siginificant movement" and any action the applicant has taken to mitigate such movement and any tension or compression features visible on the surface.

The applicant must commit to providing the regulatory authority with plans developed by the applicant to protect renewable resources and structures where due to economic constraints, seam conditions or mining techniques employed, plans will be developed three months prior to undermining surface areas to be protected within a specified time frame (not to exceed one month) of their development and incorporate such plans in the mine permit.

The applicant must provide plans showing where farming is occuring on alluvial valley floors and what measures will be taken to ensure that mining will not interupt farming in those areas.

G. Summary of Compliance

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

COAL RECOVERY

The applicant has submitted coal seam, overburden, and interburden isopachs for the mine area. Mine maps have been supplied showing the layout of the mine and mining progression. Recovery or non-recovery of each of the seams was discussed based upon seam quality, thickness and proximity to other seams. The applicant has not yet obtained a letter of concurrence from the BLM that coal recovery is being optimized. Therefore, a determination of compliance with 817.59 cannot be made.

USE OF EXPLOSIVES

Since all of the facilities for the Emery Deep Mine are currently in-place, there will be no surface construction requiring the use of explosives. Explosives are used underground to a minor extent, and are used and handled as required by MSHA. Therefore, compliance with regulations 817.61 to 817.68 is not applicable.

UNDERGROUND DEVELOPMENT WASTE

There are no plans for the disposal of underground development wastes on the surface from the Emery Deep Mine. The operation is conducted within one coal zone, the I-J zone, so that in-mine ramps are not required to obtain access to other seams. The portals are already constructed and there are no plans during this permit term for any additional portal construction. The applicant is leaving both top and bottom coal for stability reasons, therefore, no rock waste is being developed from taking roof or floor rock. Therefore, regulations 817.71 to 817.74 are not applicable.

COAL PROCESSING WASTE

Disposal of coal processing waste was reviewed and approved for the Emery Deep Mine Preparation Plant and Loadout Facilities on September 21,1982 (see Appendix B for the Technical Analysis on this facility). Therefore, evaluation of regulations 817.81 to 817.88 and 817.91 to 817.93 are not appropriate to this Technical Analysis.

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 regulatory authority an Estimated Bond Amount as shown on pages 20 to 27 of the ACR Response and shown as Table 6 in 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 occurrance, but no information was supplied on the limits for each aggregate. The rider showed that the regulatory authority 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 regulatory authority 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 the regulatory authority for a recent preparation plant bond estimate. The regulatory authority has found the bond estimate to be adequate with the following exceptions:

- 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.

- 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 acres x 43,560 sq. ft./acre x 1 ft. x 1 cu. yd./27 cu. ft. = 38,720 cu. yds.

  38,720 cu. yds. x $1.70/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.

- 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 yrs. x [(8 hrs/day x 2 days/yr x $35/hr. for inspection) + $600 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.

- 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.

- 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 acres x $100/acre) + $4000] = $7,270

  to be included in the revegetation cost estimate.

- 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.

- 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."

- A cost for continuance of the applicant's liability insurance 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, regulatory authority will become responsible for reclamation and maintenance of the site and this would include mitigation of subsidence impacts.

- 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 Table 5. 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

Table 5
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

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 a cost for continuance of the liability insurance coverage for mitigation of subsidence impacts during the 10 year responsibility period. An appropriate cost must be added to the bond amount to cover this cost. 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 this Technical Analysis.

F. Summary of Compliance

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

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	$ 13,768
	Subtotal	$ 86,288
Part II - Regrading		
A.	Pond, Road and Berm Removal	$ 65,212
B.	Backfilling and Grading	$ 72,126
	Subtotal	$137,338
Part III - Revegetation		$ 10,501
Part IV - Well Replacement		$140,000
Part V - Monitoring and Maintenance		
A.	Sediment Ponds	$ 10,000

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 = $72,520

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

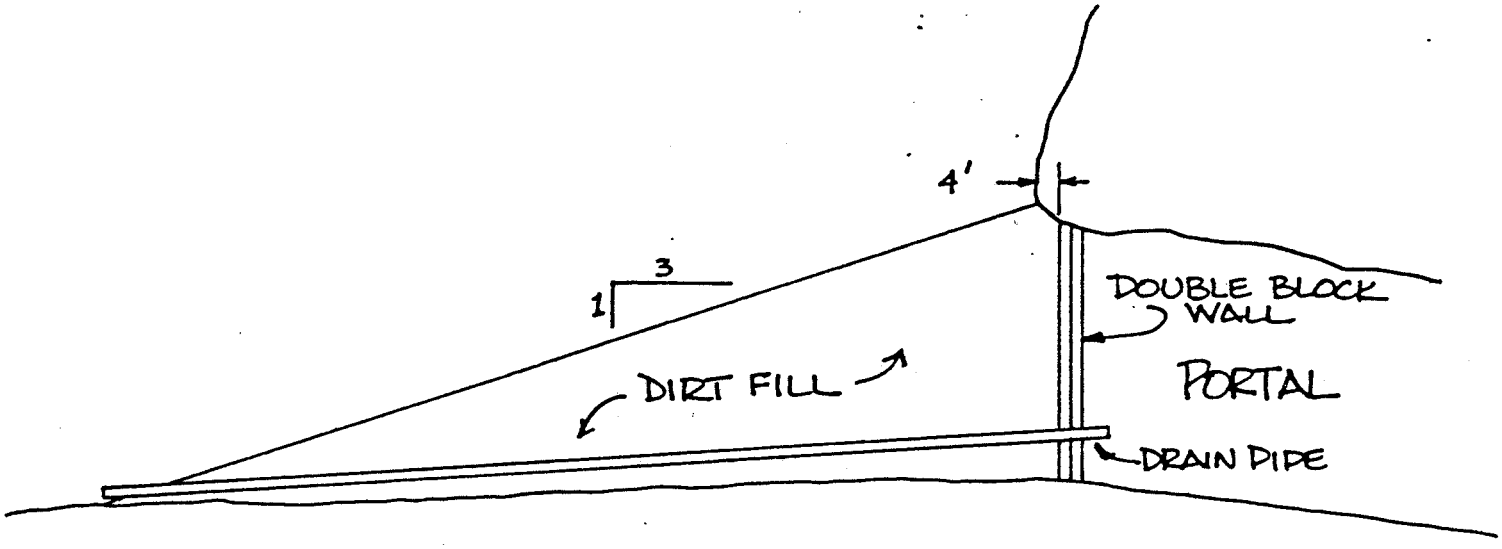
Comment: UMC 784.13(b)(2)

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)

Seedbed Preparation 32.7 acres x $28.56/acre	=	$ 934
Maintenance Costs 32.7 acres x $28.56/acre	=	$ 934
Seeding Cost 32.7 acres x $170.59/acre	=	$ 5,578
Mulching Cost 32.7 acres x $122.00/acre	=	$ 3,989
Erosion Control 32.7 acres x $37.63/acre	=	$ 1,231
Reseeding 8.2 acres x $170.59/acre	=	$ 1,399
Monitoring 32.7 acres x $108.23/acre	=	$ 3,539
Total Revegetation Cost	=	$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 reseeding. 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. Pump Road

1100 LF x 22.5 sq ft/LF x 1 cu yd/27 cu ft = 917 cu yd

9. Tank Road

2100 LF x 7.5 sq ft/LF x 1 cu yd/27 cu ft = 583 cu yd

10. Mine Yard Roads (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.

APPENDIX A

LETTERS OF CONCURRENCE - EMERY DEEP MINE

I. Letter from Bureau of Air Quality (to be added)

II. Letter from U.S. Fish and Wildlife Service

III. Letter from Division of Wildlife Resources

IV. Memo from the Office of Surface Mining (to be added)

V. Letter from Division of State History

VI. Letter from Division of Water Rights

VII. Letter from U.S. Bureau of Land Management (to be added)

state of utah

DIVISION OF WILDLIFE RESOURCES

EQUAL OPPORTUNITY EMPLOYER

DOUGLAS F. DAY
Director

1596 West North Temple/Salt Lake City, Utah 84116/801-533-9333

File
ACT/015/015
~~Copy to Lynn~~

JIM

MAY 27 1982

May 24, 1982

Mr. Cleon B. Feight, Director
Division of Oil, Gas and Mining
State Office Building
Salt Lake City, Utah 84114

Attention: James Smith

Dear Jack:

We have reviewed the Mining and Reclamation Plan (MRP) submitted by Consolidation Coal Company for the Emery Deep Mine. The MRP as it relates to wildlife is well done. Our only criticism is of section 4. The MRP's discussion of land use attempts to separate various land uses into broad general categories. Such an approach is acceptable; however, each of the broad categories experience various levels of use by wildlife. Thus, all uses of the land provide various qualities or aspects of wildlife habitat. Section 4 and table 4-1 (page 4-12) need to be corrected to properly illustrate this situation. The entire 5,180 acre permit area is a mosaic of various wildlife habitats.

Thank you for an opportunity to review this MRP.

Sincerely,

Douglas F. Day
Director

RECEIVED
MAY 27 1982
DIVISION OF
OIL, GAS & MINING

To Jim Copy to Lynn & Sue
File
ACT/007/012
ACT/015/015
ACT/007/007

United States Department of the Interior

FISH AND WILDLIFE SERVICE
AREA OFFICE COLORADO—UTAH
1311 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138

IN REPLY REFER TO: (ES)

April 8, 1982

RECEIVED
APR 19 1982
DIVISION OF
OIL, GAS & MINING

Cleon Feight, Director
Division of Oil, Gas, and Mining
4241 State Office Building
Salt Lake City, Utah 84114

JIM
APR 23 1982

Dear Mr. Feight:

On March 24, 1982, Ron Joseph of my staff examined the various powerlines of two coal companies on a recent trip to Price, Utah. The purpose of this letter is to apprise you of his findings.

Mr. Joseph met with Mr. William Kurkwood of U.S. Steel and examined the 2 phase and 3 phase company lines at their Wellington Coal Preparation Plant. Although these lines do not conform to raptor protection specifications, we do not recommend correcting the lines because they are not being used by raptors. The lack of raptor use of the crossarms is due, in part, to the close proximity to the preparation plant and the poor habitat conditions near the site.

In the afternoon, Mr. Joseph met with Dean Bray of Consolidated Coal Company and was escorted to the field to examine the 3 phase powerline at the Emery Deep Mine site. This short east-west powerline traverses shadscale habitat which is not used extensively by eagles. No eagle carcasses, bone piles, excrement, or other use was noted. Consequently, we do not recommend any modification of the Emery Deep Mine site powerline.

For your information, Mr. Joseph examined, by helicopter, the potentially hazardous powerline in Clark Valley which was reported in our October 9, 1981 letter to you. The Clark Valley line is maintained and operated by Utah Power and Light (UP&L) and this line supplies power to Kaiser Steel Company's Sunnyside Coal Mine. However, the problem sections identified traverses BLM land and is not within any coal company permit boundaries. The UP&L line to Kaiser's Sunnyside mine was examined and no eagle carcasses were discovered primarily because the line crosses pinyon-juniper land; habitat not extensively used by eagles. However, six eagle carcasses were collected along a 10 mile segment of the Clark Valley line in sagebush habitat. We will be working with UP&L to modify the segment of line through prime eagle habitat to reduce future losses.

Mr. Joseph will continue these field investigations of coal company powerlines when requested and we will keep you informed accordingly.

Sincerely yours,

Robert D. Jacobsen

Area Supervisor

cc: Larry Dalton, DWR - Price, Utah
Dave Mills, BLM - Price, Utah
OSM - Denver, Colorado ATTN: Shirley Lindsey
Marty Phillips, LE - Salt Lake City, Utah
Clark Johnson, EOS - Salt Lake City, Utah

File ACT/015/01
Folder No. 2
Copy to Lynn

SCOTT M. MATHESON
GOVERNOR

STATE OF UTAH
DEPARTMENT OF COMMUNITY AND
ECONOMIC DEVELOPMENT

Division of
State History
(UTAH STATE HISTORICAL SOCIETY)

MELVIN T. SMITH, DIRECTOR
300 RIO GRANDE
SALT LAKE CITY, UTAH 84101-1182
TELEPHONE 801/533-5755

October 24, 1983

James W. Smith, Jr.
Coordinator of Mined
Land Development
Division of Oil, Gas & Mining
4241 State Office Building
Salt Lake City, Utah 84114

JIM
OCT 26 1983

Attn: Lynn Kunzler

RE: ACR Response, Consolidated Coal Company, Emery Deep Mine, ACT/015/015, Folder No. 2, Emery County, Utah

Dear Mr. Smith:

The Utah Preservation Office has received a copy of the ACR response from Consolidated Coal Company on its Emery Deep Mine. After review of the material provided, our office notes that there are no materials on which our office can comment or provide further assistance to the Division of Oil, Gas & Mining at this time.

Since no formal consultation request concerning eligibility, effect or mitigation as outlined by 36 CFR 800 was indicated by you, this letter represents a response for information concerning location of cultural resources. If you have any questions or concerns, please contact me at 533-7039.

Sincerely,

James L. Dykman
Cultural Resource Advisor

JLD:jrc:G573/7313c

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OCT 2[illegible] 1983
DIVISION OF
OIL, GAS & MINING

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STATE OF UTAH

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER RIGHTS

DEE C. HANSEN
STATE ENGINEER

EARL M. STAKER
DEPUTY

200 EMPIRE BUILDING
231 EAST 400 SOUTH
SALT LAKE CITY, UTAH 84111
(801) 533-6071

DIRECTING ENGINEERS
HAROLD D. DONALDSON
DONALD C. NORSETH
STANLEY GREEN
ROBERT L. MORGAN

September 25, 1981

Mr. James W. Smith, Jr.
Coordinator of Mined Land Development
Utah Division of Oil, Gas, and Mining
1588 West North Temple
Salt Lake City, Utah 84116

RE: Consolidation Coal Co.
Emery Deep Mine
ACT/015/015
Emery County, Utah

Dear Mr. Smith:

This office has completed its review of the Mining and Reclamation Plan for the above mentioned project. Both the water rights and pond design are in order; therefore this letter will serve as approval for the project.

Sincerely,

Dee C. Hansen

Dee C. Hansen, P.E.
State Engineer

DCH/RLM/cpm

cc: Price Area Office

1981

Folder No. C

STATE OF UTAH
NATURAL RESOURCES
Water Rights

N 1t North Temple • Salt Lake City, UT 84116 • 801-533-6071

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dee C. Hansen, State Engineer

Copy to (Sue)
Rick, Dave D.
Lynn

December 13, 1983

JIM
DEC 15 1983

Mr. James W. Smith, Jr.
Coordinator of Mined Land Development
Division of Oil, Gas & Mining
4241 State Office Building
Salt Lake City, Utah 84114

Re: Consolidated Coal Co.
Emery Deep Mine
ACT/015/015
Emery County, Utah

Dear Mr. Smith:

We have reviewed the Apparent Completeness Review Response and Determination of Completeness documents for the above-named project. No additional comments or approvals are necessary.

Yours truly,

Dee C. Hansen

Dee C. Hansen, P.E.
State Engineer

DCH:rlm

cc: Price Office

STATE OF UTAH
NATURAL RESOURCES
Water Rights

1636 West North Temple • Salt Lake City, UT 84116 • 801-533-6071

To Sue
File ACT/015/015

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dee C. Hansen, State Engineer

copy to Sue (Lynn)

December 14, 1983

Mr. James W. Smith, Jr.
Coordinator of Mined Land Development
Division of Oil, Gas & Mining
4241 State Office Building
Salt Lake City, Utah 84114

JIM
DEC 20 1983

Re: Consolidated Coal Company
Emery Deep Mine
ACT/015/015
Emery County, Utah

Dear Mr. Smith:

We have reviewed MRP addendum (Technical Review Responses) for the above-named project. The data does not involve alteration of the sediment pond system; therefore, further comment is not necessary.

Yours truly,

Dee C. Hansen

Dee C. Hansen, P.E.
State Engineer

DCH:rlm

cc: Mark Page, Area Engineer
Price Office

BIO/WEST, Inc.

1063 West 1400 North
P.O. Box 3226
Logan, Utah 84321
(801) 752-4202

Art
by
Scott Greenwood