



United States Department of the Interior
OFFICE OF SURFACE MINING
Reclamation and Enforcement
BROOKS TOWERS
1020 15TH STREET
DENVER, COLORADO 80202

File ACT/007/004
Folder #2
Copy to Sue Sandy

RECEIVED

MAY 24 1984

DIVISION OF OIL
GAS & MINING

Susan Linner
Utah Division of Oil, Gas, and Mining
4241 State Office Building
Salt Lake City, Utah 84114

Dear Susan:

Enclosed please find the Price River Mine Complex Technical and Environmental Assessment (TEA) that was contained in the Decision Document approved by the Administrator of the Western Technical Center on May 18, 1984, and forwarded to the Office of Surface Mining (OSM) Headquarters in Washington, D.C. on the same date.

Should you have any questions or comments please forward them to either Walter Swain or me at (303) 844-3806.

Sincerely yours,

David R. Maxwell
Project Leader

RECEIVED

MAY 24 1984

**DIVISION OF OIL
GAS & MINING**

**PRICE RIVER MINE COMPLEX
TECHNICAL AND ENVIRONMENTAL ASSESSMENT**

TECHNICAL AND ENVIRONMENTAL ASSESSMENT

TABLE OF CONTENTS

Introduction	1
Topsoil Protection	4
Surface Water Hydrology	7
Hydrologic Balance - Ground Water	20
Cumulative Hydrologic Impact Assessment	30
Hydrology Monitoring Plan	34
Coal Recovery	36
Explosives	37
Miscellaneous Compliance Section	38
Backfilling and Grading	41
Wildlife	44
Revegetation	47
Roads	52
Special Performance Standards--Operations on Prime Farmland	56
Postmining Land Use	57
Air Resources	59
Subsidence	61
Alluvial Valley Floors	67
Bonding	69
Socioeconomics	72
Cultural Resources	74
Legal, Financial, and Compliance Information	77

INTRODUCTION

The Price River Coal Company has applied for a permit to continue underground mining operations in the Price River Mine Complex. The operation is located ten miles north of Price, Utah, and is approximately 110 miles southeast of Salt Lake City, Utah. The proposed permit area encompasses 8,510 acres and includes portions of the Price River and Willow Creek, which are perennial streams; the Denver & Rio Grande western railroad; and Route 33 and 6, which are Federal highways. All mine portals, surface facilities, and underground workings existing or planned during the life of the operation are located in Carbon County. The mining will be done via both the longwall, room-and-pillar, retreat mining method and room-and-pillar without retreat mining method.

The acreage information pertaining to the proposed permit area and life-of-mine area at Price River Coal Company (PRCC) is as follows:

<u>Land Description</u>	<u>Acreage</u>
Proposed permit area	8,510
Life-of-mine area	27,393
Pre-SMCRA disturbance in life-of-mine area	190
Post-SMCRA disturbance associated with PRCC mining operations	144
Disturbed land to be reclaimed from post-SMCRA disturbance	121.5
Areas to be left as roads as part of post-mining land use	22.5

The Price River mine area has up to nine seams which can be mined throughout the life of the operation. Mining in this area has been in existence since the turn of the century; and, within the permit area, extensive mining has occurred in several of the seams. In some areas, up to five seams have already been mined. Abandoned workings occur both above and below the proposed workings. In the proposed operation, within any single location of the mine, up to five seams could be mined. The seams vary in thickness, depth, and continuity throughout the property. The minimum thickness of coal that can be economically recovered is five feet, and the maximum thickness that will be recovered is twelve feet. The depth of cover over the coal seams ranges from approximately 250 feet to 2500 feet. Production at the mine is expected to ultimately reach 6.5 million tons per year. During the permit term, production rates are uncertain due to the changing coal market. During the period of time during which the permit application was being reviewed, the operation was shut down and started up, reflecting the uncertainty in expected production at the mine.

The mines are accessed through the portal areas and one shaft facility in the permit area located in Sowbelly Gulch, Hardscrabble Canyon, and Crandall Canyon, respectively. In addition, coal is conveyed from the Utah Fuel No. 1 portal under Highway 6 to a coal-preparation plant near the Price River. Associated with the plant is a coal refuse pile. This area is referred to as Castle Gate. Other areas of disturbance are the Willow Creek equipment-storage area, which is located along Willow Creek adjacent to the Willow Creek cemetery; and Gravel Canyon, which is located along the Price River and used for topsoil storage. All facilities have been constructed, with the exception of some buildings in Crandall Canyon. There are no other surface disturbances planned during this permit term.

The topography of the area is very rugged with high plateaus dissected by steep canyons. Massive sandstone layers form cliffs around the sides of the canyons. The facilities areas are located primarily in the canyon bottoms, with some cut-and-fill structures providing additional work area. Reclamation of the facilities will include the retention of some of the cuts and fills which have been in existence for many years and which have become stabilized in many instances. Retention of the cuts will blend in with the surrounding topography of steep cliffs. The large fill created by the refuse disposal in the Castle Gate area will significantly alter the appearance of that site. The mine area is sparsely vegetated, with pinyon-juniper stands being common.

Price River Coal Company originally submitted a Permit Application Package (PAP) in March 1981. An Apparent Completeness Review (ACR) was done by OSM in April 1981, and the Price River Coal Company submitted a response to the ACR on August 25, 1982. This response essentially entailed the submittal of a new PAP. A second ACR was completed in November 1982, and a meeting was held with the applicant to discuss the additional deficiencies in January 1983. The applicant submitted several responses through June 1983 which were reviewed for adequacy. Final questions were developed and sent to the applicant in July 1983, and the final responses were received in August 1983. The Technical and Environmental Assessment commenced at that time.

During the period of time that the above reviews were progressing, the Price River Coal Company requested approval of a modification to the PAP which included the construction of shaft facilities in Crandall Canyon in the northwest portion of the mine area. This modification was reviewed and approved by the State of Utah, Division of Oil, Gas and Mining, on February 19, 1982. The Crandall Canyon permit area has been incorporated into a single proposed permit area.

Impacts of the Proposed Mining Operation

The impacts which are anticipated as a result of approval of this mining and reclamation plan will be insignificant. The Price River Mine Complex is an existing operation, and surface disturbances have existed for more than 80 years. As such, there are 144 acres of surface disturbance, of which 121.5 acres will be reclaimed after mining as a result of continued operation by Price River Coal Company. The proposed reclamation plan has been reviewed under the requirements of the approved permanent Utah regulatory program and has been found to be adequate. The land will be

regraded to a stable configuration; and the topsoil material will be replaced and revegetated. The postmining land use would be one primarily of grazing, with specific wildlife habitat restoration which would be beneficial to mule deer and elk.

Approval of the proposed mining operation would allow for the recovery of several million tons of coal during the permit term, at a maximum rate of two million tons per year. The exact amount of coal to be recovered will, of course, vary due to fluctuating market conditions and resulting changes in production levels at the mine. The extraction of the coal will result in subsidence of the land over the mine. This subsidence is expected to be a reasonably uniform settling of the land over most of the mine due to the depth of cover and the existence of thick, massive, sandstone layers through much of the mine. The exception to this occurs where the area is dissected by the Price River and Willow Creek. In these areas, the applicant is proposing partial extraction to prevent subsidence; therefore, the proposed underground mining operation is not expected to have significant impact on the land surface.

Impacts to the hydrologic regime are expected to be very minor. The area has already been extensively mined and the ground-water system disturbed. Continuance of the mining operation is not expected to significantly alter the existing ground-water system, and any impacts to the surface-water system are expected to be very minor. Price River Coal Company holds water rights in the area; and, if flow is reduced to the Price River, under worse-case conditions the reduction in flow will not exceed the company's water rights and would not be significant. The surface-water drainage from the disturbed sites is being controlled using several sediment-control structures, including sediment ponds with associated diversion structures, dugouts, and straw bale dikes. Significant increases in sediment loading are not expected.

Continued construction of the coal refuse disposal area in Schoolhouse Canyon in the Castle Gate facilities area will modify the appearance of that canyon; however, the refuse pile is being constructed to be stable and will be reclaimed according to permanent performance standards.

Alternatives for the Proposed Mining Operation

Alternative #1 would be "no action." The Federal Mineral Leasing Act requires that the Secretary of the Interior respond to permit applications and approve, disapprove, or conditionally approve mining operations on Federal leases; therefore, the alternative to take no action is not viable and will not be discussed further.

Alternative #2 would be "approval of the proposed action with conditions." This is the preferred alternative. This Technical and Environmental Assessment describes the preferred alternative, including the affected environment and impacts associated with the proposed action.

Alternative #3 would be "disapproval." The disapproval alternative would result in the closure of the existing operations. Such a closure would result in the loss of jobs in Carbon County, Utah. This alternative would preclude the continued development and mining of steam coal at this site. The mine operator would begin reclamation of the disturbed surface.

TOPSOIL PROTECTION

A. Description of the Existing Environment

Available topsoil in the Price River area is limited. The terrain is rocky, and the soils are variable in nature as a result of weathering and the parent material. A description of the soil types that exist in the mine area is provided on Table 8-1, page 425, of the permit application. Soil descriptions for the areas which have been disturbed are described on pages 427 to 443. Generally, the soil types have been defined in terms of three major physiographic sections: the Wasatch Plateau, Book Cliffs, and the Mancos shale lowlands. The first two sections are typically located on steep slopes and are rocky, with relatively small areas of deep alluvial/colluvial soils in canyon bottoms and alluvial fans. The Book Cliffs section may also have a silt loam to loam surface. The Mancos shale lowland soils are high in soluble salts and are typically silty clays.

Within the existing surface disturbance areas, topsoil has not been removed and stockpiled, because the disturbances were prior to 1977. The exception is the Crandall Canyon area which is currently being constructed. In this area, topsoil has been removed and stockpiled in Gravel Canyon or is being utilized in reclamation. Three test pits were completed in the Crandall Canyon area to identify the material present. The "A" horizon material was thin, (three to five inches), but the subsoil material (which included buried "A" horizon material and other loamy-type material) was tested and found suitable as a plant growth media. In addition, the soil did not contain excessive amounts of coarse material. The total disturbance in the Crandall Canyon area was 28 acres. From this area, approximately 45,000 to 50,000 cubic yards of material has been salvaged. This would indicate that an average depth of 12.5 inches of soil material has been recovered. The applicant has indicated that an additional 8,000 cubic yards of material was stockpiled in Crandall Canyon, resulting in an average depth of 15 inches of material removed from the canyon.

B. Description of the Applicant's Proposal

The applicant has provided soil descriptions and laboratory information for thirteen backhoe pits in the mine plan area. Much of the permit area has previously been disturbed by mining activity, and the topsoil in these areas was not salvaged. Topsoil from Crandall Canyon and other areas will be utilized to topsoil these previously-disturbed areas. Soil will not be salvaged on the steeper slopes of the Schoolhouse Canyon refuse area, due to the poor quality of the topsoil and potential safety hazards involved in removing such soil. Topsoil stockpiles will be adequately revegetated using a mixture composed predominantly of cool season grasses.

The applicant proposes to apply topsoil to a depth of six inches on reclaimed areas and an additional four feet over non-toxic coal refuse material. This will require a total of approximately 142,000 cubic yards of material.

Eight on-site soil material borrow areas have been proposed by PRCC within the permit area. Two borrow areas are located in Sowbelly Canyon (B-1 and B-2), three are located in Hardscrabble Canyon (B-3, B-4, and B-5), and three borrow areas are located in Crandall Canyon (B-6, B-7, and B-8). Material to be removed from these borrow areas was selected based upon proximity to the mine site, apparent suitability for topsoil or subsoil substitutes, and reclaimability of the borrow areas. Material from these areas will produce approximately 52,800 cubic yards of topsoil, and 44,800 cubic yards of subsoil. All eight borrow areas will be reclaimed using the same method as proposed for the existing disturbance. Currently these areas are moderately to thickly vegetated and removed from mining activities.

Prior to placement of the material, the applicant proposes to test for nutrients to assess its suitability to support the type of vegetation to be planted at the mine. Fertilizer will be added, as needed, according to the results of the testing program.

The topsoil material will be placed upon the regraded sites after the surface has been scarified, to promote root penetration and prevent slippage surfaces.

C. Evaluation of Compliance

With the exception of the Crandall Canyon surface facility area, the disturbed areas within the permit area were disturbed prior to passage of the Surface Mining Control and Reclamation Act of 1977 (P.L. 95-87); and, as a result, no topsoil material was salvaged. Steep slopes, particularly at the Schoolhouse Canyon refuse area, severely limit soil removal operations; therefore, soil will not be salvaged in this area. The applicant proposed to provide soil material from eight on-site borrow areas.

The eight borrow areas will provide a total of 39 percent surplus of topsoil and subsoil materials for final reclamation of all mine sites and borrow areas. Chemical and physical analyses indicate favorable conditions for successful reclamation and existing vegetation on these areas demonstrates the actual potential for feasible reclamation. Analyses of materials presently located within the disturbed areas indicate that it is suitable for use as subsoil for the proposed reclamation vegetation. The applicant has complied with UMC 817.21 through .25 and 786.19(b) as pertaining to topsoil capabilities.

D. Special Conditions

None.

E. Summary of Compliance

The applicant is in compliance with UMC 817.21, .22, .23, .24, and .25.

F. Proposed Departmental Action

Approval of the topsoil portion of the proposed permit application.

G. Alternatives to the Proposed Action

The regulatory authority could have approved a reclamation plan for the pre-SMCRA disturbed sites utilizing only material presently available within such areas. This would have resulted in less suitable seed beds and could have caused areas of spot failure. The use of an additional six inches of selected topsoil material will enhance potential reclamation success on these sites where no topsoil was salvaged.

H. Environmental Impact of the Proposed Department Action

Approval of the proposed alternative would have insignificant impact in the permit area. Existing operations will be reclaimed using materials from existing disturbed areas. No off-site impacts would occur.

SURFACE WATER HYDROLOGY

A. Existing Environment

The surface water drainage system is an integral part of the Price River mine plan, as stream valleys provide the only areas sufficiently level to allow the construction of surface facilities. As a result, each of the five distinct facilities sites included in the mine plan (Sowbelly Gulch, Hardscrabble Canyon, Willow Creek, Crandall Canyon and Castle Gate/Utah Fuel) are constructed adjacent to their respective streams and are consequently limited by topographic constraints characterizing the stream valleys. Mine portals and mine facilities have been located in these areas for at least 80 years.

The mine lies entirely within the Price River watershed, a perennial stream that flows to the southeast through the permit area. Price River has a contributing drainage area of 415 square miles and a mean annual discharge of 112 cfs (cubic feet per second) near Heiner, Utah (located approximately two miles south of the Castle Gate facility). Flow in the river is regulated by Scofield Reservoir north of the mine site. The only other perennial stream in the permit area, Willow Creek, has a tributary watershed area of 77.4 square miles and flows to the southwest, joining Price River immediately downstream of the Willow Creek surface facilities (storage) area. The mean annual discharge for Willow Creek is approximately 8 cfs. Spring Canyon is intermittent, flowing to the southeast along the southern edge of the permit boundaries. At its confluence with Price River below the permit area, it has a contributing watershed of 22 square miles; and limited stream flow records indicate that mean annual discharge approaches 0.3 cfs. Sowbelly Gulch and Hardscrabble Canyon are both ephemeral streams with drainage areas of 3.1 and 2.8 square miles, respectively. Sowbelly Gulch is a tributary of Spring Canyon, while Hardscrabble Canyon joins the Price River at the town of Martin south of the permit area.

The chemical quality of surface water in the permit area is generally alkaline. Some pH readings have been taken as high as 9.4. Other parameters that, in the past, have exceeded water quality standards (or equivalent NPDES criteria for discharge points) include sulfate, fluoride, phenol, oil and grease, iron, total dissolved solids, and total suspended solids. While oil and grease appear to have been derived from past mining-related activities, the iron and fluoride are probably naturally-occurring constituents of geologic strata in the vicinity of the permit area (Vaughn Hansen, 1976). TSS, TDS, and sulfate are found in particularly high quantities in Hardscrabble Canyon. Suspended and dissolved solids are the result of coal and coal mines that were indiscriminately allowed to wash into the stream during mining that occurred prior to the present operations. The presence of sulfate and, in some instances, phenol, is also a reflection of the coal mines. The high sediment yields are in part indicative of the highly erodible mudstones and siltstones in the vicinity of the mine (USGS, 1976).

Precipitation at the site is low, varying according to elevation from 10 to 20 inches per year. This rate is effectively further diminished by the high rate of evaporation, approximately 55 inches per year. The 2-year, 10-year, 25-year, 50-year, and 100-year, 24-hour storm events yield 1.3, 1.9, 2.3, 2.7, and 2.9 inches, respectively.

Water rights held by Price River Coal Company include direct flow rights (Price River), reservoir rights (Scofield Reservoir), mine inflows and springs, and shares held in the Price River Water Improvement District. Discharge quantities for these water rights are presented on page 375 of the permit application. (See the Ground Water Hydrology section for an additional discussion of Price River water rights.)

B. Description of the Applicant's Proposal

Surface Water Control Structure Design - General

The applicant has provided each of the surface facility areas with a sediment-control plan based on diversion ditches and berms to route flow around the disturbed area's sediment ponds, sediment sumps, and straw bale dikes. These structures are all currently existing. Berms surround the perimeter of the facility areas and are constructed to a height of approximately 2 feet. These serve to direct runoff from adjacent hillsides away from the facilities, reducing the required sediment-pond size. At the same time, they prevent the uncontrolled discharge of flow from the facility areas into the uncontrolled hydrologic regime. Diversion ditches are designed to carry flow from a 10-year, 24-hour storm. The exception is the refuse pile diversion at Castle Gate which is designed to carry the 100-year, 24-hour storm peak, since it is designed as a permanent structure. Required peak flow capacity is calculated from the "rational formula" method, which tends to provide conservative figures in comparison with checks against the SCS method for small watersheds. The runoff coefficient, i , was estimated to be 0.4 for small watersheds and overland flow and 0.5 for larger drainage areas. The rainfall intensity parameter, i , was calculated from the time of concentration (t_c) for each watershed and the amount of precipitation that would occur at that t_c for an hour. Parameters utilized in the rational formula for each watershed are given in tables 7-4 and 7-5, chapter VII of the permit application.

A reevaluation of the hydrologic design parameters for the mine area was provided by the applicant in response to the OSM deficiency letter sent to the company on April 26, 1984. In general, the revised estimates are somewhat higher for disturbed area runoff whereas undisturbed area runoff estimates are significantly lower than previous estimates (May 8, 1984, submittal). The applicant's revised estimates are generally comparable to somewhat conservative (high) in comparison to estimates derived using SCS TR-55 (1980) methods for small watershed.

Ditches were sized using Mannings Equation. The roughness coefficient, was based on the cover and hydraulic radius of the

ditch section. Ditch sections are trapezoidal, and ditch depths have been designed to incorporate a freeboard of 0.3 feet above the water surface. Channels are earthen or excavated into rock and are riprapped where the channel gradient exceeds 5 percent (chapter VII, page 414 of the permit application).

Sediment pond volume is calculated from the 10-year or 25-year, 24-hour peak flow and the sediment volume that can be expected from the disturbed area. In response to the deficiency letter, the applicant revised the sediment-control plans for both Sowbelly Gulch and Hardscrabble Canyon. Generally, sediment ponds in both areas are now designed to act in series with the most downstream ponds provided with emergency spillways. Pond volumes are sufficient to contain water and sediment runoff resulting from the 10-year, 24-hour precipitation event (May 8, 1984 submittal). Pond volumes for those in Castle Gate are sufficient to hold the 25-year storm runoff but are simultaneously discharging reservoir storage. Sediment values are calculated at 0.035 acre feet per acre of disturbed area. This is a conservative figure in comparison with soil losses calculated with the Universal Soil Loss Equation (chapter VII, page 409 of the permit application). Sediment ponds at the mine site are generally excavated, although several are supplied with freeboard dikes, or berms, to increase the storage size. Pond 011 and the refuse pile settling pond at Castle Gate are both provided with embankments. Ponds are not receiving discharge from the inflows. Only one portal is currently discharging, the Utah Fuel portal mine, and that discharge point has an individual NPDES permit. A general NPDES permit covers all other potential sediment pond discharge points at the mine site.

The revised sediment-control plans for Sowbelly Gulch and Hardscrabble Canyon incorporate slotted box culverts proposed for construction across the main haulroads. These culverts are designed to intercept 25-year, 24-hour runoff from haul roads and other disturbed areas that was previously controlled with straw dikes and sediment sumps. Discharge from the box culverts is routed to sediment ponds. Most on-site straw dikes will be retained to augment other existing and proposed sediment control devices (May 8, 1984 submittal). The applicant has requested that a small area exemption from the requirements of 817.42(a) be granted for portions of the permit area where no sediment control is provided or is presently provided by straw dikes and sumps.

The requests are as follows:

<u>Location</u>	<u>Acreage</u>	<u>Control</u>
Hardscrabble Canyon bathouse, office #3 portal	5.7	straw dikes
Sowbelly Gulch substation	0.068	none

Sowbelly Gulch chlorination facility	0.05	none
Willow Creek expansion area	3.6	sump
Willow Creek access road	1.1	sump
Castle Gate raw water pond	0.9	sump
Castle Gate scale, guard shack	0.85	sump
Castle Gate topsoil storage (Gravel Canyon)	1.8	berm

The reclamation plan for these facilities includes the reconstruction of temporary diversions to a permanent channel capable of carrying the peak flow from a 100-year, 24-hour storm. All supplementary sediment controls, including sumps and straw dikes, will be removed. Sediment ponds will be removed after vegetation has been satisfactorily established within the watershed (chapter III, page 137 of the permit application).

Designs for riprapping to maintain erosional stability of all reclamation channels in Sowbelly Gulch, Hardscrabble Canyon, and Castle Gate facility areas have been included in the May 8, 1984 submittal. Riprap size is based on the SCS Isbash curve which relates maximum stone diameter to design velocity.

Sowbelly Gulch

Sowbelly Gulch is an access area for the #5 mine and contains various support buildings for that operation. Regrading of the site to construct these facilities required that the ephemeral streams in this canyon be permanently diverted, although the relocation was not drastic and retained the channel in approximately the same configuration. Since this is an ephemeral stream, the diversion was designed only for the peak flow from a 10-year, 24-hour storm. Five other ditches have been constructed at the site to divert flow away from the permit area and are constructed adjacent to berms that surround the perimeter of most of the site. Temporary ditches will be reclaimed to the channels shown on exhibit 3.2-3. Reclaimed ditch sections are designed to carry flow from a 100-year, 24-hour storm.

The sediment-control plan at Sowbelly Gulch involves three excavated sediment ponds (003, 004, and 005) that are connected via an 18-inch diameter culvert. The applicant connected the ponds in order to take maximum advantage of the total storage area that the three ponds provide.

The topography is such that the construction of large ponds at the appropriate locations (immediately downstream of the greatest disturbed area) is not possible. Individually, pond 003 is not sufficient to handle the runoff from its watershed. Combined with the volumes in ponds 004 and 005, which are slightly more than sufficient for their watersheds, pond 003 can handle the required sediment and runoff because it can drain excess flows into the other two ponds. Revised runoff estimated contained in the May 8, 1984 submittal confirm that this is the case for the three ponds acting in series. Pond 003 handles runoff from approximately 4.9 acres; pond 004 handles flow from 7 acres; and pond 005 has a contributing drainage area of approximately 2 acres. All but approximately 2.5 acres are disturbed. The pond designs are given on exhibit 3.2-2 of the permit application. The exhibit was subsequently corrected by information submitted by the applicant on October 31, 1983 to show revised water surface levels in pond 004. Sediment excavated from the ponds will be temporarily stored at the north end of the storage area within the pond watershed.

The revised sediment control plan for Sowbelly Gulch incorporates an emergency spillway into the most downstream pond 005. In addition, a slotted box culvert is proposed for construction immediately south of the guard shack with intercepted disturbed area runoff routed to pond 005.

Hardscrabble Canyon

Hardscrabble Canyon is currently the site of two active portals: #3 and #4. Prior to 1977, coal washing and preparation activities were conducted in Hardscrabble Canyon; therefore, there are some remnants of that operation, such as the Goose Island refuse pile, that are still located here and that are contributing runoff to the sediment control system. (Goose Island is not an island in the usual sense of the word; the refuse pile is so named due to its present topographically prominent position, and it is not surrounded by water.) The ephemeral stream in this canyon was diverted at the upstream end of the facilities area for the construction of this refuse pile and reconstructed at the downstream end to carry flows from a 10-year, 24-hour storm event. Two other temporary diversions have been constructed around the #4 portal facilities area. Berms are constructed in conjunction with the ditches along the southwest perimeter of the facilities area. At the close of operations, these ditches will be reclaimed to the configuration shown on exhibit 3.3-3. The Goose Island refuse pile diversions will also be reclaimed, as the refuse will be regraded as part of reclamation activities.

Sediment control is provided by three ponds: 006, 007, and 008; these ponds will store runoff from disturbed areas as well as handle flow from adjacent hillside areas. Topographic constraints are such that the installation of diversions around the disturbed site to prevent runoff from undisturbed areas from entering the ponds is generally not feasible. The ponds are excavated structures, although pond 007 has been provided with a partial five-foot berm. (Pond designs are shown on exhibits 3.3-2a and b.)

The drainage area contributing to pond 006 is 39 acres; that contributing to 007 is 15 acres; and the watershed contributing to pond 008 is 18.5 acres. The total disturbed area controlled by the sediment control plan is approximately 17 acres. Sediment removed from these ponds will be placed in the Goose Island refuse pile.

The revised sediment-control plan for Hardscrabble Canyon (May 8, 1984 submittal) incorporates a new two-stage pond 009 (ponds 009A and 009B) connected by an open channel spillway, with primary and emergency spillways in the lower pond 009B. Ponds 007, 008, and 009 are proposed to be interconnected by means of discharge pipes and ditches to allow for design storm inflow to pond 007, in excess of existing capacity, to discharge to ponds 008 and 009. In addition, undisturbed runoff from basin HC-11 is proposed to be piped to diversion ditch D-6 to eliminate from design consideration 55 acres that were formerly tributary to pond 008. Finally three slotted box culverts are proposed for construction across the main haul road to intercept haul road and other disturbed area runoff. This runoff will be routed to ponds 007, 008 and 009.

Willow Creek

The Willow Creek area is currently used only for storage and for a ventilation system, although it is anticipated that mining may be developed through the old Castle Gate #2 portals when market conditions improve. The area is adjacent to the Willow Creek Cemetery. Willow Creek itself has not been diverted, as the facilities were constructed adjacent to the left bank of the stream. There are three overland flow diversions along the western edge of the facilities area, and the entire site is surrounded by a berm to prevent uncontrolled discharge into Willow Creek. These diversions will be reclaimed to the sections shown on exhibit 3.6-3.

Sediment control is provided by two ponds: 018 and 019. Pond 018 has a drainage area of approximately 3.9 acres; pond 019 has a drainage area of approximately 4.6 acres. These are non-discharging structures designed to hold the runoff from a 25-year, 24-hour storm and will operate as evaporation cells. Sediment removed from the ponds during the life of the operations will be stored at the east end of the storage area within the drainage area of a pond.

Castle Gate/Utah Fuel, Schoolhouse Canyon Refuse Pile

The Castle Gate area houses the coal-preparation facilities that are expected to be in place for 35 to 100 years. The facilities are located along the left bank of Price River, with the exception of the Gravel Canyon topsoil storage area and the Utah Fuel #1 mine. The conveyor from this portal area crosses over the river to the preparation facilities. Price River has not been diverted for these operations. There have been nine diversions of overland flow or ephemeral streams constructed to divert runoff from undisturbed areas away from the site as shown on exhibit 3.4-2. One of these diversions is a permanent structure designed to carry the peak flow from a 100-year, 24-hour storm. This diversion is the reconstructed channel of Barn Canyon that carries the flow from the Schoolhouse refuse pile diversion. All temporary diversions will be reclaimed to the configurations shown on exhibit 3.4-3.

Sediment control is provided by four ponds: O11, O12A, O12B, and O10 at the facilities area. A large embankment structure has been constructed immediately downstream of the Schoolhouse Canyon refuse pile to capture sediment at that location. Pond O11 has a drainage area of 13.3 acres, all disturbed; and its design is shown on exhibit CGE-103. The pond is a discharging structure and is equipped with an 18-inch diameter pipe. Ponds O12A and O12B are connected via an 18-inch culvert to maximize storage volume, as shown on exhibit CGE-104-1. Pond O12B has a berm with a maximum height of 9 feet and an 18-inch diameter outlet pipe that discharges into a riprapped channel. The drainage area contributing to ponds O12A and B is approximately 21 acres. Pond O10 serves as the sediment-control system for the Utah Fuel portal area. It is a non-discharging excavated pond provided with a small freeboard berm. The drainage area contributing to the pond is 1.5 acres. Sediment removed from any pond at the Castle Gate area will be placed in the Schoolhouse Canyon refuse pile.

Internal drainage in the Castle Gate area is provided by two ditches along either side of the main access road. Ditch A routes runoff to pond O12A and ditch B routes runoff to pond O12B. These ditches are designed to convey runoff resulting from the 2-year, 24 hour precipitation event.

The refuse pile sediment pond has an embankment with a height of 25 feet measured from the upstream toe to the crest of the spillway. The pond does not have a pipe outlet but has been provided with a spillway channel that is capable of carrying the flow from a 100-year, 24-hour storm in the event that the refuse pile diversion fails. A pump will be available to pump out the structure, as needed. The embankment has 3h:1v side slopes, and materials test results provided by the applicant indicate that the structure has an adequate factor of safety. The reservoir geology is such, however, that seepage is expected to occur. The pond can store a maximum of approximately 11 acre feet of runoff and sediment from its 63-acre watershed, which is the amount needed to store runoff from a 25-year, 24-hour storm and sediment from all 63 acres.

Any flow from the spillway will be routed through a 60-inch culvert into Price River. Pond designs are provided in the Golder report, which is an attachment to the permit application. This pond will be removed during site reclamation after vegetation has been satisfactorily established on the refuse pile.

Surface Water Monitoring

The applicant's surface water monitoring plan is described in section 7.2-2, page 387 of the permit application. The plan consists of ten stations that are monitoring streams affected by the four surface facilities areas in addition to other streams within the general permit area boundaries.

NPDES monitoring requirements will be fulfilled according to the schedule set forth in the January 1983 submittal from PRCC. At those points that potentially discharge (20 points in total are covered in the NPDES permit), samples will be taken twice monthly or when there is flow; and reports will be submitted quarterly. Effluent limitations are as follows: TSS, daily maximum, 70 mg/l; total iron, 2 mg/l; TDS, 2000 mg/l or 1 ton per day; oil and grease, 10 mg/l; pH, 6.5-9.0. Although the applicant has NPDES permits for all sediment ponds, it is not anticipated that those without outlet structures will discharge.

C. Evaluation of Compliance

Surface Water Control Structures - General

The applicant has provided a revised surface water control plan in the May 8, 1984, submittal that is adequate to prevent uncontrolled runoff from leaving disturbed areas within the surface facilities sites. The revised plan incorporates additional ponds and other sediment-control devices which provide adequate sediment control for several sites in the Sowbelly Gulch and Hardscrabble Canyon areas that are included in the request for small area exemption. The company should revise this exemption request to reflect additional sediment control proposed for several of these sites (see Proposed Special Conditions section).

Design of the individual control structures has been accomplished according to accepted engineering practice and in accordance with the regulatory requirements. The applicant has designed ditch sections that can adequately handle the required peak flow, although the velocity in many of the sections exceeds 5 feet per second (fps). A statement was made by the applicant (on page 414, chapter VII of the permit application) that ditches with grades exceeding five percent will be riprapped. While this is an appropriate action, some of the ditch segments are on grades less than five percent and the velocities are still excessive. Ditches which have velocities greater than 5 fps are identified in the calculations submitted by the applicant in the August 1983 submittal. Although the applicant has not committed to riprapping all ditches with velocities greater than 5 fps, any damage occurring in ditch sections will be identified and removed during routine inspections and maintenance activities undertaken by the applicant.

In addition, riprap will be placed as necessary when displaced in riprap channels (page 414, chapter VII of the permit application). The applicant has re-committed to diligent maintenance of water-control structures (May 8, 1984 submittal). The applicant is in compliance with this section of the regulations.

Sowbelly Gulch

Sediment ponds 003, 004, and 005 provide a combined sediment storage volume that is adequate to serve the Sowbelly Gulch area. In addition, the revised sediment control plan (May 8, 1984 submittal) provides adequate sediment control for areas previously controlled by straw dikes. However, detailed design calculations for the proposed pond 005 emergency spillway have not been submitted (see Proposed Special Conditions section). Designs for existing ditches and reclaimed ditch sections are adequate to pass the required flow. Except as noted the applicant is in compliance with provisions for surface-water protection in Sowbelly Gulch (see the Roads section for a discussion of culverts in Sowbelly Gulch).

Hardscrabble Canyon

The applicant is proposing to phase out the Hardscrabble Canyon surface water control plan in two to three years; therefore, the surface water-control plan is not a long-term installation. Three ditch segments in Hardscrabble Canyon are underdesigned: D-1, D-4, and D-6. These ditches effectively control the required size of the sediment ponds, and they should be upgraded to achieve the necessary cross-sectional area to pass the 10-year, 24-hour storm. In this case, however, ditches D-1 and D-4 will no longer be necessary when the Goose Island refuse pile is reclaimed in 1984-85. Providing that this reclamation occurs on schedule (as conditioned), it will not be necessary to enlarge these ditches for the remainder of their useful life. Ditch D-6, however, is a different case in that it was intentionally constructed below regulatory requirements because of severe topographic constraints. To resize this diversion would cause the entrance road to the facility to become so constricted as to prevent safe operation to continue at the site. Given that the applicant is to reclaim the site by December 1986 and will be maintaining the ditch according to the plan presented on page 414, chapter VII of the permit application and in the May 8, 1984, submittal, there is little possibility that environmental damage will occur. The applicant, therefore, will not be required to reconstruct the ditch. Ongoing maintenance activities will provide assurance that the ditch will function adequately during the remaining life of the site; however, if the reclamation of Goose Island or Hardscrabble Canyon is delayed beyond the dates specified within the permit application, the regulatory authority will require that ditches D-1, D-4, and D-6 be upgraded (see Proposed Special Conditions section).

The pond 007 storage volume is currently inadequate to handle the runoff and sediment from its drainage area. In order to increase the potential storage area of the pond temporarily, the applicant has stated that sediment in the pond will be removed before it reaches 30 percent of the sediment storage volume.

The revised sediment control plan for Hardscrabble Canyon (May 8, 1984 submittal) is designed to accommodate deficient pond 007 capacity by discharging excess design storm inflow (13,600 cubic feet) to pond 008 by means of 24 inch CMP and ditching designed for peak 25-year, 24-hour storm runoff. To accommodate this additional inflow to pond 008, 10-year, 24-hour runoff from 55 acres in basin HC-11, formerly tributary to pond 008, will be routed by means of 24-inch CMP to diversion ditch D-6. The remaining deficit in total pond 007 and 008 capacities (2,000 cu. ft.) is accommodated in the design volume of 35,000 cu. ft. for pond 009. Pond 006 (Goose Island area) is not provided with discharge structures. However, the pond's existing capacity (138,000 cu. ft.) is more than double the 25-year, 24-hour storm inflow volume of 65,000 cu. ft. The structure is therefore sufficiently oversized to effectively eliminate the possibility of outflow.

Although the capacities of pond 007, 008, and 009 acting in series are sufficient to contain 10-year, 24-hour storm inflows, outflow structures for pond 008 and 009 appear to have been improperly designed. Exhibits 3.3-6A and 3.3-6B (May 8, 1984 submittal) indicate that the crests of outlet structures for both ponds are only 1.0 feet below the tops of the embankments. Therefore, design storm outflows would not occur unless pond water levels impinged on the 1.0 foot of freeboard required by UMC 817.46(j). The applicant, therefore, must submit detailed plans for discharge structures for both ponds 008 and 009 demonstrating compliance with provisions of UMC 817.46(i) and UMC 817.46(j) (see Proposed Special Conditions section).

With the implementation of the proposed conditions, the applicant will be in compliance with provisions for surface water protection in Hardscrabble Canyon.

Willow Creek

The surface water control structures at Willow Creek are currently adequate for the low level of existing disturbance at that site. If any additional disturbance is proposed within the surface facilities site, the applicant will be required to provide plans to enlarge the sediment ponds. The ponds have been designed using runoff figures utilized for undisturbed areas (table 3.6A and B); and while it is sufficient now, new construction activities will require that a higher curve number be chosen for calculating flows.

The applicant is in compliance with the provisions for surface water protection at Willow Creek.

Castle Gate/Utah Fuel, Schoolhouse Canyon

The refuse pile pond has been designed to a stable configuration. A high potential for seepage under and through the embankment has been mitigated by incorporating a blanket drain and relief well into the embankment design. In order to keep the regulatory authority advised of the status of the embankment, the applicant will provide OSM and UDOGM annual reports regarding the condition of this embankment, summarizing the MSHA-regulated weekly inspections of the pond. Any potential hazard to the structure will be identified during these inspections, and the regulatory authority will be informed of the long-term stability of the dam via the inspection reports.

Pond 011 in the coal preparation area is receiving runoff from several inlet channels, since it is in the center of its drainage area. This pond is a discharging structure. Adequate detention of the inflow is regulated by the pond configuration and outlet size. The plan view of this pond, exhibit CGE-104, shows that the inlets to the pond are relatively close to the outlet. A check of the short-circuiting potential (Barfield et al, 1981, page 426), revealed that the pond may not provide adequate detention time to allow efficient settling of suspended solids, apparently due to topographic constraints. The applicant will be monitoring the pond if it discharges, at which time any violation of solids limitation standards will be detected. If such an excursion is demonstrated, the applicant has stated that baffling, or some other design alteration, will be provided to allow for more efficient settling of pond inflows. Except as noted, the applicant is in compliance with the provisions for surface water protection at Castle Gate/Utah Fuel and Schoolhouse Canyon.

Potential surface water control problems in the Castle Gate facilities area, cited in the April 25, 1984, OSM deficiency letter have been addressed by the applicant in the May 8, 1984, submittal as follows:

The thickener overflow pond has been redesigned with a 4-foot berm proposed for the entire pond perimeter and elimination of an 18-inch CMP inflow culvert (Exhibit 3.4-4). The proposed modifications will eliminate any possibility of overland inflows to the pond.

As-built design drawings for the raw water pond (Exhibit 3.4-5) indicate that the low point of the above-grade perimeter berm is 3.06 feet above the invert of the 18-inch CMP overflow culvert thus providing sufficient freeboard. However, it is not apparent that berming or ditching adjacent to the below-grade pond perimeter on the north and east sides is sufficient to eliminate possible overland inflows to the pond. The applicant must demonstrate that no inflows other than controlled river diversions will enter the pond (see Proposed Special Conditions section).

Elevations of decant device and principal spillway inverts are given on as-built plan and cross-section drawings dated March 15, 1983 for ponds 011, 012A, and 012B. The applicant has committed to marking the decant devices to indicate design sediment levels.

Surface Water Monitoring

The monitoring requirements set forth in the NPDES permit are adequate; however, the revised standards given in 40 CFR 434.42 call for the measurement of settleable solids rather than total dissolved solids. This change should be reflected as the NPDES permit is updated.

The applicant must propose a hydrology monitoring plan that will be at least as effective as the plan contained in Supplement 1 to be in compliance with this section of the regulations (see proposed Special Conditions section).

D. Proposed Special Conditions with Justification

1) The applicant shall revise the small area exemption request to reflect additional sediment control proposals for the Sowbelly Gulch and Hardscrabble Canyon facility areas within thirty (30) days of permit approval.

2) The applicant shall submit detailed design drawings and calculations for the emergency spillway proposed for pond 005 in Sowbelly Gulch demonstrating compliance with provisions of UMC 817.46(i) and UMC 817.46(j). The spillway design must be submitted to the regulatory authority within ninety (90) days of permit approval.

3) The applicant shall either complete reclamation of Goose Island by August 31, 1985, and Hardscrabble Canyon and Sowbelly Gulch by December 31, 1986, or complete installation of culverts specified below according to designs approved by OSM by August 31, 1985 at Goose Island and by December 31, 1986 in Hardscrabble Canyon and Sowbelly Gulch. Designs for the new culverts (structures) shall be submitted to the regulatory authority for approval within ninety (90) days of permit approval. The specific structures included are: culverts 1 (including diversions D-1, D-4, and D-6) and 4 in Hardscrabble Canyon (including Goose Island) and culverts 3 and 10 in Sowbelly Gulch.

4) The applicant shall comply with and meet the requirements contained in the Hydrology Monitoring Plan in the Technical and Environmental Assessment.

5) The applicant shall submit detailed plans and calculations for the discharge structures for both ponds 008 and 009 in Hardscrabble Canyon demonstrating compliance with provisions of UMC 817.46(i) and UMC 817.46(j). Spillway designs must be submitted to the regulatory authority within ninety (90) days of permit approval.

6) The applicant shall demonstrate with design drawings that uncontrolled overland inflows will not enter the raw water pond along the below-grade portions of the north and east perimeters of the pond. The drawings must be submitted to the regulatory authority within thirty (30) days of permit approval.

7) The applicant must submit a plan to evaluate the sources of oil and grease at all surface facilities and to control leakage in the surface-water system within sixty (60) days after permit approval.

E. Summary of Compliance

The applicant is in compliance with the sections of the regulations dealing with the protection of the surface water regime.

F. Proposed Department Action

Approve this section of the application with proposed permit conditions.

G. Alternatives to the Proposed Action

1. The regulatory authority (RA) could have approved the applicant's proposal without conditions. Because the assessment of compliance is based in part on the short duration of the remaining life of the facilities on Sowbelly Gulch and Hardscrabble Canyon, the RA determined that the remaining time period of use prior to reclamation be made a condition of this proposed action.
2. The RA could require that all undersized sediment-control structures in Sowbelly Gulch and Hardscrabble Canyon be reconstructed to pass the anticipated flows generated by the 10-year, 24-hour precipitation event. This has not been required because the RA has determined that, for the time period to December 1986 when reclamation will be completed, the potential environmental risks associated with the disturbances and resulting potential sediment yields are greater than the risks associated with the low probability that the 10-year, 24-hour precipitation event would occur ($p =$ less than 0.27 for a three-year period). Should reconstruction be required and a precipitation event equal to or greater than the 10-year, 24-hour event occur, the resulting sediment yield would probably be greater than if the structures were allowed to remain as presently constructed and properly maintained. Based on this analysis, the RA has not adopted this alternative.
3. The RA could require the applicant to reconstruct or install baffles on pond O11, located in the Castle Gate facilities area. Based on the infrequent discharges and the lack of demonstrated failure to comply with established effluent standards for suspended or settleable solids, the RA has determined that changes in the pond design shall be required only when it is shown to inadequately meet effluent standards.

HYDROLOGIC BALANCE - GROUND WATER

A. Description of the Existing Environment

1. Regional Geology

The Price River mine plan area is located in the northwestern portion of the Book Cliffs Coal Field in central Utah. The coal-bearing rocks of the Book Cliffs Coal Field consist of approximately ,400 feet of Upper Cretaceous sandstones and siltstones with minor amounts of shales and clays. These rocks comprise the Blackhawk Formation of the Mesa Verde Group. In addition to the coal-bearing Blackhawk, several other rock formations are of interest in the area of the Price River Mine Complex. In ascending order, these rock formations include the Masuk Shale Member of the Mancos Shale, the Star Point Sandstone, the coal-bearing Blackhawk Formation, the Castlegate Sandstone, the Price River Formation, the North Horn Formation, and the Flagstaff Limestone. The Flagstaff Limestone forms most of the ridge tops in the region and is generally covered by 0 to 50 feet of unconsolidated colluvial/alluvial material. Solution channels and fractures are present within the Flagstaff Limestone. The Flagstaff is about 500 feet thick in the Price River Canyon area.

The North Horn Formation consists of a series of shale, sandstone, conglomerate, and limestone beds, and is up to 2,500 feet thick in the area. The Price River Formation consists of medium-grained and shaley sandstone and is up to 1000 feet thick in the area. Beneath the Price River Formation lies the Castlegate Sandstone, which is about 500 feet thick in the area. The Castlegate is the predominant cliff-former in the Price River Canyon, is easily recognizable, and serves as a marker bed in the area.

The Blackhawk Formation, as mentioned previously, contains the significant coal beds of the region. The Blackhawk ranges from 900 to 300 feet thick in the Price River Canyon, with the predominant coal beds assembled in the lower 500 feet. The alternating discontinuous fluvial channel sandstones and shales of the Blackhawk comprise the majority of the formation, with channel sandstones more numerous in the upper Blackhawk. The Aberdeen Sandstone Member is about 70 feet thick in the vicinity of the Price River Mine Complex. The Aberdeen is lithologically similar to the massive littoral sandstone tongues of the Star Point below. The Aberdeen is "regional" in areal extent. The Star Point and Aberdeen sandstones are the only aquifers of regional extent. The Blackhawk intertongues with the Star Point below, which makes a definite contact difficult to identify.

The Star Point is about 600 feet thick in the area and consists of three predominant sandstone tongues (similar to the Aberdeen above), representing a regressive-deltaic-littoral sequence which intertongues with the gray marine shales of the Masuk Member of the Mancos Shale below. These massive sandstone tongues are cliff-formers in the Spring Canyon, located in the lower portion of the mine plan and adjacent area.

The basal unit of interest in the region is the Masuk Member of the Mancos Shale. It typically is several thousand feet thick. The Masuk generally forms flat desert surfaces and badlands in the area of such low permeability that it is the basal aquaclude.

The strata present in the region strike northwest to west and dip 3 to 6 degrees to the north into the Uinta Basin. As a result of the dipping nature of the formations and the highly eroded characteristics of the land surface, all the formations of interest outcrop in a progressively southward fashion within the mine plan and adjacent areas.

Unconsolidated alluvial material is found along the canyon bottoms of streams in the area. This material is generally several tens of feet thick and is up to several thousand feet in width along major perennial drainages such as the Price River.

2. Local Hydrologic Regime

Within the mine plan and adjacent area, three distinct aquifer systems have been identified by the applicant. These systems include a perched aquifer system(s) within the Price River, North Horn, and Flagstaff Limestone formations; the regional aquifer system, which includes the intertonguing Star Point and Blackhawk Formation; and several alluvial aquifer systems which exist along the major stream courses in the area.

Perched aquifer system. The perched aquifer system is described in the permit application as consisting of small, discontinuous, ground-water bodies which receive natural recharge from local precipitation and discharge as small seeps and springs. The seeps and springs are located generally at a sandstone-shale interface, and many only flow seasonally. Recharge to this system is generally believed to be less than 5 percent of annual precipitation with recharge typically occurring in the higher plateau ridgetop location.

Regional aquifer system. The regional aquifer system in the mine plan area can be divided into two hydrostratigraphic units: the upper Blackhawk and the lower Blackhawk-Star Point Sandstone.

Recharge to the regional system probably occurs along exposed surfaces in areas where the Blackhawk forms the surface formation. Some limited recharge may also occur from overlying beds above. Discharges from the regional aquifer system in the study area include springs, principal water-courses including Spring Canyon Creek, Willow Creek, and the Price River, and inflow into abandoned mine workings in the area.

Values for hydraulic conductivity and transmissivity were calculated for the regional aquifer system from two test wells which penetrate the Blackhawk Formation. Hydraulic conductivities were in the range of 0 to the minus to 0 to the minus 4 ft/day, and transmissivities were on the order of 27 to 486 feet squared per day over the thickness zones tested. The zones were tested over 808 and 65 feet, respectively. Total saturated thickness of the regional system is not known. Transmissivity and hydraulic conductivity values for the coal were found, through similar testing, to be within the same magnitude as the other portions of the formation. The transmissivity values obtained for the Blackhawk Formation indicate that the formation would classify as having poor well development potential (U.S. Bureau of Reclamation, 977).

A potentiometric surface map for the regional aquifer could not be made by the applicant, due to the nature of the geology, the limited number of wells situated in the formation and the fact that the system has been altered by past mining disturbance. As a result, the direction of flow and hydraulic gradient within the regional system are not fully understood. Fifty or more mines have operated within the limits of the study area, some dating back as far as 85 years. Forty-eight of the mines are now abandoned. Abandoned mine workings extend a distance of about 4 miles across the mine plan area. Discharge from the Blackhawk Formation is accumulating in these old mine workings.

Alluvial aquifer system. Alluvial aquifers are found along the Price River, Willow Creek, and Spring Canyon Creek. Published information indicates that the aquifers are quite permeable and that flows of up to 500 gpm can be expected for wells completed in the alluvial deposits. The regional aquifer system and the alluvial systems are thought to be interconnected. Although the source of recharge for the alluvial system in the study area has not been definitely identified, it is assumed that base flow comes from the Regional aquifer.

3. Springs and Seeps in the Area

A records and information search by the applicant has revealed the presence of 6 springs in the study area. 48 of the springs were found to be issuing from formations overlying the Blackhawk Formation (6 springs from the Flagstaff, 16 springs from the North Horn, 22 springs from the Price River, and 4 springs from the Castlegate), 3 were located issuing from the Blackhawk, and 0 springs were located issuing from formations underlying the Blackhawk (2 springs from the Star Point and 8 alluvial springs above the Mancos Shale). The springs identified by the applicant have water rights appropriated to them; in most instances, the designated use is stockwatering. Several of the springs have designated uses of domestic or irrigation purposes. Most notably, Crystal and Goat Springs, located in the Spring Creek Canyon just south of the permit area, supply the domestic needs for three homes and, when sufficient supply is available, for irrigating a small orchard. A third spring in the Spring Creek Canyon, Gravel Spring, is owned by Price River Coal and supplies industrial water to the #5 mine. All three of these Spring Canyon springs are thought to be alluvial in nature; a veneer of alluvium exists atop the Mancos Shale in this area.

4. Ground Water Quality

The ground water above the Mancos Shale is generally a calcium-bicarbonate type; and where the Mancos Formation (water) tongues with the Blackhawk, sodium-sulfate ions may dominate. Baseline ground-water quality data have been assembled at the study site by the applicant over the time period 977 to 98. A total of six monitoring wells and three springs were utilized in the program at one time or another. No other water wells in the study area were found to exist by the applicant on the basis of a legal search. Also, during 977 and 978, several water samples were obtained from water accumulating in the abandoned Royal Mine; and, in 978, two samples were obtained from mine #3 discharge. A complete listing of the analytical results can be found in Appendix 7-A of the permit application; only the salient features will be discussed herein.

The highest level of total dissolved solids reported during the monitoring period occurred for the August 9, 1978 mine #3 discharge sample. The value was 4420 mg/l TDS (this value may represent an analytical error, because it exceeds any other reported values by a factor of 3). A second sample, obtained on August 23, 1978, showed a value of 400 mg/l TDS. These were the only samples collected at the station.

Total dissolved solids levels for samples obtained from the abandoned Royal mine (22 samples, total) ranged from 700 to 350 mg/l. Total dissolved solids for the monitoring wells situated in the Blackhawk Formation (wells MC 203, 205 and 207) ranged from a low of 95 mg/l for MC 205 to a high of 887 mg/l for MC 207. Results for a total of nine samples (for MC 205 and 4 each for MC 206 and 207) were reported. In addition to these baseline investigations, on January 9, 1983, a single sample was obtained from the abandoned Kenilworth mine, and a TDS value of 20 mg/l was reported.

Total dissolved solids levels for the three springs monitored during the baseline investigation (Crandall Canyon Spring, Mathis Canyon Spring and Dry Canyon Spring) ranged from 255 to 068 mg/l.

Other constituents identified by the applicant as noteworthy include phenols (which may be associated with the coal, especially in naturally burned areas), sulfate, and oil and grease. A review of the applicant's ground-water quality data also indicates that total iron values are noteworthy in well MC 206 (a high value of 264 mg/l reported) and in a Royal mine sampling station (a high value of 6.4 mg/l reported). A maximum dissolved iron value of 23.6 mg/l for well MC 206 has also been reported. Well MC 206 is located in the Blackhawk Formation, adjacent to the abandoned Carbon Fuel #3 Mine and the abandoned Rolapp #2 mine.

B. Description of the Applicant's Proposal

The applicant proposes that ground-water impacts as a result of mining will be minimal. Impacts to the perched aquifer system will be negligible on the basis of the lack of faulting and great thickness (500 feet) of overburden separating the aquifer and its associated springs from the coal seams to be mined. Minimal subsidence impacts to this aquifer are, therefore, anticipated by the applicant.

Impacts to the regional aquifer system are also proposed by the applicant to be minimal. Although seepage into the mines is to be expected (as evidenced by past water accumulations in abandoned mine workings), the overall impact is expected to be inconsequential. Inflow rates measured in the #5 mine and the #3 mine range from 3.5 to 48.7 gallons per minute. These rates correspond to a discharge per unit area of disturbance of 0.05 to 0.05 gpm/acre. Measurements made in several of the abandoned mines (Aberdeen, Utah Fuel #, Royal and Kenilworth) range from 0.004 to 0.024 gpm per acre of disturbance. Converted to inches per year of recharge, assuming discharge equals recharge over the disturbed areas, these measurements correspond to 0.08 in/year to 0.46 in/year of recharge.

The average value for the four abandoned mines is 0.28 in/yr. For the Price River Coal Company (PRCC) #5 and #3 mines, the values are 0.29 to .02 in/year, respectively. The normal value of recharge (based on a normal precipitation year) using #5 and #3 mine inflow rates is 0.4 in/year and will be considered a worst-case scenario. The applicant concludes that these values are of a low enough nature to not warrant concern; and it should be noted that the values are very near the expected annual recharge rate for the regional aquifer.

During active mining, the discharge rate into the mine is expected to be in excess of the natural recharge to the aquifer system, indicating that water is being removed from aquifer storage. As mining ceases, the inflow rates are expected to be reduced until equilibrium is established between recharge and discharge rates. The applicant speculates that once abandoned, the mines which lie below the regional potentiometric surface will gradually fill until either equilibrium is reached within the mine or, as is conceivable, discharge occurs at the land surface via an access portal. Many of the abandoned mine workings are interconnected via rock tunnels, and it is possible that the tunnels may serve as spillways or overflows to other underground areas as the mines fill.

The applicant further proposes that ground-water quality impacts (as evidenced by total dissolved solids levels) will be minimal, based on a comparison of values obtained from the Blackhawk monitoring wells with those seen in samples collected from the abandoned mine workings. The applicant proposes that disturbance to the regional hydrologic balance during the past 85 years as a result of 50 major coal mines operating within the lease area (48 of the mines have since been abandoned) will have little, if any, measurable impact on water resources in the area. Based upon seven years of hydrologic data available from the applicant, impacts are expected to be local in scope.

In regard to impacts to the Price River and its associated alluvial aquifers, the applicant proposes that any reduction of flow to the Price River system, as a result of past interception of water in the active portions of the #3 and #5 mines, is on the order of 4 gpm. This value is calculated on the basis that if 0.28 in/year of recharge (the average value of mine flow observed for the four abandoned mines studied in the area) is intercepted by a disturbed area equivalent to the Price River Coal Company #3 and #5 existing mines, the flow rate is approximately 4 gpm. This value represents a reduction of about 0.03 percent of the historical average flow of the Price River at the mine site.

Using a similar analysis, mine inflows can be estimated for the life of the mine. Assuming that mine inflow in the abandoned mine workings is equal to recharge and subsequent baseflow to the Price River, then the average recharge to the Blackhawk-Star Point aquifer can be estimated by averaging the quantity of mine inflows. The applicant averaged inflows from four abandoned mines ($0.08 + 0.35 + 0.46 + 0.2 + 0.4 = 0.28$ in/year) in the area to obtain an average inflow. Two other mines within the PRCC complex (No.3 and No.5) were not used in this average. The average value using these mine inflow values is 0.4 in/year and will be considered as a worst-case scenario.

For the permit area, after the 8336 acres have been undermined by coal removal, potential reductions in ground-water flow to the Price River waterway will be on the order of 20 to 82 gpm (0.27 to 0.45 cfs), for the "average" and "worst" cases, respectively. This represents a potential reduction of 0.2 to 0.4 percent of the annual flow of the Price River of 2 cfs (near Heiner).

For the life of the mine, after 19,950 acres have been undermined, potential reductions in ground-water flow to the Price River watershed may be on the order of 288 to 411 gpm (0.64 to 0.96 cfs) for the "average" and "worst" cases, respectively. This represents a potential reduction of 0.6 to 0.9 percent of the annual flow of the Price River. PRCC holds a .7 cfs water right allocation on the Price River. The amount of ground-water flow reduction for the life of the mine represents only 38 to 56 percent of this allocated water right on the Price River.

Subsidence impacts to the alluvial aquifers are also proposed to be minimal. (See the Subsidence section of this TEA for a discussion of subsidence impacts.)

For a discussion of treatment of the mine water discharges, see the Surface Water section of this analysis. The applicant has obtained NPDES permits for the discharge of water from some of the old workings on the site.

C. Evaluation of Compliance

The applicant has complied, through collection of baseline data (seven years) and statement of intent regarding future actions, with applicable parts of Section UMC 87.4 of the Utah permanent regulatory program. Due to the complex nature of the geology, there are a number of uncertainties regarding the detailed description of the local hydrologic ground-water system utilized by the applicant in projecting the probable hydrologic consequences of mining; however, these specific uncertainties regarding the hydrogeology are not significant enough to preclude an adequate determination of probable hydrologic consequences by the applicant.

Hydrogeologic information available from adjacent areas suggests that the regional aquifer system, as described by the applicant, can be divided into two hydrostratigraphic units: the upper Blackhawk and the lower Blackhawk-Star Point. The upper Blackhawk hydrostratigraphic unit is represented by discontinuous fluvial channel sandstones and adjacent siltstones and shales which would best be characterized as an aquifer of limited areal extent described as perched aquifers by the applicant. The lower Blackhawk-Star Point hydrostratigraphic unit is represented by very extensive, massive sandstone beds interbedded with low permeable marine shales (due to inter-tonguing with the Masuk member of the Mancos below). The massive sandstone beds (or tongues) consist of the three Star Point tongues and the overlying Aberdeen sandstone of the Blackhawk. These massive sandstone beds are generally not interconnected hydrologically except where faults or fractures allow this. This is a regional conceptual model of the hydrogeologic setting, and locally some variations may occur. Uncertainties are not important to the projection of effects. For this discussion, however, the system will be referred to as the regional aquifer system.

In evaluating the probable effects of the proposed mining on the ground-water system, the regulatory authority has consistently assumed that, within the range of probable conditions, the system will react to mining activities in a "worst case" manner. The natural hydrogeologic regime has been altered to some extent by past mining activities. Although the regional aquifer system is penetrated by three known wells, it is not possible to definitively establish the local potentiometric surfaces; however, the dominant ground-water flow is most likely to be to the southeast and toward the Price River, as ground-water flow tends to follow surface topography. This assumption is consistent with the worst-case scenario.

The applicant has provided sufficient information to demonstrate that impacts to the perched aquifer system and the 48 springs associated with the perched system will be negligible. Impacts associated with the proposed mining will be limited to the regional aquifer system and its associated discharge areas.

The cumulative hydrologic impact assessment prepared by the regulatory authority, using all available information, does not differ significantly from the applicant's determination of probable hydrologic consequences.

In order to verify and confirm the predicted impacts of mining and to provide a basis for possibly modifying the mine plan and developing mitigations, the regulatory authority has determined that the applicant must implement a comprehensive monitoring plan. Supplement 1 contains the hydrologic monitoring plan developed by the regulatory authority.

Review of the applicant's statement of probable hydrologic consequences (PHC) and development of the cumulative hydrologic impact assessment (see CHIA section of this TEA) by the regulatory authority indicate that the proposed coal-mining operation will be in compliance with the applicable hydrologic requirements.

D. Proposed Departmental Action

Approval of this section of the application, as supplemented.

E. Alternatives to the Proposed Action

1. The regulatory authority could have disapproved the proposed action. This would not have been a supportable action, however, because the review of the proposed mining, the applicant's PHC, and the regulatory authority's CHIA show that the proposed action is likely to comply with the applicable hydrologic regulations and result in negligible impacts.
2. The regulatory authority could have approved the proposed action without a monitoring condition. While the analyses of the ground-water system support approval, there are sufficient uncertainties regarding local structural characteristics potentially affecting detailed aspects of the hydrologic system that the regulatory authority has determined that a monitoring system is required to confirm the character and extent of predicted impacts.

F. Environmental Impacts of the Proposed Departmental Action.

Potential effects in the mine plan area and adjacent area as a result of the proposed action are:

1. Dewatering of the Blackhawk/Star Point aquifer in the vicinity of the mined-out coal seams and temporary decrease in ground-water storage. As a result of this storage loss and ground-water flow interception, there will be a potential decrease in the amount of ground water flow to the Price River and its tributaries. It should be noted, however, that this intercepted ground water (minus evaporation and operational consumption) may be discharged to the Price River Basin as surface water, resulting in a potential offsetting increase of the flow of the Price River. The worst-case estimate of loss of ground-water flow to the Price River does not include any return of water flow to the Price River from the mines. The effect outside the permit area will be minimal. Areas with lost ground-water storage will begin to refill after mining areas are abandoned.

2. Incremental increases in dissolved constituent loads to the receiving waters. Specific amounts of the loading of dissolved constituents have been generally quantified. The loading of additional TDS is predicted to be well within the State's primary drinking-water criteria of 2,000 mg/l. The effect of additional TDS is expected to be insignificant compared to amount of TDS that would enter the Price River if the water were allowed to continue as ground water into the Price River as base flow.
3. Potential subsidence impacts to streams and springs above the mine. Potential subsidence impacts have been determined to be minimal, based on the amount of overburden and lack of subsidence from the historical mining that has occurred in the area over 85 years.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT (CHIA)

INTRODUCTION

This is an assessment of the probable cumulative hydrologic impact of all anticipated mining with respect to the Price River Coal Company (PRCC) complex on the Price River Basin, prepared by the regulatory authority in compliance with UMC 786.19(c). The area considered for impact assessment is the entire life-of-mine area of Price River Coal Company and adjacent areas.

The PRCC complex is located in the Book Cliffs Coal Field and is adjacent to the Wasatch Plateau Coal Field and within the Price River drainage basin. The hydrologic effects of the PRCC coal-mining operation have no cumulative impacts with existing and proposed coal-mining operations. Coal mines upstream on Mud Creek are located above the Scofield Reservoir which effectively buffers the quantitative and qualitative effects on surface water of those mining activities. Scofield Reservoir, through the precipitation of calcium bicarbonate, reduces total dissolved solids in the water entering the Price River at the dam. The reservoir itself is not materially affected by mining on its tributary watersheds (Cumulative Hydrologic Impact Assessment for Mud Creek).

The ground-water effects are isolated by distance, geologic structure, and topographic features. Downstream, the Price River slows out onto the Mancos formation (a marine shale) within a mile of the permit area boundary, above the town of Helper. The Mancos is dominated by fine-textured shales high in soluble calcium, sodium, and magnesium salts (gypsum being predominant) and causes three- to four-fold increases in total dissolved solids within a few miles of initial contact.

Immediately below the proposed permit area, water in the Price River is subject to diversions into irrigation canals which supply farmland along the base of the Wasatch Plateau and the Book Cliffs. These irrigation systems represent the primary water use below the Price River Mine Complex and below all other coal mines on tributaries to the Price River. After spring runoff subsides, the total flow of the river is normally diverted. Since the irrigation return flows are normally saturated with respect to gypsum, the small quantities of calcium produced by mining above the irrigated Mancos would not increase saline discharges from the Price River Basin. Additionally, the increases in dissolved solids introduced by coal-mining operations are extremely small (less than three percent) when compared to the massive increases which occur when water is used for irrigation of soils derived from the Mancos formation. Between the Scofield Reservoir and the town of Helper, there are no proposed mine sites or any areas affected by Resource Recovery and Protection Plans on file with the Bureau of Land Management other than those filed by the applicant. Downstream of Helper,

there are nine existing or proposed mines which exist or have potential to exist as hydrologically distinct operations, both among themselves and with respect to the Price River Coal Complex. The cumulative effect of these mines results in no measurable increase in salts in either the Price River or the Green River. Specifically, the names of the nine mines are: Gordon Creek #2, C & W mine, Star Point, Hiawatha, Centennial, Sage Point, Soldier Canyon, Sunnyside, and Geneva.

Over the estimated life of the mining operation, a total of 19,950 acres of land will have been undermined. Some of this area has been previously disturbed by earlier mining operations within several of the coal seams.

SURFACE WATER SYSTEM

The PRCC complex includes parts of four tributary watersheds in the Price River Basin. The four watersheds are Willow Creek, Spring Canyon, Sowbelly Gulch, and Hardscrabble Canyon. These are described in the Surface Water Hydrology section of this Technical and Environmental Assessment (TEA).

Water Quality

Sediment control, which is described in the TEA, is based on diversion ditches and berms to route flow around the disturbed areas, sediment ponds, sediment sumps, and straw dikes, all of which are presently in place. The sediment ponds are designed as non-discharging evaporation cells sized to hold runoff from a 25 year storm event on top of the maximum sediment pool. Only one portal is currently discharging and has an individual NPDES permit. The surface-water control plan is sufficient to prevent uncontrolled runoff from leaving disturbed areas within the surface facilities sites. The chemical quality of the surface water in the permit area is generally alkaline with various parameters that have been found to exceed water-quality standards or equivalent NPDES criteria for discharge points, primarily as a result of coal and coal fines being allowed to wash into Hardscrabble Canyon since the turn of the century. Although the water quality at the mine site was declining prior to the implementation of surface-water controls, current monitoring data indicates that these controls are resulting in improved water quality.

Water Quantity

Slight reduction of flow to the surface-water system will occur as a result of evaporation from sediment ponds. The amount of waters evaporated is expected to be insignificant. Interception of potential flow to the Price River from the Blackhawk/Star Point aquifer is discussed below.

GROUND WATER SYSTEM

Three aquifer systems are described by the applicant. These systems include perched, regional, and alluvial aquifer systems. The aquifers can be more accurately grouped into four hydro-stratigraphic units: 1) the carbonate strata overlying the Blackhawk, 2) the upper Blackhawk, 3) the lower Blackhawk/Star Point sandstone and 4) the Mancos shale. These are described in the Ground Water section of the TEA. The hydro-stratigraphic units that will be directly impacted by mining operations are the upper Blackhawk and the lower Blackhawk/Star Point sandstone.

Water Quantity

Assuming (as indicated by available data) that mine flow in abandoned mine workings is equal to recharge, then the average recharge to the Blackhawk/Star Point aquifer can be estimated by averaging mine inflows. For the life of the mine, approximately 19,950 acres will have been undermined, resulting in approximately 0.64 to 0.96 cfs of ground water being intercepted. This would reduce baseflow to springs and streams in the area by a lesser amount, because water is discharged from the mine.

The amount intercepted represents only 0.6 to 0.9 percent of the 112 cfs mean annual flow of the Price River near Heiner. PRCC holds 1.7 cfs (763 gpm) of water rights on the Price River. The 0.64 to 0.96 cfs of intercepted ground water potentially represents 38 to 56 percent of this 1.7 cfs water right. In both absolute terms and in terms of the existing rights to Price River water, the potential worst-case reduction in flow is insignificant.

During active mining, inflow into the mine from the regional aquifer system is expected to be in excess of the natural recharge of the aquifer system, indicating that water is being removed from storage. This will result in a decrease in the hydrostatic head of the Blackhawk/Star Point aquifer. Due to insufficient potentiometric data, the loss of head cannot be quantified. This water removed from ground-water storage will eventually be replaced as recharge occurs and the mine workings fill with water.

Water Quality

Incremental increases in TDS and TSS constituent loads to receiving waters, based on comparing TDS values from the Blackhawk monitoring wells to water from abandoned mine workings, are expected to be within established effluent limitations. The impact is, therefore, considered to be minimal.

SUBSIDENCE

Subsidence impacts to the area as a result of mining will be controlled by limited extraction of coal in the mine under Price River and Willow Creek. Impacts to springs and surface waters by subsidence are expected to be minimal due to the amount of overburden and the fact that there is no apparent historical occurrence of subsidence in the area. Further discussion is in the Subsidence section of the TEA.

MONITORING

A detailed monitoring program has been proposed to verify the probable low-level impacts to the hydrologic balance by the PRCC complex both during the permit term and for the life of the operation. The proposed ground-water monitoring plan will also provide additional information on the relationship of mining to spring discharges.

SUMMARY

In the discussion in the Ground Water section of the TEA, projected impacts to the hydrologic system were analyzed. Based upon the data presented by the applicant and information from other sources, probable impacts were determined to be minimal.

Impacts to the hydrologic balance by continued mining in the PRCC complex are expected to be minimal. Continued surface- and ground-water monitoring are designed to substantiate this conclusion as mining progresses. Due to the extensive mining disturbance that has already occurred in the past and the apparent lack of any impacts to the hydrologic system, it is anticipated that the monitoring plan will substantiate this conclusion.

FINDING

This assessment of the probable cumulative impact of all anticipated mining on the hydrologic balance of the PRCC Cumulative Impact Area has shown that the proposed coal-mining operation has been designed to prevent material damage to the hydrologic balance outside the permit area over the entire projected life of the mine through bond release.

HYDROLOGY-MONITORING PLAN

Introduction

The hydrology-monitoring plan is necessary in the area of the Price River Mine Complex to ensure that the mining and reclamation plan has been developed to minimize hydrogeologic impacts both on-site and off-site and to verify anticipated impacts. The principal elements of the plan outlined herein are a compilation of suggestions proposed by the applicant coupled with concerns of OSM and DOGM.

The hydrology-monitoring results will be reported on a quarterly basis, combining both ground- and surface-water monitoring results and contain the maps and other parts as required by each section. Annually, in the fourth quarterly report, the applicant will provide a summary discussion of the quantity, quality, and geologic sources of water encountered (channel sandstone, joint, fault).

Stations to be monitored are identified on Plate 1: Ground and Surface-water Monitoring Stations, attached to the September 21, 1983 letter from Vaughn Hansen Assoc. to the Price River Coal Company. The stations are identified as: B-22, BM-29, BM-30, BM-31, and BM-32 for the ground-water stations; and B-3, B-27, B-5, B-6, B-11, B-12, B-17, B-28, B-25, and B-26 for the surface-water stations.

Ground Water Monitoring - In-mine Flows

The quarterly report will include a map of all points and/or areas of defined measurable flow (greater than 3 gpm) away from the working face, as well as an indication of the geologic source of the flow (channel sandstone, fault, fracture, joint, etc.). The report should note seepage areas in the mine that cannot be measured. The map will also show the location of sumps used to collect water. The fourth quarterly report will contain a discussion of the quantity, quality, and source of water encountered with a comparison of observed inflow rates with those projected in the mine plan submittals dated May 1983 and September 21, 1983.

Quarterly flow, field, and laboratory water quality parameters will be measured. Field water quality measurements, at a minimum, will include: electrical conductance at 25° C, pH and temperature. The laboratory parameters to be measured will be sodium, potassium, calcium, magnesium, iron, chloride, bicarbonate, sulfate, carbonate, pH, and total dissolved solids. A mass balance table of the major cations and anions in milliequivalents per liter will be required for each analysis.

If the number of measuring points becomes excessive, a request to abandon some of the monitoring points may be made to the regulatory authority. In addition to the in-mine monitoring, the applicant must provide, in the annual summary, a quantified estimate of all ground water consumption (evaporation and other losses) and transfers of water in and out of the mine.

Springs, Abandoned Mine Discharge Stations and Surface-Water Stations

The springs, abandoned mine discharge points, and surface-water stations identified earlier will be monitored four times annually, to reflect seasonal variation: first thaw, spring high-flow, end of summer low-flow, and, as the last sample, before freeze-up.

Sampling will include field and laboratory analysis. The field analysis will consist of, at a minimum, flow rate, temperature, electrical conductance at 25°C, and pH. The laboratory analysis will be for total suspended solids, total dissolved solids, oil and grease, sulfate, bicarbonate, magnesium, chloride, potassium, sodium, calcium, and iron. A mass balance table of the major cations and anions, in milliequivalents per liter will be required for each analysis.

Biannually, collected samples will be analyzed for trace metals.

COAL RECOVERY

Since this is Federal coal, the Bureau of Land Management, Branch of Solid Minerals, is responsible for the evaluation of coal recovery. A letter of concurrence has been submitted by this agency stating that the applicant is maximizing recovery of coal in this operation (see October 3, 1983 letter of concurrence from the Bureau of Land Management).

EXPLOSIVES

The applicant does not plan for the use of any explosives during the permit term.

MISCELLANEOUS COMPLIANCE SECTION

A. Signs and Markers

The applicant has placed signs throughout the proposed permit area to identify the mine and permit at the entrance to the facilities, buffer zones, and topsoil stockpiles. In addition, the applicant has placed perimeter markers around all facilities sites. The applicant is in compliance with this section.

B. Disposal of Non-coal Wastes

The applicant has provided plans for haulage of sewage material from some of the facilities areas and connection to sewage systems in other areas. Non-coal wastes are removed from the mine on a regular basis by the Carbon-Emery Disposal Company. The applicant is in compliance with this section.

C. Cessation of Operations - Temporary

The applicant has stated that should temporary cessation of operation become necessary, the regulatory authority will be notified.

D. Cessation of Operation - Permanent

The applicant has provided extensive plans for the reclamation of the mine area once mining is complete (see the appropriate sections of this TEA dealing with reclamation).

E. Coal Processing Wastes

Applicant's Proposal

The applicant is proposing to continue construction of a coal waste disposal pile in Schoolhouse Canyon, located near the preparation plant. The pile consists primarily of coarse coal refuse from the heavy media circuit which handles +3/8-inch material and -28 mesh material from the froth flotation circuit. Occasionally, slimes from clarifier are placed in the pile and mixed with the coarse refuse. The refuse material is trucked to the disposal site and placed on top of the previously-graded lift. Lifts are being graded in thicknesses of no more than 2 feet. Inter-ramp slopes will be constructed at angles of 2h:lv, which means that the overall slope of the face of the pile will be somewhat flatter than 2h:lv. The coal waste disposal pile is expected to be in use for seven years. The applicant, in order to continue disposing of waste, will have to propose additional coal waste disposal capacity at the time of permit renewal.

An underdrain was constructed by the applicant from blasted material created during the construction of the diversion ditch above the pile. The material was placed in the canyon bottom for most of the length of the pile. The drain was constructed to be at least 4 feet thick.

The final height of the pile, as proposed in this submittal by the applicant, is approximately 200 feet. Plans are being considered to increase the size of the pile to also increase the life of the disposal site. The pile will be reclaimed contemporaneously with construction activities and will be covered with 18 inches of suitable material and revegetated. (For a discussion on the suitability and availability of cover material, see the Topsoil section of this TEA. For a discussion of surface-water control structures which are in place during the life of the construction phase of the pile, and for permanent structures, see the Surface Water section.)

During the construction of the pile, inspections will take place quarterly. Placement of the materials will be evaluated for adequate mixing and density. The overall stability and appearance of the pile will be determined, and the 5 piezometers which are in place will be measured. The inspections will also be conducted to ensure that all organic material is being removed prior to placement of refuse.

Evaluation of Compliance

The applicant conducted in-place density measurements of the material in the refuse pile; and sampled the material and ran tests to determine shear strength, cohesion, and angle of internal friction. A stability analysis was performed using the "method of slices" technique and the data collected. It was determined that the stability of the pile far exceeded the required 1.5 static safety factor.

From the piezometric data which has been collected, the pile has been shown to be free-draining. The maximum water depth measured by monitoring has been six feet, and this occurred during an abnormal wet period. The wells have shown several inches of water or less the rest of the year.

The applicant is in compliance with all sections of the regulatory requirements dealing with coal refuse disposal.

F. Willow Creek Cemetery

The applicant has claimed that it should possess a Valid Existing Rights (VER) determination for the Willow Creek Cemetery. The cemetery, which is not part of the proposed permit area, is more than 100 feet from the Willow Creek Storage Area which is part of the proposed permit area. The Willow Creek Storage Area is not an active facility yet and is used mainly for storage of mining equipment and machinery. An access road from Highway 33 (which is also not part of the proposed permit area) passes within 100 feet of the cemetery but provides no access to the storage area located on the opposite side of Willow Creek from the cemetery. The applicant intends to use access right-of-way to the portal area in the future, as it has done in the past (prior to 1977).

BACKFILLING AND GRADING

A. Description of the Existing Environment

The topography of the area around the Price River Mine Complex consists of very steep and rugged terrain. The area is dominated by flat plateau tops, and steep-sided canyons and cliffs are a predominant feature. The drainages generally have very steep gradients until the canyon bottom is reached where the gradient flattens.

The mine is located in the northwestern portion of the Book Cliffs Coal Field in central Utah. The coal-bearing rocks of the Book Cliffs Coal Field consist of approximately 1,400 feet of Upper Cretaceous sandstones and siltstones with minor amounts of shales, mudstones, and clays. These rocks comprise the Blackhawk formation of the Mesa Verde Group. In addition to the coal-bearing Blackhawk, several rock formations are of interest in the area of the Price River Mine Complex. In ascending order, these rock formations include the Mancos shale, the Star Point sandstone, the coal-bearing Blackhawk formation, the Castlegate sandstone, the Price River formation, the North Horn formation, and the Flagstaff limestone. The Flagstaff limestone forms most of the ridge tops in the region, and is generally covered by 0 to 50 feet of unconsolidated colluvial/alluvial material. Solution channels and fractures are present within the Flagstaff limestone. The Flagstaff is about 500 feet thick in the Price River Canyon area.

The North Horn formation consists of a series of shale, sandstone, conglomerate, and limestone beds, and is up to 2,500 feet thick in the area. The Price River formation consists of medium-grained sandstone and shaley sandstone, and is up to 1000 feet thick in the area. Beneath the Price River formation lies the Castlegate sandstone, which is about 500 feet thick in the area. The Castlegate is the predominant cliff-former in the Price River Canyon, is easily recognizable, and serves as a marker bed in the area.

The Blackhawk formation, as mentioned previously, contains the significant coal beds of the region. The Blackhawk ranges from 900 to 1300 feet thick in the Price River Canyon, with the predominant coal beds assembled in the lower 500 feet. The alternating sandstones and shales of the Blackhawk comprise the majority of the formation. The largest sandstone member is the Aberdeen sandstone which is about 170 feet thick in the vicinity of the Price River Canyon.

Beneath the Blackhawk formation lies the Star Point sandstone. The Star Point is several hundred feet thick in the area and consists of three predominant sandstone tongues, representing a transgressive regressive sequence which is separated by gray marine shales of the Mancos shale. The sandstone tongues are cliff-formers in the Spring Canyon, located in the lower portion of the mine plan and adjacent area.

The strata present in the region strike northwest to west, and dip 3 to 6 degrees to the north into the Uinta Basin. As a result of the dipping nature of the formations and the highly eroded characteristics of the land surface, all the formation of interest outcrop in a progressively southward fashion within the proposed permit area and adjacent areas.

Unconsolidated alluvial material is found along the canyon bottoms of streams in the area. This material is generally several tens of feet thick and up to several thousand feet in width along major perennial drainages such as the Price River.

B. Description of the Applicant's Proposal

The surface facilities associated with the Price River Mine Complex are already in existence. The portal facilities were constructed prior to 1977 and consist of cuts and fills to form bench areas for buildings, storage areas, etc.; however, the majority of the facilities are located on the canyon bottoms with the cut-and-fill areas providing additional space on benches just above.

The applicant is proposing to grade the sites, backfilling slopes as needed to establish suitable postmining contours and a stable land form, and to backfill the portals. Rock cut faces will be left in the canyons which will blend in with the surrounding rock outcrop land forms such as cliffs. The applicant proposes reducing only one cut which is located in colluvium. The slope is located in Sowbelly Gulch and is approximately 12 feet high. It will be backfilled to a 2h:1v or flatter slope. Also, the applicant has stated that a coal refuse pile (Goose Island) which existed in Hardscrabble Canyon prior to 1977 and which is currently being used as a storage area will be significantly recontoured. The old refuse pile will be regraded to 2.5h:1v in as many areas as possible. The remaining cuts and fills have been shown to be stable for over seven years, and in most instances, longer than that period of time, and will not require significant grading. (For a discussion of the stability of the coal refuse pile in Schoolhouse Canyon, see Refuse Disposal in the Miscellaneous section of this TEA.)

The applicant did not provide any information on expected swell factors in the backfilled material. Due to the relatively small amount of material which will be handled, determination of a swell factor is not critical to the evaluation of backfilling and grading.

The material that the applicant will be using for backfilling and grading is primarily the weathered strata in the Blackhawk formation. This material is not toxic and has been supporting vegetation on old fill areas. The areas which will be graded will also be covered with 6 inches of suitable topsoil material which will also promote reestablishment of vegetation. The coal refuse pile which exists in Hardscrabble Canyon will be covered with four feet of suitable plant growth media, revegetated and riprapped to ensure that refuse material will not impact surface water drainages. The active refuse pile which exists in Schoolhouse Canyon will be covered with 18 inches of suitable material. (For further discussion on the

Schoolhouse Canyon refuse pile, see the Miscellaneous section of this TEA.) This depth of cover should provide a sufficient root zone for the vegetation and prevent upward migration of salts. (The availability of the cover material and topsoil material is discussed in the Topsoil section.) All material will be obtained from the permit area.

Backfilling and grading activities will commence as soon as mining is complete in each of the portal areas and weather allows.

C. Evaluation of Compliance

The applicant has proposed to grade the mine facilities areas to a configuration compatible with the surrounding terrain. Existing slopes have been shown to be stable by the performance history, and postmining slopes will also be stable. Two slope areas will be significantly regraded to lesser angles which will increase stability. The applicant is proposing to cover coal refuse with an adequate depth of suitable material, and other areas will be covered with 6 inches of topsoil material. Backfilling and grading will occur as soon as possible after mining is complete. The applicant has committed to reseeding and replanting where necessary to maintain the reclaimed areas. Should rills and gullies develop which exceed 9 inches, the applicant has committed to regrade, re-soil, and seed the damaged area. The applicant is in compliance with this section.

D. Summary of Compliance

The applicant is in compliance with this section.

E. Proposed Departmental Action

Approval of this section with the proposed condition.

F. Alternatives to the Proposed Action

The proposed action is in compliance with the applicable regulations and causes minimal additional impacts. The regulatory authority has considered various alternatives, including alternate sources of cover material and topsoil. The topsoil alternative has been recommended for approval by the Secretary (see the Topsoil section of this TEA) and has been accepted by the applicant.

Briefly, all cover and soil material will be obtained on-site, rather than off-site. Further, less material will be required than originally proposed, based on additional information provided by the applicant on the toxic- and acid-forming properties of the coal refuse material.

G. Impacts of the Proposed Action

The impacts from the proposed action and the preferred alternatives would be minor. An existing operation would be reclaimed upon completion of mining, and the area would be contoured to a configuration more compatible with the natural surrounding and more stable than are the currently-existing workings.

WILDLIFE

A. Description of Existing Environment

The Price River Mine Complex as proposed includes currently operating mines with a central processing facility adjacent to the Price River near Price, Utah. The mines are accessed through two portals, one portal in Sowbelly Gulch, the other portal in Hardscrabble Canyon, and one shaft facility in Crandall Canyon. Cumulatively, 144 acres have been disturbed to date at the three mine locations and the processing facility. No new land is proposed for disturbance. Wildlife information presented in the permit application includes work prepared by the Utah Division of Wildlife Resource Personnel (DWR), a 1978 DWR publication titled, "Species List of Vertebrate Wildlife that Inhabit Southeastern Utah", and a limited raptor survey completed for the Crandall Canyon area.

The proposed permit area (8,510 acres) accommodates wildlife habitat types as well as wildlife species typical of submontane and montane life zones in Utah. Nine habitat types have been identified in the geographic area which includes the proposed permit area. Those habitats, as described in detail in the revegetation section of this document, include: riparian/wetland, cliff and talus, sagebrush, pinyon-juniper forest, shrubland, aspen, ponderosa, park land, and spruce-fir forests. Five of those vegetative habitats have been disturbed by mining activities. The baseline information submitted by the applicant describing wildlife species that occur on the proposed permit area, is a composite of information submitted for the entire permit area, rather than wildlife species occurring in each area of disturbance.

Aquatic habitats associated with the proposed mine are restricted to Crandall Canyon and the Price River. Riparian habitat occurs in both drainages. The Price River is a perennial stream, the only stream in the proposed permit area able to support a viable fish population. The DWR manages the Price River as a cold water fishing source, supporting rainbow, cutthroat and brown trout. Crandall Canyon, an intermittent stream, according to DWR personnel, does not have a viable fish population.

Appendix A of the permit application listed the species of terrestrial wildlife likely to inhabit the geographic area, which includes the proposed permit area. Of specific importance are: deer, elk, and raptors along with important habitats for those species. Deer and elk use the area for summer and winter ranges, with portions of the geographic area classified as winter habitat for deer and elk (p. 590 mine plan). The impacts associated with surface disturbance have already occurred. The proposed permit area includes habitat types conducive to raptor habitation, as seen by the number of raptor species recorded in the geographic area. Those species include: bald and golden eagles, four species of falcons, six species of hawks, and seven species of owls (DWR publication - page 62 of mine plan). Of special concern is the potential presence of bald eagles, known to winter in the area, golden eagles, a year-round resident, and the peregrine falcon (both the American and Arctic peregrines). No known active golden eagle nests have been sited in the area. No other raptor nests have been sited in the proposed permit area.

B. Description of Applicant's Proposal

The applicant has provided a multi-faceted program for the protection and enhancement of wildlife and their habits. The program includes:

- o access control -- the applicant has limited access of non-mine personnel to the mine plan area through secured gates and a security staff. This measure is intended to limit human interference with wildlife and to prevent hunting on mine property.
- o minimize disturbance -- the applicant intends to minimize disturbances related to mining and mining activities. For future disturbances, the applicant will consult wildlife management agencies and obtain information on species which occupy the areas and mitigating suggestions.
- o employee education -- the applicant will educate employees as to general awareness of wildlife problems and related environmental values through training programs. Personnel involved with handling waste have been trained in spill prevention and cleaning procedures.
- o powerline design -- the applicant has and will construct all powerlines in accordance with environmental criteria for electric transmission systems per USDI and USDA, 1970.
- o waterway protection -- the applicant has proposed a sediment control and pollution prevention plan for waterways. This includes sediment ponds, berms, diversions, control of runoff from petrochemical material, revegetation, and buffer zones.
- o habitat restoration and enhancement -- the applicant's habitat restoration and enhancement plan includes a revegetation plan consistent with premining conditions (see revegetation section).
- o roads -- the applicant will consult wildlife management agencies during the planning stages of any roads or potential barriers to wildlife. Agency mitigation plans will be adopted by the applicant.

The applicant will notify DWR of any high interest wildlife species which occur on a regular or irregular basis in the mine plan area.

C. Evaluation of Compliance

The applicant's proposed wildlife protection and enhancement plan is adequate. The revegetation plan proposed by the applicant will offer both cover and food to wildlife in the area and is suitable for reaching the proposed grazing/wildlife habitat postmining land use.

The U. S. Fish and Wildlife Service has stated that no threatened or endangered species are known to exist in the area, therefore, no mitigation or protection plans are required (see September 13, 1983 letter of concurrence). However, the applicant will, prior to additional disturbance, survey for raptors as per U. S. Fish and Wildlife instructions and submit results of the surveys to the regulatory authority for approval.

The applicant is in compliance with this section.

D. Proposed Conditions with Justification

Prior to any additional surface disturbance the operator will conduct adequate raptor surveys pursuant to U. S. Fish and Wildlife Service guidance on proper raptor survey techniques and the results of the surveys will be submitted to the regulatory authority for approval.

E. Summary of Compliance

The applicant will be in compliance with this section upon meeting the requirements of the above condition.

F. Proposed Departmental Action

Approve this section of the mining and reclamation plan with the above condition.

G. Alternatives to the Proposed Departmental Action

To implement the measures described in the applicant's proposal.

H. Environmental Impacts of the Proposed Departmental Action

Wildlife habitat on the area of disturbance (144 acres) has been lost for the life of mine and for some species for part of the time of reclamation as well, since disturbance has already occurred. Mobile species have relocated on adjacent areas. Immobile species have been reduced in number. Although no additional acreage will be disturbed by this action, the potential for impacts associated with human presence and increased mining activity exists.

REVEGETATION

A. Description of the Existing Environment

The Price River Mine Complex (PRMC) is an existing mining operation where no further disturbance of vegetation is proposed for the five-year permit term. A grand total of approximately 190 acres have been disturbed by mining activities prior to SMCRA by all prior operators, while approximately 144 acres have been disturbed after SMCRA was enacted and are associated with PRMC mining operations. All surface-mining operation facilities are located on lands owned by Price River Coal Company. Premining land use was livestock grazing and wildlife habitat. Historically, these land uses have been replaced by coal mining.

PRMC Mine area is characterized by mean annual precipitation of 13 to 25 inches, the majority of precipitation occurring as snow in the winter. Temperatures average in the low 80's in the summer and the low teen's in the winter (Permit Application Package (PAP), page 713).

Five of the six vegetation types that occur in the mine plan area have been affected by mining activities. They are grasslands-sagebrush, mixed brush, conifers, pinyon-juniper, and riparian types. The sixth type, saltbush, has not been disturbed by mining activities.

The grassland-sagebrush type occupies steep dry slopes and lower drainages. The dominant species that occur in this type are big sagebrush (Artemisa tridentata), black sagebrush (Artemisa nova), and wheatgrasses (Agropyron spp.). Species composition consists of 2 sagebrush, 7 wheatgrasses, smooth brome, blue grama grass, muhly, Indian rice grass, 2 bluegrasses, needle-and-thread grass, and approximately 50 forbs.

The mixed brush type occurs in relatively moist sites and maintains highly variable species compositions. The most common shrub species in this type are scrub oak (Quercus gambelii), snowberry (Symphoricarpos occidentalis), and sagebrush (Artemisia tridentata). This type includes approximately 17 grass species, 71 forbs, 2 succulents, and 32 shrubs and sub-shrubs.

The pinyon-juniper type is generally found on dry, rocky slopes and flats. The dominant species are pinyon pine (Pinus edulis) and Utah juniper (Juniperus osteosperma). The type is accompanied by other species including mountain mahogany (Cercocarpus ledifolius), scrub oak, sagebrush, rabbitbrush (Chrysothamnus nauseosus and C. viscidiflorus), and wheatgrasses.

The riparian bottoms include approximately 91 plant species. This type is either characterized by the presence of cottonwoods (Populus augustifolia) or open grasslands. Species composition includes an abundance of grasses, rushes, sedges, forbs, trees, and shrubs.

The coniferous forest type generally occurs at higher elevations on north-facing slopes and in some of the moister drainages in the permit area. The dominant tree in this type is Douglas fir (Pseudotsuga menziesii). The type also includes Utah juniper, Ponderosa pine (Pinus ponderosa), subalpine fir (Abies lasiocarpa), and white fir (Abies concolor). Ground cover in this type varies inversely with forest density.

Saltbush (Atriplex canescens) and grease wood (Sarcobatus vermiculatus) dominate the saltbush type. This type is the smallest of the six vegetation types (5 acres). Some areas are dominated by Russian thistle (Salsola kali), summer cypress (Kochia scoparia), convolvulus (Convolvulus arvensis), and rabbitbrush.

No threatened or endangered plant species were identified within the proposed permit area (see U.S. Fish And Wildlife Service, Endangered Species Section's memorandum dated September 13, 1983).

B. Description of the Applicant's Proposal

Price River Coal Company (PRCC) proposes to establish on lands presently affected by mining operations, except on permanent road surfaces, an effective and permanent vegetative cover of the same seasonal variety as exists in adjacent areas (i.e. Barn Canyon). Revegetation will be conducted in a manner that assures a prompt vegetation cover, capable of stabilizing soil erosion and recovery of production levels to established success standards.

The proposed permit area encompasses approximately 144 acres of disturbed land. Approximately 121 acres of this disturbed area will be revegetated. The remaining 23 acres consist of permanent road surface.

The majority of disturbance has occurred prior to any vegetation sampling; however, vegetation was sampled in Barn Canyon prior to mining disturbance. Sample adequacy was achieved for all parameters with the exception of production (PAP, Table 3.2, page 493). Production was not measured; instead, production estimates were obtained from the Soil Conservation Service (SCS) for all vegetation types. Vegetative cover values were not significantly different ($t = 0.05$) on all reference areas from correspondingly

affected areas in Barn Canyon (PAP, Table 3.4, page 495). Vegetative similarity indexes were 50 percent or greater. Reference areas for sites previously disturbed have been selected to be representative of the disturbed areas. The applicant will monitor reference areas at three-to-five-year intervals. Site conditions will be evaluated by the local SCS office; should problems arise, the applicant will discuss and act upon improvement recommendations made by Utah Division of Oil, Gas and Mining (DOGGM) and SCS [Price River Coal Company (PRCC) letter dated October 26, 1983].

Three seed mixes have been proposed for different situations in the permit area. The applicant provides a seed mixture along with possible variants for: topsoil stockpiles; moist sites and north-facing slopes; and dry sites, south-facing slopes, roadways, and spoil areas (PAP, Tables 9-2-1 thru 9-2-3, pages 535, 537, and 540, respectively; and PRCC letter dated October 26, 1983). These seed mixtures contain greater than 25%, by pure live seed, highly competitive, introduced species; however, the applicant states that the introduced species are suitable to the permit area due to their adaptability and historic use at other western coal mines. Also, these species are compatible, achieve a quick and stabilizing cover, and are not noxious or poisonous.

Eleven introduced plant species have been proposed by the applicant. They are as follows:

<u>Bromus biebersteinii</u>	regar brome
<u>Poa compressa</u>	Canada bluegrass
<u>Agropyron intermedium</u>	intermediate wheatgrass
<u>Melilotus officinalis</u>	yellow sweetclover
<u>Melilotus alba</u>	white sweetclover
<u>Dactylis glomerata</u>	orchard grass
<u>Astragalus cicer</u>	chickpea (cicer) milkvetch
<u>Festuca arundinacea</u>	tall fescue
<u>Phleum pratense</u>	common timothy
<u>Agropyron elongatum</u>	tall wheatgrass
<u>Medicago sativa</u>	alfalfa medic

(PAP, page 532 and PRCC letters dated October 26, 1983 and January 27, 1984).

The applicant has also proposed the use of native plant materials which are contained in seed mixes 2 and 3 (PAP, Tables 9-2-2 and 9-2-3, pages 537 and 540) and supplemented by a bulk seed mix (PAP, table 9-2-4, page 542). Species composition of the final mix will be limited by availability; and substitutions will be made from the bulk seed mix, if necessary. The bulk seed mix includes over 60 trees, shrubs and forbs. The proportion of species within the bulk mix will be based on percentage by weight with the percentage of each species being equal (PRCC letter dated October 26, 1983).

Four plant lists (PAP, tables 9-2-6 thru 9-2-9, pages 546 thru 549) have been provided for shrub and tree plantings. The species listed are generally appropriate providing they are planted in suitable locations. The applicant has proposed that a minimum of three shrub and two tree species be planted at a minimum density of 400 species per acre on moist sites and that a minimum of five shrub and two tree species be planted on dry sites at a minimum density of 300 individuals per acre (PRCC letters dated October 26, 1983 and January, 27, 1984).

Seeding and planting will take place during the first fall planting season after topsoiling. Topsoil replaced in the spring will be seeded with a cover crop of cereal grain and grasses to protect topsoil from eroding during the summer months. Topsoil replaced in late summer and areas seeded with a cover crop will be seeded with seed mixes #2 and #3. Cover crops will be mowed after seeding and used as a mulch. The mulch will be crimped where slopes allow, and a tackifier will be used on steeper slopes. Straw/hay mulch would be applied at rates of 2 to 3 tons per acre when cover crops are not used (PAP, page 530). Seed mixtures will be seeded at a rate between 25 and 30 lbs/acre (PAP, page 533; and PRCC letter dated October 26, 1983).

The applicant will monitor reclaimed sites for cover, density, and frequency during each of the first three years and in subsequent odd-numbered years to determine if supplemental planting and seeding are needed. Analyses will be obtained using the same sampling and statistical techniques used in collecting baseline data (PAP, page 554; and PRCC letter dated October 26, 1983). Revegetation areas will be inspected several times each year to identify any problems.

C. Determination of Compliance

The applicant has provided adequate baseline information derived from adjacent areas and a revegetation plan for the Price River Complex (UMC 783.19, 784.13, and 817.111). The revegetation plan has been prepared which provides information on the utility of native and introduced species for the postmining land use (UMC 817.112), planting and seeding rates and methods (UMC 817.113), revegetation timing (UMC 817.113), and mulching practices (UMC 817.114). Reference areas have been established and a commitment has been made by the PRCC to maintain and monitor these areas in fair condition or better for evaluation of revegetation success (UMC 817.116 and 817.117). The applicant is in compliance with all revegetation performance standards (UMC 817.111 through 817.117) and baseline vegetation requirements (UMC 783.19 and 784.13).

D. Proposed Conditions with Justification

None

E. Summary of Compliance

The applicant will be in compliance with all regulatory requirements pertaining to revegetation.

F. Proposed Departmental Action

Approval of this section of the mining and reclamation plan.

G. Environmental Impacts of the Proposed Departmental Action

The Price River Mine Complex is an existing operation, and no additional surface disturbances are proposed for approval during the five-year permit term. Approval of this permit will allow the reclamation of the disturbed sites once mining is complete. This would have the effect of enhancing the land use for grazing and wildlife, and stabilizing surfaces that do not currently have any vegetation growing due to use of the area for mining.

H. Alternatives to the Proposed Action

Several alternatives could be suggested; however, many of these alternatives would change the postmining land use. Any change in land use is not desirable to the landowner or the regulatory authority; therefore, these alternatives will not be discussed.

Alternatives where the land use would not change include: changing the seed mixture to all native species; changing the planting stock or removing woody plant species from the revegetation plan; changing the amount or type of mulch; or changing the methodology for revegetation.

All of the above alternatives have merit; however, the landowner has indicated that the proposed revegetation plan is the most desirable. The proposed plan will achieve the utility of the postmining land use as well as, or better than, any of the alternatives and still fulfill the requirements of SMCRA.

ROADS

A. Description of the Existing Environment

With the exception of the road leading into Sowbelly Gulch, roads to the surface facilities areas are owned by the county. Roads were constructed prior to 1977 to access previous mining operations in this vicinity. Road grades in the surface facilities areas generally do not exceed five percent, as they are constructed on graded bench areas adjacent to streams.

B. Description of the Applicant's Proposal

The applicant has provided each of the roads during the life of operations with culverts that also serve as part of the surface water control plan associated with drainage diversions. In some cases, these diversions are adjacent to the roads and serve as collectors for road runoff. Where that does not occur, roads may be specifically provided with triangular ditches that intercept runoff. Culvert sizing is based on the flow that can be expected from a 10-year, 24-hour storm event under inlet control. Nomographs from the Bureau of Public Roads were utilized to determine sizing requirements. Each culvert is provided with a metal end section at the inlet and outlet, stone or concrete headwalls, and impact dissipaters, i.e. riprap, at discharge points (page 414, Chapter VII of the permit application). Design criteria for 21 culverts was supplied in the August 1983 submittal from PRCC. Additional culvert information was supplied in the October 31, 1983 submittal.

The surfacing materials on the roads in the mine plan area are of suitable quality. The road in Hardscrabble Canyon is a county road and would be maintained according to county requirements. The other roads in the permit area (except the Crandall Canyon site) have been in existence since before 1977 and have not had any adverse impacts on the environment as evidenced by vegetative growth along the sides of the roads and the quality of the surface water draining from the facilities areas. Some water quality samples did show high oil and grease concentrations which most likely came from the maintenance and machinery storage yards at the sites.

The stability of the road cuts and fills has been shown to be adequate, based on the performance history of the slopes along the roads. The slopes were constructed prior to 1977 and have not shown any significant degradation. Roads on the bench areas will be graded during the final reclamation process to a stable configuration along with the rest of the bench area.

Regrading of the surface facilities area will result in restoration of the roads. Reclamation of the roads will require removal of some culverts; several will be retained to provide permanent access to the site. This access is required for utilization of the area for light grazing. In Sowbelly Gulch, three culverts will be left in the surface facilities area road which will remain as part of the postmining land use, providing access for grazing and other activities. In Hardscrabble Canyon, there are several bridges that will remain as part of the access road. The Willow Creek area will be left with one set of culverts to allow access over the stream. Castle Gate will retain three sets of large culverts. One of these is part of the diversion system for the refuse pile constructed in Schoolhouse Canyon.

C. Evaluation of compliance

A check of culvert sizing demonstrated that there are several undersized structures at the site which will require continued maintenance to achieve adequate surface water control. The applicant has requested that the drainage-control plan for Sowbelly Gulch and Hardscrabble Canyon be accepted in its existing state because both of these sites will be phased out in the next two to three years. In its current condition, culvert C-1 in Hardscrabble Canyon has potential for erosion damage. C-1 is a 24-inch corrugated metal pipe that could potentially receive 690 cfs from a drainage area of 550 acres. This culvert is associated with diversions D-1 and D-4 which are described in the Surface Water Hydrology portion of this Technical and Environmental Assessment. As stated therein, the structures are all scheduled to be removed when the Goose Island refuse pile is reclaimed in 1985. Another undersized culvert at Hardscrabble Canyon is C-4, which is a 60-inch CMP that could potentially receive 700 cfs from a drainage area of 623 acres. While not as serious a situation as that presented by C-1, C-4 is not fully adequate for the required flow capacity. In this case, however, C-4 replacement would necessitate a temporary closure of the portal area and loadout facility access. Given the short-lived nature of the surface facilities at Hardscrabble Canyon, it is unlikely that environmental damage will occur due to this culvert (see Surface Water Hydrology evaluation of compliance). In addition, the applicant will maintain these structures during the time that they will be in existence until reclamation is complete.

In Sowbelly Gulch, culvert C-3 (a 72-inch culvert) is handling flow from at least 1006 acres. This drainage area yields a 10-year, 24-hour flow of approximately 825 cfs, while the pipe can carry only 350 cfs at an HW/D of

1.5. This particular culvert will be left as part of reclamation activities, at which time an overflow section, (RC-2) will be created in the road to reduce the flow requirement of the culvert. Another undersized culvert, C-10, is located near the confluence of Sowbelly Gulch with Spring Canyon. The sixty-inch culvert is not sized to handle the runoff from the 1,947-acre watershed. The applicant has provided statements to the effect that the culvert has performed effectively for twenty years due to overflow sections and ditches in the adjacent Spring Canyon road that can route excess flow away from the culvert.

The undersized structures in Hardscrabble Canyon and Sowbelly Gulch appear to be functioning adequately based on past performance. In addition, the applicant intends to maintain the site while the structures are in place to ensure that they will function adequately. The extent of the underdesign is such, however, that there should be no delays in reclaiming the structures within the time frame proposed by the applicant. Timely reclamation will minimize damage which may be caused by future storm events; therefore, the applicant shall reclaim Goose Island prior to August 31, 1985, and shall reclaim Hardscrabble Canyon and Sowbelly Gulch prior to December 31, 1986. If the existing surface water control structures are not reclaimed, then they must be upgraded with adequately-sized channels by that time. The applicant shall upgrade the structures according to the schedule set forth in the condition (see proposed condition in the Surface Water Hydrology section).

D. Proposed Conditions with Justification

See the Surface Water Hydrology section of this Technical and Environmental Assessment for the applicable condition.

E. Summary of Compliance

With the implementation of the proposed permit conditions, the applicant is in compliance with the sections of the regulations dealing with roads.

F. Proposed Departmental Action

Approve this section of the TEA.

G. Alternatives to the Proposed Action

See Alternatives, Surface Water Hydrology section.

H. Impacts of the Proposed Action

Implementation of the proposed plans for road reclamation should reduce the need for road maintenance at the close of mining operations. The existing drainage structures have performed adequately, and road stability has been maintained. There will be no adverse impacts from the currently existing roads provided that maintenance during operations is routinely implemented.

SPECIAL PERFORMANCE STANDARDS

Operations on Prime Farmland

A. Description of the Existing Environment

There has been no history of farming in the area. The Soil Conservation Service (SCS) has determined that the area contains no prime farmland.

B. Description of the Applicant's Proposal

Based upon the historical use of the land and the SCS findings, the applicant has requested that a negative determination of prime farmland be made.

C. Evaluation of Compliance

The applicant has provided proper documentation that the land is not prime farmland. This section is in compliance.

D. Proposed Special Conditions with Justification

None

E. Proposed Departmental Action

Approve the applicant's request that a negative determination be made.

F. Alternatives to the Proposed Departmental Action

None

G. Environmental Impacts of the Proposed Departmental Action

None.

POSTMINING LAND USE

A. Description of Existing Environment

The potential land uses within the mine plan area are restricted due to inherent environmental restrictions such as slope, soil texture, and water availability. Land in and surrounding the mine plan area is currently used for non-intensive, non-developed uses such as grazing, recreation, watershed, wildlife habitats, and in localized areas, small surface developments to support the underground coal-mining activities. No farming activities exist within or near the permit area. Most of the area currently is used for light grazing and wildlife habitat. The area has been previously disturbed from past mining operations, as discussed in Chapter V of the mining plan.

Premining land use, although not documented, is presumed to have been wildlife habitat and grazing.

B. Description of Applicant's Proposal

Maintenance of surface disturbance, as discussed in Chapter II of the mine plan, will be necessary to support underground mine development. Surface facilities anticipated during the five-year permit term are in existence now and equal approximately 100 acres. Upon completion of the surface operations at the site, the affected areas will be reclaimed pursuant to the site-specific reclamation plans presented in Chapter IX. The proposed postmining land use is light, undeveloped grazing and wildlife habitat. The applicant has stated it does not intend to request any redesignation of the present land use which is "undeveloped" pursuant to sub-definition (j) in UMC 700.5.

C. Evaluation of Compliance

The applicant has submitted information on the premining uses, land capability, and plan for restoration of the disturbed area. The determination of premining land use has been properly made, and the proposed postmining land use is appropriate for this situation.

The applicant has adequately made a commitment to restore the mined land to the proposed postmining land use and has described the means by which this is to be accomplished.

Although planned subsidence may occur, such subsidence will have no effect on the viability of the postmining land use.

The applicant is in compliance with this section.

D. Proposed Conditions with Justification

None

E. Summary of compliance

The applicant is in compliance with this section.

F. Proposed Department Action

Approve this portion of the Mining and Reclamation Plan.

G. Environmental Impacts of the Proposed Departmental Action

No significant impacts are foreseen.

H. Alternatives to the Proposed Action

Limit coal extraction to avoid subsidence; but since no impacts to structure or renewable resource levels outside of the proposed permit area are anticipated, no alternatives are necessary (see Subsidence section). Postmining land use will not be materially affected and will not differ from premining uses.

AIR RESOURCES PROTECTION

A. Description of Existing Environment

The proposed mine plan area is in a mean annual precipitation belt of 13 to 26 inches. Precipitation generally increases to the northwest. Most of the precipitation is in the form of snowfall in winter months. Temperatures are highly seasonal, with a short summer season (maximum temperatures in the low 80's) and cold temperatures in the winter (average lows are 5-10 degrees F in January). Air patterns generally follow the regional drainage patterns. Winds are moderate (generally not exceeding 20 mph) and are from the west and northwest. Air quality is generally good, and most of the region is designated a Class II PSD area.

B. Description of Applicant's Proposal

Monitoring

The applicant does not propose to conduct any air quality monitoring program, since current and proposed fugitive dust control measures will minimize particulate emissions to the atmosphere. Gaseous emissions from machines and vehicles will occur intermittently and in small quantities.

Fugitive Dust Control

Fugitive dust will be controlled by the following measures:

- o Access roads--treatment with magnesium chloride and frequent watering.
- o Truck haulage--intermittent application of magnesium chloride and routine water sprays.
- o Coal conveyors--covering conveyors.
- o Bag houses--negative pressure bag houses are installed and operating at all above-ground coal transfer points.
- o Drop and loadout points--storage areas are filled by stacking tubes; loadout from piles is by subpile chutes; rail cars are sprayed with a glue-like, surface-encrusting solution shortly after loading.
- o Storage piles--with the high moisture content (10%) and quick loadout, there is little time for desiccation; piles will be watered when it is necessary for longer storage.

C. Evaluation of compliance

The climatological data are acceptable. The Utah Bureau of Air Quality has determined that an ambient air quality monitoring program is not required since the proposed fugitive dust control plan will effectively minimize atmospheric emissions resulting from both surface and underground activities.

D. Proposed Conditions with Justification.

None.

E. Proposed Departmental Action

Approve the air quality control plan.

F. Alternatives to the Proposed Departmental Action.

An ambient particulate monitoring program could be required; however, since the Utah Bureau of Air Quality is not requiring a monitoring program and the applicant's fugitive dust control plan will minimize atmospheric emissions, no alternatives are necessary.

G. Environmental Impacts of the Proposed Departmental Action

The adverse environmental impact of the proposed action on the regional air quality will be slight and will be temporary, not extending beyond the reclamation phase of the proposed operation.

SUBSIDENCE

A. Description of the Existing Environment

The Price River Mine Complex is located in the Book Cliffs Coal Field in central Utah. For a detailed description of the geology of this region, see the Ground Water section of this Technical and Environmental Assessment. The area is very rugged with high plateaus dissected by steep-sided stream channels. The operation will be mining several seams during this permit term under varying depths of cover ranging from approximately 250 feet to 2500 feet. The areas of shallow cover coincide with canyon bottoms. Sandstone layers exist throughout the permit area which are fairly continuous both horizontally and vertically. The Castlegate Sandstone is approximately 500 feet thick and is located above all of the coal seams to be mined except in areas where stream channels have eroded through it. Below the lowest seam to be mined during this permit term is the Star Point Sandstone. Interbedded with all of the coal seams are many more minor sandstone layers. The area has already been extensively mined within the permit term area, and in some areas up to five seams have already been extracted. Plate 2 submitted with the hydrology report prepared by Vaughn Hansen Associates, June 1983 attachment to the permit application, shows the extent of the previous mining.

The renewable resource lands and structures which the applicant has identified which should be protected from mining-related subsidence during this permit term are: the Price River, the D&RGW railroad, two Federal highways, and the BLM's Price Canyon Recreation Area located in Sections 21 and 28 along the northern border of the permit term area (see page 70 of the permit application). The highways and railroad are located along the Price River stream channel. Above the mine on the top of the plateau, the land is primarily used by wildlife and cattle for light grazing. There are no major aquifers which will be disturbed (see the Ground Water section). For a discussion of cultural resources, see the Cultural Resources section.

B. Description of the Applicant's Proposal

The applicant is intending to protect the Price River, D&RGW railroad, Federal highways, and the Price Canyon Recreation Area by limited mining under these areas. The applicant has defined an area on the surface under which there will be no pillar extraction or longwall mining, by projecting a 45-degree angle of draw from the lowest seam to be mined to the surface. Within these areas, there will be no pillar extraction; and in areas where multiple seam mining will occur, the pillars will be superimposed between the seams to be mined. Pillars will be designed to be stable using methods defined by the National Coal Board (see supplemental information submitted by the applicant in August 1983). A further review of the pillar-design criteria showed that the method proposed by A. H. Wilson in "The Mining Engineer," June 1972, number 141, is the method used by the National Coal Board as described by Price River Coal Company. This

method is very conservative, as applied by Price River, and should allow for the development of pillars which will be stable for a relatively long period of time. Additionally, the operator is planning to design the pillars in these areas for the lowest coal seams to be mined and then superimpose this same size pillar in all upper seams to be mined (August 1983, Laine Adair, Price River Coal Company). As a result, the pillars in the upper seams will be very conservatively designed. In addition, past mining experience in this region indicates that the coal has a tendency to remain very stable over the long term. Abandoned operations have been investigated, and the coal pillars show only minor degradation (August 1983, Laine Adair, Price River Coal Company).

In one area of the mine under the Price River in Section 35, there will be up to five seams extracted where one seam has already been mined out. Based upon the mine maps and drill log data supplied by Price River, these five seams would be mined within only 250 to 350 feet of the surface, and up to 30 feet of coal between the five seams could be removed. Figures 1 and 2 (attached) show drill log information from two holes located in the vicinity of the area in question. Due to the relatively thin interburden between some of these layers and that the uppermost layer has been mined leaving pillars which were not regularly shaped, concern exists as to the feasibility of the proposed operation to protect the river, roads, and railroads. It is the operator's contention that (1) the sandstone layer in the mine area will support the layers between the seams and between the upper seam and the surface and (2) mining of a similar nature has occurred in other operations in this area. Substantial information on conditions in other areas has been provided by the applicant indicating that multiple seam mining with thin interburden has taken place and there have been no subsidence problems noticed due to lack of any pillar failure. Also, a recent U. S. Bureau of Mines study at the mine showed that, under certain conditions, the effects of mining between seams is often difficult to detect (August 1983, Laine Adair, Price River Coal Company). Drill log information was submitted by the applicant in November 1983, substantiating that extensive sandstone layers do exist in the area of concern.

In summary, the geologic conditions at the site show that multiple seam mining can occur with relatively thin interburden and the effects will be minimal between seams. With the additional conservatism in the mine design provided in the pillar design, protection of the Price River should be achieved.

In this operation, the surface effects of subsidence on the high plateau area are also mitigated by the existence of the sandstone layers which are prevalent throughout the site. It is the applicant's contention that the sandstone layers will have a tendency to bend as the area is mined out and finally settle on the caved strata above the workings. This would prevent severe cracking at the surface and would cause only a gradual settling. To date, there has not been any significant cracking of the surface. The maximum amount of subsidence measured has been two feet, which was recorded at only one location (June 1983 submittal).

The applicant has proposed to monitor the areas above the mine using areal photography and grid surveys on the surface to develop data to establish the effects of mining on the surface (PAP, page 68). The monitoring points are shown on Exhibit 3-21 and will be advanced as mining progresses. In addition, the applicant has committed to monitoring in the vicinity of the Price River prior to mining within the area defined by the angle of draw (see the August 1983 submittal); therefore, information will be obtained supporting the applicant's proposed plan. If subsidence impacts occur which were not planned, then the opportunity exists for revision of the mine plan.

The applicant is planning to undermine the Price Canyon Recreation Area, administered by the Bureau of Land Management, by using longwall mining methods. This will lead to subsidence at the surface; however, due to the thickness of the overburden in this area and the existence of the thick sandstone layers, this subsidence is expected to be a general lowering of the surface without any surface cracking. As a result, mining under this area will not endanger the public or affect the use of the recreation area.

C. Evaluation of Compliance

The regulatory authority has extensively reviewed the proposed plan and the applicant's assessment of potential effects and has determined that the proposed plan will protect structures and renewable resource lands from the effects of subsidence. In addition, a monitoring plan has been proposed to evaluate the subsidence-control plan. Based upon information provided by the monitoring plan, the mining operation can be modified, if necessary, to mitigate subsidence impacts.

The applicant has committed to mitigation of any subsidence impacts which might occur from mining underneath the Price Canyon Recreation Area and carries liability insurance which covers these mitigation activities. The Bureau of Land Management has consented to the applicant's proposed mining plan underneath the recreational area (see BLM letter of concurrence dated February 2, 1984); therefore, the applicant is in compliance with UMC 761.11(a)(3) since both the regulatory authority and administering agency for the recreation area approve of the proposed mining extraction method beneath the recreation area.

The applicant is in compliance with this section.

D. Proposed Conditions with Justification

The applicant shall submit to the regulatory authority a cultural resources survey and, if necessary, plans for mitigation of impacts to these resources ninety (90) days prior to any longwall mining or retreat mining in areas previously undisturbed by mining or in areas where planned mining will create any surface disturbance.

E. Proposed Departmental Action

Approval of this section of the mining and reclamation plan with the proposed condition.

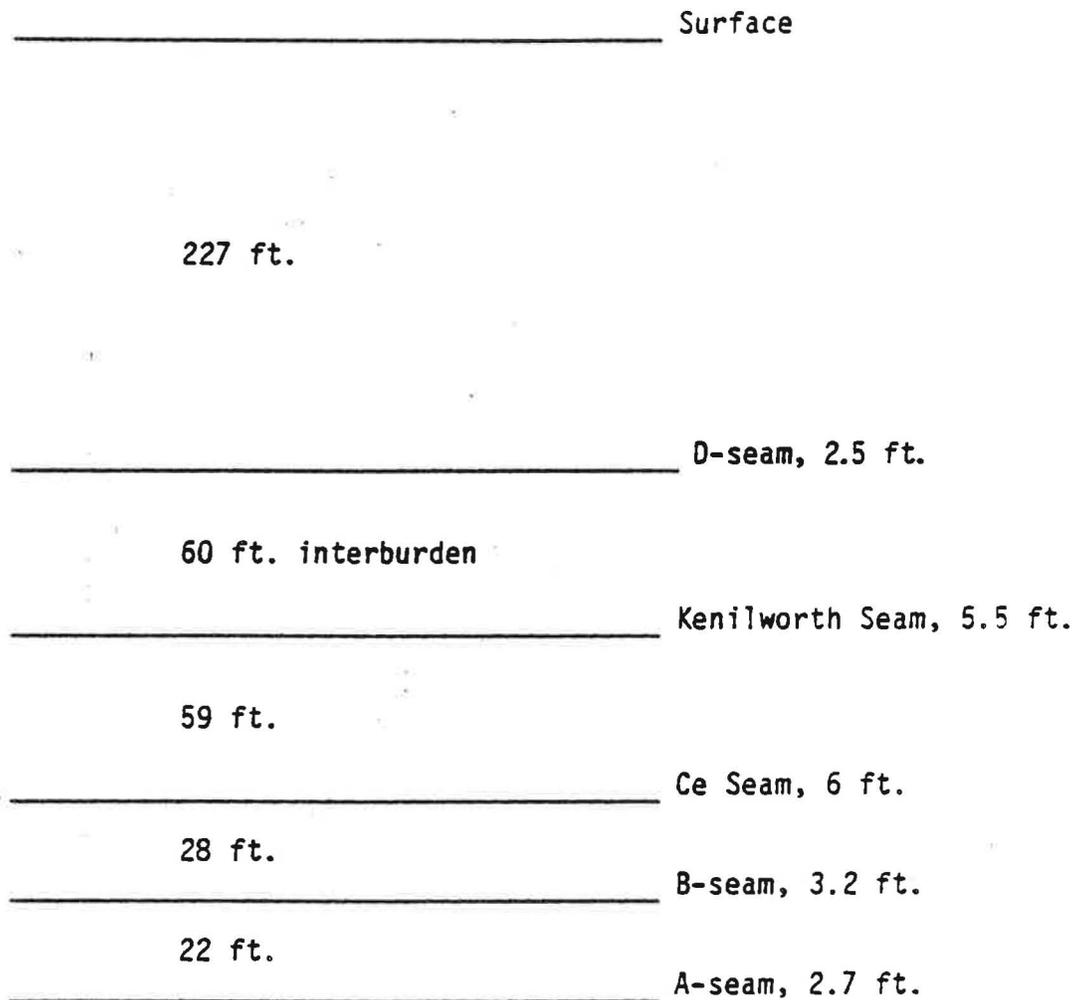
F. Alternatives to the Proposed Departmental Action

Coal extraction could be limited to prevent subsidence, but since no impacts to structures or renewable resource lands outside of the proposed permit area are anticipated, no alternatives are necessary.

G. Environmental Impacts of the Proposed Departmental Action

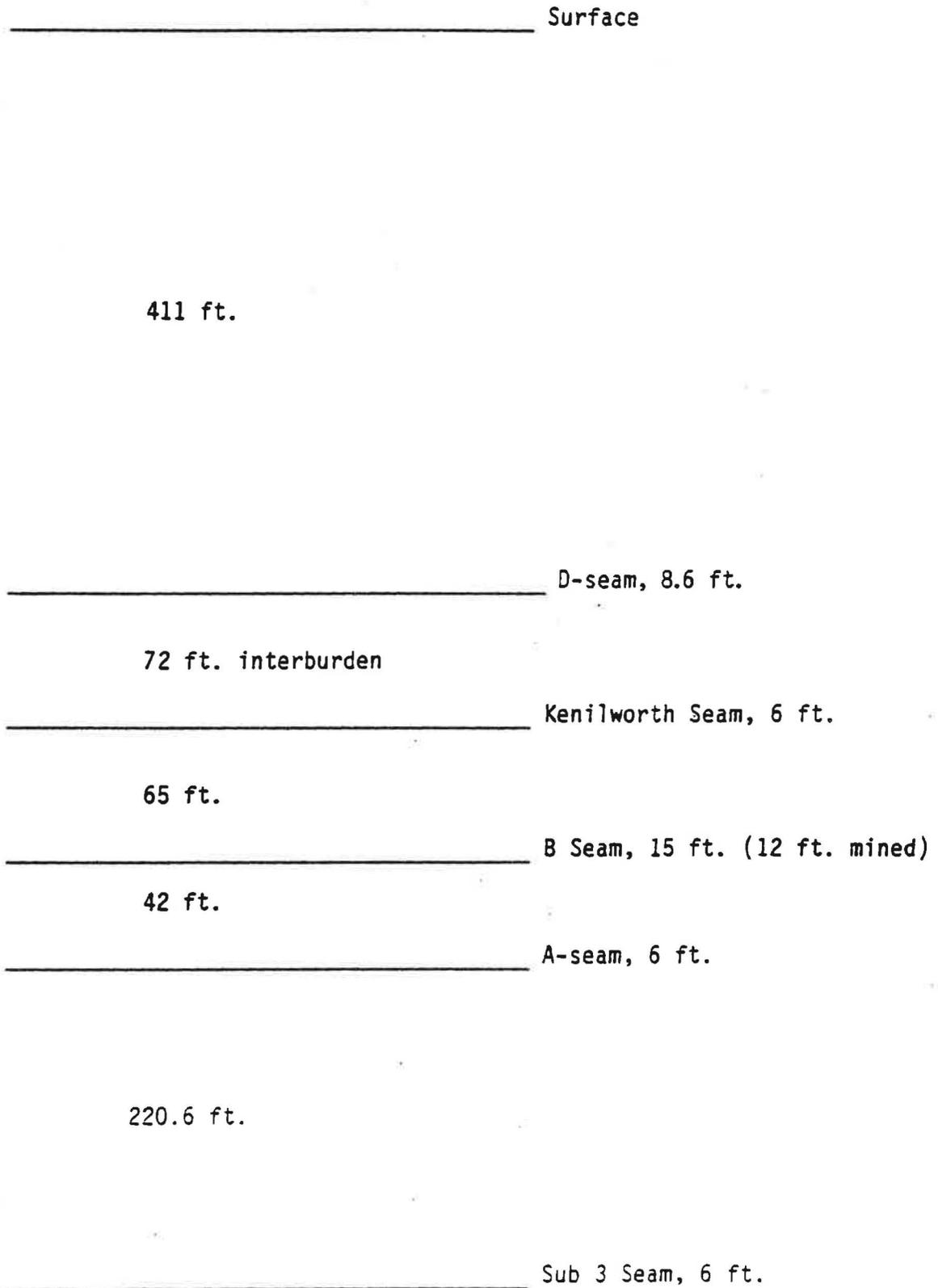
With the proposed condition, the applicant has proposed an operation which will protect significant resources and structures from subsidence. As such, impacts resulting from subsidence caused by the proposed operation are anticipated to be minor and have no unmitigated effect on structures or the use of renewable resource lands.

DRILL HOLE MC-52



Although this hole was not drilled through the Aberdeen to the Sub 3 Seam, the occurrence of the Aberdeen is very consistent throughout this area. Detailed lithologic information was submitted for three other drill holes and in each of these holes, the Aberdeen sandstone existed.

DRILL HOLE MC-6



ALLUVIAL VALLEY FLOORS

A. Description of the Existing Environment

The Price River Mine Complex is located in the Book Cliffs Coal Field of central Utah. The area is very rugged with high plateaus dissected by steep gradient narrow stream valleys with steep side slopes. Most of the flatter valley areas are occupied by stream channels, railroad right-of-ways, and major highways or county road systems. The side drainages are typically steep gradients and have little base flow to support irrigation; hence, there is little potential for irrigated or subirrigated areas in the permit area (PAP, section 7-5). The renewable resource lands are used primarily for wildlife and cattle grazing.

B. Description of the Applicant's Proposal

The applicant is planning to protect the area's hydrologic balance by designing superimposed pillars in the multiple coal seams to be mined to give maximum stability to the overburden under the Price River (see Subsidence section). The design is conservative and should provide the necessary overburden stability to prevent the river's surface and alluvial flow from entering the mine voids. These pillars will also be left under the railroads and major road systems. The area of surface disturbances for mine openings and support facilities will be minimized.

Additionally, the applicant has provided data supporting the claim that there are no alluvial valley floors (AVF's) within the permit area.

C. Evaluation of the Applicant's Claim of "No Alluvial Valley Floors"

A review of the applicant's proposed action by the regulatory authority reveals that no alluvial valley floors exist in the proposed permit area. The determination was based upon OSM staff familiarity with the area and information provided by the applicant and State of Utah. There is no land within the permit area where irrigation or subirrigation occurs (see section 7.5 of mine plan).

Price River and Willow Creek are the only streams with significant base flow that pass through the proposed permit area. These areas usually have slopes greater than 10% with the alluvial material composed of rocky stream-laid material and talus debris from the canyon sides. At best, this material would marginally qualify as AVF's.

The proposed action should not cause any adverse impacts on the water-transmitting characteristics of this material. Additionally, the applicant will protect the hydrologic balance of the permit area by controlling subsidence under the streams (see Subsidence section and the description of the proposal, above).

The subsidence-control plan will prevent the reductions in flow of both the Price River and Willow Creek as they pass through the permit area. This will prevent damage to the AVF's identified downstream of the mine complex, since the water source is obtained by diverting the flow of the Price River which is used for flood irrigation.

D. Proposed Special Conditions with Justification

None.

E. Proposed Departmental Action

Approval of the applicant's proposal.

F. Environmental Impacts of the Proposed Mining Complex

The applicant has proposed an operation that should not impact AVF'S, since none was identified in the permit area; and those that are located downstream along the Price River will not be impacted, because the hydrologic balance of the stream flow will be maintained and effects on stream water quality are not material (see Ground Water Hydrology, section F, and CHIA).

BONDING

A. Description of Applicant's Proposal

The applicable minimum period of liability beyond the cessation of production is ten years. The applicant has identified only one bonding increment. The applicant has prepared and submitted to OSM estimated bond amounts and supporting calculations. Summaries of total bond amounts proposed by the applicant are:

<u>Area</u>	<u>Proposed Bond (\$)</u>
Sowbelly	142,177
Hardscrabble	346,339
Castle Gate & Utah Fuel #1	2,552,929
Willow Creek	132,377
TOTAL	3,173,822

A \$350,000 bond for the Crandall Canyon site has been previously posted in 1980 and is, therefore, not included in this analysis. The applicant also proposed a series of alternative bond amounts assuming the possibility of a variance for the 4-foot cover requirement over refuse materials.

B. Evaluation of Compliance of the Proposal

The OSM has analyzed the bond estimates and supporting calculations provided by the applicant. Applicant estimates were based on standard construction cost estimation industry guides, i.e., the Dodge Guide for Heavy Construction, used primarily for the earthwork estimates; and the Means Guide, used for building demolition; and on past experience. All costs from references not using a 1983 dollar basis were escalated to 1983. Calculations by the applicant are broken down into five general categories of reclamation activities:

1. Demolition and disposal of buildings.
2. Portal sealing.
3. Grading.
4. Topsoil replacements (resoiling).
5. Revegetation.

Unit costs for each of the five categories above were calculated by the applicant, and the unit costs were then applied to each of the four areas to be reclaimed. The following conclusions were made as a result of the OSM analysis of the unit cost calculations and subsequent bonding estimates:

1. There is no provision for a contractor fee which would be necessary if the operator were to default and the project were to be taken over by a contractor.

2. On the grading unit cost section, the stated unit costs for dozers and scrapers may have been reversed; the total cost of \$1.05 per cubic yard, however, is reasonable and, therefore, is adequate for subsequent bond calculations on a site-by-site basis.
3. After performing a cost estimate of necessary maintenance activities added to a standard 10% contingency factor, the 15% contingency and maintenance factor used by the applicant has been judged to be adequate.
4. Acreage estimates for disturbed areas (and subsequent reclamation activities) do not include three acres for Gravel Canyon.
5. An incorrect cubic yard figure was used in the Hardscrabble resoiling calculations. The actual volume required is 39,140 cubic yards.
6. An incorrect cost per cubic yard was used in the Sowbelly resoiling calculations (the correct figure should be \$3.50 per cubic yard, resulting in a total resoiling cost of \$45,428); however, the total estimate for Sowbelly does not carry through this error and is, therefore, adequate.
7. A cost has not been included for inflation for the next 2.5 years which is the time to the mid-permit review.
8. Costs associated with topsoil handling have been revised based upon the analysis presented in the Topsoil section of this Technical and Environmental Assessment.
9. Other calculations on the site-by-site basis were adequate.

To resolve the deficiencies noted above, the following additions and changes will be made to the applicant's bonding calculations:

1. Contractor fees will be added as appropriate in the bond estimate reflecting the assumptions and references used by the applicant concerning this cost.
2. Costs for grading and revegetation of the 3-acre Gravel Canyon site will be included.
3. The difference in the Hardscrabble resoiling error will be included.
4. Volumetrics and costs have been revised in the estimate to reflect the analysis in the Topsoil section. These include covering of the Castle Gate refuse pile with 18 inches of material and obtaining all material from on-site.
5. An amount has been added to the bond estimate reflecting anticipated inflation over the next 2.5 years. Based upon Bureau of Labor statistics and the Industrial Commodities Index,

inflation over the past five years has been: 1979, 16.5%; 1980, 13.3%; 1981, 8.4%; 1982, 1.6%; and 1983 (annualized), .9%. Clearly the trend is dramatically decreasing; therefore, an annual 1% inflation factor will be used.

The changes to the bond estimate have been made on the calculation sheet submitted by the applicant and have been reviewed and found to be adequate. The new total for the bond, including Crandall Canyon at \$350,000, is \$2,532,857.00.

In addition to the bonding calculations, the applicant has submitted a certificate of insurance in its permit application. The certificate has adequate provisions for minimum liability coverage (\$25,000,000) and duration of liability and is renewable on a quarterly basis. The rider for notification to the regulatory agency of any substantive changes in the policy (including termination or failure to renew) is adequate.

C. Proposed Conditions with Justification

None

D. Summary of Compliance

The applicant will be in compliance with bonding provisions as revised by the regulatory authority.

E. Proposed Departmental Action

Approval of this section of the mining and reclamation plan as revised by the regulatory authority.

F. Environmental Impact of the Proposed Departmental Action

Once the bond in the amount of \$2,532,857 has been posted, there will be assurance of land reclamation as proposed by the mining and reclamation plan and approved by the regulatory authority. The process of reclamation would normally be completed by the applicant; however, under conditions of bond forfeiture, the regulatory authority will be responsible for the reclamation, using the funds outlined in the performance bond.

G. Alternatives to the Proposed Action

The regulatory authority (RA) could have denied the permit application, based on inaccuracies in the bonding calculations; however, based on the RA's review, changes were readily made which were accepted by the applicant, thereby eliminating this basis for permit denial.

SOCIOECONOMIC IMPACT ASSESSMENT

At present, there are approximately 180 workers employed at the Price River Mine Complex. The company anticipates increasing this work force to 600 in 1988 and to 750 workers in 1990. Employment is forecast to peak in the year 2000 at 1,200 workers.

The addition of 420 mine workers over the next five years would support approximately 336 secondary jobs in the region. Due to the current unemployment situation in Carbon County (13%), the majority of these jobs would be absorbed by the existing labor force. The addition of 600 mine workers from 1988 to the year 2000 would create approximately 480 secondary jobs. During this period, forty percent (672) of the total mine-related work force is projected to migrate from outside the region to fill these jobs. The total mine-related population is projected to reach 3,494 by the year 2000.

The primary Carbon County jurisdictions to be affected by the mine are Price and Helper and, to a lesser extent, Wellington. The population of Carbon County (including the mine-related population) is projected to increase 69 percent from its 1982 population of 24,183 to 40,344 in 1995. The year 2000 mine-related population represents 12 percent of the county's projected total population. Over this same time period, Price and Helper (including the mine-related population) are forecast to grow from 10,043 to 19,347 and 2,927 to 4,124, respectively.

Currently, Carbon County is experiencing some strain on public services and facilities from the existing population. The Carbon County School District facilities are at capacity. The Price city water-treatment system is projected to exceed its capacity by 1985. The existing sewage-treatment system is in need of upgrading at a projected cost of four to six million dollars. (See "Socioeconomic Assessment for the Sage Point Mine," OSM, 1981 and 1983.)

The expansion of the Price River complex over the next five years will have a positive socioeconomic effect on Carbon County communities since the majority of workers will be hired from the existing labor pool. After 1986, however, the expansion of the operation will create secondary impacts on the county's fiscal budget, public services, and facilities. These impacts will primarily be on public education facilities and the water treatment system, as these are projected to reach service capacities in the 1985-1995 period.

Due to the company's employment forecast, the Price River Coal Company must comply with the Utah Resource Development Code, Utah Code An. Section 63-51-1 et seq. as well as the 1982 Carbon County Impact Regulation. A meeting was held on September 22, 1983 with the applicant, OSM, Carbon County, and the Utah Department of Community and Economic Development (DCED) to discuss the requirements of these regulations. It was decided that since the applicant's plan for mine expansion was long-termed and not expected over the next five years, the company need not submit an impact-mitigation plan at this time. The applicant has agreed to work with the appropriate jurisdictions well in advance of the anticipated mine expansion to allow for proper planning of mine-related impacts.

Proposed Socioeconomic Conditions with Justification

None.

CULTURAL RESOURCES

A. Description of Existing Environment

A number of cultural resource inventories of small acreages have been conducted on the Price River permit area. A majority of these surveys were conducted on drill hole locations and access roads giving a sample inventory of areas to be undermined and potentially impacted by subsidence. No prehistoric or historic sites were located by these surveys. An inventory of a larger scale was conducted in Crandall Canyon in 1980, and three historic sites (42 CB 215, 216, 217) were recorded, evaluated, and found not eligible for nomination to the National Register of Historic Places (NRHP). Additionally, Price River Coal Company has established valid existing rights with respect to the the company's Willow Creek Cemetery, a graveyard where a majority of the 172 individuals killed in the 1924 mine explosion are buried. Though the company eventually plans to construct a rail line within 100 feet of the cemetery, the company will not directly impact the cemetery and will continue to maintain it.

B. Description of Applicant's Proposal

A series of OSM and State completeness reviews of the cultural resources documentation submitted with the permit application identified a number of deficiencies which required the submission of additional information. The Company has since submitted the required information. The permit application cultural resources information, in concert with permit conditions concerning unanticipated discoveries of cultural sites after permit approval and potential future sample surveys of subsidence areas (section F), was sufficient to allow OSM to seek SHPO concurrence on site eligibilities and determination of "no effect."

C. Evaluation of Compliance

Adherence to the measures proposed in the permit application and acceptance and implementation of the proposed stipulations (permit conditions) will indicate the applicant is in compliance with all applicable legislation and regulations.

OSM Compliance

OSM has received concurrence from the Utah SHPO concerning the determination that permit approval will have "no effect" upon significant cultural resource sites, and OSM is, therefore, in compliance.

D. Revision to Applicant's Proposal

If the plan is approved, the applicant will satisfy the stipulations identified in Section F.

E. Reevaluation of Compliance

The applicant and OSM are in compliance with applicable legislation and regulations.

F. Proposed Conditions with Justification

1. If any previously unidentified cultural resources should be discovered during mining operations, the operator shall ensure that the site is not disturbed and shall notify the regulatory authority and OSM. The operator shall ensure that the resource(s) is (are) properly evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.6). Should a resource be determined eligible for listing on the NRHP, the operator shall consult with and obtain the approval of the regulatory authority and OSM concerning the development and implementation of mitigation measures as appropriate.
2. At such time that OSM, in consultation with the Division of Oil, Gas and Mining and the SHPO, determines that subsidence within the permit area may adversely affect known or unrecorded cultural sites, additional cultural resources studies may be required. This determination will be based on new subsidence and/or cultural resource information, and clear justification will be presented to the applicant.

G. Summary of Compliance

The applicant will be in compliance if the stipulation in Section F and the measures proposed in the application are adhered to.

OSM is in compliance, with SHPO concurrence, and will remain in compliance by ensuring that the conditions are followed.

H. Proposed Departmental Action

The Secretary can approve the application with the proposed stipulations.

I. Residual Impacts of Proposed Departmental Action

At least three historic sites which are currently considered ineligible for nomination to the NRHP will be directly impacted, and an unknown number of sites will be indirectly affected by the proposed undertaking. Cultural resources that are considered insignificant today may contain information that would be recognized as significant in the future. These sites could be adversely affected, making future data recovery impossible. Unknown cultural sites may also be affected through operator activities, vandalism, and unauthorized collection.

J. Alternatives to the Proposed Action

An alternative is to require a complete inventory of the permit area and to avoid disturbance of all cultural resources during construction of surface facilities. Since no additional surface disturbance is proposed in the permit term, this is not a viable alternative. The preferred alternative is to approve and implement the measures described in the application and in Section F. This allows the applicant to proceed and allows OSM to comply with all applicable Federal legislation and regulations.

LEGAL, FINANCIAL, AND COMPLIANCE INFORMATION

Legal, financial, and compliance information can be found on pages 29 through 52, Chapter 2 of the permit application. The private mineral estate will not be severed from the surface estate by this surface-mining operation; therefore, the documentation required by UMC 778.15(b) is not required nor applicable.

Pursuant to UMC 778, and on the basis of evidence submitted by the applicant, the Utah Division of Oil, Gas and Mining and the Office of Surface Mining find that Price River Coal Company does not own nor control any operations which are currently in violation of any law, rule, or regulation of the United States or any State law, rule, regulation, or any provision of the Surface Mining Control and Reclamation Act or the Utah State Program.