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TECHNICAL ANALYSIS
DES-BEE-DOVE MINE COMPLEX

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GAS & MINING

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INTRODUCTION

Utah Power & Light Company (UP&L) of Salt Lake City, Utah, has submitted an underground mining and reclamation permit application (PAP) for the Des-Bee-Dove Mine Complex in Emery County, Utah, in compliance with the Coal Mining and Reclamation Permanent Program (Chapter I) of the State of Utah. The permit area and mining plan area consist of 2,847 acres and will be mined to the year 1998 (life-of-mine). The term of permit is five years, with right of successive renewal for the permit area, which is the life of mine. The Des-Bee-Dove Mine Complex is presently operating under an interim mining permit issued by the State of Utah, Division of Oil, Gas and Mining (UDOGM) (Act/015/107) issued on May 11, 1978.

The Des-Bee-Dove Mine Complex is one of three separate mine facilities owned by UP&L. They are located in the area of East Mountain (T17S, R7E), and are largely within the Manti-LaSal National Forest. The three mines are the Wilberg, Deer Creek, and Des-Bee-Dove, containing three mineable coal seams: the Hiawatha, Cottonwood, and Blind Canyon. Only two of these seams exist in the Des-Bee-Dove Mine Complex. These are mined in three mines: the Deseret, Beehive and Little Dove. The Hiawatha (lower) seam is mined through the Deseret mine. The Blind Canyon (upper) seam is mined through the Beehive and Little Dove Mines. The anticipated life-of-mine production is near 8.3 MM tons. Total in-place reserves within the Des-Bee-Dove mine boundaries are approximately 17.2 MM tons. The mining plan consists of a system of mains and sub-mains connecting a series of room-and-pillar continuous mining sections. Estimated annual production averages 725,000 tons.

UP&L acquired the Des-Bee-Dove Mine Complex in 1972 from the Deseret Coal Company, a Latter Day Saints (L.D.S.) Church welfare project. The L.D.S. Church and the Castle Valley Fuel Company mined the property from 1938 to 1947. From 1936 to 1938 the mine workings were operated by two men, Edwards and Broderick. Mining began in the canyon in 1898 as the Griffith Mine.

The Des-Bee-Dove surface facilities are located in three areas: a 20.0 acre canyon site in an unnamed wash on the southeastern perimeter of East Mountain; on 50 acres of haul road connecting the Wilberg mine and Des-Bee-Dove Mine Complex (both owned by UP&L); and a 4.5-acre sediment pond and storage site below the main facilities area. Surface facilities at the main site include the following: earthen structures, coal stockpile, tippie, facility conveyors, parking lot, office-bathhouse, warehouse, underground shop, materials storage areas, access and service roads, mine ventilation fans, power supply and substation, potable water system, sewer treatment system, and drainage systems. There are 17 portals associated with the mine, all of which, with the exception of two ventilation portals, are located at the main facilities area.

Coal Leases

The 2,847 acres contained in the Des-Bee-Dove permit area cover all or part of the following Federal coal leases:

	Coal Lease Area
U-02664	920 acres
SL-050133	80 acres
SL-066116	520 acres

Fee owners of coal to be mined in the Des-Bee-Dove permit area include:

The Estate of Malcolm McKinnon	48 acres
UP&L	1,000 acres

Other lands for which UP&L has right of entry:

	Area
State of Utah Special Use Lease Agreement No. 436	40 acres
U.S. Forest Service (USFS) Special Use Permit	100 acres
Bureau of Land Management (BLM) Permit for Haul Road	28 acres
Forest Service Permit for Haul Road	9 acres
State of Utah Permit for Haul Road	50 acres

Description of Operations

The Des-Bee-Dove Mine Complex is a multi-seam operation utilizing room and pillar techniques for coal extraction. The mine is located in the Central Utah coal basin and will be operating in an area known as East Mountain. Full extraction is planned in the panel sections where pillars will be pulled. Extensive areas in both seams have already been mined in this operation.

The seams which will be recovered are the Blind Canyon seam and, approximately 100 feet below, the Hiawatha seam. Mining operations plan to recover the uppermost seam first then the lower seam. Approximately 390 acres of mineable coal remain in the Hiawatha seam and 558 acres in the Blind Canyon seam that are accessible from the Des-Bee-Dove Mine Complex. The minimum seam thickness that can be economically recovered is feet. This limit defines the horizontal extent of mining in many areas. The thickness of coal in the mine area reaches 16 feet, though 10 feet appears to be about average.

Geologic Setting

The coal seams are located in the lower 150 feet of the Blackhawk Formation. Map 2-4 (PAP, Vol. 4) shows four cross-sections through the mine area. Below the Hiawatha seam is the Starpoint Sandstone which is a marker bed between the Blackhawk Formation and the Mancos Shale. Located approximately 750 feet above the Blind Canyon seam is the Castlegate Sandstone. This massive sandstone is almost 200 feet thick in this area and is a prominent cliff former. Above the Castlegate Sandstone is the Price River Formation, which is sandstone interbedded shale and conglomerate and is approximately 350 feet thick. The North Horn Formation lying above the Price River Formation is composed of interbedded shales and sandstones. This formation forms the cap of East Mountain in the area of the Des-Bee-Dove Mine Complex. Figure 2-2 (the page after 2-60, PAP Vol. 1) shows the general stratigraphy of the mine area. All of the above noted formations occurring above the Mancos Shale are part of the Mesa Verde Group.

Renewable Resources

Renewable resources exist above the mine; however, no structures exist in the area over the mine except for unimproved access roads. The renewable resources that exist are springs, seeps, grazing land, timber and wildlife habitat. The springs and seeps are shown on Map 2-11 (PAP, Vol. 4). The Ground Water section of this technical analysis (Chapter III) provides a detailed description of the hydrologic characteristics of the springs and seeps. In general, the springs emanate from the North Horn Formation on East Mountain. Only two springs emanate from the North Horn Formation within the Des-Bee-Dove permit area and these occur on or near major faults.

Land uses above the mine include deer summer range, elk winter range, and raptor habitat (Map 2-19, PAP, Vol. 5). The raptor habitat generally follows the sandstone outcrops in the eastern section of the mine area.

Hydrologic Resources

The natural terrain of the permit area is rocky, dry and very steep, with moderate vegetation. The watershed above the sediment pond has an area of 298 acres, of which 86 acres are located above the facilities area (Figure 1, Appendix VII, PAP, Vol. 3). All streams in the permit area are ephemeral with runoff occurring only in response to periods of intense rainfall. Average annual precipitation is approximately 14.0 inches. Estimated annual surface runoff for the Cottonwood basin (see Cottonwood CHIA, page 2.54) is 4.3 inches. Total annual surface runoff from watersheds in the Des-Bee-Dove permit area is probably less than 2.0 inches with evaporation accounting for 10.0 inches and deep percolation to a ground-water table another 2.0 inches.

Historically, the Des-Bee-Dove mining operations have not produced water. As a result, water has been imported to the mines for such purposes as dust control, bathing and sanitation. Sources of imported water have included a pipeline from Burnt Tree Spring, several miles to the west, and delivery of water by tanker truck. The recent source of water is via a pipeline from the Wilberg mine to a sump in the Little Dove mine. Since the Wilberg mine was closed as a result of a fire on December 19, 1984, the applicant has rehabilitated a system which allows water to be pumped up to the mine from the sediment pond. Contact with isolated (or "meteoric") bodies of ground water has occurred on two occasions (UP&L Hydrologic Monitoring Program Annual Report for 1983, page 45).

The permit area is bounded on the west by the Deer Creek and Bear Creek faults. The Des-Bee-Dove permit area is not overlain by the Flagstaff Formation which is the main recharge area for ground water on East Mountain. Two springs occur in the permit area, both associated with the Deer Creek and Bear Creek faults. The absence of springs in the permit area and the lack of ground-water inflow to the mines is largely for two reasons. First, the lateral flow of ground water is disrupted by the displacement of the Deer Creek and Bear Creek faults. Second, the recharge rate is low since the permit area is located on a portion of East Mountain that receives low precipitation.

Vegetative Resources

Vegetation information can be found on pages 2-102 through 2-120 (PAP, Vol. 1) and in Appendix II. The revegetation plan is discussed on pages 4-11 through 4-22 (PAP, Vol. 2).

The permit area includes five major vegetation types, including mixed conifer, pinyon-juniper, sagebrush, grass, and salt-desert shrub. Only pinyon-juniper and salt-desert shrub communities have been disturbed by mine facilities. Pinyon-juniper communities occur on steep rocky slopes with a southern exposure and on more gentle terrain at lower elevations. At the lowest elevations the pinyon-juniper type grades into the salt desert shrub community.

Baseline data were not collected. The main facility area was constructed prior to the enactment of SMCRA. The Desert sediment pond and Des-Bee-Dove/Wilberg Junction Road were constructed after enactment of SMCRA. Reference areas were selected and sampled from representative locations within the permit area.

The main facility area has displaced a total of 20 acres of vegetation from the pinyon-juniper community. An additional 4.5 acres of salt-desert shrub vegetation have been displaced by the Desert Sedimentation Pond, along with 50 acres of salt-desert shrub displaced by the Des-Bee-Dove/Wilberg Junction Road. It is expected that this acreage will be lost for the duration of mining and reclamation. Comparisons of similarity between each of the two reference areas and estimates of the pre-disturbance characteristics of respective disturbed communities are presented on page 2-113 (PAP, Vol. 1). The indices of similarity showed values of 83.3 and 87.5 percent for reference areas of pinyon-juniper and salt-desert shrub, respectively.

Field investigations revealed no threatened or endangered species present near any area of disturbance. The Office of Endangered Species, U.S. Fish and Wildlife Service (USFWS), provided a letter on August 15, 1983, stating that they have found no potential conflict with the proposed action.

Soils

Soils occurring within the proposed permit area are composed of four soil mapping units. These soils are Typic Cryochrepts - Lithic Cryorthents - Rock Outcrop, loamy-skeletal, shallow association, 40 to 60 percent slopes; Pachic Cryoborolls, loamy and loamy skeletal, 10 to 25 percent slopes; Typic Cryoborolls, loamy and loamy skeletal, 25 to 40 percent slopes; and Chipeta - Badlands complex, 10 to 25 percent slopes, eroded.

Due to previous mining operations, little soil remains on disturbed areas. The final graded surface to be used as a seedbed will be composed primarily of cut, fill, and mine-generated spoil materials. The pH of selected spoil samples ranged from 7.1 to 8.8 with coal waste samples having values of 7.1, 7.5, and 10.0. Electrical conductivity values for coal wastes and spoil samples taken in 1980 and 1983 were low, ranging from 0.3 to 2.5. Sodium adsorption ratios were relatively low for most materials analyzed in 1980 (< 1.0) and somewhat higher for materials analyzed in 1983 (2.76 to 3.28). Nitrogen, phosphorous and potassium levels were generally low for all samples analyzed. Percent saturation values for 1983 fill samples ranged from 20 to 30, indicating coarse spoils with relatively low water-holding capacity. Textures of 1980 fill samples were primarily sandy loam. Textures of 1983 samples were sandy clay loam (two samples) with the remaining sample a sandy loam. Soil sampling information for the Deseret sediment pond and sludge disposal open area does not exist as topsoil was determined by the Office of Surface Mining (OSM) and UDOGM to be absent (applicant's response to DOA, 1/27/84). Mancos shale was present in the surrounding area associated with a thin layer of poor soil material derived from Mancos Shale and badland parent materials. No soil information was presented for the Des-Bee-Dove/Wilberg Junction Road portion of the permit. It can be assumed from the proximity of the road to the sediment pond that soils which had overlain this road are of comparable quality to those associated with the sediment pond.

The soils which are found adjacent to the disturbed area include the Comodore-Beenom Complex (Co-Be), 40 to 60 percent slopes, and the Rock Outcrop - Rubble Land - Sunup Gravelly loam (Ro-R-S), 40 to 70 percent slopes. The Co soil (50 percent of unit) is shallow and well drained and primarily supports mixed conifer vegetation. The Be soil (40 percent of unit) is also shallow and well drained and primarily supports grass vegetation. The Rock Outcrop is from sandstone and shale with Rubbleland boulders from sandstone (75 percent of unit). The S soils (25 percent of unit) are shallow and formed in material derived from sandstone. Permeability is moderately rapid in the soil above the rock.

Fish and Wildlife Resources

Wildlife species inhabiting the mine permit area and vicinity are typical for this region of the Wasatch Plateau, and no critical habitats for threatened or endangered wildlife species occur in the areas disturbed or to be disturbed by mining operations. The bald eagle is a winter visitor to the region but will not be affected by mine activities.

Cliffs in the vicinity of the mines and facilities area represent potentially valuable cliff-nesting habitat for several species of raptors (e.g. golden eagle, red-tailed hawk, and prairie falcon). Wooded habitats within the permit area also provide nest sites for tree-nesting species such as northern goshawk, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, American kestrel, and screech owl. A 1982 U.S. Fish and Wildlife raptor survey for cliff-nesting species identified one inactive golden eagle nest (#87) approximately 1,500 feet southeast of the Des-Bee-Dove Mine Complex area. Map 2-17 (PAP, Vol. 5) gives the location of the nest site. The USFWS has made recommendations concerning protection of raptor nest sites on or in the vicinity of the permit area in its letter dated November 17, 1981.

Mule deer occur within the mine plan area year-round. During the summer, they are found predominantly in habitats at the mid to upper elevations in the permit area (e.g., mixed conifer, sagebrush, and grassland). In the winter, habitats (especially pinyon-juniper) at the lower elevations along the benches and slopes of the southern portions of East Mountain in the vicinity of the Des-Bee-Dove Mine Complex are designated by the Utah Division of Wildlife Resources (UDWR) as critical mule deer winter range. Map 2-18 (PAP, Vol. 5) shows the location of mule deer winter range in relation to the mine permit area. The Des-Bee-Dove/Wilberg Junction Road traverses high-priority mule deer winter range.

Land Use

Surface ownership of the Des-Bee-Dove Mine Complex, including the facilities area and haulroad, is Federal (1,877 acres), private (920 acres) and State (50 acres). Mineral ownership within the permit area consists of Federal and fee coal. No oil or gas wells have been drilled within the permit area, and no gas or oil fields are known for the south end of East Mountain.

Premining land uses in the disturbed areas associated with the Des-Bee-Dove mine were livestock grazing and wildlife habitat. Land use on and adjacent to the permit area consists of recreation, mining, wildlife habitat, and limited livestock grazing. Land use and local land use classifications are shown on Map 2-17 (PAP, Vol. 5). Recreational use of the permit area occurs primarily as hunting and sightseeing on East Mountain.

Coal mining in the vicinity of the Des-Bee-Dove Mine Complex began as early as 1898. UP&L Co. has operated the Des-Bee-Dove Mine Complex since 1972. No information on production, prior to UP&L Co. ownership, is available.

No farming or commercial forest harvesting has occurred within the permit area. In the vicinity of the mine facilities, steep, rocky terrain, poor soils, and low precipitation preclude any potential for farming. The predominance of rugged terrain and rocky cliffs also limits livestock grazing in the vicinity of the mine portal and facilities. BLM grazing allotments in the vicinity of the mine portal areas are judged in fair condition with a downward trend. Range condition for USFS land on East Mountain above the mine portal area is judged as good, with a static to upward trend. Pinyon-juniper and desert shrub are the only vegetation types that have been disturbed by surface mining activities. Total productivity of pinyon-juniper ranges from 25 to 100 lbs/acre (dry weight) on the steep rocky slopes, as estimated by the

applicant, to 300 to 324 lbs/acre (dry weight) on the benches, as estimated by the U.S. Forest Service. Desert shrub range productivity is estimated at 100 to 285 lbs/acre (dry weight).

I. TOPSOIL

1.1 Applicant's Proposal

General

The applicant provided a soils map and corresponding discussion which generally characterized the soils (to subgroup) occurring over the entire permit area (PAP Vol. 1, pp. 2-128 to 2-129). Mapping corresponded basically to an Order III-IV Soil Conservation Service (SCS) survey. With the exception of possible subsidence effects, these soils will not be disturbed by mining operations.

Mine Area Proper

The area to be affected by mining operations in the surface facility area at the mine proper (approximately 20 acres) has been disturbed by previous mining activities. No soil exists on the area to be redisturbed. A general survey of cut, fill and immediately adjacent soils was conducted and submitted. In 1980, a sampling program was initiated to characterize fill material which would serve as the planting medium following final grading (Vol. 2, Tables I and II, pages 4-9 and 4-10). Additional sampling was conducted in 1983 to further evaluate the physical and chemical characteristics of fill material and coal wastes (see Tables I and II as cited above).

Because the Des-Bee-Dove Mine Complex site is located on a previously disturbed site where no topsoil was salvaged, existing cut-and-fill material will constitute most of the seedbed material following grading. This medium, based on chemical and physical analysis, is considered generally suitable for reclamation given the absence of topsoil materials. Electrical conductivity (EC) and sodium adsorption ratios (SAR) are within acceptable limits. One pH value (8.8) was relatively high, though EC and SAR values for the sample were low. Textures ranged from sandy loam to sandy clay loam. Water-holding capacities are low (Vol. 2, Tables I and II, pp. 4-9 and 4-10).

Since soil material is lacking for reclamation, the applicant proposes to develop a substitute soil by temporarily reclaiming various existing fill slopes which will not be disturbed during mining operations (see Section X, Revegetation). Surface material of these slopes, through temporary reclamation, will increase in organic matter content and microbial populations thereby providing a planting medium superior to existing fill materials. At the onset of grading, this "topsoil" (cut-and-fill seedbed material) would be stripped from the reclaimed slopes and temporarily stockpiled. As grading is completed, this "topsoil" would be redistributed on newly graded surfaces to a depth of 6 to 12 inches at random locations over the site to enhance reclamation potential.

Sediment Pond

The soil overlying the sediment pond disturbance was characterized to complex level (Vol. 2, pp. 2-130 and 2-131). Series and mapping unit descriptions were provided for the soil assumed to have overlain the disturbance. These soils are derived from Mancos Shale and badland parent material. The soils are shallow, well drained and alkaline. Low plant productivities are characteristic of these soils. Fill material stockpiled during construction of the sediment pond will be redistributed during grading and contouring. Grading and recontouring will follow dewatering of the pond (Vol. 2, pp. 4-17 to 4-22).

Haul Road

The Des-Bee-Dove/Wilberg Junction Road is constructed upon the Masuk tongue of the Mancos Shale on layers of terrace debris which, in places, overlies the Mancos Shale (Vol. 1, revised p. 2-70). Topsoil was not salvaged at the time of construction. The applicant has not provided the results of soil laboratory analysis for the proposed topsoil substitute material. The applicant has, however, provided plans to collect soil samples and provide soil laboratory analysis identifying the best suitable substitute topsoil (Vol. 1, p. 126A a). The applicant proposes to use road fill material as a topsoil substitute and sample the fill areas during the 1985 field season. In the absence of this information, and considering the proximity of the road to the sediment pond, it can be assumed for the purposes of this analysis that these soils characteristics roughly parallel the soils associated with the sediment pond disturbance. Following the conclusion of mining, road culverts will be removed and the road graded prior to revegetation.

Seedbed material of all disturbances (mine proper, sediment pond, haul road) will be sampled following grading for requirements and to detect the presence of localized high EC and SAR concentrations. Fertilizer will be broadcast prior to planting according to soil test results (Vol. 2, pp. 4-16 and 4-19).

1.2 Evaluation of Compliance of Proposal

UMC 817.21 Topsoil: General Requirements

The applicant has not provided laboratory analysis data for topsoil substitute material to be used to reclaim the Des-Bee-Dove/Wilberg Junction Road disturbance. A commitment to provide this information has been provided by the applicant.

UMC 817.22 Topsoil: Removal

The applicant has not removed topsoil prior to construction of the Deseret sediment pond and the Des-Bee-Dove/Wilberg Junction Road.

UMC 817.23 Topsoil: Storage

The applicant has not stored topsoil for final reclamation of the Deseret sediment pond and the Des-Bee-Dove/Wilberg Junction Road.

UMC 817.24 Topsoil: Redistribution

The applicant has not removed or stored topsoil for the Des-Bee-Dove/Wilberg Junction Road. However, The applicant has provided plans to identify suitable topsoil substitute material for redistribution over the graded Des-Bee-Dove/Wilberg Junction Road.

UMC 817.25 Topsoil: Nutrients and Soil Amendments

The applicant is in compliance with this section.

1.3 Conditions

None

II. HYDROLOGIC BALANCE - SURFACE WATER

2.1 Applicant's Proposal

The Des-Bee-Dove Mine Complex facility is located on a 20-acre site in an unnamed canyon wash on the southern perimeter of East Mountain. There are no perennial or intermittent streams within the permit area. The natural terrain is rocky, dry and very steep, with moderate vegetation. The off-mine portions of the facilities include a haul road from the Wilberg mine to the Des-Bee-Dove mine, a waste rock disposal area (permitted under the Wilberg mine), and the sedimentation pond. The watershed area is 298 acres, with 86 acres of undisturbed area above the mine.

Diversion ditches and a sediment pond are used to protect the surface hydrologic balance (see pages 3-27 to 3-28, 3-38 to 3-41, PAP, Vol. 2, Appendix VII, PAP Vol. 3). The runoff from the undisturbed area above the mine site is bypassed through the facilities area using a series of open channels and culverts. Storm runoff from within the mine facilities area is collected in a system of open ditches, bermed roadways and culverts, and discharged to the tributary below the mine facilities. Immediately downvalley of the mine facilities, a sediment pond detains runoff and sediment yield from 298 acres of watershed, including 20 acres of disturbed area. The right of way for the haul road is 86 acres in size, 50 acres of which is disturbed by the roadway. Drainage for the roadway is provided by ditches and culverts.

The upper pad contains the Little Dove and Beehive mines. Discharge from the undisturbed area above these mines reaches the pad over the top of the Beehive mine. Historically, this inflow has been used to augment the supply of water available for mining operations in the Des-Bee-Dove Mine Complex. The applicant proposes to construct a controlled diversion structure that will collect runoff from the undisturbed area and discharge it down a specially designed road section to a large-diameter culvert (see Map 3-11, PAP Vol. 5 for detailed drawings of the drainage plan) at the switchback above the Tipple. This culvert discharges down a sandstone cliff face to a concrete-lined stilling basin located on the Tipple fill. Discharge from the stilling basin is conveyed in an asphalt-lined channel to a riprap-lined channel that extends over the remainder of the Tipple fill. The road to the Tipple has been relocated and a dip crossing provided in the asphalt-lined channel for traffic accessing the facilities area pursuant to requirements under UMC 817.153(a) and (e). The riprap-lined channel transitions to another large culvert section, and then to a half round pipe section that conveys the flow to the

bottom of the Tipple fill and into the natural drainage channel. A riprap energy dissipator is provided at the base of the Tipple fill. The conveyance system is designed to contain the 10-year, 24-hour storm and provides 1.0 foot of freeboard in the open channel segments of the design. The design accounts for superelevation and is conservative in calculating energy dissipation requirements.

The runoff from the mine facilities area is collected by a system of open ditches, bermed roadways and culverts that have a capacity to convey the peak runoff from a 10-year, 24-hour storm. The system is shown on Map 3-8 (PAP, Vol. 5).

Because of limited space within the mine facilities area and precipitous landforms surrounding the Des-Bee-Dove Mine Complex, the sedimentation pond was located down-valley of the main facilities area and placed at the mouth of the dry wash that drains the mine site. The storage requirement for the pond is 19.7 acre-feet, which includes 17.7 acre-feet of runoff and 2.0 acre-feet of sediment. The total pond capacity is 19.7 acre-feet. The design runoff volume was determined using a rainfall excess of 0.7 inches (corresponding to a SCS curve number of 85 and a rainfall depth of 1.9 inches) for the 10-year, 24-hour storm over 298 acres of the watershed. The sediment storage volume of 2.0 acre-feet is based on 0.1 acre-foot/acre sediment yield over a disturbed area of 20 acres. The applicant's annual sediment yield reaching the pond to date has been about 1.0 acre-feet.

The sediment pond has withstood a major storm event (2.5 inches). The amount of sediment and debris trapped in the pond required a significant cleanup effort (see page 3-41-C, PAP, Vol. 2). A sediment disposal area was established during cleanup adjacent to the sediment pond. The final configuration of the disposed sediment has a surface area of 0.93 acres and an average height of 35 feet. Runoff from the sediment storage site is channeled to the sediment pond for treatment (see Surface Drainage Map, MRP Amendment for Des-Bee-Dove mines, June 12, 1984).

The Des-Bee-Dove Mine Complex to Wilberg Mine haul road crosses a topographic feature known as Danish Bench. The road is 2.3 miles in length and has numerous culverts that bypass runoff from ephemeral channels on Danish Bench. There are four culverts in excess of 24 inches in diameter and 19 24-inch-diameter culverts that provide roadway drainage. Of the large diameter culverts, one conveying flows for Grimes Wash (station 232+20 Map 5-1, Sheet 11 PAP Vol. 6) has an end area greater than 35 feet. Additional discussion regarding the hydraulic design of the culvert system for the haul road is given in Chapter 11 of this technical analysis (TA).

Reclamation of the drainage at the Des-Bee-Dove Mine Complex will consist of removing the temporary drainage system and the diversion, and, at the end of the bonding period, the sediment pond. All fills will be removed above the tipple yard, which will result in a permanent channel on the original bedrock material. A riprap-lined channel will be constructed across the tipple yard fill. This channel will discharge down a riprap fan off the end of the fill, returning to the original channel. Two smaller channels will be built to prevent water from flowing onto the fill from the canyon sides and to prevent water from flowing over the steep down-valley face of the fill. All channels are designed to pass the 100-year, 24-hour runoff peak flow. The details of the reclamation drainage plan are shown on Maps 4-1 through 4-3 (PAP, Vol. 5).

A significant feature of the reclamation drainage plan is the bypass channel and riprap fan for conveying flows across the tipple yard fill. The applicant has proposed to leave the fill in place. The channel is routed along the north side of the fill, then down the riprap fan located off the fill itself. The channel will be riprap-lined (mean diameter of 1.25 feet) and have a base width of 15 feet with 2H:1V sideslopes. Where the channel crosses fill material, a 6-inch-thick clay liner will be used to prevent seepage from the channel to the fill, followed by 12 inches of filter material consisting of three gradations. On natural ground a 9-inch-thick filter with one gradation will be used. A transition is provided for directing flows into the channel and to the cascading rock fan. Since the channel will occupy the same bench as the mine access road, a grouted riprap road ford is provided at the upstream end of the transition. The fan will be constructed with a riprap size sufficient to provide energy dissipation and stability. An energy dissipation pool is provided at the base of the fan for transitioning flows into the natural channel.

The sediment pond will be left in place to control sediment yields during the bonding period. Maintenance work is proposed in the late summer of each year to stabilize those areas experiencing erosion. After the bonding period is complete and vegetation is satisfactory, the sediment pond will be dried out and backfilled to approximate the original topography.

Reclamation of the haul road will involve removal of all culverts. Material from culvert excavation will be used to cover the remaining road sections. The ephemeral stream channels will be returned to their original condition.

2.2 Evaluation of Compliance of Proposal

UMC 817.41 Hydrologic Balance: General Requirements

The applicant is in compliance with the requirements of this section.

UMC 817.42 Hydrologic Balance: Water Quality Standards and Effluent Limitations

All discharge from surface drainage at the Des-Bee-Dove Mine Complex passes through a sedimentation pond, and no water is discharged from the mines. The sediment pond has been assigned NPDES permit UT-0023591. The applicant is in compliance with the requirements of this section.

UMC 817.43 Hydrologic Balance: Diversions and Conveyance of Overland Flow, Shallow Ground-water Flow, and Ephemeral Streams

The drainage basin encompassing the Des-Bee-Dove Mine Complex is ephemeral, with a total area less than one square mile. The temporary diversions proposed by the applicant meet all the requirements of this section. For permanent reclamation of the channel the applicant meets the requirements of this section; however, UMC 817.72(d) requires that surface runoff be diverted away from a valley fill. The applicant is in compliance with the requirements of section (f) and has shown adequate riprap, filter, and clay liner to safely pass the 100-year, 24-hour runoff peak flow (see Maps 4-1, PAP, Vol. 5). Given the precipitous terrain, the only other option for location of the permanent reclamation channel is to remove the tipple fill entirely. The

applicant has therefore requested a variance from the requirements of UMC 817.72(d). Considering that the tipple fill has been shown by the applicant to be geotechnically adequate (Appendix X, PAP, Vol. 3) and the channel design meets the requirements of this UMC 817.43(f), the variance has been granted.

UMC 817.44 Hydrologic Balance: Stream Channel Diversions

All streams within the Des-Bee-Dove Mine Complex are ephemeral with a total drainage area less than one square mile and hence do not fall under the requirements of this section.

UMC 817.45 Hydrologic Balance: Sediment Control Measures

The existing drainage system at the Des-Bee-Dove Mine Complex provides an adequate means of controlling sediment runoff. All disturbed area runoff is directed to a sediment pond using a system of culverts, open ditches, bermed roadways, and a short stretch of natural channel.

During the bonding period, it is expected that some erosion will occur on areas being revegetated. Annual maintenance is planned for these areas and runoff will be routed to the sediment pond. This will provide an adequate means of sediment control during this period. Upon final reclamation, the sediment pond will be renovated, and the bond should be adjusted to include only the sediment pond area.

The sediment pond should be maintained until effluent limitation requirements can be met from the runoff from the reclaimed areas. Once these requirements are met, the sediment pond can be regraded and reclaimed, and alternative sediment control measures implemented until effluent limitation requirements are met from runoff from the reclaimed sediment pond area.

UMC 817.46 Hydrologic Balance: Sedimentation Ponds

The sediment pond will completely retain runoff from the 10-year, 24-hour storm. The sediment pond operates with a manual dewatering device. This device can produce a 24-hour detention time required to meet effluent limitations. Two acre-feet of sediment storage is provided below the elevation of the dewatering device.

The applicant provides hydrologic calculations to determine the magnitude of the 25-year, 24-hour event used to design the emergency spillway. A peak flow of 372 cfs was determined. Using this design flow and Appendix VII (Pap, Vol. 3), considering transition losses into the spillway the spillway length and pond elevations were determined. The applicant indicates that the current spillway width of eight feet must be enlarged to 30 feet. Modification of the spillway structure is shown in Appendix VII (PAP, Vol. 3).

All other requirements of this section have been addressed adequately by the applicant.

UMC 817.47 Hydrologic Balance: Discharge Structures

The applicant adequately addresses the use of energy dissipators at the outlets of the sediment pond and the permanent diversion and is in compliance with this section.

The applicant adequately addresses the use of energy dissipators at the outlets of the sediment pond and the permanent diversion and is in compliance with this section.

UMC 817.48 Hydrologic Balance: Acid-Forming and Toxic-Forming Materials

The applicant will bury any acid-forming and/or toxic forming materials under four feet of non-toxic material (See PAP, Vol. 2, page 4-5 and 4-6). The applicant is in compliance with the requirements of this section.

UMC 817.49 Hydrologic Balance: Permanent and Temporary Impoundments

The only impoundment at the Des-Bee-Dove Mine Complex is the sediment pond addressed under Section UMC 817.46. All additional requirements under this section have been addressed adequately by the applicant.

UMC 817.52(b) Hydrologic Balance: Surface Water Monitoring

Discharge from the Des-Bee-Dove sediment pond is monitored in accordance with NPDES requirements. No situation of noncompliance has been reported to date by the applicant. The applicant is in compliance with the requirements of this section.

UMC 817.54 Hydrologic Balance: Water Rights and Replacement

The applicant has committed to replace water supplies. Most as a result of mining operations in the subsidence monitor plan of their PAP. The applicant is in compliance with the requirements of this section.

UMC 817.55 Hydrologic Balance: Discharge of Water Into an Underground Mine

The applicant proposes to revise the present drainage route at the upper fill structure so that runoff from the undisturbed drainage above the mine complex does not discharge into the mine portals. The applicant's new proposed drainage route meets the requirements of UMC 817.43. Upon implementation of these plans the applicant will be in compliance with this section.

UMC 817.56 Hydrologic Balance: Postmining Rehabilitation of Sedimentation Ponds, Impoundments, and Treatment Facilities

Rehabilitation of all temporary diversions and sedimentation ponds at the Des-Bee-Dove Mine Complex have been addressed adequately by the applicant.

UMC 817.57 Hydrologic Balance: Stream Buffer Zones

No streams at the Des-Bee-Dove Mine Complex contain a biological community as defined under Paragraph (c) of this section and hence do not fall under its regulations.

2.3 Condition

Within 90 days of the effective date of this permit, the applicant must submit to the regulatory authority for review and approval, alternative sediment control plans for the Deseret sediment pond site. These must address the

timing and critical milestones of sediment pond removal during the reclamation liability period, and the methods (including maintenance plans) for control of sediment leaving the reclaimed disturbed areas and a map showing the designs.

III. HYDROLOGIC BALANCE - GROUND WATER

3.1 Applicant's Proposal

The hydrologic monitoring in the Des-Bee-Dove Mine Complex shows the mine workings to be essentially dry (see page 3-28, PAP Vol. 2). Ground-water inflow to the mines has been measured on two occasions (see PAP, Vol. I, page 2-73) and these rapidly diminished. The water-producing areas of the mines are, therefore, assumed to represent isolated pockets of stored ground water.

The dry nature of the Des-Bee-Dove Mine Complex contrasts to the wet conditions in the Wilberg and Deer Creek mines. This is attributed to the fact that the displacement of the Deer Creek fault effectively separates the mine from the source of ground water on East Mountain and that recharge over the permit area is low.

Data on the piezometric gradient in the underlying Starpoint Formation are presently being collected from within the Deer Creek mine. The applicant has stated in the 1984 Hydrologic Monitoring Report (page 39) that no piezometric level has been observed for the Starpoint Sandstone, indicating that the piezometric level is below the level penetrated by the drill holes.

As part of the applicant's hydrologic monitoring program for East Mountain, two springs in close proximity of one and other are monitored at one point where the first spring flows into the source of the second spring. The flow generated from the first spring is insufficient to measure, therefore both springs are measured together. Both springs occur in the Price River formation near the Deer Creek and Bear Creek faults. The remaining area of the permit is without springs or seeps.

3.2 Evaluation of Compliance of Proposal

UMC 817.13-.15 Casing and Sealing of Underground Openings

All surface drilled holes have been reclaimed according to the Geologic Survey's published Drill Hole Plugging Procedure and meets these regulatory requirements.

UMC 817.48 Hydrologic Balance: Acid-Forming and Toxic-Forming Materials

The underground development waste disposal area is shared by the Wilberg mine and Des-Bee-Dove Mine Complex. To avoid inconsistent references on both operation and reclamation of this single area, the Des-Bee-Dove PAP has included the design features of this area by reference. Issues unique to the Des-Bee-Dove Mine Complex affecting operation and reclamation of this disposal area were not identified. The regulatory authority therefore refers to the Wilberg technical analysis for the discussion of the operation and reclamation of the waste rock disposal site. The applicant was found to be in compliance with the requirements of this section in the Wilberg technical analysis (see Permit Number UT-001, 5/84).

UMC 817.50 Hydrologic Balance: Underground Mine Entry and Access Discharges

The portals of the Des-Bee-Dove Mine Complex will not discharge water from the underground workings due to the lack of ground water (see pages 4-1 and 3-28, PAP Vol. 2). The applicant is in compliance with the requirement of this section.

UMC 817.52(a) Hydrologic Balance: Ground-water Monitoring

One spring is monitored within the Des-Bee-Dove permit area. Monitoring of springs in the Wilberg and Deer Creek Mine permit areas is also conducted by the applicant (see 1984 Hydrologic Monitoring Report for example). The applicant's hydrologic monitoring of ground water for the Des-Bee-Dove permit area is in compliance when considered as part of the applicant's overall hydrologic monitoring program.

UMC 817.53 Hydrologic Balance: Transfer of Wells

No transfer is planned.

UMC 817.55 Hydrologic Balance: Discharge of Water Into an Underground Mine

Inflows to the Des-Bee-Dove Mine Complex from the Wilberg mine are reported by the applicant on a monthly basis in the hydrologic monitoring report. Data are submitted quarterly.

3.3 Conditions

None.

IV. PROBABLE HYDROLOGIC CONSEQUENCES

4.1 Applicant's Proposal

The applicant reports the land surface above the Des-Bee-Dove Mine Complex to be generally dry. The mine workings are also dry. Two springs are present in the permit area in an area where both seams of coal have been first mined. Monitoring of one spring has shown no impact to the flow of this spring to date. The applicant concludes that it is highly unlikely that mining will have any effect on the hydrologic regime in the area.

4.2 Evaluation of Compliance of Proposal

UMC 817.41 Hydrologic Balance: General Requirements

The Des-Bee-Dove Mine Complex is essentially a dry mine, meaning that saturated ground-water conditions do not occur within the strata from which coal is extracted. There is a long history at the mine complex for the need to import water for use in mining operations. The applicant's statement that the mine is dry (see page 3-38, Vol. 2, PAP) is a statement of historical fact. Imported water augments recharge to strata below the mining operation. The net effect of this increased recharge on water table in these lower strata is negligible. At the present time, mine water is obtained from the Desert

sediment pond. Prior to the closure of the Wilberg mine, water was piped from the Wilberg Mine sump into the Deseret mine sump. Subsidence within the permit area is not expected to alter the postmining unsaturated ground-water conditions in the Des-Bee-Dove Mine Complex area, since surface recharge conditions to ground water will remain unchanged. The mined area will remain isolated from the adjacent Wasatch Plateau ground water regime.

Subsidence at the boundary of the permit area may affect the flow of two small springs that are associated with the Deer Creek fault. Loss or reduction of flow from these springs would be a minor alteration in the prevailing hydrologic balance. It is not considered to be a likely impact based on studies and monitoring conducted to date. Planned mining operations at the Des-Bee-Dove Mine Complex are expected to achieve an even lowering of the strata over the mines. Monitoring of spring flow and subsidence is carried out by the applicant and will provide the necessary information to assess subsidence effects on spring flow.

No significant changes in surface-water quality or quantity are expected from Des-Bee-Dove mining operations. Water quality will increase slightly in TDS and TSS, but will remain well within standards for drinking water and will not cause material damage to the surrounding hydrologic balance. No consumptive use of surface water is made by mining operations. Storm runoff is retained for 24 hours in the sediment pond, then released.

4.3 Conditions

None.

V. MISCELLANEOUS COMPLIANCE

5.1 Description of Applicant's Proposal

By letter correspondence of August 3, 1978, UP&L proposed a sign and markers system to the UDOGM. The applicant submitted a Resource Recovery and Protection Plan to BLM for approval. The applicant's blasting plans are discussed in Appendix VI of the permit application package. Transportation facilities are discussed on pages 3-34 through 3-38 of the permit application package. Support facilities and utilities are discussed on page 3-15 of the permit application package.

5.2 Evaluation of Compliance of Proposal

UMC 817.11 Signs and Markers

UDOGM approved the applicant's signs and markers system by letter of August 31, 1978.

UMC 817.89 Disposal of Non-Coal Waste

Non-coal waste material is stored on site in concrete bins until collected and transported to a State approved commercial land fill. The applicant is in compliance with the requirements of this section.

817-59
The applicant is conducting mining operations so as to maximize the utilization and conservation of coal at the Des-Bee-Dove Mine Complex as stated by the Bureau of Land Management. The applicant is therefore in compliance with UMC 817.59.

note of

UMC 817.131 and .132 Cessation of Operations

The applicant is in compliance with the requirements of this rule.

needs ref to PAP

UMC 817.180 Other Transportation Facilities

The applicant is in compliance with this section.

UMC 817.181 Support Facilities and Utility Installations

The applicant is in compliance with this section

5.3 Conditions

None.

VI. EXPLOSIVES

6.1 Applicant's Proposal

Explosives were used at the Des-Bee-Dove Mine Complex to realign an access road to the lower pond face. Approximately 5,200 cubic yards of material were blasted. Due to the use of explosives on the surface, the applicant was required to meet UMC 817.61 to UMC 817.68. The applicant has provided information on blasting requirements in Appendix VI of the PAP.

All blasting was done under the supervision of a certified blaster and was conducted to meet the requirements of Utah Permanent Regulatory Program and the requirements of the Mine Safety and Health Administration, Department of Labor. The individuals were certified as provided by 30 CFR 850 and the State Industrial Commission.

There are no dwellings or buildings located within one-half mile of the mine site that are not owned by the applicant. Exhibit 1 in Appendix VI shows the proposed blasting record.

6.2 Evaluation of Compliance of Proposal

UMC 817.61 Use of Explosives: General Requirements

The applicant has stated that compliance with all Federal and State laws was achieved. In addition, blasting was conducted by a certified blaster. The applicant has stated that this certification was in accordance with 30 CFR 850 and applicable regulations of the State of Utah Industrial Commission. The applicant is in compliance with this section of the regulations.

UMC 817.62 Use of Explosives: Preblasting Survey

There are no structures located within one-half mile of the permit area, other than those owned by the applicant. This regulatory requirement does not apply.

IMC 817.65 Use of Explosives: Surface Blasting Requirements

There are no currently existing dwellings or structures within one-half mile of the area potentially affected by surface blasting. Therefore, part (a) of this section does not apply.

The applicant has stated that blasting occurred between sunrise and sunset. The applicant is in compliance with part (b) of this section of the regulations.

Information was provided concerning the warning and all-clear signals which was used during blasting operations and measures were taken to control access to the site. Therefore, the applicant is in compliance with parts (c) and (d) of this section of the regulations.

Blasting did not occur within 1,000 feet of any dwellings, or within 500 feet of any disposal wells, petroleum or gas-storage facilities, municipal waste storage facilities, fluid-transmission pipelines, gas or oil collection lines, or water and sewage lines other than those used by the mining operation. The applicant's facilities are located within 500 feet of blasting. However, since blasting was a very minor operation and it is in the applicant's best interest to protect these structures, blasting within this distance is acceptable. The applicant is in compliance with part (f) of this section of the regulations.

The applicant has provided a statement of compliance with regulations concerning the control of flyrock, airblast, and ground vibrations. The applicant is in compliance with parts (e), and (g) through (l) of this section of the regulations.

IMC 817.67 Use of Explosives: Seismographic Measurements

Since there are no structures within one-half mile of the area except those owned by the applicant, the applicant committed to using the scaled distance formula for control of ground vibration.

IMC 817.68 Use of Explosives: Records of Blasting Operations

The applicant has provided a sample blasting record which shows that all information required by this part will be recorded. The applicant is in compliance with this section of the regulations.

6.3 Conditions

None.

VII. PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL VALUES

7.1 Applicant's Proposal

The applicant's plan for protection of fish and wildlife is presented on pages 4-34 to 4-38 (PAP, Vol. 2). The applicant has committed to (1) reporting any golden eagle nesting activity in the vicinity of the mine disturbance areas to the USFWS, (2) consulting with the USFWS if any additional mine related developments are planned in the raptor nesting zone (Map 2-17 PAP, Vol. V), (3) placing deer crossing signs along the haul/access roads within the permit area, (4) reporting the occurrence of deer road-kills and snake dens to the UDWR, and (5) providing a wildlife educational instruction to employees to reduce the potential for harassment of wildlife. The UDWR is currently conducting a deer road-kill monitoring program that includes the Des-Bee-Dove Mine Complex access road and the Des-Bee-Dove/Wilberg Junction Road. If any hazardous areas are identified along the road within the permit area, the applicant will consult with the UDWR for appropriate mitigation measures (page 4-37, PAP, Vol. 2).

The applicant has supplied a map showing the location of golden eagle nests in relation to the mine facilities (PAP, Map 2-17) and has committed to consulting with the USFWS if any additional activities are planned in the raptor nesting zone (page 4-35, PAP, Vol. 2).

The 69 KV line that serves as the power source for the Des-Bee-Dove mine has been determined to be raptor-safe by the USFWS (letter dated Nov. 10, 1982, to UDOGM). Sufficient phase-to-phase and phase-to-ground clearances are provided on this line to preclude electrocution of large raptors.

Following cessation of mining, the applicant will restore the stream channel and revegetate disturbed sites. Plant species selection and planting patterns are designed to restore wildlife habitat as a principal postmining land use. Details of the revegetation plan are provided on pages 4-17 through 4-22 of the PAP (Vol. 2) and in Section X of this technical analysis.

Because of the importance of springs as a water source for the area's wildlife, as a final commitment, the applicant has stated (pages 4-37 and 4-38, PAP, Vol. 2), that any surface water disturbance resulting from subsidence associated with the Des-Bee-Dove mine will be replaced or repaired as follows:

1. "Streams will be bridged across bedrock fractures by culverts until sediments fill the cracks."

2. "Springs and seeps proven to be lost to subsidence action will be replaced by guzzlers which will be located and designed with prior regulatory authority approval."

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7.2 Evaluation of Compliance of Proposal

UMC 817.97 Protection of Fish, Wildlife, and Related Environmental Values

Surface disturbances associated with the Des-Bee-Dove Mine Complex total approximately 74.5 acres (haul/access road, main site, and sediment pond). This acreage denotes actual disturbance and does not include 36 acres of undisturbed right-of-way associated with the Des-Bee-Dove/Wilberg Junction Road. These disturbances will last for the life-of-mine and until reclamation is complete. Because of the limited areal extent of surface disturbance, wildlife impacts resulting from loss of habitat will remain relatively minor.

None of the areas affected by the mine represent any critical habitats for threatened or endangered wildlife species (USFWS Endangered Species Office letter of January 10, 1984). The bald eagle is a winter visitor to the region but will not be affected by mining activities.

Other mine associated wildlife impacts that may be more significant than direct loss of habitat include (1) human harassment of all wildlife, (2) mule deer road-kills, and (3) the potential effects of subsidence on springs and raptor cliff nesting habitat.

The effects of human harassment on wildlife, either inadvertent or purposeful, should be considered from a cumulative standpoint since at least three other mines are currently operating along the southern end of East Mountain. However, since premining baseline data for wildlife populations in the area are lacking, these effects are extremely difficult to quantify. However, UP&L has proposed an education program for mine employees to reduce the potential for harassment of wildlife. At a minimum, mining activities will likely preclude golden eagle nesting use of the inactive nest site within approximately 1,500 feet of the Des-Bee-Dove mine facilities (Map 2-17, PAP, Vol. 5).

The potential for mule deer road-kills is greatest during the winter months when mule deer congregate in high-priority winter range traversed by the Danish Bench and the Des-Bee-Dove/Wilberg Junction roads. However, unless a particularly hazardous area is identified by UDWR or applicant monitoring, this impact is not expected to be significant. The applicant has also committed to working with the UDWR to establish improved critical deer winter habitat to off-set the displacement of habitat by the Des-bee-Dove/Wilberg Junction Road.

Mine-related subsidence could impact springs on East Mountain and raptor cliff nesting habitat in areas where surface fracturing is possible. The effect of subsidence on springs and raptor cliff nesting habitat cannot be fully determined at this time. Future monitoring will be required to provide sufficient information regarding the extent of impacts related to subsidence.

With regard to subsidence impacts on raptor cliff nesting habitat, the applicant will be mining under several areas where the Castlegate Sandstone and Price River Formation form major escarpments in this area. Mining under these types of escarpments may have a significant impact on their stability. To date, significant fracturing of the Castlegate and Price River Formations has occurred over the Des-Bee-Dove Mine Complex (see the annual Subsidence

Reports, 1981 and 1982). It can be expected that this type of subsidence impact will continue as retreat mining occurs under the escarpments. However, based on the 5-year mine plan, mining under escarpments will not occur in any areas where active or inactive raptor nests have been located (Maps 3-1, 3-2 and 2-17, PAP, Vol. 5). As long as nesting does not occur in areas potentially affected by subsidence, no impacts to nesting raptors is expected. In addition, no significant impacts to raptor nesting habitat is anticipated, since subsidence-related fracturing of cliff faces would not be expected to eliminate cliff faces, but merely create new escarpments.

In the event that a new nest is established on an escarpment in a potential subsidence zone, the nest could be damaged or lost depending on the degree of subsidence. The applicant has committed to mitigating this potential impact.

7.3 Conditions

None

VIII. BACKFILLING AND GRADING

8.1 Applicant's Proposal

The mine facilities are described in the permit application package (PAP) in the mine facilities description starting on page 3-12. All of the described facilities are located in the 74.5-acre disturbance except for a breakout from the Deseret mine in Section 14 which has been constructed. All other ventilation for the mine is associated with the portals in the facilities area.

A development waste and coal waste disposal site is located below the Wilberg mine facilities area. This small fill structure has been described and evaluated in the Wilberg mine technical analysis. The fill receives coal waste and development waste from both the Wilberg mine and the Des-Bee-Dove Mine Complex.

The major earthen structures at the facilities area are shown on Map 3-10 (PAP, Vol. 5). These earthen structures are described in the PAP (Vol. 2, page 3-44). The major fill is Structure No. 1 and provides 4.1 acres of working space. This fill is constructed of approximately 200,000 cubic yards of waste rock, boney coal and coal fines. The applicant has reconstructed the fill as shown on Map 4-3 (PAP, Vol. 5). This reconstruction will entail grading of the fill to a 1V:2H slope.

The stability of Structure No. 1 has been evaluated by the applicant. Two exploratory holes were drilled through the pile and information obtained on the density of the material and the type of material. This information along with stability analyses of the fill are provided in Appendix 10 of the PAP. The applicant has determined a minimum safety factor for the fill of 1.4 assuming a friction angle of 32 degrees, cohesion of zero and a density of 71 pounds per cubic foot. The analysis in the appendix was conducted using the Spencer Method. With a cohesion of 100 pounds per square foot, a safety factor of 1.53 was determined. In the applicant's analysis using the Simplified Bishop method, page 3-56 of the PAP, a toe failure was assumed and a safety factor of 1.7 was determined.

The stability of the fill described as Structure No. 2 is described in the PAP in Appendix XI. The remaining fills are described on page 3-49.

Reclamation of the facilities site will entail the removal of all structures, backfilling of the portals, and backfilling of the facilities area to slopes no greater than 1v:2h. The volumes of material to be handled are itemized on the Quantities Summary Sheet following page 4-7 in the PAP. In addition to the quantities of material shown on this table, the applicant will be backfilling 16,296 cubic yards of material to reclaim Structure No.2. Structure No. 1 will remain, but a diversion will be constructed around the fill. The backfilling and grading plan is described in the PAP starting on page 4-1. All material will be backfilled in 18-inch lifts and compacted. Stability of the backfilled slopes is discussed in the PAP starting on page 4-6 during sampling.

All concrete above ground and all asphalt is to be buried in the backfill for Structure No. 2 with four feet of non-toxic material. All other material identified as toxic will be backfilled in this area (PAP, Vol. 2, page 4-6).

The applicant is also reclaiming the Des-Bee-Dove to Wilberg Bypass road. The proposed reclamation plan will require hauling of 263,300 cubic yards of fill material, 12,100 cubic yards of asphalt, and 20,200 cubic yards of road base. During construction of this road, approximately 624,000 cubic yards of material was excavated. Therefore, the applicant will only be replacing approximately 40 percent of the excavated material. As such, it is apparent that the site will not be returned to AOC. A cut structure of probably over 50 feet high will be retained. However, all drainage channels through the site will be reestablished. Retention of the cut structure is not inconsistent with surrounding landforms, but the applicant has not provided sufficient information to assess the long-term stability of the cut.

8.2 Evaluation of Compliance of Proposal

UMC 817.99 Slides and Other Damage

Specific plans have been provided for reporting slides to the UDOGM should they occur. The applicant is in compliance with this section.

UMC 817.100 Contemporaneous Reclamation

The applicant has stated that reclamation will commence upon completion of mining, expected date 1998. A schedule for reclamation has been provided on a table following page 4-24 of the mining and reclamation plan. This plan shows that reclamation will take approximately one year and that maintenance and monitoring will continue for an additional 10 years. In addition, the applicant has provided for an interim vegetation plan to stabilize slopes in the facilities area (see page 4-11 in the PAP). The applicant is in compliance with this section (see also Chapter X, Revegetation).

UMC 817.101 Backfilling and Grading: General Requirements

The applicant is planning to return the surface disturbances associated with the Des-Bee-Dove facilities area to a suitable postmining topography which will support the intended postmining land use. All benches will be graded to essentially their premining condition except for the Structure No. 1. The location of this fill in the canyon will not be inconsistent with the surrounding topography with its 27 degree side slopes and one adequate drainage channel around the fill has been established. The postmining drainage has been evaluated in the Surface Water section of this TA.

Due to the size and content (coal fines) of Structure No. 1, the stability of this structure is of concern. The regulatory authority has reviewed the stability of Structure No. 1 using the Simplified Bishop's Method, a friction angle of 25 degrees which is the worst-case information determined by analysis in the information provided in Appendix X, cohesion of zero which is also the worst-case information, and a density of 71 pounds per cubic foot for the coal fines. A cohesion of zero is further substantiated by information found in "Engineering Design Manual Coal Refuse Disposal Facilities", published by the Department of the Interior, Mine Safety and Health Administration, which states a typical cohesion for coal fines is zero. The abutment key fill shown on Map 4-3 (PAP, Vol. 5) was assumed to have a cohesion of zero, angle of internal friction of 40 degrees, and a density of 120 pounds per cubic foot. Using the configuration of the slope shown on this drawing, it was determined that the minimum safety factor was 1.26 for a failure surface just above the abutment key. In addition, several other failure planes located further into the pile showed safety factors of 1.4 or less. This is less than the required safety factor of 1.5 and less than the safety factors determined by the applicant.

The difference in the determinations is likely due to the different strength parameters used when compared to the analysis conducted by the applicant using the Spencer Method. Alternatively, the worst-case failure plane may not have been identified by the applicant. This is certainly the case in comparing the applicant's evaluation using the Simplified Bishop method where the failure plane was assumed to go through the toe of the fill. Given the nature of the material and the method of placement during construction of the fill, end dumping, which results in a loose, uncompacted fill material, it would appear that the safety factor for this fill is less than the required 1.5. However, it should be noted that this fill has been in place for many years without apparent major failures.

In the letter to the applicant from the Office of Surface Mining dated January 16, 1984, it was stated that the applicant could obtain a variance from the safety factor requirements if certification could be obtained from a Professional Engineer (PE) stating that the fill was stable and did not pose a threat of slope failure. In addition, the PE must also address the public health and safety issue if the slope fails. The applicant provided a letter from Rollins, Brown and Gunnel, Inc. (RBG) dated February 17, 1984, stating that in their opinion the safety factor was greater than 1.53. A following letter addressed public health and safety issues and was certified. The applicant is in compliance with the section of the regulations pertaining to stable postmining slopes.

Plans have been provided for grading along the contour. The applicant is in compliance with this section of this regulation.

The applicant has provided plans for the closure of the portals which are shown in Figure 1 in Chapter 4 of the PAP. The applicant has provided a suitable backfilling and grading plan for these areas (see Section 3.2, UMC 817.13-15 Casing and Sealing of Underground Openings).

The applicant is proposing to retain most of a cut structure at Station 125+00, along the Des-Bee-Dove/Wilberg Junction Road. Information on the configuration of this cut, the geologic conditions, and stability of the cut have not been identified by the applicant. Therefore, a determination of compliance with the requirement of UMC 817.101(b)(1) for a static safety factor (SSF) of 1.5 cannot be made.

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

The applicant is planning to bury asphalt and concrete, and acid- and toxic-forming material under more than 4 feet of material in the backfill for Structure No. 2 during final backfilling and grading operations. Although no toxic waste materials have been identified by the applicant, the U.S. Forest Service (USFS) has expressed concern over the burial of toxic waste on National Forest System

lands (letter of concurrence dated January 3, 1985). The applicant must obtain written permission from the Forest Supervisor prior to burying toxic waste on National Forest System lands, specifically, on Structures Nos. 1 and 2

The reader is referred to Chapter X, Revegetation, for further discussion related to this section.

UMC 817.106 Regrading or Stabilizing Rills and Gullies

Plans have been submitted for the repair of rills and gullies in the bond estimate. Based upon the current maintenance program, 24 hours of work per year are needed to repair rills and gullies. The applicant is in compliance with this section.

8.3 Conditions

1. Within 30 days of permit approval, the applicant must demonstrate that the long-term stability of the cut structure at station 125+00, along the Des-Bee-Dove/Wilberg Junction Road meets the 1.5 safety static factor requirement for UMC 817.101(b)(1).

2. If toxic materials are encountered at the Des-Bee-Dove Mine Complex, the applicant must either obtain written permission from the Forest Supervisor (Manti-LaSal National Forest) to bury toxic waste material on National Forest System lands, or submit for approval by the regulatory authority, an alternate site for burying toxic waste material.

SUBSIDENCE CONTROL PLAN

9.1 Applicant's Proposal

The applicant's subsidence control plan is to maximize coal extraction, i.e., pillar extraction in panel sections, to achieve an even lowering of the surface to the extent possible. It is anticipated that the pillars which might remain will crush out and minimize the effects of uneven subsidence on the surface. This will have the effect of maintaining an even subsidence trough.

The applicant has stated that full extraction panels have been oriented parallel to the major faults and joints. This alignment with respect to jointing is proposed to prevent the formation of irregular sawtooth subsidence cracks in the overlying surface lands.

The applicant has proposed a subsidence monitoring plan which is described in Appendix XII of the PAP. In general, the plan consists of a combination of photogrammetry methods tied in with conventional survey methods. The survey will be conducted once a year in mid-summer when the survey can be run in conjunction with the USFS

vegetational studies. A ground-control survey will be established on a grid system. The applicant has not provided the survey location map showing where the survey monuments will be located. The monuments will provide not only a scale for the photography but also by expanding and monumenting the control survey, a primary grid will be established for measuring both horizontal and vertical displacement.

The applicant has stated that subsidence impacts to roads will be mitigated. The roads will be repaired and regraded to restore them to their pre-subsidence usefulness.

There have been no specific mitigation plans submitted for subsidence impacts such as dewatering of springs or seeps, surface cracking, or slope failures.

The applicant has not provided for public notices to be submitted to the affected surface owners which detail the areas in which mining is to take place, the planned date of the mining activity, and measures to be taken to mitigate subsidence impacts. Most of the land over the mine is owned by UP&L and the USFS. However, it appears that some privately owned land is in areas adjacent to the mine that could be within the angle of draw of subsidence effects.

9.2 Evaluation of Compliance of Proposal

UMC 817.121 Subsidence Control: General Requirements

A. Description of Subsidence Effects Observed To Date

Monitoring of subsidence to date has included surveys by UP&L using conventional survey methods and photogrammetric methods, and helicopter flyovers. Data collected through 1982 has been documented in the applicant's annual Subsidence Reports for 1981 and 1982. In addition, monitoring has occurred over the Wilberg and Deer Creek mines which is useful in predicting subsidence in this general area. Though this data was for areas where longwall mining methods were used, the applicant is planning full extraction methods in the room and pillar panels of the Des-Bee-Dove Mine Complex which are expected to create similar subsidence impacts.

The U.S. Bureau of Mines (USBM) has been studying subsidence at the UP&L mines since 1979. The initial study monitored subsidence over two longwall panels developed in the Blind Canyon upper seam between 1979 and 1980. The depth of cover over these panels ranged from 1,600 feet to 1,450 feet. The first indication of subsidence occurred over Panel 5 East, which was mined first, in September 1979. At a minimum, the face had advanced 460 feet before subsidence occurred. Three inches (0.25 feet) of subsidence was measured at this time. The maximum amount of subsidence measured was 2.7 feet in December 1980 when the analysis in the USBM report ended. This indicates that subsidence due to mining occurs fairly soon after coal extraction. The maximum amount of subsidence occurred near the

midpoint of the panel lengths and just north of the chain pillars separating Panels 5 East and 6 East but within Panel 5 East. This shows that the chain pillars crushed out and did not significantly affect the subsidence trough.

Additional data have been supplied by the applicant showing monitoring information through September 1983; this is part of the USBM study. Based on these data, it is probable that the maximum amount of subsidence which will occur due to mining in a single seam under the conditions in this area has been observed (6 feet over Panel 6 East). However, no mining has yet occurred under Panel 6 East and as such the maximum amount of subsidence that might occur due to multiple seam mining in this area has most likely not been observed.

Almost 5 feet of subsidence has occurred as of September 1983 over Panel 5 East which was the first panel to be extracted in 1979. Since mining subsequently occurred in the Hiawatha seam (Panel 9 Right) almost directly below Panel 5 East, subsidence has continued due to multiple seam mining with a minor residual affect from single seam mining. It is expected that subsidence over mined areas within the permit area will not continue more than a few years once all mining in an area is complete.

The subsidence profile continues to show that the chain pillars are crushing out and not creating any significant variation in the profile. The barrier pillars which are located at the ends of the panels to protect the mains from mining in the panels and the pillar section to the north of Panel 5 East do not appear to be crushing at all and effectively stop subsidence except for angle-of-draw effects. The maximum slope measured at the edge of the subsidence trough as of June 1983 was over Panel 6 East and was 0.09 inches/foot.

Several other subsidence occurrences over the Wilberg, Deer Creek and Des-Bee-Dove mines have been noticed by aerial inspections conducted by the applicant. These disturbances have been recorded in the annual subsidence monitoring reports that have been submitted to the UDOGM and in an August 3, 1982, letter to the UDOGM. One area is located over the Des-Bee-Dove Mine Complex in the Castlegate Sandstone near a steep slope area. The area of disturbance encompasses approximately 10 acres and contains several east-west trending fractures. The area overlies retreat mining which took place in October 1981.

Photogrammetry and conventional surveys conducted by the applicant and recorded in the annual Subsidence Reports show subsidence over the Des-Bee-Dove Mine Complex of up to 2.5 feet due to mining since 1980. These surveys have shown that even though multiple seam mining has occurred in this area, no surface cracking has been observed in areas overlain by the North Horn Formation. Cracking has been

observed in the Castlegate and Price River Formations. The total amount of subsidence which has occurred is unknown, since monitoring commenced after mining in the upper seam was complete and subsidence had most likely already occurred.

B. Evaluation of Probable Subsidence Effects

B.1 Lowering of the Land Surface in Areas Underlain by the Castlegate Sandstone and Price River Formation

The effects of subsidence on the surface will be modified by the occurrence of the thick layers of the Castlegate Sandstone and the Price River Formation. These effects would tend to mitigate the possibility of surface cracking where the sandstone layers were continuous through the area. However, it is expected that the land surface will be significantly lowered. The maximum extent of this lowering is not known at this time due to the layout of the monitored mine areas as described above.

The maximum amount of subsidence which would be expected over a single seam maximum extraction area under 1,500 feet of cover has probably been identified in Panel 6 East in the Blind Canyon seam and is almost 6 feet as shown by data collected for September 1983. Between June 1983 and September 1983, the surface only dropped an additional 0.08 feet indicating that subsidence has probably stabilized in this area. Depth of cover over this panel is approximately 1,500 feet. It would be expected that the sandstone layers would provide a certain amount of bending action over the cave above the underground workings which would tend to reduce the amount of subsidence from what might be expected if only weaker strata existed above the mine.

If the information from Panel 6 East were doubled to reflect mining in 2 seams, then a lowering of the surface of almost 12 feet might be expected where the cover was approximately 1,500 feet and maximum extraction occurred. The applicant has estimated a maximum of 10 feet of subsidence where cumulative extraction from the two mineable seams will not exceed 20 feet. The applicant's estimate may be reasonable for areas of the mine where the depth of cover is greater than 1,500 feet given the thickness of the interburden between the Blind Canyon seam and the Hiawatha seam. In areas where the depth of cover is less than 1,500 feet to 1,250 feet which is the top of the Price River Formation, the amount of subsidence may be greater than the projected 10 feet.

Even settling of the land surface by complete extraction methods is not the primary concern associated with subsidence at the Des-Bee-Dove Mine Complex. The major problem will most likely be associated with areas of uneven subsidence caused by restriction of subsidence by barrier pillars or as retreat mining progresses, an advancing subsidence trough will occur on the surface. In these areas, the

ground surface will tilt, causing areas of tension and compression on the surface. In the case of the advancing mine face, these effects are transient and not as pronounced. However, where a barrier pillar remains, the surface tension and compression effects will remain causing horizontal strains. The maximum slope measured to date is in the vicinity of Panel 6 East (Wilberg mine, Blind Canyon seam), and slopes at 0.09 inches/foot over 1,400 feet of cover. This is a severe slope for structures and would cause severe damage if a structure existed in this region. The slope would be expected to steepen as mining in the Hiawatha seam (lower seam) progressed, increasing the amount of subsidence within the trough. This effect has been observed in the area being monitored where subsidence has increased from 2.7 to almost 6 feet and the slope has increased from 0.06 inches/foot to 0.09 inches/foot.

In the areas of high strain, steep slopes in the North Horn Formation may be susceptible to failure. The North Horn Formation consists of a high percentage of clay layers, and given the right moisture conditions, could slump. This has apparently occurred in the past in unmined areas in the North Horn Formation where in 1979, a slump 150 feet long was recorded (see Memo to Coal File, Utah Division of Oil, Gas and Mining, September 6, 1979). Subsidence could potentially trigger slope failures in this formation, although it would be difficult to determine if the failures were due to subsidence or natural failure, as was the situation with the 1979 slump.

The above-described conditions may be modified somewhat because the applicant is leaving large barrier pillars which may not crush out. The effect of this is to lessen the effective size of the opening in the mine, and maximum subsidence may not occur since the critical width may not be reached or exceeded. However, along the western side of the operation, it appears that the applicant is planning to extract a large continuous opening when retreating the 1st North Mains in the Blind Canyon seam and the 2nd North Mains in the Hiawatha seam. The critical width may be exceeded in this area and maximum subsidence may occur.

E.2 Lowering of the Land Surface in Areas not Underlain by the Castlegate Sandstone

A few land areas overlying the Des-Bee-Dove operation will be undermined where the strata overlying the operation consists only of the Blackhawk Formation. As such, the surface protection provided by the thick sandstone layers of the Castlegate and the Price River Formations will not exist.

As mining progresses in these areas of shallow cover, i.e. 150 to 750 feet of cover, surface cracking may occur along barrier pillars or between extraction panels. The applicant has stated that the

caving height can range from 35 to 50 times the thickness of the coal seam; therefore, surface fracturing could be expected where the depth of cover ranges from 100 to 350 or 500 feet of cover. To date, no fracturing of the surface has been observed in areas where the Blackhawk Formation crops out at the surface (see the applicant's annual Subsidence Reports).

In these areas of shallow cover, subsidence can be expected to be greater than measured to date. Since 60 percent of the seam thickness has not been reflected in subsidence at the surface over Panel 6 East, it would be reasonable to assume that a greater percentage of the seam thickness might be reflected in subsidence at the surface in areas where the Castlegate Sandstone does not exist. Therefore, mining in these areas with shallow cover will cause greater subsidence impacts. Areas with shallow cover above the Des-Bee-Dove Mine Complex are relatively inaccessible.

C. Evaluation of the Proposed Monitoring Plan

As mining progresses and additional information is collected, the impacts associated with subsidence will be more clearly identified. As such, the applicant's monitoring program is crucial, along with interpretation of monitoring results. The proposed program shows the location of surface grid points established over the permit area for photogrammetric and conventional surveys (CM-10399-DS Appendix 8, PAP Vol. 3). The applicant provides a map showing the grid system in this area (CM-10591-DS Appendix 8, PAP Vol. 3). The applicant has committed to providing the regulatory authority with annual survey information, interpretation of subsidence occurrences, and development of mitigation plans if appropriate (see addition dated 12/21/84 Appendix 8, PAP Vol. 8). The survey data provide information correlating the photogrammetry studies with the conventional surveys.

UMC 817.122 Subsidence Control: Public Notice

The applicant has provided for notice to the USFS on subsidence effects to the surface that they own above the mine; other lands above the mine are owned by UP&L. The applicant is in compliance with UMC 817.122.

UMC 817.124 Subsidence Control: Surface Owner Protection

The applicant has proposed to mitigate impacts to roads affected by the proposed operation. As mining progresses and additional information is obtained on subsidence impacts, additional mitigation measures may be necessary. At this time, it is not possible to determine the effects to springs in the area, the extent of disruption of the surface nor to escarpments. The applicant monitors these features and will evaluate the effect of subsidence

on them. If significant impacts to these features occur, mitigation plans will be developed by the applicant, submitted to the regulatory authority for evaluation and approval, and a final mitigation plan implemented by the applicant. These plans will be developed by the applicant on an annual basis and submitted to the regulatory authority within three months of data collection and analysis.

UMC 817.126 Subsidence Control: Buffer Zones

There are no buffer zones required for the proposed operation. The applicant is in compliance with this regulation.

9.3 Conditions

None.

X. REVEGETATION

10.1 Applicant's Proposal

Interim Stabilization and Vegetation Plan (Vol. 2, revised pp. 4-8 to 4-16)

The objectives of this plan are to: (1) control erosion on major existing fill slopes, (2) evaluate revegetation methodologies, plant species adaptability, and potential success, and (3) develop an alternate "soil" material to be applied during final grading. The applicant proposes that by establishing vegetation on existing fill slopes, the upper 18 to 24 inches of this fill material ("soil") will serve to increase revegetation potential (Vol. 2, revised pp. 4-11 and 4-12). The "soil" developed by this method will be randomly placed over the final graded surface to a depth of 6 to 12 inches at random locations. The plan will be initiated during the first appropriate season following permit approval to mine.

The surface of each slope to be revegetated shall be cleared of debris. The seed mixture and fertilizer (at rates based on soil test results) will be broadcast. Seeding will be accomplished in the fall. Two tons of alfalfa hay per acre will be spread over the slope surface and the surface will then be raked up-slope to cover the seed and fertilizer. This will also partially incorporate the mulch into the seedbed. The slopes will be covered with "Vexar" netting and the netting will be anchored. The following spring, containerized shrub and tree stock is to be planted in strips with species located randomly in rows. Basins are to be formed around each seedling and a fertilizer tablet placed in the backfill for each plant. A "Vexar" tube will be placed over the seedling as protection from browsing. Each seedling will be watered after planting.

Irrigation will be practiced only if a planting failure occurs after the first year. Slopes will be hand cultivated for two years to eliminate weeds and rodenticides will be placed by a licensed applicator to reduce rodent populations on these slopes. Plantings will be evaluated in August. Permanent line intercept transects shall be used to record species composition and ground cover. Shrub and tree plantings will be evaluated for species survival rates and vigor. Copies of evaluation reports will be forwarded to UDOGM. Samples will be taken of seedbed material at five-year intervals to record productivity changes. Standard parameters are to be evaluated.

A variety of grass, forb, shrub, and tree species will be evaluated. Most species proposed are considered drought tolerant. Four introduced species are included for planting. These are *Artemisia abrotanum*, *Kochia prostrata*, *Melilotus officinalis*, and *Medicago sativa*. The majority of species to be evaluated are scheduled for use during final revegetation.

Final Revegetation Plan (Vol. 2, revised pp. 4-17 to 4-22)

Final revegetation will be initiated the first appropriate season following grading. Two vegetative communities will be established. These are the pinyon-juniper and desert shrub communities. The pinyon-juniper community is to be established on the mine proper. The desert shrub community shall be established on the area disturbed by the sediment pond. Techniques described below may be modified given the results of the Interim Plan.

Level areas will be ripped and disked during final grading. Seedbed materials on steeper slopes will not be treated following grading. Sampling for fertilizer analysis shall then take place. "Soil" developed as a result of "interim" plantings will be randomly spread over the graded surface to a depth of six to 12 inches. The seed mixture and fertilizer (at rates based on soil tests) are to be broadcast onto the seedbed in the fall. On more level slopes, the soil surface shall be turned with a drag to cover the seed and fertilizer. Steeper slopes will be hand-raked to accomplish this objective. Alfalfa hay mulch will then be spread over the seedbed at the rate of approximately two tons per acre. Steep slopes will be covered with "Vexar" netting to anchor the mulch. On more level slopes, mulch anchoring is to be accomplished by crimping. In the following spring, containerized shrub and tree stock shall be planted. Species will be planted in "clumps" to enhance wildlife habitat. Clumps will be randomly spaced over the mine site. A fertilizer tablet shall be placed with the backfill for each seedling during planting. Basins to collect water are to be formed around each seedling. Each seedling will be hand-watered at the time of planting. Seedlings shall be protected by "Vexar" tubes.

Sprinkle irrigation will be employed if initial plantings fail. Slopes are to be cultivated for two years to eliminate weeds. Rodenticides shall be placed on revegetated areas by licensed applicators for rodents, or, as required, to control rodent populations.

The applicant has stated that vegetation methodologies to be used at the mine proper will be implemented to revegetate the Des-Bee-Dove/Wilberg Junction Road (Vol. 2, revised p. 3-31).

The majority of plant species selected for revegetation of the mine area proper and sediment pond are either native to the area or are considered appropriate additions added to increase species diversity. Melilotus officinalis is the sole introduced species currently scheduled for planting.

The seed mixture to be planted to reclaim the Des-Bee-Dove/Wilberg Junction Road is contained in the "Right of Way Grant" from the BLM.

The applicant has identified the means by which parameters for measuring revegetation success will be obtained. These measures are briefly described on pages 4-21 and 4-22 (PAP, Vol. 2) and include methods and statistical limits similar to those used when the reference areas were established.

The applicant has also committed to using a "student's t test" of the sample means to compare sampled parameters for eventual release of bond.

10.2 Evaluation of Compliance of Proposal

UMC 817.100 Contemporaneous Reclamation

The applicant will temporarily revegetate fill slopes at the tibble area, bathhouse, and stockpile area, Desert sediment pond, and Beehive mine areas to prevent erosion. This will take place the first appropriate season following permit approval to mine. Revegetation activities will be in the form of test plots as described on revised pages 4-11 to 4-16 (PAP, Vol. 2). The remaining existing disturbed areas are required for mine operation.

At the conclusion of mining operations, structural removal and backfilling will begin. Revegetation operations will commence the following September on all disturbed areas. The sediment pond will remain in operation through the 10-year responsibility period, after which it will be graded and revegetated.

The applicant is in compliance with the requirements of this section.

UMC 817.111 Revegetation: General Requirements

The applicant is in compliance with the requirements of this section. The proposed revegetation schedule conforms to accepted standards.

The vegetation data collected from reference areas show that these sites are acceptable areas and representative of the floral community which existed prior to mining. Revegetation activities will be accomplished during recognized planting seasons. Seeding and planting rates are appropriate with one exception, the desert shrub community. The applicant proposes to broadcast seed and cover by harrowing a total of nine pounds of grass seed (PLS) per acre (PAP Vol. 2, revised p. 4-18). The Regulatory Authority has determined the seeding rate for the desert shrub community to be adequate to provide for an acceptable level of plant establishment and consequent soil stability. The applicant has committed to utilize the seed mixture in the "Right-of-Way Grant" to revegetate the haul road disturbance. This seed mixture is in compliance with the requirements of this section.

The sediment pond disturbance will be revegetated at the end of the responsibility period using the techniques cited above. A revegetation plan has been presented for the area disturbed by the disposal of sediment pond sludge.

Mulching techniques proposed are in accordance with standard practices (PAP, Vol. 2, revised page 4-14). Irrigation will be used only if initial plantings fail.

Considering the potential range in average annual precipitation, proposed slopes, and the quality of seedbed materials, revegetation is considered feasible, though difficult. This is particularly true for sites exhibiting steeper slopes and/or Mancos shale parent material. It is likely that several years will be required before vegetative cover approaches assumed premining levels. However, the applicant has proposed to use plant species and employ revegetation techniques which are appropriate, given projected post-grading conditions, for attaining revegetation goals. The commitment to irrigate, if initial plantings fail, significantly increases the feasibility of revegetation. Results of test plot studies will aid in determining the potential success of revegetation and, through modifications in the proposed final revegetation plan, increase the feasibility of revegetation.

UMC 817.112 Revegetation: Use of Introduced Species

Melilotus officinalis is the single introduced species scheduled for planting. Melilotus officinalis is acceptable based on the UDOGM position that this species has a high potential for establishment, fixes nitrogen, and that commercial seed sources of native forbs are limited.

UMC 817.113 Revegetation: Timing

The applicant has complied with the requirements for this section.

UMC 817.114 Revegetation: Mulching and Other Soil Stabilizing Practices

The applicant has complied with the requirements of this section.

UMC 817.116 and 817.117 Revegetation: Standards for Success and Tree and Shrubs Stocking for Forest Land

The applicant has complied with the requirements of this section.

10.3 Conditions

None

XI. ROADS

11.1 Applicant's Proposal

There are three facility roads at the Des-Bee-Dove Mine Complex: (1) a short section of the Danish Bench access road, (2) mine access road, and (3) the Des-Bee-Dove/Wilberg Junction Road (haul road).

The mine access road is an unnumbered county road that is asphalt-surfaced and extends approximately seven miles along Danish Bench between State Highway 29 and the Des-Bee-Dove Mine Complex gate located within the permit area. The road width averages 20 feet. The road gradient is approximately five percent overall to the mine gate and approximately eight percent overall from the mine gate to the mine office. The steepest gradient is approximately 10 percent. Surfacing is four inches thick on standard gravel road base, crowned in the center and gently sloping to the sides. Roadways cut in the steep embankments have guard rails and berms installed at critical locations for safety and runoff control. The mine access road is used daily by mine personnel for access to the mine facilities.

The mine access road continues from the mine office approximately 2,500 feet to the Beehive mine. Beyond the Beehive mine, the road serves as a Forest Service access road to East Mountain. Twice yearly the road is utilized for cattle drives to and from East Mountain grazing areas. The road with averages 20 feet. The gradient averages about 10 percent overall, with one steep section near 30 percent. There is a 500-foot section with a gradient near 15 percent. The road construction consists of compacted soil and a gravel surface. Because of the steep gradients in the portal area, large berms or steel guard rails have been constructed to promote safety. The portal access road is used daily for access by mine labor and service personnel. Like the mine access road, the portal access road is utilized twice annually for cattle drives to and from East Mountain grazing areas.

The Des-Bee-Dove/Wilberg Junction Road is asphalt-surfaced and extends approximately 2.8 miles from the Danish Bench access road to State Highway 57. The road width averages 28 feet and the steepest gradient is about 15 percent. Surfacing is about 4 inches thick on standard gravel base, crowned in the center and gently sloping to the sides. Guard rails and berms have been installed at critical locations for safety and erosion control. Upon closure of the Des-Bee-Dove Mine Complex, the haul road will be restored as previously discussed throughout this document. The Des-Bee-Dove/Wilberg Junction Road is used and maintained for coal haulage and access to the mine facilities. Some local traffic also utilizes this road.

11.2 Evaluation of Compliance of Proposal

UMC 817.150 Roads: Class I: General

The applicant has provided evidence that a registered PE certified the design and construction of the mine access and haul road as required under part (d) of this section. Other requirements of this section are in compliance.

UMC 817.151 Roads: Class I: Location

The applicant has complied with the requirements of this section.

UMC 817.152 Roads: Class I: Design and Construction

All requirements of this section have been met by the applicant.

UMC 817.153 Roads: Class I: Drainage

The applicant has been found to be in compliance with all requirements of this section, except with regard to sediment control. Since construction of the Des-Bee-Dove/Wilberg Junction

Road, problems related to scour at culvert outlets and deposition of sediment in culverts has been observed. Several standard design modifications are conditioned that will alleviate these problems. Utah Division of Oil, Gas and Mining (UDOGM) inspectors have issued Notices of Violation (NOV), which are now under abatement. The abatement of the NOV is being pursued by the applicant in a satisfactory manner.

UMC 817.154 Roads: Class I: Surfacing

The applicant is in compliance with the requirements of this section.

UMC 817.155 Roads: Class I: Maintenance

The sediment control problems associated with culverts along the Des-BeeDove/Wilberg Junction Road are expected to be routine maintenance problems. The applicant has committed to maintaining the Des-Bee-Dove/Wilberg Junction Road and associated facilities (i.e. culverts, gabions, and road surface). The regulatory authority feels this commitment to a routine maintenance schedule with particular emphasis on culvert erosion and sedimentation problems is necessary. The problem was handled through the UDOGM inspection and enforcement procedures. The applicant meets the requirements of this section.

UMC 817.156 Roads: Class I: Restoration

The applicant meets the requirements of this section.

UMC 817.160 Roads: Class II: General

The applicant has complied with the requirements of this section.

UMC 817.161 Roads: Class II: Location

The applicant has complied with the requirements of this section.

UMC 817.162 Roads: Class II: Design and Construction

A section of the mine access road has a gradient exceeding 15 percent for more than the 300 foot maximum as specified under part (a) of this section. Steep canyon terrain allows no leeway for a more gradual gradient. The applicant states in the proposal that sufficient evidence was provided to OSM and DOGM to make a determination whether a variance should be granted. Based on topographic and other information in the permit application, it appears that major construction of a complying roadway would increase environmental degradation. The applicant is therefore granted a variance under UMC 817.162(a) by OSM.

All other requirements of this section have been met by the applicant.

UMC 817.163 Roads: Class II: Drainage

The applicant is in compliance with this section.

UMC 817.164 Roads: Class II: Surfacing

The applicant is in compliance with this section.

UMC 817.165 Roads: Class II: Maintenance

The applicant has complied with the requirements of this section.

UMC 817.166 Roads: Class II: Restoration

This section is not applicable. The Class II (access) road will remain at the surface management agencies (U.S. Forest Service) request.

UMC 817.170 - 817.176 Roads: Class III

There are no existing or proposed Class III roads at the Des-Bee-Dove Mine Complex.

11.3 Conditions

None.

XII. ALLUVIAL VALLEY FLOORS

12.1 Applicant's Proposal

The facilities of the Des-Bee-Dove Mine Complex are situated in a narrow canyon with steep side slopes and valley slope. The canyon lacks topsoil and does not contain irrigatable land that could be used for agricultural purposes. The canyon in which the surface facilities are located contains deposits from mass movements, slope wash, debris erosion, and sheet runoff. The area is classified as an upland and nonirrigable area and, therefore, cannot be considered as an alluvial valley floor.

12.2 Evaluation of Compliance of Proposal

UMC 785.19 Underground Coal Mining Activities on Areas or Adjacent to Areas Including Alluvial Valley Floors in the Arid or Semi-arid Areas of Utah

As there are no alluvial valley floors in or adjacent to the permit area. The applicant is in compliance with this section.

12.3 Conditions

None.

XIII. POSTMINING LAND USE

13.1 Applicant's Proposal

UMC 817.163 Roads: Class II: Drainage

The applicant is in compliance with this section.

UMC 817.164 Roads: Class II: Surfacing

The applicant is in compliance with this section.

UMC 817.165 Roads: Class II: Maintenance

The applicant has complied with the requirements of this section.

UMC 817.166 Roads: Class II: Restoration

This section is not applicable. The Class II (access) road will remain at the surface management agencies (U.S. Forest Service) request.

UMC 817.170 - 817.176 Roads: Class III

There are no existing or proposed Class III roads at the Des-Bee-Dove Mine Complex.

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As there are no alluvial valley floors in or adjacent to the permit area. The applicant is in compliance with this section.

12.3 Conditions

None.

XIII. POSTMINING LAND USE

13.1 Applicant's Proposal

Premining use of the permit area was for livestock grazing and wildlife habitat. At the present time, cattle graze the lower portions of the permit area in the spring and the upper portions (East Mountain) during the summer months. The permit area provides habitat for elk, deer, and raptors during various seasons throughout the year (pages 2-133 through 2-145, PAP, Vol. 2).

The applicant intends to return the disturbed mine areas to their premining land uses of livestock grazing and wildlife habitat. Following cessation of mining, the disturbance areas will be recontoured to blend into the existing topography and be revegetated as described in the Reclamation Plan section (pp. 4-17 through 4-22, PAP, Vol. 2). Vegetation will be re-established to be comparable to species diversity, cover, density, and productivity of the established reference areas.

13.2 Evaluation of Compliance of Proposal

UMC 817.133 Postmining Land Use

The applicant has complied with the requirements of this section.

13.3 Conditions

None.

XIV. AIR RESOURCES

14.1 Applicant's Proposal

The applicant is currently using several fugitive-dust control practices at the Des-Bee-Dove Mine Complex. The applicant proposes to continue these practices throughout the life and subsequent reclamation of the mine site.

The main service road and parking lots are asphalt surfaced. Service roads to the mine portals are gravel surfaced. Vehicular traffic on these roads is controlled to minimize contribution of fugitive dust. Service roads are used daily at low speeds for access by service and labor personnel. The steep natural terrain restricts unauthorized travel on other than established roads and limits vehicle speeds on roadways that are established.

Fugitive dust control procedures are implemented in the coal handling process. Little Dove run-of-mine belt conveyor is covered. Belt scrapers are installed on most conveyors to reduce coal dust generation. Coal sizing and handling from stockpile to truck are completely enclosed in the Des-Bee-Dove tipple. A vacuum system in the tipple helps reduce coal dust generation during crushing and screening plus assists in tipple housekeeping. Transfer points in the tipple are enclosed, rubber curtained at inlets and outlets, and are equipped with dust collection hoods.

The high moisture content of the coal at Des-Bee-Dove Mine provides dust control throughout the coal handling process. Analysis of samples taken during processing show an average 8.4 percent inherent and surface moisture content in 775 samples. Coal dust generation is reduced throughout the handling process by the dampening effect of this moisture.

The captive nature of the Des-Bee-Dove Mine product nearly eliminates the possibility of spontaneous combustion conditions developing. Long-term stockpiling within the permit area is unlikely. Maximum stockpile duration is approximately one month. Care is taken to ensure that short-term stockpiles are completely cleared away prior to restockpiling.

14.2 Evaluation of Compliance of Proposal

UMC 817.95 Air Resources Protection

The applicant has addressed adequately all major topics of this section, and is in compliance with the regulation.

14.3 Conditions

None.

XV. CULTURAL RESOURCES

See Environmental Assessment Addendum A.

XVI. BONDING

16.1 Description of Applicant's Proposal

Estimated costs are in 1984 dollars and include lands having been disturbed for the purpose of handling, crushing, storing, and transporting coal extracted through the Des-Bee-Dove Mine Complex. The applicant has identified one bonding increment. Cost estimates are based on engineering analyses and standard references such as the Caterpillar Performance Handbook and Rental Rate Bluebook for Construction Equipment. A summary of the applicant's estimated costs is shown below:

Category	Amount (\$)
1 Surface Facilities Removal	162,236
2 Portal Sealing	45,084
3 Hauling, Backfilling, Compaction and Grading	555,686
4 Toxic and Acid Forming	8,126
5 Install Drainage Channels	106,923
6 Temporary Sedimentation Control Facilities	0
7 Soil Sampling and Seed Bed Preparation	14,392
8 Fertilizing and Mulching	45,618
9 Seeding and Planting	160,903
10 Disease and Pest Control	17,776
11 Soil Stabilization - Rills and Gullies	10,315
12 Contingent Seeding and Planting	14,500
13 Revegetation Inventory for Bond Release	7,222
14 Sediment Control Structure Removal	44,689
Mobilization	<u>10,000</u>
SUBTOTAL	1,203,470

10% Contingency	120,347
TOTAL	1,323,817
Escalate 6.78%	1,837,712 (1989 dollars)

16.2 Evaluation of Compliance of Proposal

UMC 800.11 Requirements to File a Bond

- 1.a. The applicant has requested a permit term of five years.
- b. The revegetation liability period pursuant to UMC 817.116(b) shall be ten years as permit area precipitation is substantially less than 26 inches.

UMC 800.12 Requirements to File a Certificate of Liability Insurance

The applicant has complied with this section.

UMC 800.13 Regulatory Authority Responsibilities

The regulatory authority has analyzed the bond estimate and supporting calculations provided by the applicant. The estimates have been found to be adequate. The applicant has posted the bond payable to the United States of America and State of Utah. The applicant is in compliance with this section.

16.3 Conditions

None.

XVII. REFERENCES

Bureau of Land Management, 1979, Final Environmental Statement, Emery Units 3 and 4. BLM, Washington, D.C.

Bureau of Land Management, 1983, Final Environmental Impact Statement: Uinta-Southwestern Utah Coal Region, Round II Coal Leases, BLM, Washington, D.C., October.

U.S. Geological Survey, 1979, Final Environmental Impact Statement: Development of Coal Resources in Central Utah. USGS, Washington, D.C. Utah Power and Light Company, 1983, Des-Bee-Dove Coal Mine Permit Application, to Office of Surface Mining. Revised 1984.