R. Smith

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DIV OF OIL, GAS & MINING

UTAH DIVISION OF OIL, GAS AND MINING
TECHNICAL ANALYSIS
COTTONWOOD/WILBERG MINE
ACT/015/019

Utah Power and Light Company
Emery County, Utah
July 6, 1989

UMC 785.19 Alluvial Valley Floors-(RVS)

Existing Environment and applicant's Proposal

Unconsolidated streamlaid deposits do not occur within, or in close proximity to, the permit area. Quarternary alluvium (Qal) has not been identified along Grimes Wash (Doelling, 1972). Technical staff inspection of the mine site and adjacent area have not identified the existence of flood irrigation (or its historical use) or the capability of stream valleys to be flood irrigated or subirrigated.

Compliance

Sufficient information about alluvial streamlaid deposits and irrigation are available to determine, as required by UMC 785.19(c)(2), that no alluvial valley floors exist with or in close proximity to the proposed permit area.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.11 Signs & Markers-(WAW)

Existing Environment & Applicant's Proposal

The applicant's proposal for signs and markers commits to install and maintain each particular sign or marker during the conduct of all activities to which they pertain or until bond release (Page 3-20). All signs will be clearly legible and of uniform design.

Compliance

The applicant commits to post and maintain mine signs as required.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.13-.15 Casing and Sealing of Exposed Underground Openings-(WAW)

Existing Environment and Applicant's Proposal

Boreholes

From 1976 to 1988, the applicant drilled approximately 118 surface exploration holes on East Mountain (page 4-39 and Map 2-1). The East Mountain property is contiguous to the Cottonwood/Wilberg, Deer Creek, and Des-Bee-Dove coal mines. The applicant has committed to reclaim all surface drilled exploration holes according to the USGS published Drill Hole Plugging Procedure.

Entries

The applicant identifies existing and proposed access portals and ventilation breakouts (pages 3-6, 3-7, 3-4, 4-1 and Maps 3-1 and 3-16). Three portals at the Left Fork of Grimes Wash remain sealed due to the mine fire in December, 1984; one entry at the Wilberg Fan Portal was also sealed at a later date. A total of 15 remaining openings are depicted on Map 3-16 excluding the mine office facility area.

Upon completion, ventilation entries (breakouts) will be fenced with chain link to prevent entry and warning signs will be posted (page 3-6).

The applicant commits to sealing all mine entries upon completion of mining activities (pages 4-1, and 4-2, Figure I). Seals will be constructed of concrete blocks, double wall thickness, and backfilled with 25 feet (minimum) of noncombustible material. No drains or special hydrological containment seals are proposed except for the Cottonwood Fan Portal area drainage. Three portals, Channel Canyon, Miller Canyon, and Cottonwood Mine belt portal will be sealed from within the mine, the remaining portals will be sealed prior to backfilling and grading.

Compliance

As of fall 1988, all surface exploration drill holes on East Mountain have been reclaimed and permanently sealed. The applicant's plans for permanently sealing entries are designed to prevent access and keep acid or other toxic drainage from entering ground or surface waters.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.22 Topsoil: Removal-(HS)

Existing Environmental Applicant's Proposal

Topsoil was not salvaged from the disturbed area associated with the Wilberg Mine (page 2-143). Dr. A. L. Southard concluded (Soils Report, pages 2-143 through 2-148) "Basically no topsoil (Horizon-A) exists in sufficient quantities to warrant stockpiling" (page 2-143).

The applicant proposes to use substitute topsoil as a plant growth medium for reclamation (page 4-18.1). Existing material shown on Map 2-18 (upper fill, parking lot fill, sediment pond fill, spoil bank) if demonstrated to be suitable (pages 4-9.8 through 4-10), will be utilized for reclamation. Revegetation test plots will be constructed to determine the suitability of the fill material as a plant growth medium for final reclamation. Test plot design and success standards are given on pages 4-17 to 4-19.

Chemical and physical analyses and soil mapping unit descriptions of the Waste Rock Storage area are located on pages 2-152 through 2-154. The top 12 inches of soil material was separately removed and segregated prior to development of each waste rock cell (Appendix VII, page 4 and 5). Removed "topsoil" has been temporarily stored in the berms that will be used in cell reclamation.

Topsoil was separately removed and stockpiled from the Cottonwood Fan Portal area (page 3-24). Detailed analyses of the portal area soils are presented on pages 2-154 through 2-158 and page 4-28.

Compliance

Topsoil was not removed from the disturbed area associated with the Cottonwood/Wilberg Mine area. The Great Group classification (Soil Taxonomy, USDA/SCS) of the disturbed soil was Ustorthent. These soils typically lack horizonation within the first meter of the surface and have a shallow lithic contact with little biological activity.

The applicant proposes to use existing fill material as a plant growth medium for final reclamation. Preliminary data indicate potentially detrimental levels of electrical conductivity (EC) and sodium adsorption ratio (SAR) which may jeopardize reclamation success. Thus, the operator proposes to implement revegetation test plots to determine the suitability of existing fill material as a plant growth medium.

The Division will determine, based on the physical and chemical characteristics of the proposed substitute material and the results of revegetation test plots, whether existing fill material will be suitable substitute topsoil material.

Chemical and physical analyses of topsoil material removed from the Waste Rock Storage area and the Cottonwood Fan Portal area were performed. Profile descriptions and chemical and physical data indicate no characteristics that would jeopardize reclamation success within the salvaged material.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.23 Topsoil: Storage-(HS)

Existing Environment and Applicant's Proposal

No topsoil was removed or stockpiled at the Cottonwood/Wilberg Mine area.

Topsoil was removed at the Cottonwood Fan Portal area from approximately five acres and placed in two separate storage areas (page 3-29). The topsoil storage piles have been protected against wind and water erosion by establishing a perennial vegetative cover (field inspection by Division staff, conducted January 23, 1989).

The berm structures containing salvaged topsoil from the Waste Rock Storage area have and will be revegetated to minimize erosion (Appendix III, page 3).

Compliance

Removed topsoil from the Cottonwood Fan Portal area has been placed within the permit area and protected from wind and water erosion by a perennial vegetative cover. Immediate redistribution of topsoil is not practical because of the operational status of the area.

The area where topsoil has been stockpiled does not pose any imminent danger of slope failure (Appendix XVIII).

The "topsoil" salvaged from the Waste Rock Storage area is temporarily stored within the retainment berm surrounding each storage cell and is adequately protected from wind and water erosion by vegetation cover on the surface of the retainment berm.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.24 Topsoil: Redistribution-(HS)

Existing Environment and Applicant's Proposal

The final reclamation plan for the Cottonwood/Wilberg Mine area and the Waste Rock Storage area is described on pages 4-18 through 4-21.1.

The upper 18 inches of fill material, if demonstrated to be a suitable plant growth medium for final reclamation (see discussion under UMC 817.22), will be excavated from the fill slopes and temporarily stored while backfilling and grading activities occur. Prior to seedbed preparation and following scarification of the regraded spoils, temporarily stored "topsoil" will be placed on the newly-graded surface at a depth of 6-12 inches (page 4-11). All final grading and "topsoil" placement will be conducted parallel to the contour. If surface compaction has developed, it will be alleviated by hand or mechanical tillage. Topsoil will be mechanically roughened (backhoe or chisel plow) to maximize surface roughness. Mulch will be applied at a rate of two tons/acre and netting will cover mulch.

The final revegetation plan may be revised to incorporate the results of interim revegetation efforts (pages 4-11 through 4-17) and test plot results (pages 4-17 to 4-19). Revisions will be approved by the Division prior to implementation.

Compliance

Existing fill material, if proven suitable, will be utilized to cover all disturbed areas at the Cottonwood/Wilberg Mine area with 6-12 inches of substitute topsoil.

Substitute topsoil will be prepared to promote favorable revegetation establishment. The redistribution plan is adequate to support the postmining land use of livestock grazing and wildlife habitat.

Scarification of regraded spoils and mechanical tillage of the substitute topsoil will alleviate compaction caused by machinery traffic and ensure good overburden/soil contact, thereby preventing potential slippage and create a soil profile conducive to root penetration.

Regraded "topsoil" will be left in a roughened condition to provide micro-relief to reduce runoff and promote infiltration.

Hay mulch and netting will ensure adequate protection from wind and water erosion by raising the wind profile above the soil surface and acting as a barrier against raindrop impact.

A topsoil distribution plan for the Cottonwood Fan Portal area has not been submitted.

The applicant will be in compliance when the following stipulation is met:

Stipulation 817.24-(1)-(HS)

1. Within 30 days of permit approval, the applicant must submit an adequate topsoil redistribution and final revegetation plan for the Cottonwood Fan Portal area.

UMC 817.25: Topsoil: Nutrients and Amendments-(HS)

Existing Environment and Applicant's Proposal

The applicant has committed to sample redistributed topsoil prior to seeding (Item 3, page 4-20). Necessary fertilization and soil amendment application will be instituted as determined by soil test results following redistribution.

Compliance

The applicant has committed to sampling redistributed topsoil to determine type and rate of fertilizer required.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.41 Hydrologic Balance: General Requirements

Existing Environment and Applicant's Proposal

Surface Water - (DW)

The applicant describes the current disturbed and undisturbed drainages in Appendix XX.

A general description of the existing environment is contained in Chapters I and II of Appendix XX.

The regional water quality and quantity monitoring plans for surface and ground waters are found in Chapter IV of Appendix XX.

Treatment facilities (i.e. sedimentation ponds) specifications are found in Appendix XIII.

Part 4 of the PAP includes a detailed description of the reclamation hydrology, including restoration of all disturbed areas, a reclamation monitoring plan and specific designs associated with restored channels for the Cottonwood/Wilberg Mine area. Specific information is not presented for the Cottonwood Fan Portal area.

Ground Water - (RVS)

The applicant provides information about aquifers, springs and mine inflows in Appendix XX. Supplementary information about ground water is given on Maps HM-1 through HM-5.

Aquifers. The applicant describes the North Horn Formation, Blackhawk Formation, and Star Point Sandstone as the major water-bearing lithostratigraphic units in the permit and adjacent area (Appendix XX, pages 4 through 11). The applicant concludes that a zone of "perched" aquifers occurs within certain permeable sandstone channels in the North Horn Formation and Blackhawk Formation, whereas the aquifer occurring in the Star Point Sandstone is of a more regional nature.

The applicant identifies the Roans Canyon Fault Graben, Straight Canyon Syncline and Deer Creek Fault (Map HM-1) as primary structural features that influence ground-water movement on East Mountain. The applicant suggests that the Roans Canyon Fault Craben and Straight Canyon Syncline acts to intercept and directs southerly ground water towards the southwest (Map HM-1). The Deer Creek Fault appears to be an aquiclude to eastward movement of ground water (Appendix XX, page 15).

Ground-Water Use. Ground water within and adjacent to the permit area is used by wildlife and for stockwatering and domestic purposes. Table HT-7 lists five springs with appropriated water rights within the permit area. Mining has occurred beneath two of the springs with water rights and is projected to occur beneath one additional spring with a water right. Flow from 17 springs is collected in ponds or troughs. Three springs are considered to be primarily used by wildlife.

Springs. Map HM-5 indicates 52 springs occur within the proposed permit area. Total discharge from springs is approximately 300 gpm (Annual Hydrologic Monitoring Reports, 1979-1988). Springs occurring in the North Horn Formation account for approximately 50 percent of the total spring discharge.

Table HT-2 summarizes water quality samples collected at 12 springs from 1979 through 1987. These data indicate water quality degrades in terms of TDS, SO_Z, Ca, Mg, Na, K and Hardness as it passes through the Flagstaff Limestone and North Horn Formation and into the Price River Formation. The applicant also recognizes increases in TDS from north to south and suggests this change is due to an overall southerly direction in ground-water flow (Appendix XX, page 20).

Mine Water. Mine water is currently monitored at six locations in the Cottonwood/Wilberg Mine (Map HM-3). In the past, the applicant has monitored 53 separate mine inflows until they ceased flowing. Most mine inflows have been associated with sandstone channels (Maps HM-3).

Data from mine inflows and underground boreholes indicate water quality undergoes further degradation as it moves vertically through the East Mountain aquifer system (Table HT-3). Total mine inflow is estimated to be 47 gpm (Annual Hydrologic Monitoring Reports for 1988, page 56) and mine water discharge is approximately 15 gpm.

Most of the mine inflow is directed to the main Cottonwood/Wilberg Mine sumps (Figure HF-5). A portion of the sump water is utilized for underground mining operations and the remainder is discharged to the Left Fork of Grimes Wash according to the approved UPDES permit (Appendix XX, page 21). Mine inflow that does not report to the main sump is discharged at Miller Canyon according to an approved UPDES permit (Appendix XX, page 21).

Mining Methods. Longwall mining has occurred in the Hiawatha seam beneath Sections 15 and 22 (T17S, R7E) adjacent to the Deer Creek Fault and in portions of Section 29 and 28 (T17S, R7E) south of the Left Fork of Grimes Wash (Map 4-5). Six springs overlie these previously mined areas.

Longwall mining is continuing to occur in the Hiawatha seam in the remaining portions of Sections 28 and 29 (T17S, R7E) and is projected to occur in portions of Sections 32 and 33 (T17S, R7E) during the proposed permit term. One spring (84-56) overlies these areas of current and projected mining where overburden thickness is approximately 1500 feet (Map 2-10).

The Blind Canyon seam occurs in Sections 17, 18, and 19 (T17S, R76) and Sections 13 and 24 (T175, R6E). These resources have been dedicated to the Cottonwood/Wilberg Mine. Mining is projected to begin, near the end of the proposed permit term, in this area during 1994 (Map 3-2). Nine springs overlie this area where overburden thickness ranges from 1250 to 2000 feet. (Maps HM-5 and 2-11).

Compliance

Surface Water -DW

The applicant has provided the necessary facilities to treat all disturbed drainage. The applicant provides plans that address erosion control methods, including designs for riprap protection.

The reclamation of the Cottonwood/Wilberg Mine area will be achieved in a manner which will safeguard against any long term adverse changes to the hydrologic balance.

The applicant will be in compliance with the surface water portion of this section when the following stilpulation is met.

Ground Water - (RVS)

The applicant provides information about the use, occurrence and characteristics of ground-water resources within and adjacent to the permit area. Moreover, the extent and location of underground mining activities (past, present and future) have been identified and described.

Springs. Baseline and operational spring monitoring data are available to superimpose over projected areas of mining to identify potential impacts to the East Mountain ground-water resources. Although overburden thickness in conjunction with extraction methods suggests minimal longwall-induced aquifer deformation, the applicant recognizes that the potential for impacts to spring recharge and discharge above mine workings and productivity of ground water resources cannot be disregarded. The applicant proposes to conduct water monitoring at representative springs to identify longwall-induced mining impacts.

Mine Inflow. Mine inflow rates have been quantified and a suite of data indicates ground-water quality degrades as it vertically moves through permeable lithologies that occur on East Mountain.

Mine water discharge has occurred at the Left Fork of Grimes Wash and Miller Canyon Breakout. During 1988, no water was discharged to the Left Fork of Grimes Wash and 700,000 gallons were discharged at Miller Canyon (Annual Hydrologic Monitoring Report for 1988).

Mine development during the proposed permit term will primarily occur in Sections 28, 29, 32 and 33 (T17S, R7E) where ground-water resources appear to be more limited. Accordingly, it is anticipated that mine inflow will not significantly increase during the proposed permit term.

The applicant is in compliance with the ground-water portion of this section.

Stipulations UMC 817.41-(1)-(DW)

1. Within 30 days of permit approval, the applicant must submit a complete reclamation plan for the Cottonwood Fan Portal area. This plan must include calculations and designs for channel or drainage restoration according to the 100-year 24-hour event, if appropriate.

UMC 817.42 Hydrologic Balance: Water Quality Standards and Effluent Limitations-(DW)

Existing Environment and Applicant's Proposal

All disturbed area drainage at the Cottonwood/Wilberg Mine area is passed through a series of sedimentation ponds which discharge into Grimes Wash. All the undisturbed drainage is diverted around the disturbed areas by means of ditches and culverts and subsequently, discharged into Grimes Wash.

The same scenario exists at the Cottonwood Fan Portal area except all water is discharged into Cottonwood Creek. (Appendix XIII).

Mine water from the Cottonwood/Wilberg Mine is discharged in two locations: the Left Fork of Grimes Wash and Miller Canyon. Both locations are monitored according to an approved plan and are UPDES discharged points. (Appendix XX, Chapter I, Part E, page 21).

Compliance

Any discharge to either Grimes Wash or Cottonwood Creek is adequately treated to achieve compliance with all applicable state and federal effluent limitations.

Sedimentation ponds and other treatment facilities will be maintained until the disturbed area has been restored and the vegetation requirements of UMC 817.111-117 are met and the quality of the untreated drainage from the disturbed area meets all applicable state and federal water quality standards as described in Part 4, pages 4-2 through 4-7 of the PAP.

Drainage from the underground workings is passed through a series of sumps and then an oil skimmer before being discharged at two approved UPDES points (Appendix XX, Chapter I, Part E, page 21).

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.43 Hydrologic Balance: Diversions and Conveyance of Overland Flow, Shallow Ground Water Flow, and Ephemeral Streams-(DW)

Existing Environment and Applicant's Proposal

All temporary diversions were designed and constructed according to the new Utah Rules Pertaining to Coal Mining and Reclamation Operations and the current 30 CFR. The design storm was the 10-year 6-hour event.

Compliance

Cottonwood/Wilberg Mine area: Disturbed and undisturbed drainage diversions and conveyance systems are all adequately sized to pass the 10-year 6-hour storm.

Cottonwood Fan Portal area: Disturbed and undisturbed temporary diversions and conveyance systems are designed to adequately pass the 10-year 6-hour storm (Appendix XIII).

No permanent diversions exist.

Ditches UD-3, UD-4 and UD-5 at the Cottonwood Fan Portal area have riprap linings. Linings with D50 of 1.5 feet and filter blankets of a 12-inch thick layer of Type II granular bedding were included (Appendix XIII, page 8). Ditch DD-5 drains a disturbed area which is not treated with a sedimentation pond. Four gabion structures are used to effectively trap any sediment, slow erosive velocities of any flow and act as energy dissipators.

Ditches UD-3 and UD-4 at the Cottonwood/Wilberg mine area have riprap linings with D50 of 1.5 feet. Filter blanket gradation of a 12-inch thick layer of Type II granular bedding was included. This will prevent failure of the fine grained subsoils (Appendix XIII, page 31).

All temporary diversions at the Cottonwood/Wilberg mine area will be removed and the affected area reclaimed when the structures are no longer needed. (Part 4, pages 4-2 through 4-7).

All temporary diversions have been designed with adequate freeboard of 0.5 feet (Appendix XIII).

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.44 Hydrologic Balance: Stream Channel Diversions-(DW)

Existing Environment and Applicant's Proposal

This regulation covers any diversion of flow from perennial and intermittent streams which drain areas greater than one square mile. UA-1 and UA-6, undisturbed areas at the Cottonwood/Wilberg mine area meet this criteria. (Appendix XIII).

These temporary diversions were designed according to the new Utah Rules Pertaining to Coal Mining and Reclamation Operations and the current 30 CFR. The design storm was the 10-year 6-hour event.

Compliance

The longitudinal profile of the stream, channel and floodplain were designed and constructed to remain stable and to prevent additional contributions of suspended solids to streamflow or to runoff outside the permit area. (Appendix XIII).

These ditches will be reclaimed according to the reclamation plan described in Part 4, pages 4-2 through 4-7. The natural drainage pattern will be restored to establish a shape with environmentally acceptable gradient, cross sections, riffles, pools, and drops that approximates natural stream channel charactertistics.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.45 Hydrologic Balance: Sediment Control Measures-(DW)

Existing Environment and Applicant's Proposal

The applicant has provided plans for sediment and erosion control (Appendix XIII). All drainage from disturbed areas is treated by conveying drainage to sediment ponds or effectively treating the water with alternative sediment control measures (i.e. gabion structures).

Compliance

The ability to effectively treat disturbed drainage has been demonstrated by the applicant meeting effluent limitations at UPDES discharge points and not degrading the overall water quality from undisturbed and disturbed areas. Documentation is given in both Appendix XX (Hydrology) and the applicant's annual report for 1988.

Water produced in-mine is treated in a series of sumps located in 1st North and Wilberg Main. These sumps act as settling basins to effectively remove settable solids. Mine water discharge is passed through an oil skimmer in accordance with the stipulations of the Cottonwood/Wilberg Mine Discharge Permit UT-0022896-01. Mine water then is subsequently discharged into the Left Fork of Grimes Wash. Small quantity discharges occur at the Miller Canyon breakout, after undergoing treatment. This discharge is in accordance with the stipulations of Cottonwood/Wilberg Mine Discharge Permit UT-0022896-04.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.46 Hydrologic Balance: Sedimentation Ponds-(DW)

Existing Environment and Applicant's Proposal

All disturbed area surface drainage is passed through one, or a series of sedimentation ponds, with the exception of one region at the Cottonwood Fan Portal area. Four gabion structures are in place (area DA-4).

The ponds were sized according to the new Utah Rules Pertaining to Coal Mining and Reclamation Operations and the current 30CFR. This involves total containment of at least one year of sediment and the 10-year 24-Hour storm volume. Temporary inlet structures are sized to pass the 10-year 6-hour event and emergency decant structures for the 25-year 6-hour event.

Primary decant devices exist on the two Cottonwood/Wilberg Mine area ponds. Decants consist of one, three inch diameter pipe for each pond. The ponds at Cottonwood Fan Portal area do not have primary decant devices.

Compliance

Cottonwood/Wilberg Mine area - The total runoff volume produced from a 10-year 24-hour event is 2.9 acre-feet. One year sediment volume, calculated using .1 acre-feet of sediment/acre of disturbed land and a sediment delivery ratio of 64.5 percent, was 0.85 acre-feet. The total volume needed between the two ponds is 3.75 acre-feet. The two ponds contain 4 acre-feet of storage volume.

Cottonwood Fan Portal area-north pond - Calculations were made in the same manner as previously described.

Runoff volume, 10-year 24-hour storm	- 0.008 acre-feet
Sediment volume, 1 year accumulation	- 0.118 acre-feet
Combined, total pond volume needed	- 0.126 acre-feet*
Actual pond volume	- 0.100 acre-feet*

* The method used to estimate sediment volume overestimates actual amounts under most conditions. The 0.026 acre-foot discrepancy can be attributed to this fact. The pond is sized correctly.

Cottonwood Fan Portal area-south pond - Calculations were made in the same manner as previously described.

Runoff volume, 10-year 24-hour storm	- 0.267 acre-feet
Sediment volume, 1 year accumulation	- 0.300 acre-feet
Combined, total pond volume needed	- 0.567 acre-feet
Actual pond volume	- 0.600 acre-feet

A breakdown of the applicant's calculations are found in Appendix XIII.

Four rock gabion structures are effectively being used as sediment traps, controlling runoff and erosion from DA-4 at the Cottonwood Fan Portal area.

All above ponds meet effluent limitations according to their UPDES permits. (See 1988 Annual Hydrologic Monitoring Report and Appendix XX).

The applicant will remove sediment from the ponds when the volume of sediment accumulates 60 percent of the design sediment storage volume (1 year accumulation). See pages 3-26 and 3-33.

Each pond was designed, constructed and is inspected under the supervision of a registered professional engineer.

The sedimentation ponds will be maintained and remain functional until the disturbed area has been reclaimed. Drainage entering ponds meets the applicable state and federal water quality standards for the receiving streams. After pond removal, the areas will be regraded and revegetated. See pages 4-2 through 4-7.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.47 Hydrologic Balance: Discharge Structure-(DW)

Existing Environment and Applicant's Proposal

Discharge structures have been sized for the 25-year 6-hour event according to the new Utah Rules Pertaining to Coal Mining and Reclamation Operations and the current 30CFR.

Compliance

Discharge structure designs are adequate to meet the requirements of this section.

The operator is in compliance with this section

Stipulations

None.

UMC 817.48 Hydrologic Balance: Acid and Toxic Forming Materials-(HS)

Existing Environment and Applicant's Proposal

The applicant commits to covering any toxic-and/or acid-forming material with four feet of material (Appendix VII, page 7).

Procedures to identify acid-and toxic-forming materials and coal/rock ratio within the Waste Rock Storage area are described in Appendix VII, pages 8, 9 and 12.

Compliance

The applicant's proposal for identifying acid-and toxic-forming materials does not adequately address the requirements of this section.

Analysis of disposed material in waste rock cells 1 through 6 has not been submitted. The waste rock cells are not designed to bury acid-and toxic-forming materials (Appendix VII, Figures 1 and 2).

Data given in Appendix VII, Table 2, indicate roof and floor materials have unacceptable levels of SAR (Mean = 17.36 S.D. = 15.14). High SAR's may detrimentally affect revegetation.

Appendix VI Coal Lithologic Log, Drill Hole EM-23 C indicates a low pH (3.3, 2.9, 3.7) within the mudstone and siltstone directly below the Hiawatha seam. Additionally, roof and floor analyses (Appendix VII, Table 2) indicate high FeS_2 (pyritic/marcasite) levels (% FeS Mean = 8.15 S.D. = 10.82). These materials may be detrimental to surface and ground water as well as established vegetation.

The applicant will be in compliance when the following stipulation is met.

Stipulation UMC 817.48-(1)-(HS)

1. With 30 days of permit approval, the applicant must submit: (1) Previous waste rock data collected from the completed waste rock cells (1 through 6); (2) Laboratory analysis of previously collected roof and floor samples, and sample location map; (3) A commitment to annually monitor roof, floor, and midseam material for its potential acid- and/or toxic-forming characteristics according to Division's Guidelines for the Management of Topsoil and Overburden (i.e. Water soluable Selenium and Boron, Clay Content, pH, Acid-Base Potential, SAR, E.C.); (4) a commitment to properly bury or otherwise treat all acid-and toxic-forming materials within 30 days of initial exposure at the mine site.

UMC 817.49 Hydrologic Balance: Permanent and Temporary Impoundments-(DW)

Existing Environment and Applicant's Proposal

No permanent or temporary impoundments are proposed to be left in place following final reclamation. Sedimentation ponds at the

Cottonwood/Wilberg Mine area will be left in place during initial reclamation and through the bonding liability period. (See Part 4, pages 4-2 through 4-7).

The Cottonwood Fan Portal area also has no permanent impoundments.

Compliance

No permanent impoundments will be retained and temporary impoundments meet the requirements of UMC 817.46.

The applicant is in compliance with this section.

Stipulation

None.

UMC 817.50 Hydrologic Balance: Underground Mine Entry and Access Discharge -(DW)

Existing Environment and Applicant Proposal

Rocks in the mine plan and adjacent areas strike northeast and dip approximately three degrees to the northwest. However, northwest of the Straight Canyon Syncline, the dip is generally southeast. Mine inflow is measured to be 46 gpm and is collected in two sump areas prior to discharge or in-mine use. Mine inflow is of marginal quality with high historical concentrations of calcium, magnesium, chloride and sulfate.

Portals are updip from the workings and located at elevations ranging from 7300 to 7600 feet. Due to the Straight Canyon Syncline, the Cottonwood Fan Portal is located at the lowest elevation. A gravity drain piping system will be implemented at this site during final reclamation (portal sealing) to alleviate concerns of direct discharge after abandonment. This will accommodate the flooding of workings and associated build-up of hydraulic head.

Compliance

Portals have been located and constructed to control gravity discharge from the mine. The mine currently experiences inflow of marginal water quality.

Following mine closure, workings will flood and unplanned discharges of marginal water quality may occur. The applicant commits to monitoring unplanned discharges after mining for compliance with UMC 817.42 and other applicable state and federal regulations. Monitoring will be conducted quarterly (as accessible) and treatment will be initiated, if necessary, during the period of discharge or until bond release (Appendix XX, page 21).

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.52 Surface and Groundwater Monitoring-(DW)

Existing Environment and Applicant's Proposal

The applicant monitors streams (Hydrology Map, 1988 Annual Hydrologic Monitoring Report), springs (Spring Map, 1988 Annual Hydrologic Monitoring Report), mine water discharge, sediment pond outlets (both under UPDES regulation) and mine inflow (Map #4, 1988 Annual Hydrologic Monitoring Report) locations. Current monitoring plans are discussed in the 1988 Annual Hydrologic Monitoring Report.

Compliance

The applicant monitors both surface and ground water following the Division's Water Monitoring Guidelines. Monitoring is adequate to measure any changes in the hydrologic balance.

The applicant submits quarterly reports that include laboratory analyses and field parameters. Long term effects are addressed in annual reports.

Monitoring will continue through the cessation of mining activities and the reclamation of all surface disturbed areas. Monitoring points prior to and directly after the final sedimentation pond will be implemented during this time at the Cottonwood/Wilberg Mine area (See Chapter IV, Appendix XX). No reclamation monitoring plan has been established for the Cottonwood Fan Portal area.

The applicant will be in compliance when the following stipulation has been met.

Stipulation UMC 817.52-(1)-(DW)

1. Within 30 days of permit approval, the applicant must submit a reclamation water monitoring plan for the Cottonwood Fan Portal area.

UMC 817.53 Hydrologic Balance: Transfer of Wells-(DW)

Existing Environmental and Applicant's Proposal

The applicant does not propose to transfer exploratory or monitoring wells. Therefore, this section is not applicable.

Stipulations

None.

UMC 817.55 Hydrologic Balane: Discharge of Water into an Underground Mine-(DW)

Existing Environment and Applicant's Proposal

The applicant currently does not discharge or transfer water between underground workings. All water produced in the mine is either used for mining, dust suppression, culinary purposes, or is discharged to the Right Fork of Grimes Wash, or at the Miller Canyon breakout under UPDES regulation. Locations of the breakouts can be found on the Hydrology Map, 1988 Annual Hydrologic Monitoring Report.

Compliance

Water produced and subsequently discharged from the Cottonwood/Wilberg Mine workings does not show any water quality problems or potential detrimental impacts to the hydrologic balance.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.56 Hydrologic Balance: Postmining Rehabilitaiton of Sedimentation Ponds, Diversions, Impoundments, and Treatment Facilities-(DW)

Existing Environment and Applicant's Proposal

The applicant does not propose to retain ponds, diversions or culverts following final reclamation.

Compliance

This section is not applicable.

Stipultions

None.

UMC 817.57 Hydrologic Balance: Stream Buffer Zones-(DW)

Existing Environment and Applicant's Proposal

Grimes Wash below the mine contains a biologic community as described under paragraph (c) of this rule and therefore, must be protected and a buffer zone established.

Above the mine, both Right and Left Forks of Grimes Wash are ephemeral and cannot be determined to have a community as described under paragraph (c).

The main drainage through the Cottonwood/Wilberg Mine area was completely interrupted during construction of the surface facilities. The undisturbed drainage from above the site is transferred to below the site by an extensive culvert system (See Appendix XIII). The reclamation plan contained in Part 4 outlines methods of stream channel rehabilitation which will establish a biologic community described in paragraph (c) of this rule.

Compliance

Proposed upgrades to the hydrologic system which include drop structures, steps and energy dissipators will enhance stream habitat following reclamation (See Part 4).

All sensitive areas are identified and protected as critical stream habitat by buffer zones.

The applicant is in compliance with this section.

Stipulation

None.

UMC 817.59 Coal Recovery-(PGL)

Existing Environment and Applicant's Proposal

The applicant has an approved Resource Recovery and Protection Plan (R2P2) issued August 17, 1982 by the Bureau of Land Management (BLM). Recovery methods to obtain the maximum amount of coal are described on page 3-13.

Compliance

The applicant is conducting mining operations so as to maximize the utilization and conservation of coal at the Cottonwood/Wilberg Mine.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.61-.68 Use of Explosives-(PGL)

Existing Environment and Applicant's Proposal

There are no explosive storage and handling facilities at the Cottonwood/Wilberg Mine (page 3-52.1). Therefore, this section is not applicable.

UMC 817.71-.74 Disposal of Underground Development Waste and Excess Spoil-(WAW)

Existing Environment and Applicant's Proposal

The applicant's proposal for the Waste Rock Storage area is contained in Appendix VII. The applicant presently disposes underground development waste, sediment from sedimentation ponds, and trommel reject in a 16-acre site which is part of an approved 48 acre BLM right-of-way. The present site is nearing capacity and the applicant plans to initiate a permit application for a new Waste Rock Storage area in mid 1989.

The Waste Rock Storage area is situated on a gently sloping (approximately seven percent slope) and naturally stable area (Exhibit 10, page 10). The disposal area is constructed of earthen retainment berms which incorporate topsoil or substitute soil medium for reclamation. Typical slopes of the berms are 2h:1v (Figures 1 and 2, DWG CM-10361-WB) with a varying top width. Drawing CM-10361-WB and as-built drawings KS1142E have been certified by a professional engineer. The earthen containment structures are designed to contain, without discharge, all storm runoff from a 10-year 24-hour storm event (page 4, Figures 1 and 2).

Fill material will be hauled by truck to the facility then placed in horizontal lifts two feet thick and compacted. The applicant also proposes to limit the coal/rock ratio to 50/50 (Appendix VII, page 8). During reclamation, the interior berms will be removed and used to cover the stored rock.

The applicant commits to conduct inspections quarterly and during critical construction periods. Reports will be submitted to the Division within two weeks of inspection and retained at the Huntington office (Appendix VII, page 11).

Compliance

The applicant's proposal addresses the designs and precautionary measures that will be taken to ensure surface and ground waters are not degraded, stability of the fill, and the land is reclaimed and revegetated. Topsoil or substitute soil mediums were collected and stored in the retainment berms for utilization during reclamation. The applicant has taken steps to minimize erosion including maintaining 2h:1v slopes and revegetation of disturbed areas.

The facility is located on a moderately sloping area (approximately seven percent), therefore, keyway cuts or rock toe buttresses are not required.

The fill material is placed in horizontal lifts, two feet thick, and compacted. The final configuration of the fill will be compatible with the postmining land use. The stability analysis demonstrates a safety factor of at least 1.5 (Appendix XVIII).

The applicant commits to continually inspect the site for stability on a quarterly basis and during critical construction periods.

The disposal area does not contain springs, natural or man-made water courses, or wet weather seeps, therefore, an underdrain system is not required. Also, adequate stability of the structure has been demonstrated and therefore the requirements of foundation or abutment testing are not required.

There are no plans to return underground development waste or excess spoil to underground workings.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.81-.88 Coal Processing Waste Banks: General Requirements-(PGL)

Existing Environment and Applicant's Proposal

The applicant disposes of coal processing wastes in the Waste Rock Storage area (See Appendix VII). This material is placed and

compacted in two foot horizontal lifts. The applicant commits to cover any acid-or toxic-forming materials with four feet of non-acid, non-toxic-forming materials.

No coal processing waste will be returned to underground workings.

Compliance

The construction, inspection, and reclamation plans for the Waste Rock Disposal area are adequate (see UMC 817.71-.74). Therefore, the disposal of coal processing waste in the Waste Rock Storage area meets the requirements of this section.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.89 Disposal of Non-Coal Waste-(PGL)

Existing Environment and Applicant's Proposal

A trash chute and collection box have been provided for disposal of non-coal waste material. When the dumpster is full it is transported to an approved landfill. During reclamation, the concrete trash chute and collection box will be demolished and used for backfill (page 3-43).

Compliance

The applicant's proposal for disposal of non-coal waste meets the requirements of this section.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.91-.93 Coal Processing Waste: Dams and Embankments: General Requirements-(PGL)

Existing Environment and Applicant's Proposal

There are no coal processing dams or embankments at the Cottonwood/Wilberg Mine. Therefore, this section is not applicable.

UMC 817.95 Air Resources Protection-(WAW)

Existing Environment and Applicant's Proposal

The applicant's Air Pollution Control Plan is found on pages 3-59 and 3-60. Fugitive dust control measures have been applied during construction of the facilities (i.e., dust collection system, pages 3-41 to 3-43) and will be applied throughout the life and subsequent reclamation of the site.

All service and haul roads at Cottonwood/Wilberg Mine are asphalt surfaced with the exception of the fan access.

Revegetation efforts have been implemented on all non-use areas in the portal yard, and will be repeated (as necessary) until vegetation is established (page 3-59).

Fugitive dust controls are implemented throughout the coal handling process. All conveyors are covered and equipped with belt scrapers. Dust collection systems with baghouses are located at the storage sites, crushing and cleaning facility, and the truck loadout (pages 3-59, 3-60). The high moisture content of the coal also aids in fugitive dust control.

Compliance

The applicant has implemented approved fugitive dust controls at the Cottonwood/Wilberg Mine facility, and has taken additional steps to ensure that fugitive dust is controlled (i.e. revegetation). Moreover, the State Department of Health determined that the applicant's proposal to modify the Cottonwood/Wilberg Mine to produce 6 million tons/yr. are consistent with the requirements of the Utah Air Conservation Regulations (UACR) and the Utah Air Conservation Act. No PSD permit is required for this source (letter dated January 31, 1985 from Brent C. Bradford, UAC committee).

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.97 Protection of Fish, Wildlife, and Related Environmental Values-(BAS)

Existing Environment and Applicant's Proposal

Fish and wildlife resource information is located on: (1) pages 2-159 to 2-175 and page 4-50 et seq. (which includes a plan for fish

and wildlife protection); (2) Maps 2-19, 2-20a, and 2-20b; and (3) Appendix XVI. The Utah Division of Wildlife Resources (DWR) was the primary contributor, although the applicant, the U.S. Fish and Wildlife Service (USFWS), the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM) provided supplemental information and input.

The most important biological concerns involve subsidence impacts to: (1) Nesting golden eagles (Appendix XVI); and (2) Hedysarum occidentale var. canone (page 2-107) and native vegetation as a result of slumping or talus deposition (pages 2-142.1 and 2-142.2). Evaluations of impact and impact mitigation plans are included in the above citations.

Compliance

The applicant has conducted aerial raptor surveys encompassing a 10-mile radius (Appendix XVI). Nests which may be jeopardized by mining disturbances are monitored annually.

The applicant has obtained the necessary permits from USFWS and DWR to take golden eagle nests in Newberry Canyon.

A commitment has been made to notify USFWS of nests and raptors not previously reported (page 4-52). Cliff subsidence will be monitored (pages 4-44 to 4-47), as well as subsidence impacts to nesting golden eagles (Appendix 16). Powerlines have been constructed to raptor safety standards, and have received USFWS approval (page 4-50).

No important fisheries occur within the permit area (page 4-50). Creeks and drainages in the impact zone of surface disturbance will be protected by diversions and dust control measures (page 4-51).

In the event that subsidence interrupts streamflow, the applicant commits to appropriate restoration (page 4-54). Springs or seeps which are lost for wildlife or livestock use will be replaced by guzzlers (page 4-54).

The applicant has committed to prevent, control and suppress range, forest, and coal fires (page 4-55).

Because wildlife habitat is a postmining land use (page 4-38), species selected for revegetation (page 4-19) have been selected on the basis of proven nutritional and cover values for wildlife.

The applicant will not use persistent pesticides, unless approved by the Division (page 4-55).

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.99 Slides and Other Damage-(PGL)

Existing Environment and Applicant's Proposal

The applicant commits to notify the Division as soon as possible at any time a slide occurs which may have a potential adverse effect on health, safety, and the environment. Remedial measures, agreed upon by the applicant and the Division, will be employed to remedy the situation (page 3-73).

Compliance

The applicant's commitment meets the requirements of this section.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.100 Contemporaneous Reclamation-(BAS)

Existing Environment and Applicant's Proposal

The applicant has committed to revegetate, as contemporaneously as practicable, all disturbed areas which are no longer required for mining operations (pages 4-15 to 4-17).

Compliance

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.101 Backfilling and Grading: General Requirements-(PGL)

Existing Environment and Applicant's Proposal

The applicant constructed several major cut and fill areas to provide sufficient working areas for the Cottonwood/Wilberg Mine facilities. The applicant proposes to regrade the mine facilities

area to the approximate premining topography. The grading plan for the facilites area is described on pages 4-1 through 4-5. Postmining topgraphic drawings (Plates 4-1 and 4-2) indicate the volumes of material to reclaim the area. Highwalls to be retained are shown on Plates 4-1 and 4-2 and justified on pages 4-7.1. The final configuration for the Cottonwood Fan Portal area is shown on Plate 3-14 and explained on pages 4-4-A and 4-5. A commitment to submit within 60 days prior to approval the stability analysis for the final reclaimed slopes demonstrating static safety factor of at least 1.5 was included on page 4-10.3.

Compliance

The applicant proposes to return the surface disturbances associated with Cottonwood/Wilberg facilities area and Cottonwood Fan Portal area to approximate original contours. All roads will be backfilled except for the haul road, which is a county road. The applicant's justification for retention of highwalls is adequate. The commitment to submit analysis slope stability of the fills after reclamation that demonstrates a safety factor of at least 1.5 meets the requirements of this section.

The applicant is in compliance with this section.

Stipulations

None.

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

Existing Environment and Applicant's Proposal

The applicant proposed a sampling program to detect the presence of acid-and toxic-forming materials (Appendix VII, pages 8, 9, and 12) at the Waste Rock Storage area. The applicant has committed to cover any acid-and toxic-forming materials with four feet of non-toxic and non-acid forming materials (Appendix VII, pages 7 and page 4-6).

Compliance

The applicant's commitment to bury any acid-or toxic-forming materials at the Waste Rock Storage area meets the requirements of this section.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.106 Regrading or Stabilizing Rills and Gullies-(PGL)

Existing Environment and Applicant's Proposal

The applicant commits to fill, regrade and otherwise stabilize rills and gullies which develop in areas that have been regraded and topsoiled (page 4-6).

Compliance

The applicant's commitment meets the requirements of this section.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.111 Revegetation: General Requirements-(BAS)

Existing Environment and Applicant's Proposal

Following completion of topsoiling and seedbed preparation, the final revegetation plan will be implemented (pages 4-18 to 4-20.1).

The final revegetation seed mix consists of six grass, six forb, four shrub, and two tree species, and follows USFS recommendations. Plantings of trees and shrubs will take place in the spring, following final reclamation (pages 4-20 and 4.20.1). Seed will be hand-broadcast with a hurricane spreader or applied by hydro-seeder at a rate of 83 Pls/ft^2 (page 4-20). Woody plants will be hand-planted at a rate of 1600 stems/acre. Mulch will be applied as described under UMC 817.114. Fertilizer will be incorporated, if soil test results warrant.

Compliance

The applicant has provided an acceptable revegetation plan, which will be followed, except where interim revegetation and test plot results dictate otherwise. All changes will be contingent upon prior Division approval (page 4-18).

All plant species in the final revegetation seed mix (page 4-19) are perennial, and capable of succession and regeneration.

Bond liability will continue for not less than 10 years. Sampling efforts, described on pages 4-20.2 and 4-20.3, will document whether vegetation is at least equal in extent to the reference area vegetation parameters, which are described on pages 2-101 to 2-114.

Revegetation methods, materials and timetables, are expected to achieve a permanent and diverse vegetative cover and recovery of pre-disturbance productivity.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.112 Revegetation: Use of Introduced Species-(BAS)

Existing Environment and Applicant's Proposal

Three introduced species are proposed for use in the final revegetation seed mix (page 4-19). An additional three species are proposed for interim revegetation (pages 4-15 and 4-16). These are smooth brome, crested wheatgrass, intermediate wheatgrass, small burnet, alfalfa, and yellow sweetclover. Each was recommended by the USFS as being: (1) consistent with regional forest management plans, and (2) adapted to the area to be reclaimed.

Compliance

The applicant proposes to test the revegetation seed mix, provided by USFS, as justification for the inclusion of introduced species. Proposed field trials are described on pages 4-17 to 4-19. A further justification, the appliant reported greenhouse study results, involving each species. Publications were cited, affirming the desirability of each species (pages 4-18.4, 4-18.5).

Inasmuch as all species in the seed mix (page 4-19) are present on the Manti-LaSal National Forest, all introduced species are believed to be compatible with the regional flora. As all species are highly palatable, compatibility with regional animal species may also be assumed.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.113 Revegetation: Timing-(BAS)

Existing Environment and Applicant's Proposal

Where necessary to effectively control erosion on disturbed areas before final reclamation, seeding and planting will take place as contemporaneously as practicable with completion of backfilling and grading (page 4-15). Where circumstances prevent immediate seeding, hand or mechanized tilling will be employed to break the surface crust (page 4-16). On interim reclamation, a 60 percent ground cover on the majority of the revegetated area will serve as the criterion for success--provided erosion has been adequately controlled (page 4-17).

Final reclamation seeding will take place contemporaneously with soil grading. Time of seeding will be late fall or early spring (page 4-18). If time lapses between seedbed preparation and seeding, any surface crust which develops will be broken up mechanically or by hand (page 4-19).

If over a month lapses between seedbed preparation and seeding, the soil will be protected with a mulch cover which will be mechanically or chemically anchored (page 4-18).

Compliance

The applicant meets the requirements of this section by proposing to: (1) seed immediately after seedbed preparation, during the normal period for favorable planting conditions (i.e., late fall or early spring), and (2) protect the soil with a temporary vegetative cover or mulch.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.114 Revegetation: Mulching and Other Soil Stabilizing Practices-(BAS)

Existing Environment and Applicant's Proposal

The applicant has opted to choose from among three types of mulch: (1) two tons per acre of hay mulch, anchored with plastic netting; (2) commercial erosion-control blanket, anchored per manufacturer's specifications; and (3) one ton per acre chemically tackified hydromulch (page 4-20).

The relative benefits of each will be tested in the applicant's test plots (page 4-17 to 4-19). Test plot results will influence ultimate mulch choice.

Compliance

All three mulch options, rates of application, and methods of anchoring meet the requirements of this section.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.116 Revegetation: Standards for Success-(BAS)

Existing Environment and Applicant's Proposal

Success of revegetation will be measured by comparison with approved reference areas. Three reference areas have been established to represent pre-disturbance vegetation types for the mine's disturbed areas. Locations of reference areas are depicted on Plate 2-15.

Vegetative parameters of each reference area have been measured. Methods and results of all reference area sampling are described on pages 2-101 to 2-142.

The applicant commits to reassessment of the range condition of all reference areas at five year intervals to assure that they will be maintained in fair or better condition (page 4-20.2).

Compliance

Bond liability will continue for not less than 10 years under the conditions of this section.

Ground cover, woody plant density and production shall be considered equal to their respective reference area counterparts, when there is 90 percent success at 90 percent statistical confidence (page 4-20.2).

Monitoring commitments (pages 4-20.1, 4-20.2, and 4-21) are adequate to document progress toward realization of reclamation objectives. Should problems occur, requiring maintenance or repair work, the applicant has committed to take appropriate action (page 4-20.1).

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.117 Revegetation: Tree and Shrub Stocking for Forest Land-(BAS)

Existing Environment and Applicant's Proposal

All surface-disturbed land is owned and managed by USFS (Map 1-2). Although limited timber harvest may occur within the permit area (Map 2-19), the disturbed area is non-commercial forest land, and as such, falls under part (c) of this section.

The applicant has adopted USFS species recommendations for both trees and shrubs (page 4-19). Recommended stocking levels, however, were increased fourfold to 1600 stems/acre in order to meet reference area woody plant density standards (1461 shrubs and 78 trees, per page 2-110). Trees and shrubs will be planted in the spring.

Compliance

The applicant has satisfied USFS requirements in adopting that agency's recommendations for both species and stocking levels. The applicant commits to establishment of 90 percent of the stocking level of live, woody plants of the same life form of the approved reference areas with 90 percent statistical confidence (pages 4-20.2, 4-20.3).

Measurement of tree and shrub density will utilize the approved point-quarter method (page 4-20.2).

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.121-.126 Subsidence Control-(RVS)

Existing Environment and Applicant's Proposal

The applicant provides information about subsidence on pages 4-41 through 4-49, Appendix XVI, and Maps 4-4 and 4-5. Supplementary subsidence information is provided in the Annual Subsidence Monitoring Reports from 1980 to 1988, and the document entitled "Assessment of Mining Related Impacts in Newberry Canyon, December 1987."

Mining will occur in the Hiawatha seam and Blind Canyon seam (Maps 2-4 and 2-5). Coal extraction will primarily occur by longwall methods (70 percent) with the remaining production occurring by continuous mining development (page 3-2). Multiple seam mining where the Blind Canyon seam directly overlies the Hiawatha seam will not occur during this permit term (Maps 3-1 and 3-2). The applicant estimates that maximum subsidence will be approximately 75 percent of extraction height (page 4-44). Accordingly, where a full ten feet are extracted, maximum subsidence is anticipated to be less than eight feet.

Overburden thicknesses range from approximately 500 to 2000 feet over longwall panels in the Hiawatha seam (Map 2-10). Whereas, overburden thicknesses range from 1600 to 2000 feet for longwall panels in the Blind Canyon seam (Map 2-11).

A review of the Annual Subsidence Monitoring Report for 1988 indicates 15 areas have undergone measureable vertical movement above the underground workings. An angle-of-draw was calculated for nine of the subsided areas. The average angle-of-draw is approximately 26 degrees. Map 4-5 shows areas where more than two feet of vertical movement has occurred.

Ground failure, both in the form of surface tension cracking and cliff spalling, has occurred in Newberry Canyon above and adjacent to extracted longwall Panels 6 East and 7 East. Major spalling has occurred along cliffs that overlie and parallel the long axis of panels whereas, lesser spalling has occurred along cliffs that overlie and parallel headgate and/or tailgate areas of panels. Tension cracks have developed above and adjacent to Panel 6 East. They are oriented approximately parallel to the long axis of the panel. Approximately 1200 feet of overburden is present where tension cracking occurred 500 feet north of Panel 6 East. Longwall mining of the Hiawatha seam is proposed to occur beneath cliffs in Sections 33 and 32, T17S, R7E. Approximately 3.0 miles of cliffs that have been identified as raptor nesting habitat will be undermined (Map 2-19A).

The applicant identifies renewable resource lands above areas of current and projected mining (page 4-41). The applicant concludes, on the basis of mining methods, overburden thickness and past mining experience that impacts to renewable resource lands will be minimal (Pages 4-41 through 4-44). However, when subsidence impacts occur, the applicant commits to restore surface lands to a condition capable of supporting reasonably forseeable use (page 4-48). The applicant also commits to repairing structures such as roads, fences and stock ponds that are damaged by subsidence.

The applicant has monitored subsidence since 1980 by photogrammatic and conventional surveys. Five subsided areas were initially identified in the 1980 survey. Ten areas have been added to the monitoring program since 1984. The applicant has compared photogrammatry and conventional ground surveys for monitoring subsidence above the Cottonwood/Wilberg 5-13th Right workings. Data indicate the photogrammatic method of surveying provides more detail because of the greater number of surveyed stations (Map 4-4). Accordingly, the applicant proposes to conduct subsidence monitoring by photogrammatic methods (Appendix XVI and Map 4-4).

The applicant commits to conducting photogrammatic subsidence monitoring once a year and a field survey (surface traverse) twice each year, during the spring and fall (Appendix XVI, page 4). Results of surveys will be submitted to the Division on an annual basis (Appendix XVI, page 5). The applicant will notify surface owners of the mining schedule (page 4-49).

No perennial streams, significant aquifers, public buildings or major impoundments occur within the areas projected to be mined during the proposed permit term.

Compliance

The applicant has provided information about mining methods and locations, overburden thickness and lithology, vertical movement, renewable resource lands and structures.

Maximum subsidence of eight feet is projected for areas at the southern end of East Mountain, primarily within Section 32, 33, and 28, T17S, R7E. Spring 84-56 occurs in Sections 28 (Maps 3-1 and 4-5 where overburden thickness is approximately 1750 feet (Map 2-10). In early 1994, at the end of the proposed permit term, mining of the Blind Canyon seam is projected to begin in the Flag Lake Canyon and Roans Canyon area of East Mountain (Section 18 and 19, T17S, R7E and Sections 13 and 24, T17S, R6E). Springs 84-53, 79-32, 79-33, 79-26 and 79-27 occur (Map 4-5) within the area of proposed mining where maximum subsidence is also projected to be eight feet. Overburden thickness ranges from 1250 to 2000 feet beneath these springs (Map 2-11).

Longwall mining of the Hiawatha seam is proposed for areas that underlie cliffs. Mining in Panels 10th East and 17th West appear to pose the greatest risk for cliff spalling because the panels are oriented parallel to cliffs. Development in Panels 9th East and 13 West through 16th West will be at a somewhat lower risk for cliff spalling because panels are oriented perpendicular to the cliffs.

Although the cliff area has been identified as raptor nesting habitat, no nests are currently located above the proposed mine workings. No other renewal resources have been identified in the areas that may be impacted by cliff spalling.

Although subsidence monitoring data suggest a low potential for subsidence-induced surface impacts when overburden thickness is greater than 1,200 feet, the possibility of subsidence-induced material damage that results in the reduction of reasonably foreseeable use of surface lands cannot be excluded. Accordingly, the applicant has provided plans to restore surface lands and structures in compliance with UMC 817.24.

The applicant has provided a subsidence monitoring plan that describes surveying methods, schedules for collecting and submitting quantitative data as required by UMC 817.121 and notifying surface owners according to UMC 817.122.

Mining will not occur beneath structures or resources described under UMC 817.126. Therefore, the requirements of UMC 817.126 are not applicable.

The applicant is in compliance with this section.

Stipulation

None.

UMC 817.131-.132 Cessation of Operations -(PGL)

Existing Environment and Applicant's Proposal

The applicant commits that before cessation of mining and reclamation operations for a period of thirty (30) days or more, a Notice of Intention to Cease or Abandon Operation will be submitted to the Division (page 4-47.2).

The applicant proposes to permanently reclaim the Cottonwood/Wilberg Mine.

Compliance

The applicant's commitment to submit the Notice of Intention to Cease or Abandon Operations to the Division with all of the required information as well as conduct the required monitoring meets the requirements of this section.

The PAP meets the requirements to permanently reclaim the site.

The applicant is in compliance with this section.

UMC 817.133 Postmining Land Use-(BAS)

Existing Environment and Applicant's Proposal

Land use information is described on pages 2-175 to 2-182. Land uses within the permit area include mining, recreation, livestock grazing, wildlife habitat, and limited timber harvest.

Postmining land uses are described on pages 4-38 and 4-39. Primary uses are wildlife habitat and livestock grazing.

Compliance

The reclamation plan (Part 4) is compatible with postmining land uses, and will restore wildlife, recreation, and livestock uses, commensurate with those conditions which existed prior to mining.

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.150-.176 Roads-(WAW)

Existing Environment and Applicant's Proposal

There are five facility roads at the Cottonwood/Wilberg Mine area: 1) haul road, 2) truck turn-around, 3) service road 4) portal road, 5) fan access road (page 3-52).

The haul road is a continuation of the plant access highway, State Road No. 57. It is 28 feet wide for two-way traffic, with a grade of 8 to 12 percent. Construction consists of a 6-inch thick gravel base course on a prepared subgrade, topped with a 6-inch thickness of asphalt. Super-elevations on curves are designed for speeds of 40-50 mph.

The truck turn-around is also 28 feet wide. The road is level from the point of exit from the haul road through the platform scale at the truck loadout bin and around the 180° turn heading back to the haul road. A vertical curve in the road provides the transition to a 12 percent slope matching the slope of the haul road at the

junction of the two roads. Construction of the truck turn-around is the same as the haul road. Super-elevations on curves are designed for speeds of 5-30 mph. The haul road and truck turn-around are used for the transportation of coal, and therefore, are defined as Class I roads.

The haul road was designed and constructed by the Utah Department of Transportation (UDOT). The truck turn-around was included in the Roberts and Shaefer Facilities Design and Certification (page 3-58). Road plans and cross sections are in Appendix IX and a copy of the road construction variance is in Appendix X.

The service road starts with a 150-foot long transition section at the junction of the haul road and truck turn-around and terminates at the upper storage yard. The service road is 20 feet wide for two way traffic, with a nominal grade of 12 percent.

The portal road starts at the upper storage area, then turns west at a 6 percent grade to the elevation of the facility portals where it follows the existing grade, approximately 3 percent. Surfacing of the road terminates near the promontory substation. From this point, the road turns into the fan access road.

The fan access road is a dirt road constructed along an existing alignment and is essentially level.

The Cottonwood Mine access utilizes the portal road, to a point adjacent to the upper storage yard where a spur road was cut along the western coal outcrop providing an access to the main portal and fan portal.

The service road, portal road, and fan access road are used more than six months out of the year and therefore, are classified as Class II roads.

A class II access road is proposed for the Cottonwood Fan Portal. The road will utilize an existing road that originally served the Old Johnson Mine (page 3-21). Plans and cross sections are depicted on Maps 3-7, 3-8, and 3-12.

Roads will be cleared of snow and debris as needed to maintain proper drainage and utility. Resurfacing of roads will be performed as needed to maintain grade and prevent erosion (page 3-55).

The applicant's proposal for reclamation of roads is discussed on pages 4-3 through 4-5. The asphalt and gravel road base from the service road and truck turn-around, and concrete in the lower parking lot will be removed and disposed on site. Material will be excavated from berms along roads, the upper and lower parking lots, Cottonwood/Wilberg Mine storage yard, and the upper storage yard to use as backfill for each facility area and adjacent road cuts. Final slopes will be 2h:1v. The unpaved access road at the Waste Rock Storage area will be scarified prior to revegetation.

Compliance

The applicant adequately addresses the designs, locations, maintenance, and reclamation of Class I and Class II roads. There are no existing or proposed Class III roads at the Cottonwood/Wilberg Mine.

Large sections of the Class I and Class II road grades exceed 10 percent and were granted a construction variance by the Division on May 25, 1978.

The applicant is in compliance with this section.

Stipultions

None.

UMC 817.180 Other Transportation Facilities-(PGL)

Existing Environment and Applicant's Proposal

The coal handling circuit at the Cottonwood/Wilberg Mine includes seven conveyors which are covered to prevent wind erosion. These conveyors are regularly maintained and will be dismantled and removed from the site (page 3-57).

Compliance

The applicant commits to maintain and reclaim the conveyors so that damage to fish, wildlife, and related environmental values are prevented.

The applicant is in compliance with this section.

UMC 817.181 Support Facilities and Utility Installations-(PGL)

Existing Environment and Applicant's Proposal

The Cottonwood/Wilberg Mine has a truck loadout and scales, rock dust and storage tank, concrete storage silo, 69 KV powerlines, exhaust fans, and a power substation (pages 3-47, 48, 68 and 70). These facilities are regularly maintained and will be removed at the end of the mine life.

Compliance

The support facilities associated with the Cottonwood/Wilberg Mine will be maintained throughout the life of the facility to prevent environmental degradation. All of these facilities will be removed at the end of mining.

The applicant is in compliance with this section.

Stipulations

None.

UMC 828.00 Prime Farmland Investigation-(HS)

Existing Environment and Applicant's Proposal

The applicant on page 2-181 asserts a negative prime farmland determination within or adjacent to the proposed permit area due to: (1) absence of historical cropland land use, (2) disturbed area slopes in excess of 10 percent, and (3) absence of a developed irrigation source.

The SCS affirms a negative prime farmland determination (page 2-181A), by their finding: (1) no prime farmland soils on the disturbed area, and (2) slopes too steep for irrigation.

Compliance

On the basis of a soil survey and field review of the lands within the permit area, there are no soil map units that may be designated prime farmland by the SCS.

The applicant is in compliance with this section.

Stipulations

None.