ENVIRONMENTAL ASSESSMENT

FEDERAL COAL LEASE BY APPLICATION
UTU-74804
BEAVER CREEK TRACT

Prepared for

U. S. Department of the Interior
Bureau of Land Management
Price River Resource Area
Price, Utah - Carbon County
(801) 637-4584

and

U. S. Department of the Interior
Office of Surface Mining Reclamation and Enforcement
Western Regional Coordination Center

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1.0 INTRODUCTION

1.1 EXISTING MINING OPERATION

The proposed Horizon Lease Tract area is located approximately 15 miles northwest of Price, Utah in Carbon County. The surface facilities under construction for the Horizon No. 1 Mine are located adjacent to the Consumers Canyon Road approximately 14 miles northwest of Price (Plate 2). The mine permit area covers 317.5 acres, with 9.15 acres designated as disturbed.

The Horizon Coal Corporation (HCC) plans to recover fee coal during 1997 and 1998 from lands leased from Hidden Splendor Resources and a federal underground right-of-way lease (UTU-73227). The right-of-way lease (17.5 acres) connects the two blocks of coal leased from Hidden Splendor Resources.

HCC proposes to mine the coal from the lands within the Horizon Lease Tract as a logical extension of the current mining operations. The Horizon Tract is comprised of currently unleased federal lands, some of which were included in the terminated Federal Coal Lease SL 060311. The United States owns the coal deposits under the described lands and the appropriate rights to explore and mine the coal.

Economic coal reserves have been identified in the Castlegate "A" and Hiawatha Coal Seams. Horizon will begin underground mining of fee coal in the Hiawatha Seam, but when feasible intends to mine the Castlegate "A" Seam in the future.

Horizon Coal Corporation is the only coal operation presently owned by K & K Enterprises. However, the owners of K & K Enterprises share ownership in other coal operations in the United States.

Other adjacent unleased federal coal lands which are accessible only through the lands described above may ultimately be developed depending on the severity of the fault structure that separates the tracts The fault structure can be explored by underground workings in the lands requested to be leased.

1.2 AGENCY ROLES AND RESPONSIBILITIES

The proposed coal leasing and potential related future mining operations have been designed to effect full compliance with all applicable Federal, State, and local laws and regulations. Specifically, coal lease acquisition and management must comply with applicable land management regulations and guidelines of the BLM, and any mining plan application that may result from BLM's leasing decision must adhere to applicable regulations and guidelines set forth by Utah Division of Oil, Gas and Mining (UDOGM) and Office of Surface Mining (OSM).

Bureau of Land Management

The BLM has the responsibility and authority to determine whether or not mineral leases are to be issued for Federal lands under the BLM's jurisdiction. Under applicable NEPA provisions, prior to granting leases, an evaluation of the potential effects of the proposed development

on the environment of the affected area(s) must be completed. As the primary responsible Federal land management agency for those Federal lands which will be affected by the proposed mine, the BLM will utilize this EA as a basis for the required determination on the lease application. The BLM will select a Preferred Alternative and determine whether or not the Preferred Alternative will result in unnecessary or undue degradation of potentially affected Federal lands consistent with applicable provisions of Federal Land Policy and Management Act (FLPMA). The BLM will also review the lease application and associated development plans in the context of the existing Management Framework Plan (MFP). Lease approvals may be conditioned on coordination with other resource values and land uses and appropriate rehabilitation of disturbed lands.

Office of Surface Mining

The OSM has jurisdiction over any mining plan application that may result from BLM's leasing decision. As a result, OSM is participating in the preparation of this EA as a formal cooperating agency.

The Surface Mining Control and Reclamation Act of 1977 (SMCRA) give OSM primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations. In January 1981, pursuant to Section 503 of SMCRA, the UDOGM developed, and the Secretary of the Interior approved, a permanent program authorizing UDOGM to regulate surface coal mining operation and surface effects of underground coal mining on non-Federal lands within the State of Utah. In March 1987, pursuant to Section 523 (c) of SMCRA, UDOGM entered into a cooperative agreement with the Secretary of the Interior authorizing UDOGM to regulate surface coal mining operations and the surface effects of underground coal mining on Federal lands within the State.

Pursuant to the cooperative agreement, Federal coal lease holders in Utah must submit permit application packages to OSM and UDOGM for proposed mining and reclamation operations on Federal lands in the State. UDOGM reviews the packages to assure that the permit application complies with the permitting requirements and that the coal mining operation will meet the performance standards of the approved permanent program. If it does comply, UDOGM issues the applicant a permit to conduct coal mining operations. OSM, BLM, and other Federal agencies review the permit application package to assure that it complies with the terms of the coal lease, the Mineral Leasing Act of 1920, NEPA, and other Federal laws and their attendant regulations. OSM recommends approval, approval with conditions, or disapproval of the mining plan to the Assistant Secretary, Land and Minerals Management. Before the mining plan can be approved, BLM and the surface management agency (if other than the BLM) must concur with this recommendation.

UDOGM enforces applicable performance standards and permit requirements during the mine's operation and has primary authority in environmental emergencies. OSM retains oversight responsibility for this enforcement. BLM has authority in those emergency situations where UDOGM or OSM inspectors cannot act before significant environmental harm or damage occurs.

Other Jurisdictional Agencies

For any related future mining operations, Horizon will also comply with applicable regulatory requirements relating to the following designated activities/structures under the authority of the noted jurisdictional agencies.

Federal Agencies

Environmental Protection Agency (EPA) - Compliance with applicable air, water, and hazardous materials requirements under programs administered by the Utah Division of Air Quality (UDAQ) and Utah Division of Water Quality (UDWQ)

U.S. Army Corps of Engineers (COE) - Compliance with Section 404 of the Clean Water Act as it relates to the planned construction and stream realignment.

U.S. Commerce Department, Bureau of Alcohol, Tobacco, and Firearms - Permits for procurement, transportation, storage, and use of explosives.

Mine Safety and Health Administration (MSHA) - Compliance with applicable requirements relating to coal processing waste dams; impoundments and sedimentation ponds; plans for underground disposal of development waste, coal processing waste, or excess spoil; reclamation and closure of mine openings; any discharges into underground mines; mining within 500 feet of an active underground mine; and plans for extinguishing coal mine waste fires.

U.S. Fish and Wildlife Service (USFWS) - Compliance under the Endangered Species Act, Bald Eagle Protection Act, and Migratory Bird Act.

State Agencies

Utah Division of Oil, Gas and Mining (UDOGM) - Compliance under the State Utah Coal Mining Rules.

Utah Division of Air Quality (UDAQ) - Compliance with applicable air quality permitting and operational requirements.

Utah Division of Water Quality (UDWQ) - Compliance with applicable water discharge permitting, operational, monitoring, and reporting requirements.

Utah State Engineer - Compliance with well and pond design and construction requirements and water rights requirements.

Utah Department of Transportation (UDOT) - Highway modification and driveway permits.

Utah Division of Wildlife Resources (UDWR) - Compliance with applicable wildlife protection measures.

Utah State Historic Preservation Office (SHPO) - Compliance with applicable provisions of the National Historic Preservation Act.

Local Agencies

Carbon County - Compliance with applicable requirements for special use, building and water and sewer permits.

HCC has either applied for and received, or approvals are pending for all required permits and approvals.

1.3 CONFORMANCE WITH LAND USE DESIGNATIONS AND PLANS

In accordance with applicable provisions of 43 CFR 1600, the BLM has developed an implemented a Management Framework Plan (MFP) for the Price River Resource Area which addresses both multiple use objectives and resource specific objectives for protection and management of those Federal lands under the BLM's jurisdiction and authority. The following program description summarizes the Mineral Management Decisions presented in the MFP:

"The minerals program provides for the exploration and disposal of minerals by lease, license, or permit; coordination for minerals development with other land uses; and the assurance of rehabilitation of mined land ..."

The proposed action of coal leasing is consistent with both the general minerals management objectives as stated and specific multiple use objectives and decisions as outlined in the MFP.

The multiple use objectives and decisions for specific management categories (range, recreation, watershed, wildlife, and cultural) include limitations relative to the nature and extent of allowable disturbance. Relative to coal leasing, actual physical disturbance would be limited to that disturbance which would result from mine development, operation, and reclamation as reasonably foreseeable related future actions. Specific control, reclamation, and monitoring provisions included in the mining and reclamation plans reviewed and approved by UDOGM with input form the BLM effectively address compliance with all applicable limitations imposed by the BLM's multiple use objectives and decisions as outlined in the MFP.

1.4 ISSUES AND CONCERNS

Issuance of the proposed coal lease and related development and operation of the planned mine offer a number of important benefits specifically including the following:

Combined adjacent minable coal reserves with existing leased coal reserves as a logical mining unit assuring effective utilization and recovery of the available resource.

Assures continued availability of a valuable energy resource for industry and to generate electricity.

Facilitates effective reclamation, through a comprehensive reclamation program, of both new disturbance and previously disturbed areas.

Provides stable jobs for approximately 45 employees.

Support Federal, State and local governments through payments of property, sales, excise, fuel, and other taxes.

Support the National, State, and local economies through direct purchase of equipment, materials, supplies, services, and royalty payments.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The proposed action is the approval and issuance of a coal lease ("lease") for approximately 1,280 acres of Federal lands administered by the BLM pursuant to a lease application by Horizon Coal Corporation (August 10, 1995).

Lease Description:

Township 13 South, Range 8 East, Salt Lake Meridian, Utah

Section 6: SE1/4SW1/4, S1/2SE1/4, NW1/4SE1/4;
Section 7: Lots 1 - 3, E1/2, E1/2W1/2;
Section 8: NW1/4NW1/4, S1/2NW1/4, SW1/4NE1/4, N1/2SW1/4, W1/2SE1/4, SW1/4SW1/4;
Section 17: N1/2NW1/4, SW1/4NE1/4;
Section 18: NE1/4NE1/4.

Refer to the Horizon Lease Tract application or Attachment D for drawings (HT3, 4 and 5, Block A-B) of the above described lease.

Leasing would provide both surface access for necessary mining related activities; and the rights to extract economically recoverable coal reserves. The coal would be recovered consistent with the terms of the BLM lease agreement, the approved Mining and Reclamation Permit (M&RP), Utah Division of Oil, Gas and Mining, and the approved mining plan, Assistant Secretary for Lands and Minerals.

2.2 PURPOSE AND NEED

The purpose and need for the proposed action are to make the coal resources available for development, extraction, and beneficial use consistent with applicable provision of the Mineral Leasing Act of 1920 as amended by Sections 2 and 3 of the Coal Leasing Amendments Act of 1976; the FLPMA of 1976; BLM regulations and the land use planning and management determinations presented in the Price River Management Framework Plan (1983).

Horizon considers the subsequent development of the requested federal lease to be necessary to the continued operation of the Horizon No. 1 Mine. Horizon presently retains access and extraction rights to coal resources which will provide coal productions for approximately one year. The "lease" would facilitate the operation of the mine for an additional 10 to 15 years, while providing a natural continuation of the mining unit. Leasing of this tract would assist in conserving the coal resource by avoiding a bypass. In addition the acquisition of the lease by Horizon would provide access for future development of coal reserves without requiring additional surface facility disturbance.

The current mine facilities are confined to Portal and Jewkes Canyons. Expansion of these facilities is possible, however the expansion would be within these canyons and would not extend into the "lease" area.

Environmental assessments of the area were performed in 1981 (Attachment A) and 1995 (Attachment B). The 1995 environmental assessment lists the unleased tract of Federal coal as the "Beaver Creek" tract.

2.3 ALTERNATIVE ACTION

The alternatives to issuance of the lease as described in this submittal would be as follows:

No Action

Under this alternative the requested coal lease would not be issued. This would result in the potential loss and sterilization of reserves since mining would then bypass these reserves and potential future access would be lost.

The only economical access to this reserve is through portals located on fee lands in Portal Canyon, where the Hiawatha Coal Seam nearly outcrops. The reserve block is bounded by the Fish Creek Graben to the south, the B-C Fault to the north, a stream channel system to the west and old mine workings to the east. No other economic point of access exists.

Should the coal lease not be issued, Horizon currently has coal reserves for one year of coal production.

Reduction in Size of Lease

A reduction in the area and total reserves under the requested lease was considered as a possible alternative to the proposed action. This alternative was eliminated because the requested lease block is based on natural geologic boundaries that support a logical sequence of mine development and recovery of available coal reserves. Reduction of the lease area would offer no advantage relative to reduction of potential mining-related impacts and would result in potential loss and sterilization of reserves since mining would then bypass these reserves and potential future access could be lost.

Expanding the Lease Area

The lease block is based on natural geologic boundaries that supports a logical sequence of mine development and recovery of available coal reserves. Data gained by mining the lease block may enable future economic crossing of the geologic boundaries to the north or west. Currently mining costs projected to cross the geologic boundaries cannot justify expansion of the lease area.

2.4 COAL MINE DEVELOPMENT AND PRODUCTION

Socio-Economics

With the acquisition of the "lease" the life of the mine will be extended for 10 to 15 years. Associated employment and economic benefits for the surrounding counties will be extended with the life of the mining operation. Horizon plans to hire and utilize employees from the Utah, Carbon and Emery County areas.

General Project Scope and Schedule

The Horizon Mine facilities are being constructed during 1997 in the adjoining Portal and Jewkes Canyons along Consumers Canyon Road. The mine facilities are being constructed on private lands leased from Hidden Splendor Resources. Mining of fee coal is due to begin during the Fall of 1997.

A BLM right-of-way was requested and granted (April 24, 1996) to connect two blocks of fee coal owned by Hidden Splendor Resources. The fee coal along with the BLM right-of-way lease should provide approximately one year of production, thus the necessity for the additional coal "lease".

Mine Construction and Development

No mine construction or development listed below is on the requested "lease". This information is provide for background purposes only.

The facilities in Portal and Jewkes Canyon will consist of the following structures:

3 Portals - Fan, Manway and Beltway
3 - 4 Trailers for use as offices, bath house, supply storage, etc.
Sediment Pond
Conveyor
Coal Stockpile
Substation
Storage Tanks - Fuels and Water
Pad Area for Equipment and Supply Storage, Parking

Mining and Related Operations

Coal will be extracted using continuous miners (2), loaded into shuttle cars, and hauled to an underground feeder breaker. The feeder breaker will reduce the coal to an appropriate size, after which the coal will be fed onto a conveyor to be carried to the surface. A crusher on the surface will further reduce the size of the coal, whereupon the coal will be transferred by conveyor to the raw coal storage pile. Coal from the storage pile will be loaded onto coal trucks.

The coal will be hauled by truck to the Wildcat Loadout and transported from there by train to various destinations and customers. No additional related operations are planned for the immediate mine area except as described above.

The coal from the Horizon No. 1 Mine will be sold on a run-of-mine basis, not washed. A minimal amount of rocky or high ash coal is expected to be produced. This material will be shipped to the coal terminal and blended with higher quality coal to be sold. Production/resource recovery is expected to be approximately 50,000 tons per month initially. A summary of anticipated coal reserves can be found in Attachment D.

The waste rock stowed underground will be backfilled into dead-end panels primarily near the outer extent of the area to be mined. Backfilling will occur prior to second mining to ensure that adequate roof support exists in the area.

2.5 SUBSIDENCE CONTROL AND MONITORING PLAN

The subsidence monitoring network will consist of permanent survey monuments located outside of the anticipated area of subsidence and a series of monitoring stations within the potential subsidence zone. The monitoring stations will be steel re-bar with aluminum caps set so that weather, frost heave, or livestock will not disturb them. Stations will be installed above the active mining area, as each new area is approached.

Multiple readings will be taken where necessary to ensure accuracy. Monitoring of the subsidence stations will be performed on an annual basis for a period of two years following final cessation of mining operations in a specific area. Reports of monitoring will be sent to the UDOGM on a yearly basis.

Springs Monitoring Plan

Each of the springs to be monitored issue from portions of the Blackhawk Formation which are stratigraphically higher than the Hiawatha coal seam. Therefore, data collected from the springs will allow quantification of potential impacts to perched aquifers within the permit and adjacent areas of both the initial permit term and future permit terms. Spring SP-2 is within approximately 400 feet of the initial planned workings and in an area which overlies future workings. Springs SP-1, SP-4, and GV-70 are in an area which lies within 200 to 700 feet of future workings. These distances are all within the zone of potential subsidence. Hence, data collected from these springs will assist in determining the impacts of subsidence on the groundwater resources of the Blackhawk Formation.

Springs SP-9 and 2-6-W lie approximately 1800 feet and 4900 feet southwest of the future mine workings. As a result, they are in areas which will not likely be impacted by subsidence effects. Hence, these springs will be monitored to provide background data on groundwater conditions within the Blackhawk Formation in areas that will not likely be impacted by mining. Spring locations are noted on Plate 7-1.

Stations SS-3, SS-5, SS-7, SS-8, SS-10, and SS-11 will be monitored once each calendar quarter (as access conditions permit) during the operational and reclamation periods. Stations SS-3 and SS-5 are located on Jewkes Creek down- and upstream from the surface facilities,

respectively, and will provide information regarding the impacts of surface disturbances. Stations SS-7 and SS-8 are located on Beaver Creek up- and downstream from potential future expansions of the mine. Similarly, stations SS-10 and SS-11 are located in tributaries to Jump Creek and Beaver Creek, respectively, downstream from potential future expansions of the mine. Through the collection of flow and water-quality data up- and downstream from underground mining activities, these latter four stations will provide information on the potential impacts of underground mining activities (e.g. increases or decreases in flow and water quality due to subsidence and other potential interruptions to the hydrologic regime) on surface hydrologic conditions.

Flow data collected from stations SS-7 and SS-8 will be compared to determine variations in flows up- and downstream from the mine workings. It should be noted that wide variations have been noted historically between these stations, with flows increasing and decreasing in the downstream direction. If the data suggest that abnormal variations in flow are occurring between stations SS-7 and SS-8, additional seepage evaluations will be conducted along Beaver Creek. Furthermore, station SS-12 will be established for the collection of flow data from Beaver Creek to further evaluate flow conditions in the creek as mining progresses to the northwest. These flow data will be collected on a quarterly basis during normal monitoring periods.

2.6 RECLAMATION OF MINING DISTURBANCES

Upon permanent cessation of operations, permanent reclamation will be performed in the disturbed area south of the "lease" area. All surface equipment, structures and facilities (other than sedimentation control) associated with the operation will be removed.

When no longer needed for mining operations, all entry ways or other openings to the surface from the underground mine will be sealed and backfilled. Prior to the sealing of the mine openings, all combustible materials will be removed from the portal area. The permanent closures will be constructed to prevent access to mine workings by people, livestock, and wildlife. Potential surface drainage will also be kept from entering the sealed entries.

All existing structures and roads which lie within the disturbed area boundary will be removed. Nonhazardous and nonflammable materials, such as concrete and steel, will be used as backfill in areas such as the sediment pond, highwalls, and cut slopes.

Diversions that are not planned for permanent use following reclamation will be removed during the backfilling and regrading operations. The area will be recontoured to drain to the final reclamation channel.

A loader will be used to load topsoil into haul trucks at the topsoil stockpiles. The haul trucks will be used to deliver the topsoil from the topsoil stockpile to the area where the dozer and backhoe will be working. The dozer will be used to evenly distribute the topsoil over the area.

Following redistribution of topsoil, the site will be reseeded, fertilized, and mulched.

Depending upon the season of the year and weather conditions the procedures listed above may be completed as one operation from start to finish or may be completed area by area to

control erosion and provide drainage. Erosion control matting and sediment controls will be place throughout the reclamation process as they are needed.

All exposed coal outcrops resulting from this operation as well as toxic and acid-forming materials will be covered with a minimum of 4 feet of non-combustible, non-acid, non-toxic material during backfilling and grading. Similarly, any underground development waste that remains in temporary storage on the surface at the time of reclamation will be placed against an adjacent faceup or cut slope and covered with at least 4 feet of suitable backfill.

The revegetation plan has been designed to assure that all disturbed lands will be returned to productive self-perpetuating plant communities once the mining operation has been completed. The plan calls for temporary revegetation of disturbed areas where possible during the mining operation as well as permanent reclamation of all areas once mining has ceased.

Reclamation is particularly important as a means of controlling erosion and restoring disturbed areas to a productive state. To assist in meeting these desirable ends, the following aspects have been incorporated into the reclamation plan: (1) planting a diverse mixture of native grasses, forbs, and (where appropriate) woody species, (2) using seedling stock rather than relying solely on seeds for trees or shrubs, and (3) planting vegetation to create an edge effect by clumping selected shrub or tree species.

2.7 PLANNED MITIGATION MEASURES

Cultural Resource Mitigation

Should cultural or historical artifacts be discovered, the appropriate regulatory agencies will be notified and the site will be protected from further disturbance until it can be examined by authorized personnel.

Mitigation and Management Plans

The small surface disturbance associated with the mining facilities (south of "lease" area) will be mitigated upon completion of the project by reclaiming the disturbed sites. The revegetation plant mix includes herbaceous and woody species that are adapted to on-site conditions and are of known value to wildlife for cover and forage.

Habitat loss associated with disruption or pollution of North Fork Gordon Creek (Consumers Canyon) will be controlled through the mine's runoff- and sediment-control plan. Impacts to Beaver Creek should not increase when mining is introduced to the lease area, since no surface disturbance will be associated with the "lease". The "lease" area will be accessed on existing private roads for well monitoring and the collection of seep and spring water data.

Impacts to wildlife will be minimized by mandatory employee awareness programs which will inform mine personnel of especially sensitive periods (e.g., the nesting season for raptors, fawning season for deer) or habitats in the vicinity of the mine area. Road kills will be minimized through the awareness program, speed limits, and game crossing signs. Mine personnel will be strongly discouraged from leaving the disturbed area boundary during working hours except as required to fulfill permitting requirements.

Horizon will attempt to mitigate impacts with the following procedures:

1. Controlled speed limits on roads to protect wildlife. Personnel will restrict travel to exiting roads.

2. Wildlife habitats will be reclaimed with beneficial plant species. Native plants and berry producing shrubs will be planted for avian species.

3. Pesticides will be avoided on the mine site.

4. All toxic materials will be fenced to keep wildlife out, and taken to a disposal site.

5. Raptors and their offspring will be protected from disturbance and subsidence. Electrical and other transmission lines will be designed in accordance with the regulatory guidelines.

6. Subsidence, surface water and groundwater will be monitored as described in the Horizon's M&RP.

A wildlife monitoring program will be conducted throughout the operational life of the mine as required by regulatory agencies. The monitoring will utilize the services of an environmental specialist or as necessary, professional consultants. The program will also ensure that sensitive or critical use areas remain undisturbed by future activities and permit monitoring of reclamation efforts upon completion of mining activities. Any threatened or endangered species observed will be reported to the UDOGM and UDWR. The monitoring program will immediately be initiated upon opening the Horizon Mine.

Mitigation for impacts is discussed more extensively in the UDOGM approved Horizon M&RP ACT 007/020.

3.0 AFFECTED ENVIRONMENT

3.1 EXISTING ENVIRONMENT

Topography, Minerals

Topographically, the area consists of steep slopes on the face of the plateau and along drainages, flat surfaces or terraces or flood plains in valley bottoms and relatively gentle terrain on top of the plateau. The area is underlain by nearly flat sedimentary rocks of the Tertio-Cretaceous North Horn Formation and the Lower Tertiary Flagstaff Formation.

Coal is the primary mined mineral in the immediate "lease" area.

Geology

The Horizon Mine is located in the northern portion of the Wasatch Plateau. The Wasatch Plateau is the northwestern outlier of the eroded San Rafael Swell. The plateau dips westward producing a great monoclinal fold that is interrupted by faults in the borderlands of the Great Basin. Superimposed over the region are numerous structural features including anticlines, synclines, faults and igneous intrusions.

The Wasatch Plateau is comprised primarily of Cretaceous to Tertiary age sedimentary rocks. These rocks are principally siliciclastic of both continental and marine origin. Coal seams of economic significance occur in the Cretaceous sediment.

The coal beds of interest lie within the Upper Cretaceous Mesaverde Group. This group is divided into four stratigraphic units and include in ascending order: The Star Point Sandstone, the Blackhawk Formation, the Castlegate Sandstone, and the Price River Formation. The minable seams are found in the lower 350 feet of the Blackhawk Formation. Plates 6-2 and 6-3 (Horizon M&RP) are geologic cross sections that illustrate the stratigraphic relationships of the Blackhawk and Star Point Formations and the mappable coal beds present in the Horizon Mine area.

Star Point Sandstone. The Star Point Sandstone is the oldest stratigraphic unit exposed in the area. It is the basal unit of the Mesaverde Group and is approximately 440 feet thick. The formation contains the Panther, Storrs, and Spring Canyon Sandstone Members which consist of coarsening upward littoral sequences of white to light gray, fine to medium grained, tight, quartzose sandstone (Blanchard 1981). The Star Point Formation overlies and intertongues with the marine Mancos Shale. The Star Point is the lowest cliff-forming unit over most of the east side of the Wasatch Plateau.

Blackhawk Formation. The Blackhawk Formation measures approximately 900 feet thick in the Gordon Creek area and 1,200 feet thick in the Beaver Creek area. The formation consists of interbedded fluvial and marine sandstone, siltstone, and shale. The Blackhawk Formation conformably overlies the Star Point Sandstone and the boundary between the two formations is sharp; the massive Spring Canyon Sandstone member of the Star Point Sandstone is overlain by an easily erodible, shaley sandstone.

A total of eight coal seams can be identified in the Gordon Creek region. Four of the eight seams are present in the mine area and outcrop on the walls of the North Fork of Gordon Creek Canyon, Coal Canyon, and Bryner Canyon. Weathering, burning and vegetation obscures the majority of coal outcrops of the Hiawatha, Gordon, Castlegate "A", and Bob Wright seams. Only the Hiawatha and Castlegate "A" seams have been economically mined in the area. The Hiawatha seam marks the base of the Blackhawk Formation. The Castlegate "A" seam overlies the Aberdeen Sandstone. The Aberdeen is a marine sandstone sequence that coarsens upward, and is similar in character to the Star Point Sandstone. The Aberdeen measures over 120 feet at Price Canyon (Sec. 12, T13S, R9E) and thins to the west pinching out within the lease boundary.

In the area, the Blackhawk Formation is the principal surficial bedrock unit. The Blackhawk is disconformably overlain by the massive, coarse grained, fluvial Castlegate Sandstone.

Castlegate Sandstone. The Castlegate Sandstone is exposed in the central and northeastern portion of the permit area. The formations consists of a white to gray, coarse grained to conglomeratic fluvial sandstone. Exposures of the Castlegate Sandstone typically form cliffs to steep slopes. The Castlegate Sandstone is approximately 300 feet thick in the Gordon Creek area.

Price River Formation. The Price River Formation occurs in the northeastern portion of the permit area. The Price River is also a fluvial deposit and contains gray to white silty sandstones with interbedded subordinate shale and conglomerate. The formation typically forms ledges and slopes. The Price River formation ranges from 600 to 1,000 feet in thickness.

Unconsolidated Deposits. Unconsolidated deposits composed of silt and fine grained sand, alluvial sediments and talus debris occur along valley floors and at the base of steep slopes. The thickness of these sediments is variable. In the Horizon Mine area, the thickest alluvial deposits occur along Beaver Creek. Based on field observations, the alluvial sediments appear to exceed 10 feet in thickness.

Igneous Dikes. Several igneous dikes have been reported in area mines including the Beaver Creek Coal Mines #2 and #3. The dikes are reported to be Miocene age and are a mica peridotite (Tingey, 1986). The dikes are typically associated with faults that bisect the area and trend east-west to northwest-southeast.

Both the lease and permit areas are faulted. Two major fault zones affect the area: the North Gordon and Fish Creek fault zones. The North Gordon fault zone measures three miles wide and five miles in length. The Fish Creek fault zone averages two miles wide and enters from the northwest. Both the fault zones pass through the lease area.

The two major fault trends are the N60 degree west trending faults (Range N50-75W) associated with the Fish Creek fault zone, and the N-S trending faults associated with the North Gordon fault zone. Sympathetic faulting also occurs within the mine area. Displacements of the faults in the mine area are variable ranging from a few feet to as much as 200 feet.

Faulting may also effect the locations of springs and seeps in the area. The faulting and fracturing of the bedrock in the area may provide open conduits for surface water to enter into the subsurface or allow groundwater movement between aquifers.

A structural feature which influences the area is the Beaver Creek Syncline. The synclinal axis trends NE-SW and the strata dip toward the axis at approximately 3.5 degrees. The lease is located on the western limb of the syncline.

The igneous dikes of the area generally trend parallel to the Fish Creek fault trend. The dikes range from 0.1 to 14.0 feet in thickness.

Geology of Coal Beds and Adjacent Strata

Numerous surface exploration and surface development holes have been drilled by various energy companies and government agencies in the surrounding area. Many of these drill holes were drilled under the direction of the Beaver Creek Coal Company during exploration and evaluation projects for their Gordon Creek mines. Four holes, LMC 1 - 4, were drilled in the area under the direction of LMC Resources. The LMC drill hole geophysical logs were interpreted and lithologic logs were constructed by the Bureau of Land Management (BLM). Geologic cross-sections were generated from drill hole logs created by Beaver Creek Coal Company (BCCC), LMC, and the USGS. See Plates 6-2 and 6-3 in the map section attached to this environmental assessment.

Hiawatha Seam. The Hiawatha Seam is the lowest stratigraphic coal in the current Horizon mining area. It directly overlies the Star Point Sandstone and is the most laterally persistent seam in the area. The Hiawatha seam ranges in thickness from 6.0 to 11.0 feet, averaging 7.0 feet within the area. A thin rider seam overlies the Hiawatha in the southwestern part of the current permit area.

The floor rock of the Hiawatha seam ranges from the competent littoral Spring Canyon of the Star Point Sandstone to fluvial overbank shales and siltstone and channel sandstones. Horizon Coal Corporation will be mining the Hiawatha Seam.

Gordon Coal Zone. The Gordon seam is stratigraphically located about 80 feet above the Hiawatha. It is very lenticular and generally less than 5.0 feet in thickness with multiple splits. It is not economically mineable in the Gordon Creek area.

Castlegate "A" Seam. The Castlegate "A" seam is stratigraphically located 150 to 230 feet above the Hiawatha seam. The seam ranges 4.0 to 14.0 feet in thickness. The average thickness in this area is 8.3 feet. The Castlegate "A" seam becomes unmineable in areas near the southwestern permit boundary and pinches out near the western boundary of the lease, there are no current plans to mine this seam. Horizon Coal Corporation plans on mining the Hiawatha Seam.

Bob Wright Seam. The Bob Wright seam lies about 120 feet above the Castlegate "A" seam. It is very lenticular and contains abundant partings. It does not achieve minable thickness (4.0 ft.) within the Gordon Creek area. However, the seam does thicken above 4.0 feet southwest of the current permit area.

3.2 SOILS

Soil mapping units are a refinement of USDA Soil Conservation Service manuscript mapping. The soils mapping was done by Patrick D. Collins (Botanist/Reclamation Specialist) using the information supplied by George Cook of the Soil Conservation Service (SCS) as to the locations, types and depths of soils.

The soil descriptions were compared with recorded characteristics of the soils in adjacent areas and in the official SCS series descriptions. Depths and types of soil were identified by SCS. A complete survey of the soil within the permit area was completed on November 3, 1990 and data for the lease area collected from SCS sources.

Shupert-Winetti Complex

The Shupert - Winetti complex consists of very deep, well drained, moderately permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. These soils are fine-loamy, mixed (calcareous), frigid Typic Ustifluvents. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

Beje-Trag Complex

The Beje-Trag complex consists of shallow to deep, well drained, moderately permeable soils on ridges and draws of plateaus. These soils formed in alluvium derived from sandstone and shale. Slope is 3 to 30 percent. Elevation ranges from 7,000 to 9,700 feet. These soils are loam and clay loam. Average annual precipitation is 16 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

Uinta Family-Podo Association

The Uinta Family-Podo Association consists of shallow to deep, well drained, moderately slow to rapid permeable soils on mountain ridges and slopes. These soils formed in colluvium derived from sandstone, shale, and siltstone. Slope is 30 to 70 percent. Elevation ranges from 8,000 to 9,000 feet. These soils are stony, sandy loam. Average annual precipitation is 16 to 30 inches, and average annual air temperature is 34 to 42 degrees F.

Uinta-Toze Families Complex

The Uinta-Toze Families Complex consists of deep, well drained, moderately slow permeable soils on mountain slopes. These soils formed in colluvium derived from sandstone, shale, and siltstone. Slope is 30 to 75 percent. Elevation ranges from 7,800 to 9,600 feet. These soils are loam, sandy loam, and gravelly silty loam. Average annual precipitation is 20 to 30 inches, and average annual air temperature is 34 to 38 degrees F.

Brycan

The Brycan Series consists of very deep, well drained, moderately slowly permeable soils on alluvium derived from shale and sandstone. Slope is 3 to 8 percent. Elevation is 7,700 to 8,600 feet. These soils are fine-loamy, mixed Cumulic Haploborolls. Average annual precipitation is 16 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

Curecanti

The Curecanti family consists of very deep, well drained, moderately permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 50 to 70 percent. Elevation is 6,800 to 9,000 feet. These soils are loamy-skeletal, mixed Typic Argiborolls. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

Rabbitex

The Rabbitex series consists of very deep, well drained, moderately permeable soils on mountain slopes and ridge tops. These soils formed in residuum and colluvium derived dominantly from sandstone, shale, limestone, and siltstone. Slope is 15 to 70 percent. Elevation is 7,000 to 9,200 feet. These soils are fine-loamy, mixed Typic Calciborolls. Average annual precipitation range from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

Senchert

The Senchert family consists of moderately deep, well drained, moderately permeable soils on mountain slopes, plateaus, and ridges. These soils formed in residuum and alluvium derived dominantly from sandstone and shale. Slope is 1 to 50 percent. Elevation is 8,000 to 10,100 feet. Average annual precipitation is 20 to 30 inches. An average annual air temperature is 36 to 38 degrees F. These soils are fine loamy, mixed Argic Pachic Cryoborolls.

Prime Farmlands

The SCS has determined that there are no prime farmlands of statewide importance, or unique in the lease area. None of the soils mapped at the site have potential for the growth of crops or pasture land. The soils, short growing season, and weather are not conducive to the raising of crops.

Rangelands

The principle limitations for the use of the land as range are erosion and shallowness. According to the SCS the soils cannot support cultivated crops. The soils incapability have very severe limitations thus restricting the use of the land largely to grazing, woodland, or wildlife habitat.

3.3 HYDROLOGY

Field reconnaissance of the mine area by Darin Worden, UDOGM (1988-1990) permitted observation of the geologic setting of springs and seeps, and confirmation of the geologic observations made from aerial photo reconnaissance. Hydrologic data collected from wells and springs in the area were evaluated. Data evaluated also include drill hole logs, mine maps from the permit and adjacent areas, published and open file reports from the U.S. Geological Survey (USGS), Utah Geological Survey, Bureau of Land Management (BLM), and the U.S. Forest Service. BCCC records were also used to study the hydrology of the area.

Furthermore, at the request of UDOGM in 1996, a reconnaissance of the permit and surrounding areas was performed for seeps and springs. Areas evaluated included Sand Gulch, Coal Canyon, and several unnamed drainages which contribute to Beaver and Jump Creeks. The flow and temperature for each of the seep or spring within the Horizon permit boundary are summarized in the Horizon mining permit. These data were gathered to provide baseline information in anticipation of future mining. A plate showing the majority of the seeps and springs is included in this submittal as Plate 7-1. Several springs are outside the area covered by Horizon's current base map, however their locations will be provided upon request.

Regional Groundwater Hydrology

The lithologic nature of the Upper Cretaceous strata generally render these units unsuitable as significant aquifers. Price and Arnow (1974) do not identify Gordon Creek area as a region for potential large scale ground water development. In general, all the upper Cretaceous sediments of the area have low hydraulic conductivities and low specific yields (0.2 to 0.7 percent) (Price and Arnow, 1974). Much of the precipitation that falls in the Wasatch Plateau exits the area by overland flow and evaporation. Much of the water that does enter the ground moves only short distances before discharging as springs and seeps (field observations made by Darin Worden - UDOGM).

The lowest principal water-bearing formations of the Wasatch Plateau are the sandstone units of the Mancos Shale Group.

The Star Point Formation overlies the Mancos Shale. It is composed of littoral sandstones interbedded with tongues of the Mancos Shale. Lines (1985) identified the Blackhawk Formation and Star Point Sandstone as an aquifer in the region. The majority of the water contained in the Blackhawk-Star Point aquifer resides in the sandstone tongues of the Star Point Formation. It is likely that the Star Point Sandstone is the only formation within the permit and adjacent areas that contains groundwater on an areally-extensive basis.

The Blackhawk Formation overlies the Star Point Sandstone and contains the principal coal beds mined in the area. The Aberdeen Sandstone is a marine sandstone unit of the Blackhawk Formation. Sandstone units of the Blackhawk are generally very-fine grained, and have a significant clay content. Ground water that occurs in this formation generally occurs in laterally discontinuous perched aquifers. As a result, the Blackhawk is not a significant regional aquifer, and little work has been done to determine its hydraulic characteristics.

The Price River Formation overlies the Castlegate Sandstone and consists of interbedded sandstone, shale, and siltstone. Groundwater contained within the Price River Formation occurs within perched aquifers. Laboratory tests on sandstone from the Price River show that it has generally high porosity (21%) but apparently a low permeability (Cordova, 1964).

3.4 GEOLOGIC OCCURRENCE

Formations which outcrop within the Horizon permit and adjacent areas include quaternary alluvium, the Price River Formation, the Castlegate Sandstone, the Blackhawk Formation, the Star Point Sandstone, and the Mancos Shale. A regionally extensive groundwater system has not been identified in the permit area (Engineering Science, 1984). Characteristics of these formations, and their potential to serve as aquifers in the permit and adjacent areas, is presented below.

Price River Formation

Due to its limited outcrop extent within the permit and adjacent areas, the presence of claystone and shale within the formation, and drainage of the formation by deeply incised canyons, the Price River Formation is not considered to be a significant aquifer within the permit and adjacent areas. According to the Cumulative Hydrologic Impact Assessment (CHIA), completed by UDOGM (1989) for the Upper Gordon Creek Area, "groundwater associated with the Price River Formation may be characterized as occurring within a 'perched' aquifer and represents a relatively insignificant hydrologic resource." UDOGM compiled a CHIA for the Upper Gordon Creek and Beaver Creek Basins in September 24, 1996.

Castlegate Sandstone

The Castlegate Sandstone consists of 150 to 500 feet of white to gray, coarse-grained often conglomeratic sandstone with a few thin interbedded mudstones or shales near the base. Cliffs often form along outcrops of the Castlegate Sandstone. Based on the limited area of exposure for surface recharge (due to the steep slopes), the limited potential for recharge from the overlying perched aquifers of the Price River Formation, and drainage of the sandstone into the deeply incised canyons of the area, water contained within the Castlegate is minimal. Consequently, this formation is not considered to be a significant aquifer.

Blackhawk Formation

The Blackhawk Formation underlies the Castlegate Sandstone and consists of several hundred feet of interbedded sandstone, siltstone, shale, and coal. The Hiawatha coal seam is located near the base of the Blackhawk Formation. The Blackhawk Formation has a mixed lithology of sandstones, shales, and coals which produce alternating perched aquifers and impermeable beds (Doelling, 1972). Four springs were identified in the area by the 1989 Cumulative Hydrologic Impact Assessment with "all springs discharging from the Blackhawk Formation".

The above-mentioned springs are associated with fractures and/or channel sands that are of limited areal extent, which contain water perched over shale beds and have limited recharge

areas. This type of spring commonly has considerable variation in flow because of the limited recharge area and the limited amount of storage in the aquifer (Engineering Science, 1984).

According to UDOGM (1989), mine inflows into mines in the area of the Horizon Mine are insignificant. Since mining in the area occurs within the Blackhawk Formation, this indicates that extensive aquifers are not present within the Blackhawk Formation in the permit and adjacent areas.

The Aberdeen is present in the Horizon Mine area but is not anticipated to be a significant aquifer in the permit area.

Star Point Sandstone

The Star Point Sandstone consists of fine to medium grained sandstone that decreases in grain size with depth. This unit consists of several littoral sandstone tongues separated by Mancos shales (Doelling, 1972). Regionally, recharge to the Star Point occurs primarily from vertical movement of water through the overlying Blackhawk Formation. Due to the low vertical permeability of the Blackhawk Formation, the magnitude of this recharge is limited. This formation is monitored via monitoring wells HZ-95-1, HZ-95-2, and HZ-95-3, which have been installed into the uppermost Spring Canyon tongue.

Mancos Shale

Underlying the Star Point Sandstone is the Masuk member of the Mancos Shale. The Masuk Shale consists of blue-gray fissile claystone or silty claystone which weathers light blue-gray to light tan. Although the Masuk Member of the Mancos Shale may be locally saturated beneath the Star Point Sandstone, it is not considered to be an aquifer. Except where extensively fractured, the low-permeability shales in the Masuk will transmit only relatively small quantities of water (Lines, 1985).

Quaternary Alluvium

Unconsolidated Quaternary deposits are present in the floors of drainages and generally consist of silts, sands, and gravels. The alluvial deposits receive water from the adjacent bedrock in some of the deeply incised canyons. Water is probably supplied to the alluvium by seepage from the Blackhawk and Star Point Formations. Discharge from the Quaternary alluvium is to the surface water system. Due to the limited areal extent of alluvium in the area, this unit is not considered to be a significant aquifer.

No water rights exist within the permit and adjacent areas for water wells. However, rights exist for the use of water from several springs in the permit and adjacent areas. Typically, these rights are for the use of less than 5 gallons per minute of water from springs issuing from the Blackhawk Formation. Water in this formation issues from perched aquifers of limited areal extent. This accounts for the low flow and usage rates of the springs.

Approximately 50 to 70 percent of the stream flow in the region occurs during the May-July snowmelt runoff period (Waddell et al., 1981). Summer precipitation usually results in minor amounts of runoff.

Water quality in the Price River and its tributaries can be classified as good at the higher elevations, with TDS concentrations of 250 mg/1 and below. As is the case with springs in the area, these surface waters tend to be a calcium bicarbonate type. At lower elevations below diversions, the water changes to a sodium sulfate type with dissolved solids ranging from 2,500 to more than 6,000 mg/1 (Waddell et al., 1981). These changes are caused by leaching of salts from irrigation return flows and natural runoff from areas underlain by Mancos Shale.

The three principal surface water courses in the region of the "lease" are Jump Creek to the north, Beaver Creek through the center, and North Fork Gordon Creek to the south.

Beaver Creek originates at 9,200 ft. about 4 km west of the mine facilities, first being mapped as a perennial stream at an elevation of 8,950 ft. 0.8 kilometer below its upper end. Beaver Creek is fed by a perennial stream (Spring Creek) within the study area. During the 1980-81 field studies, however, this tributary was dry above the spring (8,550 ft.) except during snow-melt. Between the upper limits of permanent water and its confluence with Sand Gulch near the northern end of the study area at 8,300 ft., Beaver Creek has a mean gradient of 650 ft/mile (12 percent). Much of the stream length is characterized by active or abandoned beaver ponds, willow thickets, and wet meadows with fairly well-developed meanders in some broader sections.

One of the contributing springs, the Homestead Spring (sampled by BCCC as 2-6-W), is an area of seeps located in a small tributary to Beaver Creek in the SW¼ NE¼ Sec. 13, T. 13 S., R. 7 E. (approximately 0.5 mile south of the lease area). Past measurements collected by BCCC personnel have indicated that this spring discharges from 3 to 136 gallons per minute, with the higher flow rates in June including surface runoff from snowmelt conditions.

Jewkes Spring (SP-9) is located near the Beaver Creek stream channel in the SW¼ SW¼ Sec. 7, T. 13 S., R. 8 E., approximately .25 mile west of the lease area. With the exception of a spurious measurement in July 1985, discharges from this spring have generally varied during the period of record from about 1 to 40 gpm, with no observable flow during drought periods.

The general flow direction of Beaver Creek is to the northeast toward the Price River. The drainage pattern in the upper portions of the Beaver Creek basin is dendritic. The valley profile is not as steep as the North Fork of Gordon Creek.

The USGS formerly maintained a gauging station near the mouth of Beaver Creek (Station No. 09312700) approximately 8 miles northeast of the lease. During the 29-year period of record from October 1960 to October 1989, the minimum annual discharge of 254 acre-feet occurred during water year 1981. The maximum annual discharge of 9,950 acre-feet occurred two years later in water year 1983. The average annual discharge of Beaver Creek at the USGS monitoring station during the 29-year period of record has been 3,310 acre-feet.

The annual variability of flow in Beaver Creek can be seen by the fact that the annual maximum and the annual minimum during a 29-year period of record were separated by only two years. This variability is also evident in the high coefficient of variation for the station (74 percent).

Stream flow at the Beaver Creek USGS station was typically highest in the spring and early summer (April through June, as a result of snow melt) and lowest during the autumn and winter months. Occasional late summer rapid increases in flow were also observed, probably as a result of summer thunderstorms. Several days of no flow were also reported during the period of record (mostly in the winter and late summer).

Jump Creek is located approximately 1 mile north of the lease area. Flow data for Jump Creek is minimal therefore it is not discussed. The creek joins with Beaver Creek and flows into the Price River.

North Fork Gordon Creek originates from two unnamed intermittent tributaries about 5 kilometers (km) southwest of the mine site, at an elevation of about 8,750 ft. Within the study area, North Fork Gordon Creek is augmented by a number of minor intermittent tributaries, particularly the Jewkes Creek that flows through the mine's disturbed and permit area. North Fork Gordon Creek covers approximately 3.5 miles of stream length, with a mean gradient of 340 ft/mile or 6.5 percent. The stream has few meanders but is characterized by scattered beaver ponds. Riparian vegetation is poorly developed along much of its length. The elevation of North Fork Gordon Creek is lower than the Hiawatha coal seam, the lowest minable seam in the area.

Jewkes Creek originates at 8,240 feet at the spring being monitored by Horizon as SP-1. Multiple springs add to the flow in Jewkes Creek as it drops from the 8,240 feet to 7,600 feet and empties into the North Fork of Gordon Creek. Jewkes Creek is an intermittent stream which enters the Horizon disturbed area at approximately 7,600 feet.

3.5 VEGETATION

Mountain Shrub

One of the most widespread habitats, especially on steep slopes at lower elevations, was a highly variable mixture of shrub species typical of mountainous areas in the region.

The xeric phase was prevalent on south-facing slopes. Characteristically, these areas were dominated by open stands of Gambel's Oak with varying amounts of Alder-leaf Mountain Mahogany, Serviceberry, Snowberry, Antelope Bitterbrush, and Rubber Rabbitbrush. Conspicuous herbaceous species during early fall were a Tansy-aster and Salina Wildrye. At higher elevations, some south facing slopes were strongly dominated by Greenleaf Manzanita an evergreen shrub of particular values to wildlife.

The mesic phase, typically occurring on north-facing slopes, was dominated by dense stands of Gambel's Oak or Wasatch Maple. Associated woody plants included isolated clumps of Quaking Aspen, scattered Douglas Fir, and White Fir (often appearing to represent a later successional stage), and shrubs such as Chokecherry, Serviceberry, Snowberry, Woods' Rose, Oregon grape, and Mountain lower. The variable herbaceous stratum was dominated by Mountain Brome, Nodding Brome, and perennial forbs such as Aster, Erigeron, Fragaria, Frasera, Galium, Geranium, Lathyrus, Thalictrum, and Vicia.

Slope Bunchgrass

This rather widespread habitat was similar in composition to Xeric Mountain Shrub habitat, except for the near absence of woody species. The dominant plant was the bunchgrass Salina Wildrye. The casual distinction between these two xeric communities is not clear, but it probably is related to soil moisture and texture.

Middle Elevation Conifer

This widespread habitat type was limited to north-facing slopes and along drainages, typically appearing as isolated clumps scattered through larger areas of Aspen or Mesic Mountain Shrub. Mature White Firs and Douglas Firs were visually and numerically dominant throughout. Prominent understory species were Mountain Snowberry, Oregon Grape, Currants, Mallow Ninebark, Woods' Rose, Aster, Fragaria, and Heuchera.

High Elevation Conifer

Atop the Wasatch Plateau especially at elevations of 8,500 ft. or higher, coniferous forests were dominated by Engelman Spruce, Subalpine Fir, and Douglas Fir. Understory species were similar to those described above for Middle Elevation Conifer Forests.

Aspen

Dense stands of mature Quaking Aspen occurred as a mosaic in moist sites, either on north slopes among Mesic Mountain Shrubs and Middle Elevation Conifers or along forest edges adjacent to High Elevation Conifers. In both occurrences, the understory was similar to other mesic habitats; prominent species included Mountain Snowberry, Mountain-lower, Oregon Holly-grape, Fragaria, Geranium, Lathyrus, Thalictrum, and Vicia. In the north-slope phase of this community type, Wasatch Maple often was sufficiently common to be considered a co-dominant.

Mixed Riparian

Streams at lower elevations in the study area generally were characterized by riparian vegetation dominated by larger deciduous shrubs: Mountain Maple, Redtwig Dogwood, Elderberry, Chokecherry, and Willow (Salix) species. This assemblage was most common in shaded areas, where the stream was closest to the base of north-facing slopes. More open sites often lacked a distinct riparian community, instead being dominated by species occurring on adjacent xeric hillsides. Trees frequently were absent altogether, but some sites did support large Plains Cottonwoods and Box Elders.

At higher elevations, aspen and conifers (including Blue Spruce) often occurred as part of the riparian complex.

Subalpine Moist Meadow

Moist meadows commonly were the dominant riparian habitat type above 8,500 ft. These open areas supported dense stands of mesic grasses, such as Foxtail, Red-top, Canada Wildrye, Reed Canary-grass, Bluegrass species, and Sedge species.

Plate 9-1 outlines the sections of vegetation within and adjacent to the "lease" area. Refer to Section 4.0 for description of threatened and endangered species study.

3.6 WILDLIFE AND FISH

In 1981 and 1990, the UDWR provided detailed wildlife information for the area, UDWR also prepared a wildlife plan representing their recommendations for mitigation and impact avoidance procedures in the disturbed area. The UDWR personnel providing the information were John Livesay, Larry Dalton, Darrel Nish, Clark Johnson, Bill Bates, Robert G. Valentine, and Cleon B. Feight.

Large herbivores and large carnivores were inventoried by road surveys during each field session for abundance, distribution, and habitat use. This data was augmented with walked transects across each habitat type.

Medium-sized mammals, such as predators, lagomorphs (rabbits and hares), and large rodents were studied at dawn and dusk when they are most active. Data for small mammals, which may be used as indicators of ecosystem quality and reclamation success, were drawn almost exclusively from UDWR (1978) and Durrant (1952).

Upland game bird surveys were conducted in conjunction with other field programs. The upland fowl and water bird populations in this area were insufficient to warrant recreational value.

The most likely raptors in the mine area are the Flammulated Owl and Cooper's Hawk, which occur in the Wasatch Plateau and prefer wooded country, such as riparian and conifer forests. With the availability of cliffs for nesting and open areas for hunting within a relatively short distance the Prairie Falcon is a potential breeder in the area.

Information provided by UDWR (1981a) indicate that the most important habitat types in the study area are the Mixed Riparian zones along Beaver Creek and North Fork Gordon Creek and the Subalpine Moist Meadows atop the plateaus.

It is probable the sixty-six species of mammals inhabit the project area as well as the biogeographic area (reference the UDWR Publication No. 90-11). Mule deer and elk are inhabitants of the biogeographic area. In the lease area both species show altitudinal migrations in response to winter conditions.

On June 14, 1996 a bat survey in the portals located in Portal Canyon were performed by Brad Lengas, a qualified biologist. This report states that "the adit(s) show no evidence of being used as summer bat roost(s)". No bats were observed in the portal area during site construction (fall and winter, 1996).

Two hundred forty-two species of birds, all of which are protected, are known to inhabit the biogeographic area in which the mine and lease are located. It is possible that one hundred thirty-eight of these species inhabit the project area.

Golden eagles are a common yearlong resident of the area. No active aerie territories are known inside the project disturbed area. Golden Eagle/Prairie Falcon nests were observed during the 1995 survey, Bill Bates (UDWR) confirmed that they had not been nor were they inhabited recently. The nesting area surveyed by UDWR is used by Golden Eagles one year and by Prairie Falcons another year, only one species will use the nesting area any given year. The mine plan and adjacent areas have been ranked as being of substantial value to golden eagles.

The northern bald eagle is an winter resident (November 15 to March 15) of the biogeographic area. The area has been ranked as being of substantial value to wintering bald eagles, therefore the lease area may be used by the bald eagle. The American peregrine falcon and the prairie falcon are yearlong residents of the area.

The sixteen reptile species suspected of inhabiting the project area are protected under the law but none are federally listed as a threatened or endangered species. Six species of amphibians, all of which are protected, are known to inhabit the biogeographic area. No amphibians which are known to inhabit the mine area are federally listed as a threatened or endangered species.

Listed threatened and endangered species potentially present in the study area are the American Peregrine Falcon, which breeds in Utah; Arctic Peregrine Falcon, which migrates through Utah; and Bald Eagle, which winters in Utah.

Wildlife in the area has been monitored yearly by the UDWR due to the proximity of the lease to the Gordon Creek Wildlife Management Area. Detailed data is available from the UDWR and can be supplied upon request.

Aquatic Studies

Aquatic field and lab studies were performed in the North Fork Gordon Creek and Beaver Creek by the UDWR. Biotic components specifically included sampling for macroinvertebrates and evaluating the fisheries potential. Abiotic components included field techniques for testing water quality, as well as descriptions of substrate and channel morphology. Studies were conducted in November 1980 and April and June 1981. Additional stream surveys and inventories were done on Beaver Creek in 1953 and 1987 by the UDWR.

The 1980 and 1981 aquatic studies involved six stream sample sites: four in the Beaver Creek system and two in the North Fork Gordon Creek system. The sites were selected to provide information from representative stream reaches, above and below substantial tributaries. The sites on North Fork Gordon Creek were located in the drainage south of Bryner Canyon, southwest of the Horizon permit area. No fish were seen or collected in either the North Fork Gordon Creek or Beaver Creek (UDWR, 1981a).

The two sites in Beaver Creek were located upstream of the unnamed stream which is the tributary in extreme northwestern Section 18. A third site was located on the unnamed tributary called Spring Creek, and the fourth site was about 1 kilometer farther downstream, in southern Section 7.

Beaver Creek is ranked by UDWR as being of substantial value as a salmonid fishery, with a self-sustaining population of introduced Yellowstone Cutthroat Trout. Nongame fish species listed by UDWR for Beaver Creek in the study area are the Mottled Sculpin, Mountain Sucker, and Speckled Dace. No fish were seen in Beaver Creek during the April or June surveys, suggesting that populations are fairly small in the study area, probably due to low flows and low gradients (the latter reflected by fairly high temperatures). Fish surveys were not conducted because the mining project is not expected to affect the stream. This was recognized by UDWR in their evaluation of wildlife in the study area (UDWR 1981a).

Beaver Creek has been essentially unaffected by mining or exploratory drilling programs in the Beaver Creek valley. This situation is not expected to change with an additional mining operation.

3.7 CULTURAL RESOURCES AND PALEONTOLOGY

Coal mines were opened in the area in the 1920s. Among the larger mines in the area were Sweet in 1925, Consumers in 1922, and National in 1908. Mining camps sprang up at the mines and for a short time Coal City (Dempseyville), located 2 miles east of the mines served as the business and residential center of the mining district. Remains of the major mining camps and coal mining operations can still be seen, including remains of cabins and work areas constructed by National Coal Company.

The historical, cultural and paleontological resources inventory and Class I literature search for Horizon Coal Corporation were completed by Baseline Data, Inc. (BDI) in 1995 under Utah State Project Authorization No. U95-BS-416P. The inventory fulfills requirements of the Utah Coal Mining and Reclamation Act of 1979. A copy of the data collected by BDI can be found in Appendix 5-1 of the Horizon M&RP.

The area inventoried lies approximately 14 miles northwest of Price, Utah in Township 13 South, Range 8 East, Section 17. The BDI inventory consisted of a 100% examination of the proposed mine disturbed area. The area disturbed by the drilling of monitoring wells HZ-95-1, 1S and 2 (Section 8) was also inventoried for historical, cultural and paleontological resources. No artifacts were collected during the inventories. Since no additional surface disturbance is planned for the requested lease, the data is presumed sufficient.

The archaeological survey of the area recorded no historic archaeological sites. A search of the site files at the Utah Division of State History turned up no previously recorded sites in or near the permit area. Letters from the Utah State Historical Preservation Office (SHPO) on May 30, 1995 and October 24, 1995 both recommend that there would be **"No Effect"** upon cultural resources by the Horizon No. 1 Mine project. A conversation with James L. Dykmann (SHPO) on January 19, 1996 confirmed "no change" in their recommendation of 1995.

An inventory of the area was performed by Betsy L. Chapoose, Director of the Tribe Cultural Rights and Protection for the Ute Tribe. She determined there would be **"No Effect"** to tribal cultural artifacts with the issuance of the "lease" to HCC.

The permit and "lease" areas do not contain any public parks, cemeteries, archeological sites, units of the National System of Trails or of the Wild and Scenic River System.

Historic Land Use

The general region has been occupied by Native Americans for several thousand years. There is no evidence of permanent occupation by Native Americans, and their use of the area was probably limited to passage to higher grounds west of the mine or seasonal hunting and foraging activities.

Historic use of the area may have occurred as early and the 1830 - 1840s by fur trappers, but no evidence of this activity has been documented in the area. The first use of the mine location by Euro-Americans probably occurred in the early 1850s in the form of grazing by settlers from the Sanpete Valley. Grazing activities in the Gordon Creek Canyon were probably continued if not increased with the settlement of the Price River area east of the mine location.

A high quality coal seam was discovered in the area in 1921. Between 1922 and 1956, the mine area was the location of the operating Blue Blaze Mine. The mine expanded and contracted through those years with the ups and downs of local and national economic conditions.

From 1956 to the present, little activity has occurred at the mine property. There have been a few proposals to reopen the mines but none successfully. The mine properties generally deteriorated and buildings collapsed. In the mid-1980s, efforts aimed at public safety closed several portals and removed some mine buildings.

History of Gordon Creek Area

Gordon Creek was initially settled not for its coal resources, but as a ranching and farming area by Alfred Grams in 1885. Arthur E. Gibson began prospecting the Gordon Creek in 1920 and in the Spring of 1921, discovered a substantial deposit of high quality coal in the canyon walls. He secured a lease for 1480 acres in Gordon Creek and began development of the coal seam he had discovered (Daughters of the Utah Pioneers 1948).

In 1922, Gibson with a small crew of assistants removed 34 carloads of coal from Gordon Creek Canyon. The coal was shipped to prospective stockholders in Salt Lake City via the Utah Railway Company. Investors from Salt Lake City purchased the stock and organized the Consumers Mutual Coal Company which would later be known as the Blue Blaze Coal Company (Desert West, 1985).

Two other coal mines developed in Gordon Creek - the National and Sweet mines. National was actually developed earlier (1908) than Consumers by an engineer named Williamson who leased land from the government. In 1921, Fred Sweet took over the property developed by

Williamson and started the National Coal Company. A tent city developed around the Sweet Mine which was soon replaced by regular housing. Red tile housing constructed at National can still be seen at the site today. By 1925, the National Railroad extended into the area which greatly increased the capacity of each mine.

The community of Consumers (Blue Blaze Mine) boasted of a four story apartment house, store, service station, and a post office. During the later 1920s each of the three communities continued to develop. National had a row of red tile homes with arched doorways that are still found at the site, a store and a service station. The Consumers Mine closed in 1938, but a prominent Carbon County mining operator names Terry McGown opened the mine at a later date. By 1952, the demand for coal was low and all three of the mines in Gordon Canyon shut down. During its years of operation, the Blue Blaze produced over 2.5 million tons of coal (Doelling, 1972).

Prehistoric Inventory

No prehistoric sites or artifacts were noted during the inventory. The surface of the mine area has been heavily impacted by historic mining and the remains of any prehistoric sites have been removed or completely covered in mine tailing and rubble. Undisturbed areas along the edges of the mine location contained no evidence for prehistoric remains.

Paleontological Inventory

The paleontological inventory recorded the presence of plant "hash", or leaves, stems and branches. Occasional isolated larger wood sections were observed. In most instances, the paleontological remains are either impressions or compressions. A few of the finer sandstone and siltstone units contain well defined leaves, but these are the exception rather than the rule. The plant remains suggest the presence of Cretaceous deciduous trees and more limited conifers.

In addition to the plant remains, occasional invertebrate burrows were noted in the sandstone units. These trace fossils are fillings of burrows that preserved their shapes. The identification of the invertebrate animal that created the burrows would be difficult. Neither the plant hash or the trace burrows are considered to be paleontologically sensitive. No fossil remains found within the lease area were determined to fall into the sensitive category.

4.0 ENVIRONMENTAL IMPACTS

Subsidence Impacts

The surface effect of the backfilling operation will be to reduce the surface expression of subsidence in an area where subsidence will already be minimal.

The extent of the potential subsidence on adjacent area outside of the permit area was determined based on a maximum overburden thickness of 1500 feet (from data presented by Hansen, 1988) and an angle of draw of 35 degrees as measured from the vertical (the maximum angle of draw recommended by Dunrud [1976]). This angle of draw is significantly in excess of the 20-degree value used by Beaver Creek Coal Company for adjacent mining operations (Guy, 1985), but will result in a conservative estimate of the extent of the adjacent area. Based on the 35-degree angle of draw and a maximum overburden thickness of 1500 feet, subsidence impacts will extend a maximum of 1050 feet (0.2 mile) from the edge of the permit area. Hence, for the purpose of this application, the adjacent area for potential subsidence is defined as that area within 0.2 mile of the permit area.

Renewable Resources

Hydrologic and vegetative renewable resources exist within the area to be mined. One perennial stream, Beaver Creek, and various springs are known to exist above the area to be mined. Based on past experience and monitoring results from this area, it is not expected that mining will affect any hydrologic resource through subsidence.

Substantial inflows of groundwater to underground workings are not currently anticipated. However, should a substantial inflow of groundwater occur, mitigation measures may include: attempts to seal off the inflow, increased monitoring efforts, lining of the stream bed through the affected area, and replacement of lost water if indicated by monitoring. An extended mitigation plan will be enacted should a measurable impact occur to surface water due to mining activity.

The vegetation resource above the mining area consists of rangeland for stock and wildlife grazing and a limited timber resource. If subsidence should occur, the effects would be minimal, possibly resulting in some fractures or slight depressions. Thus, the effect upon vegetation resource would also be minimal. Should impacts to vegetation occur due to subsidence, mitigation measures may include: filling of fractures, regrading of broken areas, replanting degraded areas, and intensified monitoring.

Geologic Hazards

Geologic hazards in the mine area exist in the form of steep slopes and numerous inactive normal faults. Roof conditions will typically worsen in these areas due to fracturing and slickensides; however, no surface movement or new effects have been noted to date from mining through fault zones in this area.

Movement could result in rock falls from exposed outcrops; however, no evidence of such falls or movement has been noted in this area from past mining. There are no potential

landslide or slump areas known to exist that were caused by previous mining activities in the area. Horizon is unaware of escarpments within the "lease" area.

Subsidence can normally be expected to occur over areas where second mining (pillaring) has taken place. Maximum potential subsidence from pillar extraction in the No. 1 Mine (the Hiawatha seam) has been estimated from Figure 3-5 (Attachment D) using the following criteria:

Panel Width = 600 ft
Average Depth = 800 ft
Width/Depth Ratio = 0.75
Seam Thickness = 7.0 ft

Using these data, subsidence due to pillar extraction in the Hiawatha seam could reach 2.33 feet directly over a pillared panel. The cumulative potential subsidence for areas where both seams are pillared is 6.18 feet (3.85 + 2.33). Again, past experience in this area suggests that subsidence would be of a lesser magnitude.

The following observations and conclusions regarding subsidence have been made from past mining activities in the vicinity of the mine:

(1) Pillaring in the upper (Castlegate "A") seam has previously occurred beneath Beaver Creek. Specifically, the northernmost west panel was pillared beneath Beaver Creek by Swisher Coal Company in January 1978 in an areas where the overburden thickness was about 650 feet. In addition, in September 1981, Beaver Creek Coal Company pillared the "A" Panel area beneath Beaver Creek in an area with an overburden thickness of approximately 425 feet. Neither of these areas show any measurable effect on Beaver Creek.

(2) The Gordon Creek No. 2 Mine overlies areas pillared up to 40 years ago in the lower seam (Sweet's Mine) with no noticeable subsidence effects. The Consumers No. 3 Mine also pillared areas in the permit area which show no noticeable subsidence effects.

(3) The overburden in the permit area above the Castlegate "A" seam (with a thickness of 600 to 800 feet) contains massive sandstone units which are unlikely to allow caving effects to reach the surface. In addition, the seams are separated by over 150 feet of similar interburden with no noticeable effects from past pillaring.

(4) Subsidence, should it occur, is not likely to affect the Beaver Creek flow due to the numerous beds of swelling shales within the overburden and interburden. Fractures within these sedimentary deposits have a strong tendency to heal due to the swelling of the shales and sandy shales contained therein.

Threatened or Endangered Plants

In 1981, Mt. Nebo Scientific completed a preliminary vegetation study of the area for Sanders Exploration, Ltd. (C & W No. 1 Mine). In 1990, Mt. Nebo Scientific performed a vegetative study for Blue Blaze Coal Company and a threatened and endangered plant and general vegetation study for Horizon in 1995. In August of 1995 a habitat study for Ute Lady's Tresses (Spiranthes diluvialis Shev.) specifically was performed. No threatened or endangered plant species were found during the 1995 study. Refer to Appendix 9-1 of the Horizon M&RP for details of these studies.

Threatened or Endangered Animals

No reptiles or amphibians known to inhabit the mine area are federally listed as a threatened or endangered species.

Listed threatened and endangered species potentially present in the study are the American Peregrine Falcon, which breeds in Utah; Arctic Peregrine Falcon, which migrates through Utah; and Bald Eagle, which winters in Utah. Bald Eagles are known to use riparian woodlands along lower North Fork Gordon Creek and the Price River as winter roosts (UDWR 1981a). The mine disturbed area elevation is high for the willow flycatcher, but it may occur in the general area during the summer months. The loggerhead shrike is a yearlong inhabitant of the Wasatch Plateau and is most likely found in the mine area (UDWR, 1990).

If any endangered or threatened species are found in the permit area Horizon has committed to report them to UDOGM and the UDWR.

Information or conclusions provided by the Section 7 consultation with the U.S. Fish and Wildlife Service is included in Attachment D.

Floodplains and Wetlands

A reconnaissance investigation of the permit and adjacent areas was conducted to delineate alluvial deposits which might be considered to be alluvial valley floors (AVF). Identification of locations where unconsolidated stream-laid deposits occur was performed using surficial geology and soils maps of the area. Further, field reconnaissance and an analysis of aerial photographs of the mine permit and adjacent areas were conducted. Locations of stream-laid deposits thus identified are the same as those identified on Plate 6-1 as Qal (Recent Alluvium and Qoa (Older Alluvium).

From a geomorphic standpoint, the rugged mountainous terrain of the permit and adjacent areas has resulted in drainages still in a youthful stage of development. The streams are confined in narrow, steep-sided, V-shaped valleys with steep channel gradients. Meanders normally associated with AVF development are absent except in a few isolated locations.

Alluvial deposits along Beaver Creek exhibit minor stream meandering and contain numerous beaver ponds. Some of the stream-laid deposits along Beaver Creek, particularly at the mouths of small tributary canyons, appear to be debris flows. Soils in the valley exhibit localize signs of being flooded or water logged during a field visit to the site.

Alluvial deposits were also identified at the mouth of Jewkes Creek and along North Fork Gordon Creek. The alluvial deposits at these locations are below the coal outcrop and thus, could not be directly impacted by mine subsidence.

Agricultural developments are not found along North Fork Gordon Creek, Jump Creek, Beaver Creek, or their tributaries in the permit and "lease" areas. The agricultural potential of the valley floors in the area is limited by the soil capability and the short growing season. The narrow valleys are occupied by the stream and the road and both break up the narrow valley so that development of hay meadows or improved pasture is impractical.

The valley floor along Beaver Creek, Jump Creek, North Fork Gordon Creek, and their tributaries would be incapable of supporting agricultural activities without proper drainage. Even with adequate drainage, agricultural development would be restricted to grasses and pasture because of the high elevations and short growing seasons. Hence, given the extensive prior disturbance in the proposed disturbed area, the narrowness of the valleys, and climactic conditions in the area, the stream-laid deposits in the permit and lease areas are not considered to be alluvial valley floors. This conclusion is supported by the opinion of Mr. T.B. Hutchings, State Soil Scientist with the U.S. Soil Conservation Service (see Appendix 7-6, Horizon M&RP).

Since no surface disturbance is planned in the lease area, the government agencies required to make a wetland determination were not contacted. However riparian vegetation is prominent along Beaver Creek and Jump Creek.

Surface and Groundwater Impacts

Potential impacts of coal mining on the quantity and quality of surface and groundwater flow may include:

- Increased sediment yield from disturbed areas;
- Diminution of springs in perched aquifers overlying the mine area;
- Decreased availability of groundwater in the regional aquifer system;

Impacts to the Perched Aquifer System. The hydrologic data indicate an absence of significant perched aquifers within the Blackhawk Formation overlying the coal to be mined. The geology of the area and the occurrence of springs in the Blackhawk Formation indicate the presence of small, laterally discontinuous perched aquifers in the Blackhawk. These small perched aquifers within or adjacent to the mine plan area may be impacted as a result of mining related subsidence.

The perched aquifers of the Blackhawk Formation characteristically produce water from channel sandstones bounded by impervious shale beds at their bases. If subsidence fractures do intersect these perched aquifers, clay minerals contained within these shale beds will likely seal the fracture planes. Sealing of the fracture planes may allow spring discharge to continue uninterrupted.

According to the Cumulative Hydrologic Impact Assessment prepared for the area by UDOGM (Attachment C), "Subsidence impacts are largely related to extension and expansion of the

existing fracture system and upward propagation of new fractures." Vertical and lateral migration of water is partially controlled by fracture conduits. Potential changes include increased flow rates along fractures and diverting flow along new fractures or within permeable lithologies. Subsurface flow diversion may result in diminution and/or loss of flow to springs that are undermined.

Retreat mining also results in uniform downwarping and lowering of strata above the mined interval. This uniform downward movement is generally not accompanied by a significant degree of fracturing. As a result, the original attitude and integrity of the strata are maintained. Little impact on the perched aquifers of the overburden are expected to result from downwarping.

The probable consequences of mining on the hydrologic resources associated with perched aquifers are considered minimal due to: 1) small number of springs, 2) low and/or erratic spring flow, 3) absence of municipal water use rights, 4) water loss experienced at one location may be accompanied in an increased flow at another location, and 5) possible sealing of subsidence fractures by clay minerals.

Impacts to the Regional Aquifer System. It is anticipated that the coal in the Horizon No. 1 Mine will be saturated essentially from the beginning of mining. It is assume that groundwater inflow to the mine workings will occur primarily as a result of porous-medium flow rather than fracture flow. Historically, large amounts of the Hiawatha Coal seam have been mined out to the southwest of the permit area by Sweet Coal Company's Sweet Mine, Blue Blaze Company's No. 1 Mine, National Coal Company's No. 1 Mine, and Beaver Creek Coal Company's No. 3 Mine. Based on a review of mine records (Skaggs, 1992), many faults have been mined through in the Hiawatha seam with only insignificant/minor amounts of water being encountered.

Only one fault has produced significant quantities of water when mined through. This fault lies in the east portion of the permit area and was intersected in mining of the Beaver Creek Coal Company No. 3 Mine. Inflows of approximately 400 gpm occurred when this fault was encountered (Skaggs, 1992).

Surface mapping and mining experience in the overlying Castlegate "A" seam within the permit area indicate that fracturing within the permit area is not significant. Therefore, the previous estimates of potential groundwater inflow rates to the mine workings are considered adequate.

Impacts to the Hydrologic System Resulting From Subsidence. Stream buffer zones will be maintained for a distance of 100 feet on either side of Beaver Creek, within which second mining will not occur. According to Gentry and Abel (1978), topographic lows (e.g., stream channels) tend to be protected by upwarping of adjacent slopes during subsidence. Therefore, mining-induced surface fracturing should be very limited (or nonexistent) within the Beaver Creek stream channel area. Any fracturing that does occur in the stream channel is likely to fill rapidly as a result of sedimentation.

It is also not anticipated that subsidence will affect springs within the permit and adjacent areas. Von Schonfeldt et al. (1980) found that uniform subsidence "rarely causes problems

to renewable resources such as aquifers, streams, and ranch lands." Since second mining will occur uniformly across the permit area except in buffer zones, the resulting subsidence should also be uniform, minimizing the potential impacts to overlying springs.

As noted in the Cumulative Hydrologic Impact Assessment, mining in the area adjacent to the Horizon permit area has not resulted in hydrologic impacts due to subsidence. Given the lack of extensive aquifer systems in lithologic units that overlie the coal within the permit and adjacent areas, it is not anticipated that groundwater will be affected by subsidence. Thus, subsidence caused as a result of mining by HCC should not cause significant surface or groundwater impacts within the permit or adjacent areas.

Wilderness Values

The surface above the coal lease is privately owned with the exception of 120 acres managed by the BLM. At the discretion of the owners the area has been used for hunting, grazing, and timbering (1995 - 1996). Recreational properties exist on the lease (a cabin on approximately 1 acre) as well as north and west of the "lease" area. Portions of the BLM managed subsurface acreage is presently leased to Horizon as a right-of-way.

Since the BLM managed lands within the "lease" have been used by livestock under the assignment of various grazing allotments and due to the continuous use of the privately owned lands, the value of classifying the area as wilderness is questionable.

Visual Resources

No surface disturbance will occur in the "lease" area except indirectly in the form of limited mine-related subsidence. This should not result in discernable aesthetic impacts. The access roads on the "lease" are pre-existing.

Air Quality

Since no construction is planned for the lease area, air quality concerns would be confined to the mine yard area which is south of the lease area. Dust caused by the existing roads within the "lease" would be minimal, due primarily to travel to water monitoring locations.

Wild and Scenic River

To the best of the applicants knowledge the permit area does not contain any public parks, cemeteries, archeological sites, units of the National System of Trails or of the Wild and Scenic River System.

Grazing

The lands adjacent to the mine portal area are used for grazing by both cattle and sheep. The extent of use varies from year to year and season to season. The southern portion of Beaver Creek runs through private lands used for grazing, with BLM grazing allotments scattered through the Jump Creek, northern Beaver Creek and North Fork of Gordon Creek areas. Plate 4-1 outlines land uses in the area including grazing.

Recreation

The mine area has no established parks or recreation areas. The majority of camping and recreation vehicle activity in the area is done during the fall when hunting season begins. However the majority of the surface area in the lease is privately owned and is behind locked gates.

Land Uses

The land on which the Horizon No. 1 Mine is located has long been used for coal mining. Areas adjacent to the mine and lease area are used for the monitoring of previous mining operations, mining reclamation activities, wildlife habitat, recreation, and grazing. The mine area has been classified as M & G (mining and grazing) by Carbon County.

Private landowners presently administer the lands in the lease area for livestock forage and timbering. Cattle and sheep are herded along the county road running adjacent to the mine site in spring and fall. Wildlife habitat, watershed, dispersed recreation, and coal mining are also land uses in the area. There are no range improvements in the area. Access to the grazing lands is limited to jeep trails into the higher elevations leading to Beaver Creek. There are no plans to alter this access situation.

Carbon County owns and maintains two roads, one runs parallel to the permit boundary on the south (Consumers Canyon-County Road 290), the second runs parallel to the disturbed area (for approximately 1250') enabling access to higher elevations for grazing and recreational activities.

It is not projected that the mining operation will affect the land use within and adjacent to the it's boundary. Efforts will be made to minimize the area of disturbance so the environmental impacts will remain minimal. No utilities are planned for installation on the "lease".

Once mining has ceased, the disturbed areas will be reclaimed to a degree acceptable to UDOGM and the land will once again support its principle pre-mining use: i.e., undeveloped land.

The land owners of record and their addresses are recorded in Attachment D along with Figure 4-1 showing the location of their property.

Residual Impacts

First and foremost the coal resource will be removed which will result in changes in the geology and hydrology of the area. The impacts could include minor surface subsidence and an alteration of groundwater flow patterns. Although the area near Beaver Creek has been mined south of the "lease", detailed records were not kept of the operation. Therefore the impacts which may have been caused by mining in the immediate area are not documented.

Alluvial deposits were identified at the mouth of Jewkes Creek and along North Fork Gordon Creek. The alluvial deposits at these locations are below the coal outcrop and thus, could not be directly impacted by mine subsidence.

The removal of the coal within the proposed "lease" should cause no residual impacts of a long-term nature to man or the environment.

Public Interest

The economy of Carbon and Emery counties is dependent on the stimulus provided by coal mining. The general public and the business community encourage the development of coal mining in the area.

The impact and need for area housing, utilities, educational, medical, and social services will remain consistent throughout the life of the mine.

Roads

The county road connecting Carbon County Road 290 (Consumers Canyon) to Utah State Highway 96 at Clear Creek has been used for recreation and the movement of livestock since the early 1900. This road parallels Horizon's disturbed area boundary. During 1995 and 1996 the road was graded, realigned, and widened by a logging operation removing timber along Beaver Creek. The constant change in the road caused a substantial increase of erosion and siltation in the both Jewkes and Beaver Creeks. This county road provides access to the "lease" area where all roads are privately owned and gated.

Traffic will increase on U.S. Highway 6, Consumers Road and various associated county roads (having no associated numbering or labeling). The existing transportation routes should be sufficient to handle the additional traffic. As is common in the mining industry the majority of the employees will car pool to the mine site.

Native American Religious Concerns

Horizon is unaware of any cause for concern by native americans. Archeological and paleontological studies have been done for the area with no concerns being voiced by SHPO upon the submittal of the studies findings. A letter from the Ute Tribe confirms the lack of concern for the disturbance or destruction of cultural or historical artifacts in the proposed coal lease area (Attachment D).

Solid and Hazardous Wastes

Any waste produced by the mine will be disposed of as defined in the Horizon M&RP. Wildlife will be restricted from contact with any hazardous wastes stored on the mine site.

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6.0 AGENCIES AND PERSONS CONSULTED

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Utah Division of Wildlife Resources

Bill Bates
Utah Division of Wildlife Resources
Southeastern Regional Habitat Manager

Kevin Christopherson
Utah Division of Wildlife Resources
Southeastern Regional Aquatic Manager

Mark Page
Utah Division of Water Rights
Regional Engineer

Dan Guy
Blackhawk Engineering
Civil Engineer

Patrick Collins
Mt. Nebo Scientific
Biologist/Reclamation Specialist

Steve Stamatakis
Land Owner

Roger and Margaret Skaggs
Blue Blaze Coal Company

Utah Division of Oil, Gas and Mining
Salt Lake Office

Steve Falk
Bureau of Land Management
Price River Resource Area
Mining Engineer

Tom Rasmussen
Bureau of Land Management
Price River Resource Area
Geologist

Dave Levanger
Carbon County
Director of Planning

Ray Hansen
Carbon County Road Department

Chris Hansen
EarthFax Engineering, Inc.

Brad Lengas
Biologist

ATTACHMENT A

WASATCH COAL COMPANY ENVIRONMENTAL ASSESSMENT, 1981
UT-060-PR-81-19

9/4/97

ENVIRONMENTAL ASSESSMENT COVER SHEET

Project Name Wasatch Coal Company — Intensity of Analysis Medium

Office Price River Resource Area — EA Register No. UT-060- PR-81-19

Action Coal Lease Readjustment — File Code 1791/ 3400

Location T. 13 S., R. 8 E., SLM — Serial No. SL-063011

Required by 43 CFR 23: / / Yes /X/ No

Prepared by	Title	Resource(s) Assigned
Jim Kenna	Outdoor Recreation Planner	Recreation
Ann Lambertsen	Clerk-Stenographer	Typist
Mark Mackiewicz	Realty Specialist	Soils
Blaine Miller	Archaeologist	Archaeology
Dave Mills	Wildlife Biologist	Wildlife
Jesse Purvis	Hydrologist	Hydrology
Sid Vogelpohl	Geologist	Geology (Team Leader)
Dennis Willis	Range Conservationist	Vegetation

Compliance responsibility assigned to: _____
(Name and Title)

	Signature	Date
* Area Manager	Leon E. Berggren	9/25/81
** District Manager		

* Signature will be required on all EA's
** Will sign off on all high-level EA's

1791/3400
SL-063011
(U-066)

DECISION RECORD/RATIONALE
COAL LEASE READJUSTMENT
WASATCH COAL COMPANY
EA NO. UT-060-PR-81-19

DECISION: The readjustment of Federal coal lease SL-063011 held by Wasatch Coal Company is recommended with the incorporation of stipulations developed in the attached environmental assessment.

RATIONALE: The proposed lease readjustment would be the first change in lease stipulations protecting the environment since lease issuance 40 years ago. Lease readjustment is a normal procedure in the management of Federal leases (43 CFR 3451.1).

ENVIRONMENTAL STATEMENT: Preparation of an environmental statement to consider the readjustment of coal lease SL-063011 is not recommended. Lease readjustment would not have significant impacts on the environment and would not be a major Federal action. Lease readjustment in itself would not irreversibly or irretrievably commit any resources. Public comment has not been requested or received.

Lynn E. Bergman
Area Manager, Price River Resource Area

9/25/81
Date

District Manager, Moab

Date

I. INTRODUCTION

A. Description of Proposed Action

Federal coal lease SL-063011 was issued November 28, 1941. The lease, currently held by Wasatch Coal Company, is due for an optional readjustment of lease terms on November 28, 1981. The development of revised or new lease stipulations will be considered herein. A legal description of the lease is presented below and the location is indicated on figures 1 and 2. All of the surface estates except for the 40 acres in Section 8, which is public land, are in private ownership.

T. 13 S., R. 8 E., SLM

Section 7: S½SE¼
Section 8: SW¼SE¼
Section 17: SW¼NE¼, N½NW¼
Section 18: NE¼NE¼

280 Acres

B. Purpose and Need

In accordance with 43 CFR 3451.1, coal leases are subject to readjustment at the 20-year anniversaries of issuance through 1976 and at the end of each 10-year period thereafter. The BLM develops stipulations to protect the resources not granted to the lessee. The Geological Survey sets royalties, rentals and production requirements. Other than the royalty rate and production requirement, lease stipulations of SL-063011 have not been changed since lease issuance. Stipulations to protect the environment were not included in the 1941 lease agreement.

C. Proposed Development

Subject lease is located in a block of coal lands to which C & W Coal Producers Corporation has coal production rights. A mine plan was submitted to the Office of Surface Mining on April 4, 1979 with an addendum on June 27, 1980. The C & W No. 1 and No. 2 Mines would be operated by Blazon Company. The No. 1 Mine would produce coal from the Castlegate "A" seam and the No. 2 Mine would produce from the Hiawatha seam. Production of the No. 2 Mine would begin as the No. 1 Mine is being phased out. Most of the Castlegate "A" seam has been mined from the area of subject lease (Blue Blaze No. 3). None of the surface facilities for either mine would be located on subject lease. Maximum minable coal thickness of the two seams is 13 feet. Four exploration holes have been drilled on or near the Federal lease. Additional surface exploration is not currently planned, but can be expected.

Surface subsidence can be anticipated above mined areas. Factors influencing subsidence include mining methods, thickness of coal removed, number and spacing of seams, nature of strata above mined areas and thickness

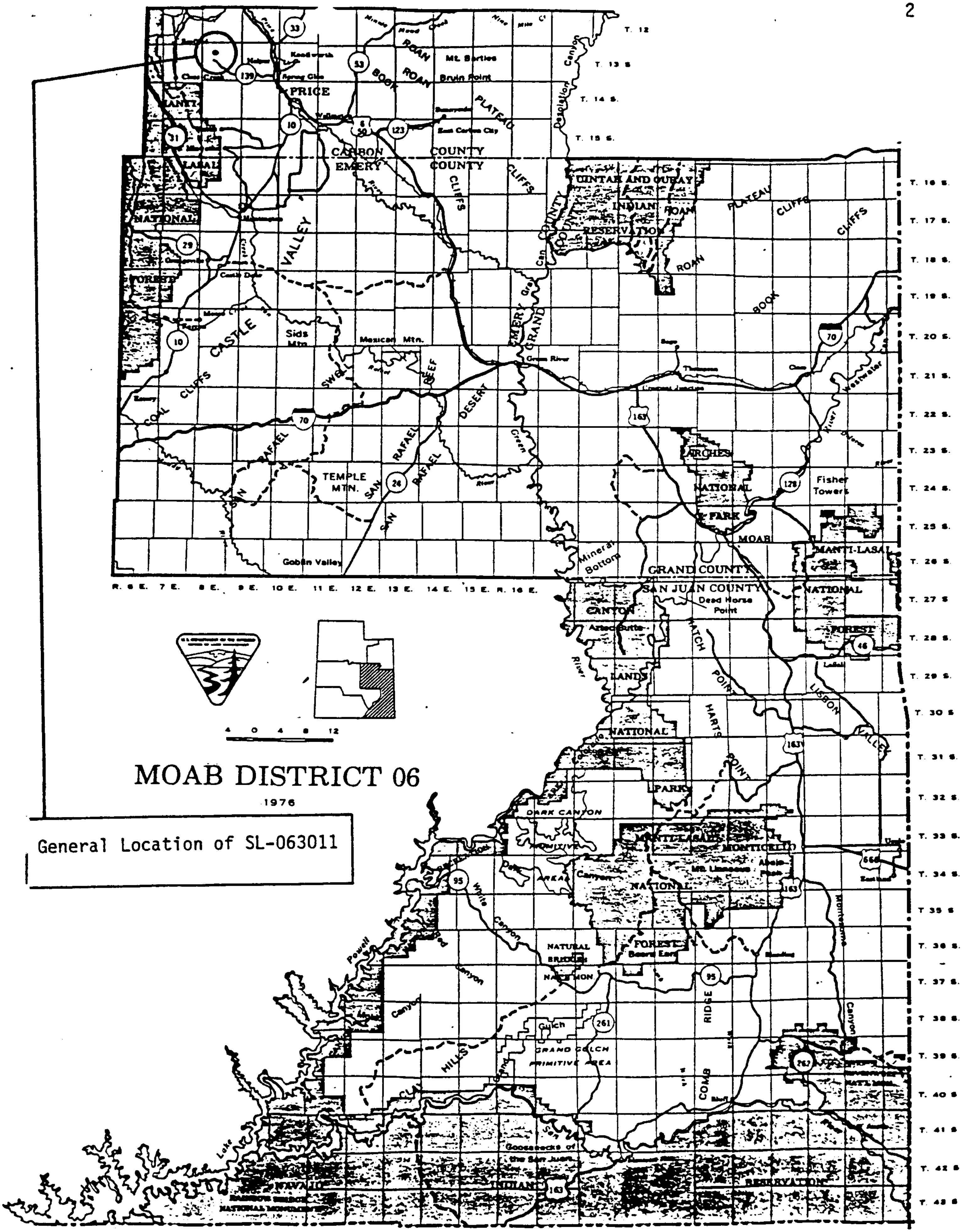

MOAB DISTRICT 06
1976
General Location of SL-063011
PRICE
CARBON COUNTY
EMERY COUNTY
GRAND COUNTY
SAN JUAN COUNTY
MOAB
ARCHES NATIONAL PARK
MANTI-LASAL NATIONAL FOREST
CANYON LANDS NATIONAL PARK
UINTAH AND OURAY INDIAN RESERVATION
SAN RAFAEL SWELL
SAN RAFAEL DESERT
CASTLE VALLEY
TEMPLE MTN.
Sids Mtn.
Mexican Mtn.
Green River
Fisher Towers
Goblin Valley
DARK CANYON PRIMITIVE AREA
GRAND GULCH PRIMITIVE AREA
NATURAL BRIDGES NAT'L MON.
MONTICELLO
NAVAJO INDIAN RESERVATION

Figure 1

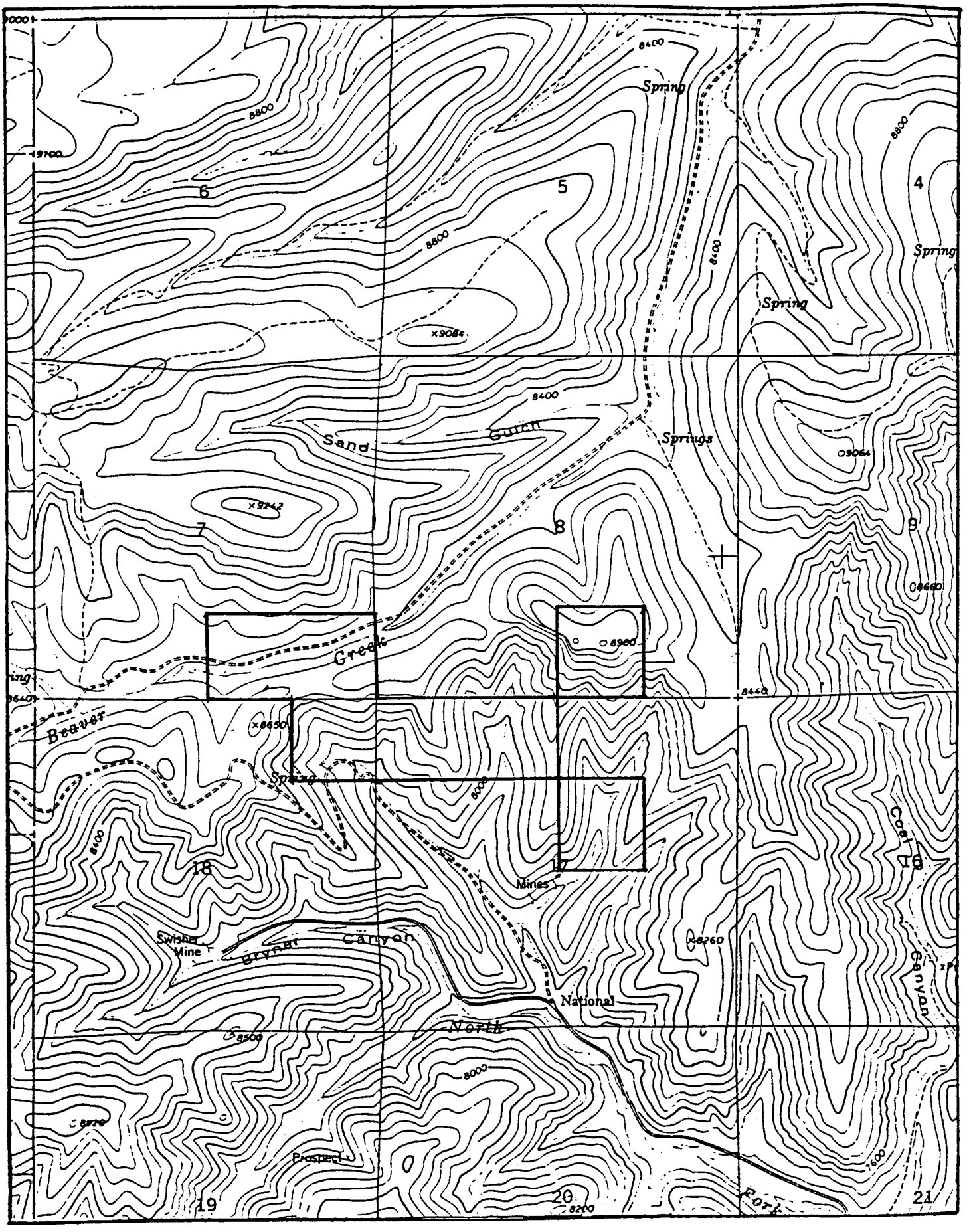

Spring
Spring
Spring
Springs
Sand
Gulch
Creek
Beaver
Spring
Canyon
Swisher
Mine
Bryner
Mines
National
North
Prospect
Fork
Coal
Canyon
4
5
6
7
8
9
16
17
18
19
20
21
8400
8800
9700
9084
9242
8650
8900
8760
8500
8000
8570
8200
7600

Figure 2

of overburden. As mine passageways subside, stress is transferred to solid coal boundaries or pillars with caving occurring until the stress is dissipated. The effects of mine passageways closing may be measurable on the surface, but accurate prediction of the amount of subsidence has not been fully accomplished. In accordance with the mine plan, subsidence monitoring that could detect as little as 2 inches of subsidence will occur.

D. Alternatives

The only alternative is "No Action". In the "No Action" case, the lessee would be allowed to operate under lease stipulations issued more than 40 years ago for the next 10-year period. These lease stipulations did not consider environmental protection. The "No Action" alternative is not considered viable.

II. EXISTING ENVIRONMENT

Subject lease is located within the Wasatch Plateau Known Recoverable Coal Resource Area (KRCRA). The lease is in the Wattis Planning Unit of the BLM's Price River Resource Area, Moab District. The lease is in Carbon County, Utah, about 14 miles northwest of Price (figure 1). This area is characterized by rugged mountainous terrain (figure 2 and photos) developed by erosion of uplifted, low dipping, predominately sandstone strata. Elevations vary from about 8,400 feet to 8,900 feet. Rainfall is 15 to 20 inches annually. Vegetation consists mainly of mountain shrub, sage, maple and Douglas fir communities. Endangered or threatened plant species are not known to be present. Wildlife habitat of special interest on the lease areas include moose critical winter range. Threatened or endangered animals are not known to be present; however, the bald eagle (winter resident) and peregrine falcon could occur in the area.

The area of subject lease does not include floodplains, prime and unique farmlands, alluvial valley floors, wilderness or wilderness study areas. The Beaver Creek drainage has been identified as a wetland (see photos). Under the Visual Resource Management (VRM) classification system, the lease area is in an area designated Class III so that changes to the landscape should remain subordinate the basic elements (color, line, form and texture) of the existing characteristic landscape. Cultural sites are not known to be present.

Additional information on the existing and affected environment is available in the land use planning documents (URA III and III) for the Price River Planning Area, Wattis Unit.

The unsuitability criteria were applied to the Wattis Planning Unit through a Management Framework Plan Supplement completed in 1979. That portion of the lease area including the Beaver Creek drainage was identified as critical winter habitat for moose (Criterion 15). A recent raptor survey has identified an active golden eagle nest (Criterion 11) in T. 13 S., R. 8 E., SLM, Section 8: SW¼SE¼.

III. ENVIRONMENTAL CONSEQUENCES

A. Topography, Geology, Paleontology and Minerals

Changes in topography may occur on subject lease. Road or pad construction for exploratory work and ventilation shafts could have a significant local impact if indiscriminately located. Mining near cliffs could cause rock falls and slides. Should roads be cut along steep slopes, scars may remain long after reclamation.

Subsidence at the surface could be as little as 12 percent of mined height or as great as 70 percent. Maximum total coal thickness expected to be mined is 13 feet so that maximum expected subsidence is 9 feet. Monitoring of surface effects, as proposed in Blazon's mine plan, would permit identification of any unacceptable changes in time to allow modification of mining plans in other areas to prevent similar damage.

Although visual recognition of surface subsidence is not common in the area, surface expressions of subsidence can include open and closed fractures or buckles in sandstone and depressions. The fractures and depressions would generally fill with soil and debris as they form and would not be obvious to an observer. The potential for rock slides or rock falls along cliffs would increase if mining approached too near the outcrop. Coal beds above mined areas that are not mined because of existing economic conditions may be rendered unsuitable for future mining.

Impacts to paleontological resources would consist of destruction or disturbance of fossil material in the portal area and within the mine. Mining activity could expose fossils which would otherwise not be available for research and other uses.

Oil and gas exploration would not be allowed over active mine workings and, following mine abandonment, drilling with mud would not be possible where subsidence has occurred due to circulation problems. Air drilling would probably be possible. Potential loss of oil or gas cannot be estimated.

B. Soils

Soils would be disturbed and productivity lost along the route of new roads, at drill pads and adjacent to ventilation shafts. The total acreage disturbed would depend on the number and location of ventilation shafts constructed and exploratory holes drilled over the next 10 years. During construction increased runoff from exposed soil could result in soil movement through rill and gullying. Wind erosion could also occur. Annual soil loss would be dependent on the amount of precipitation and wind, but could be up to 4 cubic yards per acre as a result of water erosion and 5 cubic yards per acre as a result of wind erosion. The potential for erosion would gradually decrease with revegetation.

Soils on lesser slopes of the lease area have a good potential for revegetation. Productivity of disturbed land would be restored in the long-term. Surface subsidence could have an effect on soil development and productivity.

Subsidence would affect soil characteristics due to small scale changes in runoff patterns. Recognition of the net effect of such changes would be unlikely.

C. Water

Exploration and construction of ventilation shafts is not expected to have significant impacts on either surface or ground water. Sediment load may be increased due to runoff from disturbed areas or where low water stream crossings would be required. Exploratory drilling may penetrate aquifers, but, since non-toxic, biodegradable drilling fluids would be used and the holes plugged with concrete, no significant impacts are expected. Aquifers would be under low pressure and probably of small volume.

Subsidence could have significant impacts on surface and ground water. The course of runoff and streams could be altered or additional seepage of surface water into the subsurface may be caused by subsidence. Ground water at the mine horizon or above could seep into lower strata. Subsidence could affect existing springs or produce new springs. The net effect of such changes is unknown.

Beaver Creek is a perennial stream with an associated wetland. Regulations (30 CFR 817.26) will not allow underground mining activities to be conducted beneath or adjacent to perennial streams unless the Office of Surface Mining determines that subsidence will not cause material damage to the stream. Wetlands are protected under E. O. 11990 and associated agency regulations (Bureau of Mines, FR 45(105):52936-38; Office of Surface Mining, FR 45(145):49872-74; and Bureau of Land Management, FR 45(25):7889-95.

The quality of stream water could be changed by seeping into the subsurface as could the quality of ground water that may migrate lower or into mine openings.

D. Vegetation

Vegetation would be destroyed or damaged by construction of roads and pads for exploration and ventilation purposes; but the area of disturbance or species lost cannot presently be determined. Changes in vegetation patterns may occur as a result of altered surface runoff caused by subsidence. Fire danger would be increased by the presence of additional persons and vehicles associated with exploration activity. Some large trees could be lost due to construction, but normally these trees are sufficiently scattered to allow changes in road or pad locations so that few would be destroyed. Vegetation would be destroyed or trampled by construction of roads and pads with the type and quality of vegetation destroyed being determined by the location of future drill sites and access roads. Significant subsidence could cause some change in vegetation patterns.

Surface disturbance frequently results in the rapid increase of invader species. These species are usually unpalatable as in the case of cheatgrass, halogeton, rabbitbrush and Russian thistle. Halogeton, the most common invader, is toxic to livestock.

E. Livestock

Collision of vehicles with cattle would be possible with resulting fatalities or injuries. Anticipated surface disturbances are not expected to require reduction of AUMs.

F. Wildlife and Fish

Some small animal and bird species would lose habitat due to surface disturbances. The degree of adverse effects would vary depending on the number of any certain species and their adaptability to human activities. Activities associated with drilling or ventilation shafts would cause some wildlife to avoid adjacent areas and could disturb deer fawning, elk calving and raptor nesting. Disturbance of elk in critical winter range could have significant impacts. Threatened or endangered faunal species, i.e., peregrine falcon and bald eagle, would not be impacted as allowed by site specific field inspections upon receipt of exploration or mine plans. Subsidence could disrupt springs valuable to wildlife.

Cutthroat trout were stocked in this area of Beaver Creek in the late 1960s. Current information on the status of their population is lacking. Any disruptions in the aquatic environment caused by mining could conceivably disrupt any remaining population.

G. Recreation

Activity on subject coal lease would detract from the solitude experience that may be sought by hikers or hunters. New or improved roads would allow improved access; however, access to the public may be restricted by locked gates on private land. Game animals may become more elusive of hunters as a result of exploration activities. Roads and pads that would be located on public land would be reclaimed.

Subsidence would not have any effect on recreation as it will be gradual and probably only detectable by monitoring devices.

H. Cultural Resources

Based on current data from nearby studies, the probability of impacting cultural resources, except near springs and in drainage bottoms, is considered low. Construction could damage or destroy unknown sites resulting in irreparable loss of scientific and educational information. Any sites requiring salvage would produce archaeological data which may benefit our understanding of prehistoric cultures. Subsidence would not affect cultural resources.

I. Visual Resources

Scenic values would be damaged for distances away from construction areas determined by the lay of the land and one's vantage point. After reclamation is completed, natural processes would aid in reestablishing a natural appearing landscape.

Subsidence would not affect VRM ratings or be visually noticeable.

J. Land Uses

The general area has been zoned for mining and grazing by Carbon County. Anticipated surface disturbances would have minor impacts on grazing while subsidence could hinder future oil and gas exploration. Should zoning changes allow construction of residences at a later time, subsidence could be a potential problem. Environmental damages would be minimized if reclamation of roads and pads were to occur immediately upon completion of exploration.

IV. RECOMMENDED MITIGATING MEASURES

A. Surface disturbances and facilities planned for the lease area shall be subject to Visual Resource Management considerations. Efforts shall be made to mitigate visual impacts by imitating the form, line, color and texture of the natural landscape to the greatest extent practical as determined by the Authorized Officer.

B. Surface disturbances on the lease area related to the exploration or mining of the coal resources shall be reclaimed to the extent that the productivity of the land is equal or superior to that existing prior to surface disturbance. Reclamation will be complete when so determined by the Authorized Officer and, where the surface in fee, in consultation with the surface owner.

C. Surface disturbances will be confined to existing roads or level terrain where feasible. Surface disturbances will not occur on steep slopes (greater than 60 percent) where the Authorized Officer determines that critical to severe erosion hazards would occur and reclamation potential is low.

D. Areas of surface disturbance shall be reclaimed before the first growing season following the time of discontinued use. Reclamation shall include recontouring, spreading of stockpiled topsoil and seeding with native shrub, forb and grass species as determined by the Authorized Officer.

E. The lessee will be required to establish and maintain a monitoring system capable of measuring the effects of underground mining on the surface and subsurface resources. Monitoring shall be conducted by methods and in a manner approved by the Mining Director and in conjunction with requirements of the surface management agency. Results of monitoring shall be reported periodically to the Mining Director and Authorized Officer. The Mining Director may require the lessee to employ such measures and precautions deemed necessary in their mining operation to assure that neither damage to surface resources nor loss of perennial streams occurs or hazardous conditions are created.

F. Prior to surface disturbing activities, the lessee shall have an archaeologist, acceptable to the Authorized Officer (BLM District Manager, Moab), conduct an archaeological survey of the area to be disturbed. The Authorized Officer retains the prerogative to require the relocation of proposed facilities to protect archaeological values located on leased lands, or the lessee may be required to have sites salvaged by a qualified archaeologist prior to proceeding with operations. If sites are uncovered by his operations, the operator shall not proceed further until additional clearance is granted by the Authorized Officer.

G. The lessee may be required to conduct a wildlife field survey and provide survey data to the Authorized Officer prior to surface disturbing activities that includes identification of nesting sites for raptors and migratory birds of high Federal interest, resident fish habitat, wildlife species of high interest to the State and eagle concentration areas. The field survey shall be acceptable to the Authorized Officer. Mitigating measures to protect identified wildlife species shall be developed by the Authorized Officer upon review of exploration and mine plans.

H. Surface disturbing activities may not approach the golden eagle nest (T. 13 S., R. 11 E., SLM, Section 8: SW¼SE¼) nearer than 0.25 miles where the disturbance is below the nest and 0.50 miles where the disturbance is above the level of the nest or in direct sight of the nest. Disturbances of a temporary nature, such as exploration, may be allowed within the above described buffer zone, but not during the period February 15 through June 15.

I. Generally, surface structures and surface disturbances will not be allowed on moose critical habitat along Beaver Creek. Some exploration and surface disturbances may occur from July 16 through November 30 as determined on a site specific basis.

J. Powerlines constructed across the lease area shall be in conformance with the publication "Suggested Practices for Raptor Protection on Powerlines (Edison Electric Institute, 1975). Where feasible, power poles and phone poles shall be a minimum distance of 100 yards from public roads to protect raptors from shooting.

K. Lands affected by surface operations on the Federal lands shall be subject to assessment under criteria established by 43 CFR 3461.1 to evaluate unsuitability of the lands for mining.

L. Diligent lease development and continued operations as detailed by 43 CFR 3475.4 shall be accomplished.

M. Proper precautions shall be taken at all times to prevent and suppress fires with the lessee responsible for all costs associated with fires on public lands caused by negligence of his operators, employees, contractors or subcontractors.

V. RESIDUAL IMPACTS

Changes in topography, surface water and ground water brought about by subsidence over mined out areas can be expected to occur over a number of years. Any such changes would not be reversible; however, monitoring of surface effects will permit identification of any unacceptable changes in time to allow modifications of mining plans in other areas to prevent similar damage.

VI. RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

Exploration activity and construction for ventilation shafts will cause vegetative productivity to be lost with a gradual return to equal or improved productivity in the long-term (5 to 10 years). Habitat and food for wildlife will be accordingly affected which in turn will affect reproductivity of certain wildlife species on a very limited scale.

Subsidence is not expected to significantly affect productivity of surface resources.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Coal resources not mined in mined out areas or not mined for economic or technologic reasons will become inaccessible in most cases due to collapse of mineways. Both the mined coal and unmined coal will have been "consumed" and not available for future production.

The fuels expended in coal exploration or mining would be irretrievably consumed.

Plants and animals would be lost as a result of exploration activities; however, productivity of those not affected would generally cause such destruction to be insignificant.

VIII PUBLIC INTEREST

The economy of Price and surrounding area is dependent on the stimulus provided by coal mining and the general public strongly favor actions by the Federal Government that would encourage coal production.

IX. PARTICIPATING STAFF

Jim Kenna, Outdoor Recreation Planner
Mark Mackiewicz, Realty Specialist (Soils)
Dave Mills, Wildlife Biologist
Blaine Miller, Archaeologist
Jesse Purvis, Hydrologist
Sid Vogelpohl, Geologist (Team Leader)
Dennis Willis, Range Conservationist

X. SUMMARY

Additional drilling or construction of ventilation shafts would require clearing and leveling of pad areas and construction of roads as required for access. Construction would begin only after a plan has been approved by the BLM and USGS and cultural and T&E clearances have been obtained. Dust, noise and vehicle emission would be introduced to the local environment and vegetation and wildlife habitat in construction areas destroyed. Wildlife fatalities may be incurred during construction or as the result of vehicle strikes along access roads. The noise and air pollution associated with exploration would cease with reclamation activities. Ventilation shafts would be used throughout mine life. Vegetation and wildlife habitat and habitatation would begin to return to normal following reclamation.

Surface subsidence can be expected above mined areas. Factors influencing subsidence include mining methods, thickness of coal removed, nature of strata above mined areas and thickness of overburden which make the amount of surface subsidence difficult to predict. Estimations of subsidence range from 12 to 70 percent of total mined height. Total mined height would not exceed 13 feet. A subsidence monitoring system would be established.

The significant detrimental impacts of surface subsidence could include unknown effects on surface and ground water supplies. Surface runoff could be diverted along different courses on the surface or seep into the subsurface by subsidence cracks. Ground water may pass into lower strata or into mine cavities. The net effect of such changes cannot be predicted, but would be monitored.

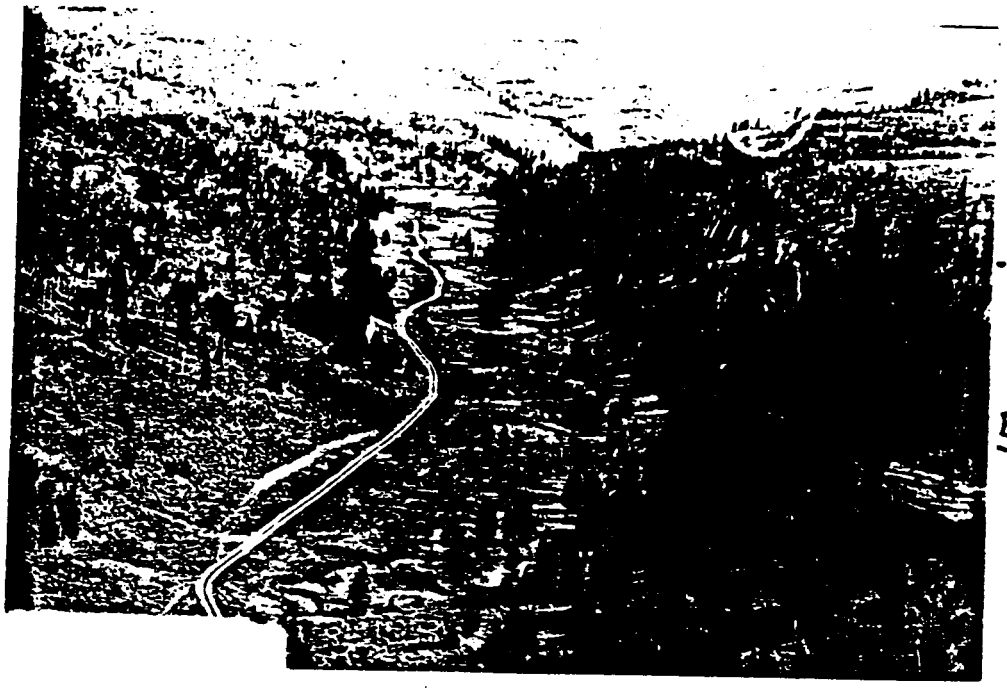
XII. RECOMMENDATIONS

A. Bonding

It is recommended that the standard $25,000 statewide or $75,000 nationwide bond would be sufficient for subject lease.

B. Stipulations

Those stipulations listed under Recommended Mitigating Measures (p. 8) are recommended for readjustment of subject lease.



T. 13S, R. 8E., SL

SEC. 7: S½SE¼

-IN MIDDLEGROUND

BEAVER CREEK

ATTACHMENT B

HORIZON COAL CORPORATION ENVIRONMENTAL ASSESSMENT, 1995
UT-066-95-18

9/4/97

File Code: 3482, 2810

ENVIRONMENTAL ASSESSMENT COVER SHEET

EA Log No.: UT-066-95-18

Serial No. and Lease: UTU-74111

EA Preparation Date: 09/05/95

Project Name: Horizon Coal Corporation Beaver Creek Exploration

BLM Office: Price River Resource Area

Phone No.: (801)-637-4584

BLM Office Location: Price, Utah

County: Carbon

Applicant: Horizon Coal Corporation

Phone No.: 703-679-0804

Address: P.O. Box 2560
Wise, VA. 24293

Proposed Action: To approve an exploration plan and to drill up to four coal exploration holes in the Beaver Creek area.

LANDS INVOLVED

Township	Range	Meridian	Section	Subdivision
T. 13 S.	R. 8 E.	Salt Lake	7	S2SE
T. 13 S.	R. 8 E.	Salt Lake	8	N2S2, SWSE
T. 13 S.	R. 8 E.	Salt Lake	17	N2NW, SWNE
T. 13 S.	R. 8 E.	Salt Lake	18	NENE

PREPARER

Team Leader:

Signature | Geologist (Title) | 09/05/95 (Date)

ENVIRONMENTAL ASSESSMENT

I. INTRODUCTION

Project Details:

Applicant: Horizon Coal Corporation EA NO.: UT-066-95-18

Address: P. O. Box 2560, Wise, VA. 24293 Ser/Case No.: UTU-74111

BLM Office: Price River RA Location: Price, Utah

EA Preparation Date: 7/95
BLM Plan and Date: Price River MFP approved September 2, 1983
Project Title: Horizon Coal Corporation Beaver Creek Exploration
Project Location: Beaver Creek 12 Miles Northwest of Price, Utah

Need for Proposed Action:

Horizon Coal Corporation (HCC) is currently assessing the feasibility of opening a coal mine located 12 miles northwest of Price in Carbon County, Utah. As a result of this assessment, HCC has determined a need to drill up to four coal exploration holes to evaluate the quantity and quality of the coal reserves present, and to complete three of the exploration drill holes as water-monitoring wells to satisfy permitting requirements of the Utah Division of Oil, Gas and Mining. The four holes would be located on a unleased tract of Federal coal which will be referred to as the "Beaver Creek" tract.

Plan Conformance: This proposed project is in conformance with the Price River Management Framework Plan of September 1983 which allows for the exploration of, leasing of, and mining of Federal coal leases. An exploration license would be issued under authority of 43 CFR 3400.0-3.

II. PROPOSED ACTION AND ALTERNATIVE

Proposed Action:

HCC has submitted a proposal to drill up to four coal exploration holes (Attachment 1), with three completed as water-monitering wells, in the area locally known as Beaver Creek. These four drill holes are designated PRP-1, PRP-2, PRP-3, PRP-4. The four proposed exploration drill holes would be located 12 miles northwest of Price in Carbon County, Utah. Only three of the drill holes would be drilled to total depth. PRP-2 is located near a fault; therefore, PRP-4 would be permitted as an alternate site in the event that PRP-2 could not be completed. The three holes which are completed to total depth would be completed as water-monitering wells. All of the proposed holes are located on unleased Federal coal lands. The surface is privately held.

The first drill hole, PRP-1, would be located in the SW1/4 NE1/4 Sec.17, T. 13 S., R. 8 E. PRP-1 would be located approximately 1200 feet up the drainage from the old Blue Blaze Mine portals. Access would be gained along the existing road to the mine portals and via approximately 500 feet extension of new road up the drainage to the proposed drill site. The pad would be 75 feet by 125 feet. The surface disturbance for PRP-1 would be 0.43 acre.

The second drill hole, PRP-2, would be located in NE1/4 SE1/4 Sec. 8, T. 13 S., R. 8 E. PRP-2 would be located approximately 100 feet west of the existing road which passes up the drainage tributary to Beaver Creek. Access would be gained via the county road which passes through the head of Beaver Creek then via the private road passing down Beaver Creek, then along another private road passing up the drainage to the drill site. Approximately 400 feet of new road would be constructed starting from the existing road, along elevation contour, north-

westward to PRP-2. The drill pad dimensions would be 75 feet by 150 feet. The surface disturbance for PRP-2 would be 0.43 acre.

The third drill hole, PRP-3, would be located in the NW1/4 SW1/4 Sec. 8, T. 13 S., R. 8 E. The PRP-3 site access would be gained via the county road to the head of Beaver Creek, then down Beaver Creek via the private road as described for PRP-2 access. No new road construction would be required since the site would be adjacent to the existing private road. The drill pad dimensions would be 75 feet by 150 feet. The surface disturbance for PRP-3 would be 0.26 acre.

The fourth drill hole, PRP-4, would be located in the NE1/4 SE1/4 Sec. 8, T. 13 S., R. 8 E. The PRP-4 access would be gained via the same route as for PRP-2, except approximately 600 feet of road would be constructed, along grade, from the existing road to the proposed site. The drill pad dimensions would be 100 feet by 100 feet. PRP-4 would be used as an alternative site to PRP-2 because of the possibility that PRP-2 could not be completed, since there is a fault which passes through the drainage near PRP-2. The surface disturbance for PRP-4 would be 0.48 acre.

Water for the drilling program would be obtained from Beaver Creek or the artesian well which flows approximately 15 gallons per minute, located adjacent to the access road in the SE1/4 of section 5. A small 500-gallon storage tank would be placed immediately downhill from the artesian well to act as a reservoir from which to pump. A second source of water could be the beaver pond which lies along the access road in upper Beaver Creek. A third source of water could be to purchase the water from another source, a possible example of this would be Price City. Temporary changes in the point of diversion would be obtained from the State Engineer, when needed, prior to obtaining water for the exploration program.

HCC would like to maintain the roads to the drill sites with water-monitering wells for the life of mine, so that the groundwater in the area can be monitored. Monitoring would probably be performed on a quarterly basis during the permitting of the proposed mine and continue for the life of mine.

The annulus of the three water-monitering wells would be plugged by emplacing cement (in stage lifts) to prevent the migration of ground water between aquifers. Drill holes which are not completed as water-monitering wells would be plugged from bottom to the surface with a slurry of portland cement and bentonite immediately after being drilled.

This exploration project would probably be completed during the 1995 summer drilling season prior to the winter months, but if it could not be completed during the 1995 drilling season the 1996 summer drilling season would be used to complete the project. Access to the drill sites would be required through the entire drilling period. The estimated time to drill each hole would be approximately two to three weeks.

It would be recommended to the private surface owner that all areas should be reclaimed in accordance with the regulations of the BLM and the Utah Division of Oil, Gas and Mining. The recommendations would be that drill sites would be recontoured, the stockpiled topsoil would be replaced, and the area would be reseeded. A seed list of grasses, forbs and shrubs would be provided by the BLM if the surface owner so desired.

Alternative Action:

The only alternative proposed is no action. HCC would be denied approval of the exploration plan and underground right-of-way.

Affected Environment:

The project area is characterized by a deeply incised plateau. This topography is the result of advanced erosion carving up a flat-top plateau forming steep-walled canyons cutting into the proposed tract. Elevations range from over 9,000 feet above sea level on the top of the ridges to 7,500 feet above sea level in the bottom of the deepest canyon.

The two principal drainages found within the exploration plan are Beaver Creek and the North Fork of Gordon Creek. They are both perennial streams.

The plants found in the area include sagebrush, grasses, Mountain mahogany, Utah serviceberry, aspen and occasional conifers. Some of the predominate mammals which may occur in the general area include elk, deer, black bear, cougar, bobcat, coyote, badger, porcupine, snowshoe hare, golden mantled squirrel, red fox, marmot, and other species of small rodents. Some of the birds which may inhabit the area include Golden Eagle, Prairie Falcon, Goshawk, Cooper's Hawk, Red-tailed Hawk, various species of owls, Blue Grouse and Ruffed Grouse. Reptiles and amphibians of the area may include boreal toad, leopard frog, northern sagebrush lizard, great basin gopher snake and great basin rattlesnake.

Soils in the proposed license area consist of very deep, well-drained, moderately permeable soils derived from shale and sandstone.

A site-specific raptor nest inventory was conducted by Ben Morris, Utah Division of Wildlife Resources, see Attachment 2. Three raptor nests were verified in the project area. One golden eagle nest was tended (evidence of current use). The other two nests were inactive.

III. ENVIRONMENTAL IMPACTS:

The following mandatory items have been considered for this environmental assessment. Items that may be impacted have been discussed within the environmental assessment; the remainder will not be affected and are not discussed.

	May Be Impacted	Will Not Be Affected		Specialist Signature/Date
1. a.	[ ]	[✓]	Threatened or Endangered Plants	9-6-95
b.	[ ]	[✓]	Threatened or Endangered Animals	9-6-95
2.	[ ]	[✓]	Areas of Critical Environmental Concern	9-7-95
3.	[ ]	[✓]	Cultural or Historic Resources	9-6-95
4.	[ ]	[✓]	Floodplains and Wetlands	9/6/95
5.	[ ]	[✓]	Wilderness Values	9/7/95
6.	[ ]	[✓]	Visual Resource Management	9-7-95
7.	[ ]	[✓]	Water Resources	9/6/95
8.	[ ]	[✓]	Air Quality	9/6/95
9.	[ ]	[✓]	Paleontological Resources	9/7/95
10.	[ ]	[✓]	Prime or Unique Farmlands	9/6/95
11.	[ ]	[✓]	Wild and Scenic River	9/7/95
12.	[ ]	[✓]	Nat. Amer. Rel. Concerns	9-6-95
13.	[ ]	[✓]	Wastes, Hazardous/Solid	9/6/95
14.	[ ]	[✓]	Hole Plugging Procedure	9/6/95

The above project has been analyzed for conformance with BLM plans and consistency with local government. Significant discrepancies are discussed in the body of the environmental assessment.

The following items have also been considered in this environmental assessment. Items which may be impacted have been discussed within the environmental assessment; the remainder will not be affected and are not discussed.

	May Be Impacted	Will Not Be Affected		Specialist Signature/Date
1.	[ ]	[ ]	Grazing	9-7-95
2.	[ ]	[ ]	Wildlife	5-6-95
3.	[ ]	[ ]	Recreation	
4.	[ ]	[ ]	Soils	4/6/95

Impacts of the Proposed Action:

There would be 1.6 acres (Figure 1), more or less, of disturbed private surface lands for the new drill pads and roads.

FIGURE 1

DRILL HOLE	ACRES DISTURBED		TOTAL
	DRILL SITE PRIVATE	DRILL ROAD PRIVATE	
PRP-1	0.22	0.21	0.43
PRP-2	0.26	0.17	0.43
PRP-3	0.26	0.0	0.26
PRP-4	0.23	0.25	0.48
TOTAL	0.97	0.63	1.60

Approximately 1.6 acres of vegetation would be disturbed as a result of this project. Vegetation would be lost and unavailable to livestock and wildlife until the area is reclaimed.

During the period of time the pads and access roads are void of vegetation, soils would be subject to both wind and water erosion.

Wildlife could be displaced during the drilling activities if these activities take place in the winter and spring months, which are critical time periods for wintering deer and elk. Displacement could also affect elk and deer that use the area for calving and fawning, June 1 - July 15. Drilling during the period of July 16 - October 31 would avoid these impacts.

Proposed drilling could affect active raptor nests if conducted during the nesting period (February 1 to July 15). Avoidance of drilling during this period would eliminate this potential impact.

Since long-term human presence at well sites is minimal (one visit quarterly) and raptor nests are not in the line-of-sight of drill sites, the water-monitering wells are not believed to represent a significant impact.

Increased activity associated with the drilling program could displace recreationists utilizing the area. In addition, opportunities for recreationists to experience the quiet enjoyment of the area free of noise and other disturbance would be reduced.

Increased road usage may lead to damage to the road, including increases in fugitive dust due to powdering of the road, ruts, as well as washboarding.

The drilling of coal exploration holes, if not properly plugged, could cause the mixing of ground water and the depletion of flow to the surface at springs.

An archeological/cultural survey has been conducted for the affected areas by a BLM authorized contractor and no cultural resources were located during the surface survey.

Impacts of Alternatives:

The impacts of the no action alternative action would be to HCC. They would not be able to properly evaluate the minability of the Federal coal lands involved, and would not be able to complete the permitting process for a mine or develop a mine plan to mine the Federal coal resource. The impacts of a coal exploration program would not take place.

We would also lose the opportunity to evaluate the coal resource in the lands involved.

Mitigation Measures and Residual Impacts:

The amount of water needed for this project would be less than 2 acre feet. The U. S. Fish and Wildlife Service (Attachment 3) on July 5, 1994 issued an opinion on the effects of small depletions (less than 100-acre-feet average annual depletion) in the Upper Colorado River Basin. The biological opinion determined that fees for small depletions are no longer necessary because the Recovery Implementation Program has made sufficient progress to be the reasonable alternative to avoid the likelihood of jeopardy to the endangered fishes to avoid destruction or adverse modification of the critical habitat for small depletions. For this reason, it is determined that use of the projected 2-acre-feet of water needed for this project would have no effect on Special Status fish species.

Reclamation of the new access roads and all the drill pads would be recommended as soon as the water-monitering wells are no longer needed. Reclamation will help reduce the impacts of loss of forage and soil erosion.

During the drilling program, the roads would be watered as needed to control dust and road surface competence. There would be no long-term impacts to the access roads.

Significant impacts to big game could be avoided by drilling outside of critical use periods for winter range and calving and fawning (November 1 - July 15). Summer drilling would also avoid conflicts with winter sports recreation.

Impacts to nesting raptors could be avoided by drilling outside the nesting period (February 1 to July 15).

The annulus of the water-monitering wells would be sealed with cement to prevent the migration of ground water. The inside of the casing would be plugged with cement at the end of the useful life of the water-monitering well to prevent future collapse of the casing.

It would be recommended to the surface rights owners that the following reclamation standards should be used:

A. Site Preparation

1. The entire roadbed and drill site should be obliterated and brought back to the approximate original contour. Drainage control shall be reestablished as necessary.

2. All areas impacted by road construction should be recontoured to blend in with the existing topography. All berms shall be removed. In recontouring the disturbed areas, care should be taken to not disturb additional vegetation.

3. Erosion-control structures such as water bars, diversion channels, and terraces should be constructed to divert water and reduce soil erosion on the disturbed area. Water bars shall be spaced on road grades greater than 4 percent (i.e., 4 to 8 percent grade on 200-foot intervals and greater than 8 percent on 100-foot intervals). In addition, water bars should be installed at all alignment changes (curves), significant grade changes, and as determined by a qualified engineer. Water bars should be sloped with the grade and cut to a minimum 12-inch depth below the surface. The grade of the water bar should be 2 percent greater than the grade of the road.

B. Seedbed Preparation

1. An adequate seedbed should be prepared for all sites to be seeded. Areas to be revegetated should be chiselled or disced to a depth of at least 12 inches.

2. Ripping of fill materials should be completed by a bulldozer equipped with single or a twin set of ripper shanks. Ripping should be done on 4-foot centers to a depth of 12 inches and shall follow final grading and precede seedbed material application. Ripping shall be completed at a speed which maximizes ripper shank action and promotes soil material disruption to the specified depth. Ripping should be repeated until the compacted area is loose and friable.

3. Seedbed preparation should be considered to be complete when the soil surface is completely roughened and the number of rocks on the site is sufficient to cause the site to match the surrounding terrain.

C. Fertilization

1. Commercial fertilizer with a formula of 16-16-8 shall be applied at a rate of 200 pounds per acre to the site.

2. Fertilizer shall be applied not more than 48 hours prior to seeding and cultivated into the upper 3 inches of soil.

3. Fertilizer shall be broadcast over the soil using hand-operated "cyclone-type" seeders or rotary broadcast equipment attached to construction or revegetation machinery as appropriate to slope. All equipment shall be equipped with a metering device. Fertilizer application shall take place prior to the final seedbed preparation treatment. Fertilizer broadcasting operations shall not be conducted when wind velocities would interfere with even distribution of the material.

D. Mulching

1. Mulching shall be conducted as needed.

2. The type of mulch shall meet the following requirements:

> Wood cellulose fiber shall be natural or cooked, shall disperse readily in water and shall be nontoxic. The homogeneous slurry or mixture shall be capable of application with power spray equipment. A colored dye that is noninjurious to plant growth may be used when specified. Wood cellulose fiber shall be packaged in new, labeled containers. A minimum application of 1500 pounds per acre shall be applied. A suitable tackifier shall be applied with the mulch at a rate of 60 to 80 pounds per acre.

An alternative method of mulching on small sites would be the application of straw or hay mulch at a rate of 2000 pounds per acre. Hay or straw shall be certified weed free. Following the application of straw or hay, crimping shall occur to ensure retention.

E. Reseeding:

All disturbed areas shall be seeded with the seed mixture required by the surface rights owner. The seed mixture(s) shall be planted in the amounts specified in pounds of pure live seed (PLS)/acre. There shall be no primary or secondary noxious weed seed in the seed mixture. Seed shall be tested and the viability testing of seed shall be done in accordance with State law(s) and within 12 months prior to purchase. Commercial seed shall be either certified or registered seed. The seed mixture container shall be tagged in accordance with State law(s) and available for inspection by the Authorized Officer.

Seed shall be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture shall be evenly and uniformly planted over the disturbed area. (Smaller/heavier seeds have a tendency to drop to the bottom of the drill and are planted first. The holder shall take appropriate measures to ensure this does not occur.) Where drilling is not possible, seed shall be broadcast and the area shall be raked or chained to cover the seed. Woody species with seeds that are two large for the drill shall be broadcast. When broadcasting the seed, the pounds per acre noted below are to be increased by 50 percent. The seeding will be repeated until a satisfactory stand is established as determined by the surface rights owner. Evaluation of growth will not be made before completion of the second growing season after seeding. The surface rights owner is to be notified a minimum of seven (7) days prior to seeding of the project.

The disturbed areas for all drill sites and roads must be seeded with the following seed mix immediately after the topsoil is replaced:

Common Name	Scientific Name	Pounds per acre/PLS*	
Shrubs			
Antelope Bitterbrush	Purshia tridentata	0.5	
Common Snowberry	Symphoricarpus albus	0.5	
Big Wyoming Sagebrush	Artemesia tridentata wyomingensis	0.25	
Saskatoon Serviceberry	Amelanchier alnifolia	0.5	
True Mountain Mahogany	Cercocarpus montanus	0.5	
Mountain Big Sagebrush	Artemesia tridentata vaseyana	0.25	
Forbs			
Western Yarrow	Achillea millefolium	0.5	
Arrowleaf Balsamroot	Balsamorhiza saggitata	0.5	
Rocky Mountain Penstemon	Penstemon strictus	0.5	
Grasses			
Letterman Needlegrass	Stipa lettermanii	1.5	
Bluebunch Wheatgrass	Agropyron spicatum	1.5	
Western Wheatgrass	Elymus smithii	1.5	
Slender Wheatgrass	A. trachycaulum	1.5	
Mountain Brome	Bromus carinatus	1.5	
	TOTAL	9.5	Pounds

*Rate is pounds per acre pure live seed drilled. Rate is increased by 50 percent if seed is broadcast. Pure Live Seed (PLS) formula: % of purity of seed mixture times % germination of seed mixture = portion of seed mixture that is PLS.

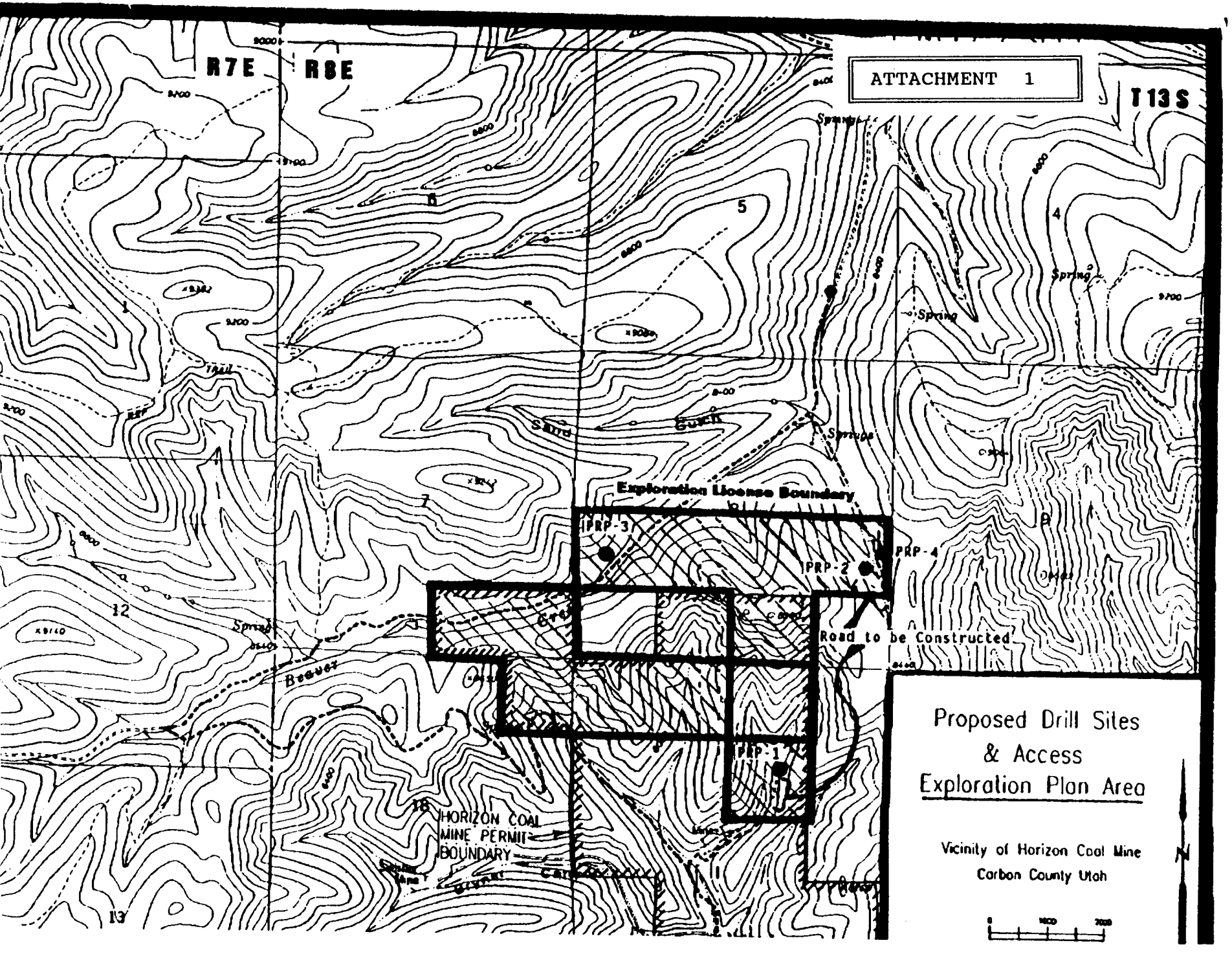
PERSONS OR AGENCIES CONSULTED:

Ms. Pamela Grubaugh-Littig
Permit Supervisor
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Mr. Ben Morris
Habitat Biologist
Utah Division of Wildlife Resources
455 West Railroad Avenue
Price, Utah 84501

Mr. Steve Stamatakis
2676 W. Gordon Creek Road
Price, Utah 84501
Mr. Pete Stamatakis Jr.
1111 S. 450 West
Price, Utah 84501
(The results of the consultation with Steve Stamatakis is summarized in Attachment 4.)

Price River Resource Area
Moab District
Bureau of Land Management
900 North 700 East
Price, Utah 84501
Mark Bailey, Area Manager
Dean Nyffeler, Supervisory Geologist
George Tetreault, Supervisory Mining Eng.
David Mills, Wildlife Biologist
Kerry Flood, Hydrologist
Ray Jenson, Supervisory Rangeland Management Specialist
Mark Mackiewicz, Realty Specialist
Dennis Willis, Outdoor Recreation Planner
Blaine Miller, Archeologist


ATTACHMENT 1
R7E
R8E
T13S
Exploration License Boundary
PRP-1
PRP-2
PRP-3
PRP-4
Road to be Constructed
HORIZON COAL MINE PERMIT BOUNDARY
Sand Gulch
Spring
Trail
Proposed Drill Sites & Access
Exploration Plan Area
Vicinity of Horizon Coal Mine
Carbon County Utah
N

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
Robert G. Valentine
Division Director

Southeastern Region
455 West Railroad Avenue
Price, Utah 84501-2829
801-637-3310
801-637-7361 (Fax)

ATTACHMENT 2

Greg Hunt
Geo-Hunt Consulting
449 Gordon Drive
Castle Rock, Colorado 80104

Greg,

Here's your copy of the raptor survey near the proposed drill sites at Blue Blaze. Nest #1 appeared to be tended in 95 but had no young in the nest, so it won't be affected by drilling. Nest #2 was old and dilapidated, this means that several year have passed since it was last used. Nest #3 was inactive or no bird use this year. Nests #4 and #5 are tree nests that we couldn't find from the air. Since tree nests are so difficult to find from the air I am planning to go up on foot, hopefully by the end of this week. We have been having abnormally wet and cold weather so I may not get there until next week.

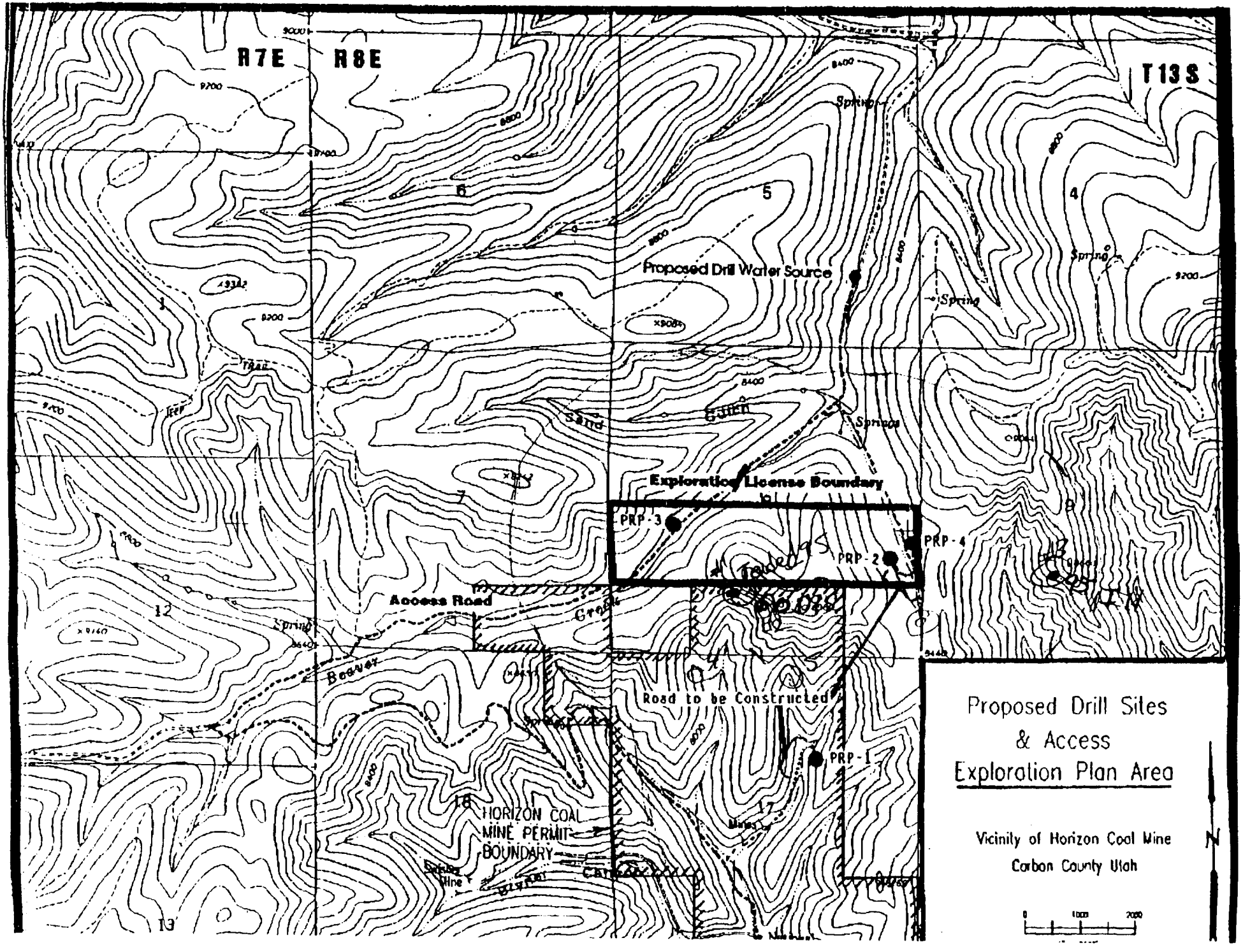
As mentioned in our phone conversation, if there were any young raptors present, drilling should not effect them after 1 July of the year. Also line of sight is important when considering impacts from activities near raptor nests. If the activity is out of the line of sight, and noise, such as blocked by a mountain or cliff then the activity will have little effect on the raptors.

We saw several elk getting ready to calve in and near the drilling area. The elk calves are not significantly affected by drilling after 5 July.

If there is anything else I can help you with give me a call at (801) 637-3310

Ben Morris

Ben Morris
Habitat Biologist


R7E
R8E
T13S
Proposed Drill Water Source
Exploration License Boundary
PRP-3
PRP-2
PRP-4
PRP-1
Access Road
Road to be Constructed
HORIZON COAL MINE PERMIT BOUNDARY
Spring
Sand Gulch
Beaver Creek
Proposed Drill Sites & Access Exploration Plan Area
Vicinity of Horizon Coal Mine
Carbon County Utah
N

United States Department of the Interior

FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE
LINCOLN PLAZA, SUITE #404
145 EAST 1300 SOUTH
SALT LAKE CITY, UTAH 84115

ATTACHMENT 3

In Reply Refer To
(ES)

July 20, 1994

Forest Service
Regional Office
Intermountain Region
324 25th Street
Ogden, Utah 84401

Dear Resource Manager:

On July 5, 1994, the Fish and Wildlife Service (Service) issued an intra-Service biological opinion on the effects of small depletions (less than 100 acre-feet average annual depletion) in the Upper Colorado River Basin on the endangered Colorado River fishes. The biological opinion determined that fees for small depletions are no longer necessary because the Recovery Implementation Program in place in the Upper Colorado River Basin has made sufficient progress to be the reasonable and prudent alternative to avoid the likelihood of jeopardy to the endangered fishes to avoid destruction or adverse modification of their critical habitat for small depletions.

Formal consultation will still need to be conducted for all projects authorized by your agency that result in small depletions from the Colorado and Green River systems. This program does not apply to the San Juan River. When authorizing a project with a small depletion, your agency should submit a written request for consultation to the Assistant Field Supervisor at the address shown above, along with a brief description of the project, the amount and source of the proposed depletion, and the project location. Due to the simplified nature of the consultation, a turn-around time of approximately 30 days should be expected.

If you have further questions about this program, please contact me or Henry Maddux at (801)524-5001.

Sincerely,

W. Robert Burton

for Robert D. Williams
Assistant Field Supervisor

ATTACHMENT 4

Steve and Pete Stamatakis are the surface rights owners of portions of the lands included in the proposed Horizon Coal Exploration Plan. Steve Stamatakis reviewed the draft environmental assessment and had the following comments:

1) Concerned about subsidence of mud pits after they are filled and reclaimed.

2) Steve has leased his land for hunting, beginning Sept. 16 1995, and is concerned with how the hunters will react to drilling on the property.

3) Steve wants to be present when the drill sites and roads are built.

4) Steve is also concerned with the culvert installation at the Beaver creek crossing for PRP-2 & 4.

The response to these comments follows:

1) The mud pits can be overfilled when reclaimed to take into account subsidence of the filled area .

2) The Stamatakis' and Horizon Coal Corporation need to resolve this issue.

3) A stipulation has been added which would require Horizon Coal Corporation to notify the surface rights owner 24 hours prior to drill pad or road construction.

4) The Stamatakis' and Horizon Coal Corporation need to resolve this issue.

File Code 3482, 2810

RECORD OF DECISION ON EXPLORATION PLAN AND FINDING OF NO SIGNIFICANT IMPACT

EA Log No.: UT-066-95-18

Serial No. and Lease: UTU-74111

Project: Horizon Coal Corporation Beaver Creek Exploration Drilling Project

Applicant: Horizon Coal Corporation
Address: P.O. Box 2560
Wise, VA. 24293

Project Location: T. 13 S., R. 8 E., SLB&M

County: Carbon, Utah

BLM Office: Price River RA

Phone: (801) 637-4584

RECORD OF DECISION

Decision:

My decision is to grant an exploration plan to Horizon Coal Corporation to drill four exploration coal drill holes subject to the attached stipulations for the exploration plan on the described public lands:

T. 13 S., R. 8 E., sec. 7 S2SE
T. 13 S., R. 8 E., sec. 8 N2S2, SWSE
T. 13 S., R. 8 E., sec. 17 N2NW, SWNE
T. 13 S., R. 8 E., sec. 18 NENE

Rationale:

1. The proposal is not adverse to local, state, or Federal land use plans for the area.

2. The proposal would not cause any significant environmental impacts.

3. The approved exploration plan is necessary to conduct the surface-drilling activities.

4. Conditions of approval and stipulations for the coal exploration plan will be adhered to.

Plan Conformance: This decision is in conformance with the Price River Management Framework Plan of September 1983 which allows for the exploration, leasing, and mining of Federal coal leases.

Authority: This decision is based on the authority set forth in 43 CFR 3482 for exploration plans.

Environmental Considerations: I have considered the environmental consequences of this decision as documented in the accompanying environmental assessment referenced above.

Except as noted above in the Decision and Rationale, all environmental considerations have been adequately addressed in the accompanying document.

STIPULATIONS

This decision incorporates by reference the attached stipulations. The stipulations have been developed to mitigate adverse environmental impacts which may result from the action permitted by this action.

FINDING OF NO SIGNIFICANT IMPACT

Based on the analysis of potential environmental impacts contained in the accompanying environmental assessment referenced above, I have determined that impacts are not expected to be significant. Therefore, an environmental impact statement is not required.

Mark E. Bailey
Area Manager

7 Sept 95
Date

Attachment
Exploration Stipulations (4pp)

to show hole number, year drilled, lessee/licensee name, and as feasible, the section, township, and range in which the hole is located. The top of the concrete plug, if located in a cultivated field must be set below normal plow depth (10 to 12 inches). In noncultivated areas, all marker caps should not protrude above the ground level. All drill holes shall be surveyed in to assure proper location. An exact survey of each drill hole location will be submitted to the Authorized Officer.

17. Upon completion of exploration activities, two copies of each report as required by 43 CFR 3485.1, shall be submitted to the Authorized Officer. The reports at a minimum must contain the following:

A. Location(s) and serial number(s) of lands under Federal lease or license on which exploration was completed.

B. A description of the completed exploration operations that includes the number of holes drilled, total depth, survey coordinates, and completion date of each hole.

C. A map showing the locations of all holes drilled, other excavations, and the coal outcrop lines as appropriate. The scale of the map shall not be less than 1 inch equals 2,000 feet.

D. Analysis of coal samples and other pertinent tests obtained from exploration operations.

E. Copies of all in-hole mechanical or geophysical stratigraphic surveys or logs, such as electric logs, gamma ray-neutron logs, sonic logs, or any other logs. The records shall include a lithologic log of all strata penetrated and conditions encountered such as water, gas, or any unusual conditions.

F. Status of reclamation of the disturbed areas.

G. Any other information requested by the Authorized Officer.

H. Hydrologic reports using the attached form.

18. When dry, mud pits must be reclaimed by selectively backfilling excavated materials, top soil last, such that the disturbed area is replaced to approximate original contour.

19. The Authorized Officer and the surface rights owner shall be notified 24 hours prior to drill pad or road construction.

Stipulations

1. No construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of six inches deep, the soil shall be deemed too wet to adequately support construction equipment and travel on roads must be halted.

2. The use of the roads, including construction activity and surface disturbances (road maintenance or snow removal), will be prohibited during the period from November 1 to July 15 for the protection of wintering elk and deer. This stipulation will not preclude access by conventional means (vehicle, snow machine, etc.) to monitor the wells after completion.

Any exceptions to this requirement must have prior written approval from the Price River Resource Area Manager.

3. The holder shall have a seasonal protective closure of February 1 to July 15 in which no drilling, workover or other drilling-related operations would be permitted within 0.5 mile of known raptor nest sites.

Exception: This restriction may be waived or modified under the following circumstances.

The holder arranges for a raptor survey to accomplish the following:

1) Determine activity status of known raptor nest sites.

2) Survey of drainage bottoms and aspen habitats within 0.5 mile of proposed access routes and drill pads for goshawk nesting territories. The protective restrictions would be waived or modified if the raptor survey reveals no active raptor nests within 0.5 mile of proposed activity.

4. The holder shall repair any damage to existing roads or road improvements (e.g. cattleguards). If dust from the roads reachs excessive levels, a program of wetting the roads shall be implemented.

5. The holder shall secure the approval of the District Engineer for the Utah Division of Water Rights for any appropriation of water.

6. The holder shall mitigate project surface impacts to mule deer and elk critical winter range when total cumulative surface disturbance reaches 10 acres or more in size, as determined by the Price River Resource Area Manager. Cumulative surface disturbance shall take into consideration actual impacts from the proposed action and any surface disturbance from subsequent development occurring on winter range in affected herd units within the next five years. Mitigation shall include one acre of enhanced habitat for every one acre of surface-disturbed habitat. Project design for enhancement work will be developed by the Price River Resource Area Manager in coordination with HCC.

7. Any cultural and/or paleontological resources (historic or prehistoric site or object) discovered by HCC, or person(s) working on their behalf, on public or Federal land shall be immediately reported to the Price River Resource Area Manager. HCC shall suspend all operations in the area of such discovery until written authorization to proceed is issued by the

ATTACHMENT C

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT, UDOGM

9/4/97

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT (CHIA)

UPPER GORDON CREEK
AND
BEAVER CREEK BASINS

Horizon Mine
ACT/007/020

Gordon Creek #2, #7 & #8 Mines
ACT/007/016

Gordon Creek #3 & # 6 Mines
ACT/007/000

Carbon County, Utah

September 24, 1996

I. INTRODUCTION

This Cumulative Hydrologic Impact Assessment (CHIA) is a findings document involving an assessment of the probable hydrologic consequences of anticipated coal mining operations on the hydrologic balance within the Cumulative Impact Area (CIA). The CHIA is not a determination whether coal mining operations are each designed to prevent material damage beyond their respective permit boundaries, but rather is a determination whether there is expected material damage resulting from cumulative effects beyond individual permit boundaries. This CHIA encompasses the area where mining occurred or is planned in the North Fork of Gordon Creek and adjacent areas, Figure 1.

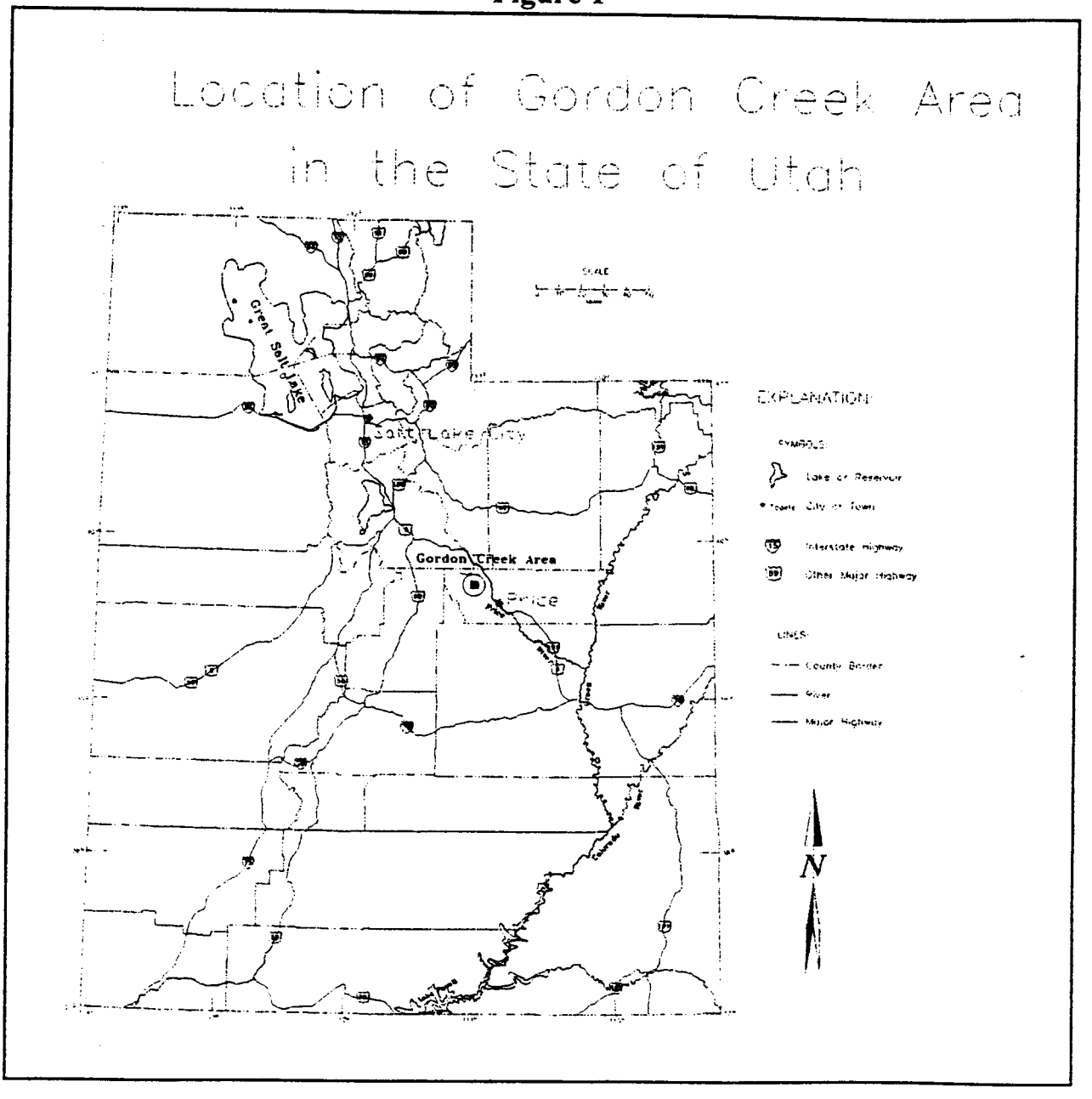
The objectives of a CHIA document are to:

1.	Identify the Cumulative Impact Area (CIA).	(Part II)
2.	Describe the hydrologic system and baseline conditions.	(Part III)
3.	Identify hydrologic resources in the impact area.	(Part IV)
4.	Identify standards against which predicted impacts can be compared.	(Part V)
5.	Estimate probable future impacts of mining activity.	(Part VI)
6.	Assess probable material damage.	(Part VII)
7.	Make a statement of findings.	(Part VIII)

Material damage is not defined in either the Utah or Federal regulations. Criteria that are used to determine material damage to hydrologic resources in coal mining programs administered by other states or by the Federal Office of Surface Mining (OSM) include:

- Actual or potential violation of water quality criteria established by federal, state or local jurisdictions.

Figure 1


Location of Gordon Creek Area
in the State of Utah
Great Salt Lake
Salt Lake City
Gordon Creek Area
Price
EXPLANATION
SYMBOLS
Lake or Reservoir
Interstate Highway
LINES
County Border
River
Major Highway
N

- Changes to the hydrologic balance that would significantly affect actual or potential uses as designated by the regulatory authority.

- Reduction, loss, impairment, or preclusion of the utility of the resource to an existing or potential water user.

- Short term (completion of reclamation and bond release) impairment of actual water uses that cannot be mitigated.

- Significant actual or potential degradation of quantity or quality of surface water or important regional aquifers.

This CHIA has been prepared by the Utah Division of Oil, Gas, and Mining. It complies with Federal and Utah coal regulations as found in 30 CFR 784.14(f) and R645-301-729, respectively. The last CHIA for the area was prepared in May 1992 for permitting the Blue Blaze Mine. In addition to reference sources cited, information was garnered from the Horizon Mine Permit Application Package (PAP), the Gordon Creek #2, #7 and #8 Mine PAP and the Gordon Creek #3 and #6 PAP.

III. CUMULATIVE IMPACT AREA (CIA)

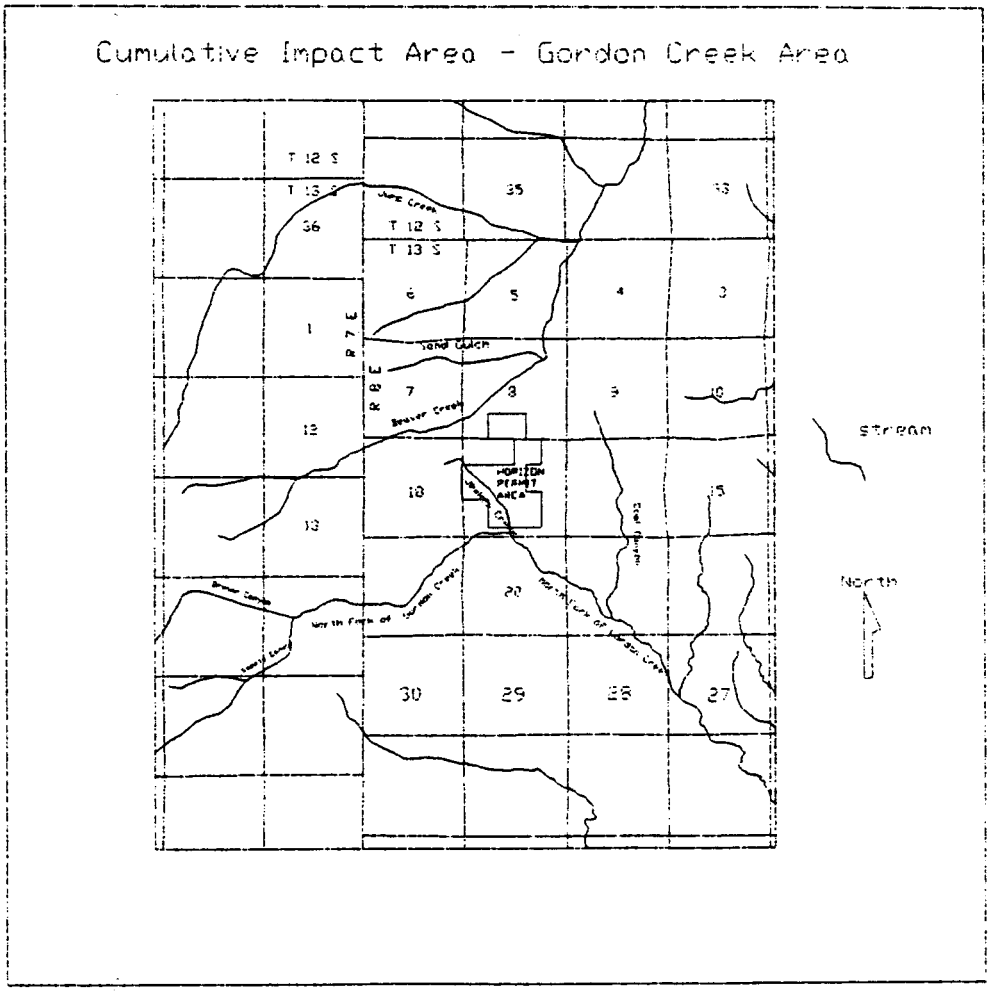
The Cumulative Impact Area (CIA) is shown on Figure 2. This is the region where anticipated, past and present coal mining activities may interact to affect the surface and ground waters. The CIA is determined based on a potential for the hydrologic resources to be impacted by mining activities. Both surface and ground water CIA's lie within the map in Figure 2.

The groundwater CIA boundary was chosen to incorporate mined and proposed lease areas, fault systems and potential mine expansion which could influence the hydrologic balance of the current

The surface water CIA is contained within two watersheds the Beaver Creek Watershed and the Gordon Creek Watershed. The surface waters of the CIA area lie within the Price River Drainage Basin. Beaver Creek flows to the North West and discharges into the Price River South of Colton, Utah. Gordon Creek flows east and joins the Price River north of the city of Price, Utah. The extent of potential impact identified for the Gordon Creek watershed is at a point where the fault system intersects of the outcrop of the Starpoint Sandstone. The extent of potential impact to the Beaver Creek Drainage is a point downstream of the seeps and springs which contribute water to the surface streams.

A ground water CIA includes all areas between the anticipated mining operations and known aquifer discharge points. Groundwater is found in alluvial/colluvial, perched, and regional aquifers in the Gordon Creek and Beaver Creek area. Alluvial/colluvial systems correspond closely with the stream channels. Shallow, perched aquifers are recharged within relatively small areas around the seeps some and springs. The extent of the regional aquifer was established with the best information available. Variability in lithofacies and a high degree of faulting controls flow and direction of the groundwater. The CIA exhibits extensive faulting with some offset over 100 feet. Mining is planned to take place exclusively within the Jump Creek graben during the first five year permit term. The faults within the graben may act as conduits for groundwater movement.

Figure 2


Cumulative Impact Area - Gordon Creek Area
T 12 S
T 13 S
36
35
T 12 S
T 13 S
6
5
4
3
1
R 7 E
R 8 E
7
8
9
10
12
18
15
13
20
30
29
28
27
stream
North

MINING HISTORY

Coal mining operations began in Upper Gordon Creek drainage in the Wasatch Plateau Coal Field in the early 1920's and continued at various locations and some brief hiatuses through the early 1990's. The more prominent mines in the CHIA produced more than 500,000 tons of bituminous coal, they were the Blue Blaze Mines (McGowan, Consumers), Gordon Creek Mines, Sweets Mines and National Mine (Doelling). Some less known mines such as the Davis Mine, K.L. Stores Mines, Success Mine and Western Mine operated in the area at various times until the early 1950's. Several small communities sprang to life in the canyons and the town of Consumers bosted a population of 5,000 inhabitants. Building reminents, debris and coal refuse from some of those mines still remain.

All of the mines except the Gordon Creek #2, #7 and #8 mines and #3 and #6 mines were developed and operated prior the enactment of the Surface Mining Control and Reclamation Act (SMCRA), Title 95-87, passed in 1977. The Gordon Creek Mines are currently under reclamation.

All mining was completed underground in the Hiawatha and Castlegate "A" Coal Seams using room and pillar mining techniques. The Consumers Mine operated from 1924 until the 1940's in Consumers Canyon. The National Mine operated from 1928 until the 1950's in a canyon east of Consumers Canyon. The Sweets Mine operated from the 1925 to 1950 in a canyon west and south of Consumers Canyon. The Swisher #1 Mine opened in the 1960's on the south side of Bryner Canyon.

Proposed and Currently Operating Mines

Horizon Coal Corporation

Horizon Coal Corporation (Horizon) has proposed opening the Horizon Mine located in Consumers Canyon, approximately 14 miles due west of Helper, Utah (Figure 2). The proposed permit area comprises approximately 345.5 acres for which mining will occur in the Hiawatha Seam. The Permit area is located entirely in Sections 8 and 17 of Township 13 South, Range 8 East, Salt Lake Baseline and Meridian and requires access through federal coal by acquisition of a BLM right-of-way. Additional lease areas are anticipated in the majority of Section 7, a portion of Section 5 and a portion of Section-8 for 1,288.44 acres under Lease Application UPU-74804.

The proposed mine portals will be located in the North Fork of Gordon Creek in a north east trending side canyon (named Portal Canyon for the purposes of this permit). Portal Canyon is an ephemeral drainage that joins Jewkes Creek, also named for the purpose of this permit. Jewkes Creek discharges to the North Fork of Gordon Creek.

Access to the area is obtained through county road 290 (formerly State Highway 139) and the Consumers/Clear Creek Road. County road 290 trends to the north west off U.S. Highway 6 between Spring Glen and Carbonville Utah. County Road 290 currently is paved for approximately four miles where it turns into a graded gravel road for the remainder of it's length. The Consumer/Clear Creek Road is the County Road that passes through the Horizon mine permit area. This road is approximately 11.5 miles from the Junction of Highway 6 and County Road 290.

Coal Leases obtained from Hidden Splendor include Fee Coal and an expired federal coal lease. Additionally, Horizon has obtained a right-of-way, UTU-73227, through BLM land to facilitate mining the Fee Coal. Horizon is perusing leases to the west north-west of the permit area. These leases include Coal Lease Application UPU-74804 and UPU-73227. The U.S. Bureau of Land Management (BLM) prepared an Environmental Assessment for the Right-of-way granted on November 21, 1995 with a Finding of no significant impact.

Gordon Creek #2, #7 and #8 Mines (Mountain Coal Company)

Swisher originally opened the Swisher #1, on the south slope, and #2 mine, on the north slope, in Bryner Canyon. The enteries to the mines sit above the current access road and were recently reclaimed. After Beaver Creek Coal Company purchased the mine. Two sets of portals were developed up canyon that connected to the Swisher #2 mine, thus the Gordon #2 Mine was named. Later Beaver Creek Coal Company developed the #7 and #8 Mines up canyon from the #2 Mine.

The permit area encompasses approximately 2,300 acres. There were 2 federal lease areas that were designated by the Bureau of Land Management as "Logical Mining Units" (LMU's): U-8319 and U-53159. The permit area encompassed 2,300 acres.

Gordon Creek #3 and #6 Mines (Mountain Coal Company)

Room and Pillar mining began at the Gordon Creek #3 mine, February 1976 with retreat mining initiated in January 1982 and completed in May 1982. All portals were permanently sealed during September 1983. The Gordon Creek #3 and #6 mines encompassed acres.

III. HYDROLOGIC SYSTEM

The CIA area is characterized by steep canyons and forested mountainous plateaus. Streams and springs tend to be perennial in the forested uplands and trend to ephemeral in the lowered semi-arid desert floors. . Vegetation varies from Grassland-Sagebrush and Desert Shrub communities at lower elevations to Spruce/Fir/Aspen and Mountain . Meadow communities at higher elevations. Areas north of the CIA are characterized by steep canyon lands with mixed pinon-juniper and sagebrush. These communities are generally used for wildlife habitat and livestock grazing. Alluvial fans covered with desert scrub line the Price River from its confluence with Willow Creek to Helper.

Land within the CIA is used for extensive underground mining activities, electric power generation, and transportation facilities. The remainder of the CIA generally consists of undeveloped lands utilized for low-intensity grazing, wildlife habitat, limited dispersed recreation, and very limited timber production. Anticipated post-mining uses are for wildlife habitat, grazing, and recreation. Water within the CIA is used for watering livestock and wildlife, mining coal, domestic use, fisheries, and recreation. Downstream, the water is additionally used for irrigation and industrial needs.

Climate

Precipitation sources surrounding the CIA include the Skyline Mine, the town of Price, and the town of Hiawatha. Climatic variation at these sites are influenced by elevation and aspect. The Skyline Mine lies in a high mountain canyon at an elevation of 8,710 feet, the town of Price lies in a river valley at an elevation of 5,700 feet, while the town of Hiawatha lies at an elevation of 7,200 feet.

The average annual precipitation in the CIA area may vary between 10 inches in the valley and over 30 inches on the ridges in the form of snow and rain.. In the Wasatch Plateau, about 70 percent of the precipitation occurs during October-April. Summer rain showers often occur in the mountains and high valleys when no precipitation is recorded in the towns and cities in the valley floors. Late summer often produces intense storms that last short periods but contribute significant amounts of rainfall..

The closest active meteorological reporting station is located at Scofield, Utah. Climatic characterization is based on historical climate data from this station and general regional climatic information. Evaporation and infiltration rates in the proposed lease and adjacent area vary with vegetation, soil type, and time of year. Average annual potential

evapotranspiration in the upper Gordon Creek/ Beaver Creek area is 18 to 25 inches per year (Atlas of Utah, 1981). Much of the precipitation is lost to runoff, evaporation, and sublimation, minimizing the amount of water available for ground water recharge.

Temperature

Generally, the climate of the area is temperate. Temperatures in the area normally reflect a typical seasonal pattern with gradual warming beginning in mid to late-March, high seasonal temperatures in July and early August, a gradual cooling beginning in late August to early September, and seasonal lows in late-December through mid-February. Summer high temperatures range from 60° to 75°F (15° to 24°C) and winter lows typically vary from 10° to 20°F (-12° to 7°C). The recorded high temperature for the area is 90°F (32°C) and the low is -10°F (-23°C). The average frost-free period in this area ranges from approximately 60 to 120 days.

Precipitation

The climate in the area is arid to semi-arid, with annual precipitation ranging from 13 to 20 inches and averaging 14.8 inches. Monthly average precipitation ranges from 0.65 inches (June) to 1.86 inches (September) and the high average monthly snowfall is 9.9 inches (December). The majority of the precipitation occurs as snowfall during the months of December, January, February, and March. Rainfall comes typically as brief, high-intensity thunderstorms, with most thunderstorm activity occurring during late summer and early fall and peaking in August. Price and Arnow (1979) estimate probably less than 5% of the precipitation recharges the ground water system, which would be 0.6 to 1 inch per year.

Wind

Monitoring at the Carbon Generating Station has not included wind speed or direction. General regional information indicates that prevailing winds are from the west and northwest, and average wind velocities generally do not exceed 20 miles per hour. During the winter the prevailing wind direction can shift for extended periods and blow from the northeast. Exposure of plateau and ridgeline areas may produce higher wind velocities than in more sheltered slope, basin, and valley areas. Surface air movements are strongly affected locally by natural drainage patterns and diurnal temperature variations (up and down canyon winds).

Geology

The area is characterized as deeply incised "plateau topography" with flat-topped ridges that rise above adjacent high desert lands. Moderately nonresistant fine-grained clay and siltstone units interfinger with resistant sandstone units. Erosion produces moderate to steep weathered slopes interspersed with vertically exposed resistant ledges and cliffs. The regions characteristic high topographic relief incised by steep-walled canyons is the result of extensive erosion along zones of weakness. Surface elevations vary from 5500 feet to 9000 feet within the CIA, with the thick sandstones Blackhawk and Castlegate Formations forming most of this relief.

Stratigraphy and General Lithology

The stratigraphy of the CIA area includes, the Upper Mancos, the Mesa Verde Group and Starpoint Sandstone, the Blackhawk Formation, the Castelegate Sandstone and Price river Formation, Quaternary Alluvium.

Lithology of the Book Cliffs and Wasatch Plateau Coal Fields consists of a thick accumulation of Upper Cretaceous and Tertiary strata (Table 1). The Upper Cretaceous sediments of the section were deposited along the western margins of a north-south oriented interior seaway. A rapidly rising mountain belt to the west supplied clastic material for shoreline construction in wave-dominated delta systems. Throughout Cretaceous time, this seaway underwent a series of onlap (transgressive or advancing) and offlap (regressive or retreating) phases that deposited a number of broad delta and prodelta sheet sandstones. These sandstone tongues thicken westward and grade into back barrier, coastal and delta plain, and continental deposits. Seaward there is thinning and fining of sediment sizes.

Major coal deposits found in Utah are usually formed immediately landward of shoreline delta sandstone pinchouts and on top of these offlap delta deposits.

Landward of the often thick shoreline coal accumulations, delta plain depositional influences such as splays, small channels, and levee deposits have generally created a series of splits in the coal section. Additional transgressive-regressive events commonly invaded the swamp systems and left interdeltaic features such as storm washover fans, tidal inlet deltas, and lagoonal muds. Coal deposited in these environments are often thinner due to decreased time available for peat deposition. Coals that formed on delta sandstone sheets are usually very planar and continuous whereas coal seams found in the delta or lower coastal plain are much more likely to exhibit rolls or undulations, scouring by fluvial channels, and discontinuous or lenticular geometry.

In ascending order the strata exposed in the area are the Masuk Shale member of the Mancos Shale, the coal-bearing Blackhawk Formation, the unconformably overlying Castlegate Sandstone, the Price River Formation, and the North Horn Formation.

Mancos Shale

The Mancos Shale is exposed in the lower canyons over the CIA. It consists of medium gray to bluish gray shales and siltstones interbedded with sandstones and minor amounts of limestone. The Mancos Shale, which forms the valley floor and lower slopes of the prominent cliffs, is over 4,000 feet thick in the area and consists primarily of interbedded marine shales. The Masuk Shale, the uppermost member of the Mancos, grades upward into the basal sandstones of the Blackhawk Formation, and westward thinning wedges of Mancos Shale intertongue with the sandstones. The Mancos is a clay-rich unit and the shale beds are good aquicludes, with low horizontal and vertical permeabilities even near faults.

Star Point Formation

The Star Point Sandstone is the basal unit of the Mesa Verde Group is about 440 feet thick in the CIA. The Star Point consists of interbedded cyclic layers of sandstones and Mancos Shale. The three massive sandstone beds are identified as the Panther Canyon Member, Storrs Sandstone and Spring Canyon Member. The Spring Canyon Tongue lies immediately below the Hiawatha Coal Seam.

Blackhawk Formation

The base of the Blackhawk Formation is locally comprised of five cliff-forming sandstone members, the Panther, Storrs, Spring Canyon, Aberdeen, and Kenilworth Sandstones, in ascending order. The basal Blackhawk sandstones were deposited in a barrier-beach environment and intertongue with the Mancos Shale below. The sandstone tongues thicken westward and grade into the back-barrier, coastal plain, and deltaic deposits of the Blackhawk Formation. The Panther, Storrs, and Spring Canyon sandstones merge to the west into one massive sandstone unit, up to 1000 feet thick, called the Star Point Sandstone. Lithologies are usually comprised of gradational sorted sandstones; medium-grained and cross-bedded at the top and fine-grained to silty at their base. These sandstones are generally poor aquifers, due in part to low permeability shale lenses, but ground water transmission is greatly enhanced where these rocks are faulted, fractured, and jointed.

Table 1 - Generalized Stratigraphic Section

System	Series	Stratigraphic Unit		Thickness (feet)	Description
TERTIARY	Paleocene	Wasatch Group	Flagstaff Limestone	200 - 1,500	Dark yellow-gray to cream colored, dense, cherty, lacustrine limestone with thin interbeds of gray and gray-green shale. Minor amounts of sandstone and volcanic ash, with pink calcareous siltstone at the base in places. Ledge former. Many springs originating from this unit have large discharge rates shortly after snowmelt with rapid decrease, indicating large transmissivity and small storage capacity characteristic of solution-cavity ground water systems.
			North Horn Formation (Lower Wasatch)	500 - 2,500	Variegated shale and mudstone interbedded with sandstone, conglomerate, and limestone, all of fluvial and lacustrine origin. Ledge former. Many springs originate where low permeability layers intersect the land surface, indicating perched ground water systems.
CRETACEOUS	Danian?				
	Maestrichtian	Mesaverde Group	Price River Formation	500 - 1,000	White to gray, gritty, calcareous to argillaceous sandstone interbedded with subordinate carbonaceous shale and conglomerate. Ledge and slope former.
	Campanian		Castlegate Sandstone Member	100 - 500	Coarse grained fluvial sandstone, pebble conglomerates, and subordinate zones of mudstone. Cliff former. High permeability but largely unsaturated. Seeps and springs with seasonal variability are common.
			Blackhawk Formation	900 - 1,400	Fine to medium grained, thin to thick bedded, massive fluvial channel sandstone, alternating with subordinate siltstones, carbonaceous shales and mudstones, and coal. Fluvial channel sandstones are more common in the upper portion. Thick, discontinuous coal seams in the lower 500 feet. Slope former with sandstone ledges. Poor aquifer material even where faulted due to the discontinuous nature of the channel sands and the swelling properties of the shales. Relatively low transmissivities. Springs have seasonal variability. In-mine flows of up to 200 gpm with rapidly decreasing discharges. The lower Blackhawk and Starpoint are considered to be one aquifer.
			Kenilworth, Aberdeen, *Spring Cyn., *Storrs, and *Panther Sandstones (*Star Point)	90 - 1,000	Fine to medium grained, massive, moderately well sorted coarsening upward sandstones. Cliff forming. Subordinate siltstones and carbonaceous shale. Intertongues with the Mancos Shale below and the Blackhawk Formation above. Uppermost portion contains fluvial channel sandstones. Generally poor aquifer material yielding < 10 gpm. Springs have low seasonal variation, indicating large aquifer storage coefficient. Transmissivities are relatively large where rock is fractured and faulted with yields up to 300 gpm.
	Santonian	Mancos Shale	Masuk Shale	300 - 1,300	Slope forming sandy marine shales interbedded with sandstones and minor amounts of limestone. Grades upward into and intertongues with the overlying Star Point Sandstone. A good aquiclude.

After Doelling, 1972

The aggregate thickness for the Blackhawk Formation in the area is roughly 900 to 1,400 feet thick. The Blackhawk Formation is the primary coal-bearing formation in the Book Cliffs and Wasatch Plateau Coal Fields. The important coal seams occur in the lower 500 feet. Thick and laterally extensive seams are closely associated with shoreline barrier-beach sands. Resting on and landward of the barrier-beach sandstones are lenticular sediments including reworked tidal channel-fill sandstones, fluvial sandstones, mudstones, siltstones, claystones, and coals deposited in back-barrier, lower coastal plain, and deltaic environments. Claystones contain high percentages of montmorillonite and other swelling clays.

There are two coal seams of economic interest at present. These seams are the Castlegate Aberdeen Seam, generally developed on the Aberdeen Sandstone and the Hiawatha Seam which sits directly on the Starpoint Sandstone

Fluvial channel sandstones are found in the lower Blackhawk but are more frequent toward the top of the formation. These sandstones are local in extent, generally fine grained, and well cemented. They have localized high clay content. The discontinuous character of these channel sandstones and the abundance of clay throughout the Blackhawk Formation produce perched aquifers and favor formation of local flow systems that discharge through numerous seeps and springs.

Castlegate Formation

Unconformably overlying the Blackhawk Formation are the massive cliff-forming sandstones of the Castlegate Formation. This formation is characterized by fluvial sands probably deposited in a braided stream environment that progressed seaward over the deltaic and coastal plains (Van de Graff, 1982). The Castlegate Sandstone is good aquifer material, with seeps and springs common at the Castlegate-Blackhawk contact. In the Price River area the Castlegate can be subdivided into three generic members with an aggregate thickness of about 630 feet. The Castlegate represents offlap coastal and fluvial deposition during the rapid retreat of the Upper Cretaceous Seaway in the area. Castlegate Sandstone is exposed along the ridge in the northern part of the CIA. Tertiary rocks of the Wasatch Group form the uppermost exposures in areas south of the CIA.

Price River Formation

The Price River Formation conformably overlays the Castlegate Sandstone. This formation consists of fluvial pebble conglomerates and coarse grained sandstones. The remainder of the Price River Formation is comprised of fine-grained sandstones and slope-forming mudstones and siltstones totaling approximately 650 feet in thickness.

Deposition of the upper Price River Formation took place from southwest to northeast indicating major reorientation of area drainage patterns between the periods represented by the Castlegate Sandstone and the Price River Formation, and the contact appears unconformable at some locations.

North Horn Formation

The North Horn Formation, the youngest consolidated rocks exposed within the CIA, has a total thickness of about 2,400 feet. This unit mainly consists of basal mudstones (170 feet), a middle zone of sandstones (860 feet), mixed thin limestones and claystones (330 feet), and an upper 1,000 foot sequence of sandstones and limey sediments. Lenticular, cliff-forming (10 feet) sandstones comprise about 10 to 15% of the section. The basal 170 feet of the formation represents the uppermost of the Mesozoic strata in the area. Tertiary (Paleocene) fluvial and lake deposits appear from the top of the basal mudstones to the top of the section.

Structure

Faults

Generally, the CIA area is within the transition between the Book Cliffs and the highly fractured strata of the Wasatch Plateau. The area is generally broken into two major folds and two systems of High angle normal faults that are NS and WNW-ESE trending. The northern part of the CIA dips gently NW-NE associated with the Beaver Creek Syncline. To the south rocks dip east and west off the Gordon Creek aniticline.

The CIA contains three major fault zones: the Pleasent Valley, North Gordon and Fish Creek Fault zones. The Gordon Creek fault zone, trends north-south, and the Fish Creek fault zone trends north 60 degrees west. The faulting appears to have influenced the development of Gordon Creek and the locations of springs and seeps in the permit area. Faulting and fracturing provide conduits for surface water to enter the groundwater and allows movement between aquifers. The other major structural feature potentially controlling groundwater occurrence is the Beaver Creek Syncline trending NE-SW with dip at approximately 3.5 degrees.

The largest fault within the Fish Creek Fault Zone is the Coal Canyon fault. The Coal Creek Fault with a displacement of approximately 600 feet forms the eastern boundary for the Gordon Creek No. 3 and 6 mines. Similarly, an unnamed fault with 120 feet displacement forms the southwest boundary for the Gordon Creek No. 2 mine. Numerous smaller faults with displacement of approximately 3 to 40 feet were encountered in the Gordon Creek Mines. Mine maps form the Gordon Creek Mining and Reclamation Plan show north-east trending and north-south trending faults were encountered in the mines.

IV Hydrologic Resources in the Impact Area
Ground Water

Aquifer Characteristics

A principal factor influencing the distribution and availability of ground water is geology. Lithology and Structure will affect the presence of groundwater and the location and rate of it's discharge. Aquifers producing a significant number of springs in the CIA include the Castle Gate the upper zone of the Blackhawk. The Price River formation, Price River/Castlegate and Castlegate/Blackhawk contacts, and the Star Point formation also yield spring discharge at a lower frequency. Regionally the Blackhawk/Star Point aquifer has been considered an important aquifer.

The Star Point Sandstone consists of the Panther, Storrs and Spring Canyon Sandstone members from the stratigraphically lowest to stratigraphically highest member respectively. The Spring Canyon Member is composed of fluvial shales siltstone and channel sandstones (Section 6.5.2.1). The Star Point is approximately 900 feet thick in the Gordon Creek area. Recharge to the Star Point occurs primarily from vertical movement thorough the Blackhawk. The vertical permeability from fractures in the area is relatively significant.

The Hiawatha Coal Seam in the Blackhawk Formation directly overlies the Star Point Sandstone. Information from the proposed mining indicates this seam will produce water during mining. Removing coal from this zone may reduce the potentiometric surface of the Star Point.

The floor of the Castle Gate "A" seam is carbonaceous silty shale to fine grained fluvial sandstone. The roof consists of carbonaceous silty shales over 80 % of the permit area and the remaining 20% consists of fluvial channel sandstones that initially produce water then tend to dry up. The general channel trend is NE-SW and the channels tend to increase in frequency to the West.

The Aberdeen Sandstone overlies the Castle Gate "A" Coal Seam. Drill logs indicate this sandstone member is discontinuous over the CIA area. The sandstone is interbedded with siltstones and shales. This sandstone is not anticipated to be a significant aquifer because it has a thin interbedded lithology and only one springs in the CIA may issue from this formation. According to information provided in the Gordon Creek 2/7/8 mine plan, the Aberdeen Sandstone is under artesian pressure near the Junction of Jump Creek and Beaver Creek. This is on the north side of the fracture bounding the region proposed for mining.

Other members containing aquifers above the coal seams include the Castlegate Sandstone, the Price River Formation and unconsolidated alluvial sediment deposits. The Castlegate Sandstone is exposed in the central and northeastern section of proposed mining and is approximately 300 feet thick in the Gordon Creek area. The Price River formation overlies the Castlegate Sandstone and occurs in the north eastern portion of the permit area.

Alluvial/Colluvial Aquifer System

The alluvial/colluvial aquifer system consists of shallow, unconfined ground water in the limited alluvial/colluvial deposits associated with surface drainage in the area. These aquifers are closely tied to the surface water systems, with ground water recharge occurring during periods of high flow and ground water discharge becoming more pronounced during periods of low flow as stream levels drop below the water table. The regional aquifer system may also be a source of recharge to alluvial/colluvial systems. Unconsolidated deposits occur along valley floors and at the base of steep slopes. Some of these deposits are recharged from the Blackhawk and Star Point aquifers. The thickest alluvial deposits in the permit area occur along Beaver Creek.

Water in Mines

The Gordon Creek No.6 mine was briefly developed into the Castle Gate "A" seam and the only water encountered is reported to have issued from channel sands exposed in the roof. The rate of discharge was described as dripping with no measurable inflow. Some of the formations may tend to appear dry because they loose water to fracture systems. Many of The Gordon Creek No. 3 mine was extensively developed in the Hiawatha Coal Seam and was essentially dry until a 12 foot graben was encountered which initially produced 400 gallons per minute.

During retreat mining of the graben the faulted zone was dry. Additional water occurred along intrusive dikes where the coal was coked creating a more permeable zone of water. Water was produced from the roof floor and face but, dried up behind the mine. The Hiawatha Coal Seam was developed prior to mining the Gordon Creek No.3 mine (1984, CIA). This early mining may have dewatered overlying aquifers, if present, providing a relatively dry mining condition for Gordon Creek. As mining moved across the graben to the west substantial amounts of water were encountered. Estimates place the flow from 200 to 600 gpm. The area where significant increases of water were encountered is north of the fault bounding the area proposed for future mining.

Currently a large volume of water seeps from the hillside at the junction of Coal Canyon and the North Fork Gordon Creek. This is associated with a fault system and is likely to be discharging water that accumulates in the mined areas and recharges the fracture. A vegitation change has occured in an area below the Gordon Creek No. 3 mine within the past 10 years. An area has been saturated which has killed a stand of aspen trees. Some speculation suggests that water draining from the reclaimed mine now saturates the area and that is why the trees have died.

The Gordon Creek #2 mine mined beneath Beaver Creek. There was generally a greater amount of groundwater inflow to the mine where there was less than 100 feet of overburden. A significant groundwater inflow took place when mining occurred under Beaver Creek at a point where the operations encountered a fault. The overburden was 500 feet. Water occurred at a rate of 20 to 40 gallons per minute and was considered to be associated with the downdropped side of the fault. Overall, the water intercepted by mining use has not met in mine water needs and water was pumped into the mine from Sweets Canyon to supply water needed for mining operations.

Adjacent to the Gordon Creek #2 mine portal is a fault of 100 feet displacement. On the oposite side of the fault was a spring with less than 1 gallon per minute flow. According to the Gordon Creek #3 and #6 permit mining up to the fault did not produce significant amounts of water from the fault.

No information on in mine groundwater was available for the abandoned Sweets Mine. Surface drainage from the North Fork of Bryners was observed to be impounded behind the Gordon Creek No. 2 mine yard, with out an obvious discharge. It is considered possible that this water seeps into the Old Sweets Mine via subsidence tension cracks.

A spring located along the fault zone in Sweets Canyon also intersects in the region of the suspected subsidence tension cracks. The fault zone is hypothesized to be the hydraulic connection between inflow to Sweets Mine and the Discharge to Sweets Canyon.

Locally, potential water bearing members below the Hiawatha coal seam includes the Blackhawk and the Blackhawk-Star Point aquifer. Both the Blackhawk and Star Point Formations serve as sources of spring and seep flows. According to Price and Arnow (1974), the upper cretaceous sediments of the area have low hydraulic conductivities and specific yields of 0.2 to 0.7%. Two pump tests from wells drilled in the Blackhawk formation in

Eccles Canyon indicate transmissivities of 21 and 16.3 gallons per day per foot. The Blackhawk aquifers are generally laterally discontinuous perched aquifers and fluvial channel sandstones.

The Horizon mine has developed wells in the Star Point, Spring Canyon tongue. The hydraulic conductivity of the Spring Canyon formation was found to be 16.1 feet/day in the fractured portion of the formation as found in HZ-95-1. The hydraulic conductivity of well HZ-95-2 was 0.25 feet/day and HZ-95-3 was 0.20.

Seeps and Springs

The majority of the springs in the CIA are associated with the Blackhawk formation. Several springs were identified as being related to faults. The most apparent fault related springs occur between Beaver Creek and the North Fork of Gordon Creek at the boundary between the C&W mine and the Gordon Creek #2 mine. Groundwater discharge from the Consumers Canyon produced 200 gallons per minute in September 1983, a high snowfall year. Information in the C&W Mining and reclamation plan indicated flows of 5 gallons per minute is a representative discharge from the springs (C&W, 1980). The Gunnison Homestead and Sweets Canyon spring are also fault related.

Information provided by the Horizon Coal Mine indicate that 42 springs issue from the Upper Blackhawk , 3 springs issue from the Star Point formation 67 springs issue from the Castlegate, 15 issue from the Price River formation, 8 issue from the contact between the Price River/Castlegate formation and 2 springs issue from the contact of the Castlegate/Blackhawk formations within the region of proposed mining..

Groundwater Quality

The groundwater quality of the upper Cretatious Sediments in the Wasatch Plateau is characterized by total dissolved solids (TDS) contents of less than 1,000 milligrams per liter (mg/l). The following range of TDS measured in springs wells, and mines issuing from or completed in formations found in the permit and adjacent areas as reported for the Wasatch Plateau and Book Cliffs areas by Waddell et al.(1981):

- Price River Formation 122-792 mg/l
- Castlegate Formation 315-806 mg/l
- Blackhawk Formation 63-796 mg/l
- Star Point Sandstone 355-391 mg/l

Springs from the Blackhawk Formation are a calcium-bicarbonate type. Concentrations of TDS tend to vary inversely with flow and pH of the waters is generally somewhat alkaline. The following table contains some selected water quality data collected by mine operations and is included in the Horizon mining and reclamation plan. Table 2 identifies field parameters of selected springs adjacent to the Horizon Mine.

Table 2.
Selected Spring Sampling Summary
(Summary of information from portions of the Horizon Mine Plan)

Sampling Point	Monitoring History	Location (Formation)	Water Quality	Water Quantity	Comments
SP-1 1989 to present	Station #1 1989 through 1993	Issues from Hillside and flows into Jewkes Creek (Blackhawk Sandstone unit above coal seams 8195 ft msl.)	TDS 230-330 mg/l pH 7.5 - 8.5	Late Spring 10-15 gpm High flow on 5/89 was 45 gpm Late Summer/Fall 5 to 6 gpm	
SP-2 1989 to present	Station #2 1989 through 1993 (This description matches the station number 1 previously; Channel in North Fork of Gordon Creek.)	Issues from Hillside and usually flows approximately 100 feet (Blackhawk, 8005 ft msl)	TDS 480-540 mg/l pH 7.5 - 8.52	Flow in Late Spring 1-2.5 gpm Flow in Late Summer/Fall <1 gpm Dry 7/1991, 8/1991, through 12/1992	Spring flows through alluvium below the point of origin.
SP-4 1989 to present	#4 1989 through 1993	Jewkes Creek Drainage flows along road empties into Jewkes Creek (Blackhawk, 8102 ft msl)	TDS 350-480 mg/l pH 7.5 - 9.71	Flow in Late Spring 1-2.25 gpm Flow in Late Summer/Fall <1 gpm	
SP-6 1989 to 1995	#6 1989 to 1995	Upstream from the proposed mine portal (Blackhawk)	N/A	dry from 1989 through 1995	This location is not a spring and will not be included in future monitoring
2-6-W	Gunnison Homestead Spring	Tributary to Beaver Creek near confluence of spring discharge channel and Beaver Creek (Blackhawk)	not discussed	3-136 gpm the 136 gpm included snowmelt runoff.	
SP-9	Jewkes Spring USGS 1979-1983 Station 2-5-W Beaver Creek Coal Company 1985-1995	Near Beaver Creek Channel, south west corner of proposed LOM permit area. (Blackhawk, 8550 ft msl)	TDS 240-300 mg/l pH 7.5 - 8.5	Typical Late Spring flow 20 to 60 gpm decreasing late fall 1.10 to 38 gpm (Maximum flow on 7/85 was 1372 gpm considered spurious).	Location mapped on Figure 7-3 Information on flow discussion in Section 7.2.2.2 varies from Section 7.1.2.2

Two water quality samples were collected in the Blue Blaze No. 1 Mine workings, in May 1992 and one in November 1995. The water was determined to be a calcium bicarbonate type with TDS ranging from 414 to 452 mg/l and pH from 6.8 to 7.66. Groundwater samples collected in-mine at the Horizon #1 Mine in 1995 and 1996 show pH ranging from 7.38 and rising to 8.36, with specific conductance ranging from 485 to 595 ohms.

Surface Water

The CIA lies within the Price River Basin. The major drainage within the CIA area are; the Beaver Creek Drainage and the Gordon Creek Drainage which drain into the Price River. The Price River is tributary to the Green and Colorado Rivers.

Beaver Creek has a drainage area of approximately 16,700 acres. Smaller drainage basins in the Beaver Creek Drainage include; Jump Creek; Sand Gulch; Johnston Creek; and unnamed perennial, intermittent and ephemeral drainage. Johnston Creek is at the downstream boundary of the CHIA area.

The main water source in the Gordon Creek drainage comes from the North Fork of Gordon Creek which is a perennial stream. The North Fork of Gordon Creek flows along County Road 290 southeast of the permit area. The total drainage is about 12,000 acres. Other principle drainage include Jewkes Creek a perennial stream, Bryner Canyon, Consumers Canyon, Sweets Canyon and Coal Creek.

Surface Water Quantity

Streams within the CIA receive their maximum flows in late spring and early summer as a result of snowmelt runoff. Flows decrease significantly during the autumn and winter months.
According to information presented in the 1989 CHIA 50% to 70% of the runoff occurs during May and July snowmelt. Summer thunder storms may cause localized occurrences of short duration high intensity runoff.

Beaver Creek has a drainage area of approximately 16,700 acres an average annual precipitation of 23 inches and an average annual streamflow of 2,860 Acre-feet (Waddell, et. al. 1986). Beaver Creek is a perennial stream with base flow maintained by seeps and springs. Beaver ponds are common in Beaver Creek and also play a part in providing perennial flows. Some springs contributing to the base flow include the Gunnison Homestead Spring(spring 2-6-W), and Jewkes Spring(spring SP-9). Discharges from these springs vary between 3 to 136 g.p.m. Jewkes Spring was observed to have dry periods.

The United States Geologic Survey (USGS) maintained a gauging station (09312700) near the mouth of Beaver Creek through a period of record from 1960 through 1989. The minimum annual discharge for this period was 254 acre feet in 1981. The maximum annual discharge of 9,950 acre-feet occurred in 1973. The average annual discharge for the 29 year period of record was 3,310 acre feet.

Decreases in downstream flow were observed in Beaver Creek between monitoring stations SS-7 and SS-8 monitored by Horizon Coal Mining Co. The decrease is most prevalent during the low flow season. This losing stream section may occur due to either alluvium, fracture and fault systems, previous mining activities or other unknown factors. According to the 1989 CHIA, flows monitored by the Beaver Creek Coal Company at stations 2-4-W and 2-3-W, show an average loss in flows from the upstream and downstream station. Flow ratios varied between 68% to 91% with an average of 80%. The mean flow for the upper station in 1988 was 176 gpm, and while the mean flow at the lower station was 221 gpm. A study of flows determining existing losing and gaining reaches was conducted in September of 1996 by Horizon.

The North Fork of Gordon Creek, commonly referred to as Sweet's Canyon is perennial and potentially intersects groundwater from the regional aquifer. The total drainage is about 12,000 acres. There is no flow data available for the North Fork of Gordon Creek below all mine operations. However, Beaver Creek Coal Company provided a stream sampling station below the Gordon Creek 2, 7 and 8 Mines in the North Fork of Gordon Creek. Observations from monthly flows data obtained in 1988 ranged from 87 g.p.m. to 359 g.p.m. with a mean flow rate of 190 g.p.m.

Jewkes Creek was named by the consultant for the purpose of the permit, flows in Consumers Canyon, drains a watershed area slightly greater than 1 square mile and discharges into the North Fork of Gordon Creek. Jewkes Creek has flow in it during part or all of the year due to a flow from a developed spring on the left fork. Flow in Jewkes Creek has varied from about 200 g.p.m. to 5 g.p.m.. The flow data indicate that normally the creek flows all year at monitoring Station #5, but becomes intermittent at Station #3. The flow diminishes in a downstream direction beyond sampling point SS-5, infiltrates into the alluvium and does not reappear immediately downstream according to data collected by Horizon Coal Company. Water may reappear one half mile down stream in the North Fork Gordon Creek where the Mancos shale outcrops. A potential reason for the diminished flows in this area may be due to recharge of subsurface soils in the riparian area near monitoring Station #3.

Bryner Canyon's drainage basin is about one square mile in area. Bryner is an ephemeral stream with flow usually occurring only during snowmelt periods. Flows up to 3.6 cfs have been measured. Intermittent springs and seeps were

found in the drainage. The main spring discharges from below the Castle Gate "A" coal seam south of the Gordon Creek #2 portal. Flow was estimated to vary from 1 to 5 gallons per minute. Flows which have accumulated in the channel seldom continued beyond the Gordon Creek #2, #7 and #8 mines disturbed area. The general feeling is that this water has been infiltrating into old mine workings associated with the Swisher Mine.

According to the 1989 CIA the Coal Canyon drainage area is approximately 1,329 acres and is ephemeral in nature. One sample was obtained in Coal Canyon above the Gordon Creek #3 and #6 Mine during spring runoff and flowed at approximately 1.6 g.p.m.. However, a greater flow, observed in the channel since reclamation, has occurred during onsite inspections. Springs at the tributary of Coal Canyon contribute significant flow to the North Fork of Gordon Creek.

The Beaver Creek Drainage and Gordon Creek drainage have numerous springs which contribute to base flows. All of the drainage and many of the springs provide a point of use for water rights. Water rights are shown to be used for stockwatering and irrigation.

Surface Water Quality

Regional studies by the USGS and others indicate that, the general chemical quality of surface water is relatively good in the headwaters of Gordon Creek. TDS are usually less than 500 mg/l and the water signature is a calcium bicarbonate type. Near the confluence of Gordon Creek and the Price River the water signature changes to a magnesium-sodium-calcium-sulfate type water with dissolved solids content as high as 1100 mg/l (Mundorff, 1972). These changes in water quality are caused by water contact with Mancos shale and irrigation return flows.

According to the 1989 CHIA, Beaver Creek had a mean TDS at the upper Gordon Creek #2, #7 and #8 monitoring station 2-4-W of 247 mg/l. The lower station, 2-3-W, had a mean TDS of 259 mg/l while maximum values are generally less than 500 mg/l. The mean TDS based on 12 monthly field samples for 1988 was 464 mg/l. The mean TDS for the North Fork of Gordon Creek at station 2-2-W for 1988 was 344 mg/l and ranged from 284 to 395 mg/l. Data from early mining operations are not extensive. Since mining had already occurred in the CHIA prior to enactment of SMCRA, the pre-mining characteristics are not available.

Information provided by the Horizon mine indicates the TDS concentration of Beaver Creek varies from about 200 to 350 mg/l and is lower than Jewkes Creek, which typically ranges from 300 to 500 mg/l. The pH of Beaver Creek is typically 7.5 to 8.5 and Jewkes Creek generally varies from 8.0 to 8.6. Both Jewkes Creek and Beaver Creek are typically a calcium bicarbonate type water. Dissolved constituents tend to be inversely proportional to flow while total constituent concentrations tend to be directly proportional to flow. Additionally, the ranges of water quality observed over the baseline monitoring period for the Horizon Coal Company are presented below in Table 3.

TABLE 3
SURFACE WATER QUALITY
Data summary 1989 - 1996

Station	Period Sampled	Iron (Total - mg/l) Range	Manganese (Total. mg/l) Range	TDS (mg/l) Range	TSS (mg/l) Range	pH Range
3	1989-1996	ND - 8.5	ND - 0.25	283 - 799	ND - 72	6.2 5- 9.5
5	1989-1996	ND - 3.9	ND - 0.14	198 - 550	ND - 245	6.7 - 9.34
7	1989 1996	ND - 5.19	ND - 0.19	168 - 353	ND - 297	6.0 - 8.54
8	1991-1996	ND - 1.3	ND - 0.46	192 - 357	ND - 44	6.6 - 8.69
10 (1)	1996	0.32	0.01	60	ND	8.12 -8.96
11 (1)	1996	0.85	0.03	108	21	7.66 - 8.63

Comments
(1) The current data base is limited for this site.

Recharge

Recharge for springs and seeps in the CIA probably originates in the small drainage or basins in the immediate vicinity. Low precipitation and high evapotranspiration limit the amount of water available for recharge. The low hydraulic conductivity of the rocks further limits recharge, although fractures are locally important in recharge and ground water flow.

Recharge to the regional aquifer system appears to occur primarily where outcrop zones are exposed to direct precipitation and near-surface infiltration. Recharge percolates from the surface downward until shale is encountered and then moves downdip following discontinuous, but more permeable sandstones. Water either continues to move downdip until it is discharged at the surface or resumes vertical flow where more permeable zones are encountered, and recharge eventually reaches the regional aquifer. Vertical ground water movement through the overlying sediments is minimal due to the low permeability of the overlying units and the presence of relatively impermeable shales. Steep slopes and relatively small outcrop exposure areas are two factors that limit recharge. Faults and fractures are important ground water conduits in the CHIA..

Some recharge of the regional aquifer system may occur where the associated formations are exposed and come in direct contact with surface discharge or the alluvial/alluvial aquifer system, such a in sections of Beaver Creek. Such direct recharge is limited by formation permeabilities.

Perched Ground Water System

Perched aquifers in the Wasatch Plateau and Book Cliffs typically occur in numerous small, localized lithologic units that have sufficient permeability to store and transmit ground water. They are found at shallow depths in the Flagstaff, North Horn, and Price River Formations and upper portions of the Blackhawk Formation, which are dominantly interbedded sequences of shale, siltstone, and fluvial channel sandstones. Fine grained, well cemented sandstones are typically the water-bearing unit with lower permeability siltstones and relatively impermeable shales acting to confine ground water movement. Burned-out coal zones also have good permeability and can be perched aquifers. Isolated perched water tables may occur deeper in the rock where more permeable zones are encountered, and recharge eventually reaches the regional aquifer. Vertical ground water movement through the impermeable shales. Steep slopes and re surrounded by unsaturated strata.

Perched aquifers in the Wasatch Plateau and Book Cliffs are of limited areal extent and thickness because of the discontinuous or lenticular shape of the sandstone bodies. Variations of permeability within the sandstone bodies further limit storage and movement of water, and perched aquifers can be breached and truncated by deeply eroded surface drainage. The discontinuous character of the sandstones and the abundance of clay throughout the formations favor formation of local flow systems that discharge through numerous small seeps and springs. Perched aquifers are separated by unsaturated rock.

Discharge from perched aquifers is primarily from seeps and springs at outcrops of sandstone-shale interfaces. Discharge from the perched ground water system to the regional ground water system can also occur due to fracture or fault related secondary permeability, such vertical movement is significant in the CIA because of the abundance of faulting and fracturing.

Perched aquifers are generally recharged within small areas in the immediate vicinity of the seeps and springs where they discharge. Recharge is almost exclusively by infiltration of direct precipitation and snowmelt, and discharge from these aquifers closely tracks precipitation rates. The combination of steep terrain and relatively low permeabilities, which probably limit infiltration to less than 5 percent of annual precipitation (Price and Arnow, 1979),

Regional Aquifer System

The regional aquifer system includes the coal bearing zones and the barrier-beach sandstones of the lower Blackhawk Formation and extends into the underlying Mancos Formation. Because it includes the primary coal-bearing sequence, the regional aquifer system will be directly affected by the mining operations.

The regional aquifer extends to the outcrop of Mancos Shale along Gordon Creek. Water is unable to flow downward through the Mancos in any significant amount but will flow laterally through more permeable overlying strata until it discharges at the surface. The regional aquifer discharges at springs along the Blackhawk - Mancos contact in . Leakage to the Mancos and other units underlying the regional aquifer should be minimal.

Stored Mine Water System

Coal mining has resulted in extensive underground mine workings in the area. Where the mine workings are below the local ground water table or where subsidence has opened fractures connecting with the perched ground water system, significant quantities of stored ground water have accumulated in the underground workings.

Abandoned mine workings that extend beneath the regional water table serve as sinks in the regional aquifer system. However, seepage into the mines is extremely slow. In the western coal reserves area, mine inflows appear to be greatest where extensive retreat mining has produced substantial subsidence.

The total volume of ground water storage in the old mine workings in the eastern coal reserves is unknown, although it is probably substantial. There are few known instances of mine water discharge from old workings to the surface because most of the abandoned mine workings in the area have been sealed and water accumulates predominantly in down-dip workings behind the seals. Ground water inflow to the old mine workings will continue until equilibrium is established between inflow, discharge to the surface, recharge into the subsurface, and the local ground water table.

Ground Water Usage

Of the four primary aquifer systems, only the alluvial/colluvial aquifer yields sufficient water to serve as a reliable source of water for beneficial use. A number of individuals, water user associations, government agencies, and corporate entities hold ground water rights for alluvial/colluvial wells in area drainage, shallow wells that intercept perched aquifers, and numerous small springs and seeps. Water rights have been filed on mine inflow or stored mine water in four mines in the area.

Actual ground water use within the hydrologic basin is primarily limited to large volume municipal and irrigation use or small volume stock watering applications. The Price River Water Improvement District extracts water for municipal use from ground water wells in Sections 23 and 24 of T. 12 S., R. 10 E. Along the Price River valley, especially near Heiner, Martin, and Helper, numerous individuals and corporations have significant water rights that are used for irrigation. Additionally, PacifiCorp owns significant water rights for water from their UGW well located in Section 35 of T 12 S, R 9 E.

In certain areas the perched ground water and stored underground mine water systems may provide water of sufficient quantity and quality for specific uses such as stock watering.

V. MATERIAL DAMAGE CRITERIA - RELEVANT STANDARDS AGAINST WHICH PREDICTED IMPACTS CAN BE COMPARED.

Standards of quality for waters of the State of Utah are set by the Utah Department of Environmental Quality and the state Division of Water Quality, R317 (Utah Administrative Code). There are also primary (PDW) and secondary (SDW) drinking water standards set by the Division of Drinking Water in Rules for Public Drinking Water Systems, R309 (Utah Administrative Code). The drinking water standards are generally more stringent than the water quality standards when a parameter is listed in both, but many parameters are unique to one set of standards or the other. Standards from both sets of rules were established for Total Dissolved Solids (TDS), total iron, total manganese, and pH. There are water quality standard for total manganese as it relates to Post-Mining Areas, underground mine drainage after application of best practicable control technology currently available (40CFR Ch.1 Subpart 434.55). There is no drinking water or water quality standard for Total Suspended Solids (TSS).

The level of protection or non-degradation for waters is also determined by the Utah Division of Water Quality. Standards usually vary between classifications. Waters within and adjacent to the permit area are classified as:

- 1C - protected for domestic use with prior treatment,
- 3A - protected for agriculture,
- 3C - protected for non-game fish and other aquatic life
- 4 - protected for agricultural uses.

Beaver Creek and it's tributaries are classified for 1C and 3A water uses. The Gordon Creek drainage and its tributaries are classified for 3C and 4 water uses. Identified land uses within the proposed Horizon Mine are wildlife and livestock grazing, recreation, and logging. Areas are not being evaluated for wilderness potential within the CIA. The CIA includes a section of the DNR Wildlife Management Area. Recreational use involves four-wheel driving, camping, and hunting.

The most likely post mining land uses in the CIA for the foreseeable future will continue to be logging, livestock and wildlife grazing, and recreation. The land and waters of the CIA should be maintained or restored to support these uses.

VI. ESTIMATE OF PROBABLE FUTURE IMPACTS OF MINING ON THE HYDROLOGIC RESOURCES

Regulatory requirements R729.100 require the Division to assess the probable impacts of coal mining on the hydrologic system. Additionally, each mine in the CIA is required to provide an assessment of the following:

- Whether adverse impacts may occur to the hydrologic balance;
- Whether acid and toxic forming materials exist which could result in contamination of surface or ground water supplies;
- What impacts coal mining and reclamation activities will have on; sediment yield; acidity, total suspended solids, dissolved solids and other important water quality parameters; flooding or streamflow alteration; groundwater and surface water availability; other characteristics required by the Division;
- Whether the proposed surface mining and reclamation activity will result in contamination diminution or interruption of an underground or surface source of water in the permit or adjacent area which is used for a legitimate purpose.

The assessment of the Probable Cumulative Hydrologic Impacts (PCHI) will address each element that the individual mine operations are required to address. The last item will be handled under "Material Damage Determination" in this CHIA. The PCHI assessment will include consideration for those measures used to minimize impacts in mining operations and will be assessed for risk analysis based on past mining experiences and based on site specific information.

Adverse Impacts to the Hydrologic Balance

The hydrologic balance is defined under the regulatory requirements R645-100: ""Hydrologic Balance" means the relationship between the quality and quantity of water inflow to, water outflow from and water storage in a hydrologic unit such as a drainage basin, aquifer, soil zone, lake, or reservoir. It encompasses the dynamic relationships among precipitation, runoff, evaporation, and changes in ground and surface water storage."

Potential Changes in Ground Water Quantity

Potential changes in groundwater quantity may occur from the changes in the hydrologic charactaristics that are brought about as a result of mining. Tables 4 present a risk assessment of the potential for a mining related factor to affect the hydrologic system and the potential that a quantity of a use may be affected by these changes. Risk is rated as High (H), Moderate(M), and Low (L). Additional potential changes or site specific information on the hydrologic system is also discussed.

TABLE 4
GROUND WATER QUANTITY POTENTIAL IMPACTS

Source	Potential Change in Hydrologic Regime	Mining related factor	Mining related operations used to minimize impacts or, site specific characteristics affecting the potential for impact.	Evidence of existing and past water quantity changes that may be attributed to mining.	Risk that a mining related factor may occur.	Risk to quantity of a water use
Springs	Dewatered	Subsidence induced fractures propagating through perched aquifers associated with springs.	Most surface springs issue from the upper geologic units of the Blackhawk. Massive Sandstone units exist above the coal to be mined diminishing potential for surface expression . Numerous surface springs are present above previously mined areas.	No diminished flows have been documented by previous mining activities.	M-L	M
		Dewatering fractures associated with springs.	Operations are designed to avoid the major fault system. Numerous smaller fault/fractures are present. A fracture associated with HZ-91-1 will be mined through. No springs were identified as associated with this fault.	Mining through a graben in Gordon Creek #3 and #6 resulted in 400 gpm inflow but, no decrease in discharge was documented for any springs.	M	M
		Change in direction of Piezometric surface dewatering springs	A limited number of springs issue from aquifers below the coal. Geologic structure, dip, location and orientation could result in interruption of springs issuing below the mine but, they should re-issue following reclamation.	Excess water encountered from mining has not been discharged from portals in previous mined areas. An estimated excess of 50 gpm was predicted may off set flow losses if they occur.	H	M
	Increased Discharge	Sumping or redirecting in-mine water could result in increased recharge to springs within and below the mined sections.	Dewatering of aquifers above the coal may increase recharge to aquifers below mined areas. Interbedded shales may limit vertical movement.	Vegetative changes may be the result of increased flows from Springs in Coal Canyon and may be mining related.	H	L
	Change in location of discharge	Sumping or redirecting in-mine water could result in a change in location of springs	Location of sumps in mine, dip of coal beds and location of fractures in the system may have an affect on where springs are relocated.	New springs issuing from the canyon west of Coal Canyon may be mining induced.	H	L
		Subsidence could cause surface springs to relocate.	Subsidence is not expected to reach the surface.	No known subsidence has changed the location of springs in this area.	L	L

TABLE 4
GROUND WATER QUANTITY POTENTIAL IMPACTS (cont.)

Source	Potential Change in Hydrologic Regime	Mining related factor.	Mining related operations used to minimize impacts or, site specific characteristics affecting potential for impact.	Evidence of existing and past water quantity changes that may be attributed to mining.	Risk that a mining related factor may occur.	Risk to quantity of a water use.
Aquifers Above Coal	Increased Recharge	Increased recharge may occur due to subsidence above the coal seam.	Increased recharge to aquifers above the coal is unlikely unless fractures heal between aquifers. Clays have been considered to have sealing characteristics between water bearing zones. Overburden between the coal and most surface water is greater than 800 feet.	The old Sweet's mine may have subsidence fractures near the surface in areas where overburden is shallow. Drill holes indicate zones above mined areas are dry.	H	L
	Increased discharge or, de-watering.	Increases in hydraulic conductivity from caving and fracturing above the mined zone.	Few aquifers have been identified above the coal that are known to issue as a spring or associated with a water right.	Most in- mine waters were stated to come from isolated channel sandstone.	H	M
Aquifers Below Coal	Increased recharge and discharge rates.	Increases in recharge may occur due to location of sumps and due to dewatering aquifers above the mine or. increasing hydraulic conductivity between overlying aquifers. New discharge locations may occur.	Mine operations including location of sumps, and mine water discharge rates may affect the rate of recharge to aquifers below the coal. Following reclamation increased recharge may occur from intercepting aquifer waters above the coal. The aquifers below the coal are separated by clay and shale layers that may impede flow to lower aquifers.	An increase in discharge may have occurred in the Storrs Sandstone of the Star Point aquifer. New seeps are present in a canyon west of Coal Canyon below the mined zone.	H	L-M
Mined Coal Zone	Change in Hydraulic Conductivity.	Due to the removal of coal and subsidence above the coal the hydraulic conductivity will be changed.	The amount of coal removed will dictate total influence.	No related information has been presented from previous mining in the CIA.	H	M

Evaporative Losses

Presently the mines at Gordon Creek #2, #7 and #8, and Gordon Creek #3 and #6 are under reclamation and all mine associated openings are presently sealed. The proposed mine ventilation in the Horizon Mine is expected to evaporate an average of 5.66 gpm from air circulating through the mine at 200,000 cfm.

Mine water Discharge

Information from the 1989 CIA indicate that no water was directly discharged from mines in the CIA.

Change in the Potentiometric surface

There is insufficient data from early mining operations to determine what the potentiometric surface for aquifers within, above and below the coal seams was prior to any mining. Mining activity has occurred in the Castle Gate "A" seam and has occurred in the Hiawatha seam, which may have dewatered aquifers previously existing. No monitoring well data exists from these previous mining activities.

A potentiometric map for the Spring Canyon Sandstone was developed for the Horizon mine plan. Monitoring wells suggests the Spring Canyon Tongue has a hydraulic gradient of 0.014 in an east-southeast direction based on December 1995 data. The overlay of the potentiometric surface and elevation of the Spring Canyon Tongue was used to estimate the saturated portion of the coal formation. Data obtained in July through September 1996, indicate the surface water elevation had remained relatively steady in Well HZ-95-2. Other water levels had changed. Water elevations decreased by approximately five feet at well HZ-95-3 and increased by seventeen feet at HZ-95-1. Currently it is not known whether the potentiometric surface has stabilized, or if it is controlled by seasonal variation. The September, 1996 data indicate the potentiometric surface has a gradient of 0.019 ft/ft and indicated the general direction of flow is the same but, flows a little more southerly than the December, 1995 data indicated.

Groundwater was observed in the HZ wells above the Star Point formation and was present from 100 to 600 feet below the ground surface. The presence of water indicates a potential for aquifers to be present above the Hiawatha seam in areas that were not previously mined. Well HZ-95-1-S was completed above the Hiawatha at 205 to 210 foot depth. Two drill holes previously drilled by Beaver Creek Coal Company near Beaver Creek were artesian flow and are referred to as BC-1 and BC-2. Water from these drill holes is assumed to originate from 80 to 100 feet below the ground surface. These artesian aquifers may suggests that the water rests on aquitards and are overlain by confining units or, may be recharged from a fracture system with hydraulic head above the issuing point. Additionally, most springs in the CIA issue above the presented potentiometric surface of the Star Point. This may indicate the Star Point is not in connection with overlying fractures or, because of the low hydraulic conductivity of the lower formation, water transmission may occur slowly causing the water to be retained and discharge through springs associated with fractured systems near the surface.

Wells have not been completed fully through the Star Point Formation. The Star Point sits over shale members through the proposed permit area potentially blocking vertical flow below the aquifer. However, where there are fracture related flows, water has issued from formations below the Star Point. No wells were completed in the Blackhawk, where the coal is to be mined.

The elevation of water in HZ-95-1 was 7585.4 feet msl in July 1996. The standing water elevation in the Blue Blaze No. 1 Mine was 7,587 ft on 5/16/96, and 7,585 ft on 6/14/96; similar to the surface elevation in HZ-95-1. This could indicate an interconnection with the in-mine water and the fracture, but could also be due to local influences. The base of the Hiawatha at Well HZ-95-1 is approximately 7,331.6 feet msl; at HZ-95-3 approximately 7,477.6 ft msl; and HZ-95-2 is approximately 7,189.3 ft. msl (a 288 ft. difference between HZ-95-3 and HZ-95-2) and is outside the proposed mining area on the side opposite the fracture associated with the graben. The potentiometric surface elevation presented indicates the Star Point aquifer is in connection across the fracture of the graben. The elevation to which coal is removed could potentially decrease the potentiometric surface in the CIA.

The Hiawatha Coal Seam will be saturated from the beginning of mining operations. The rate of inflow will depend primarily on whether a faulted zone is encountered that contains groundwater in storage or, that is in connection with, an overlying perched aquifer. The potential sustained inflow occurring from future operations was estimated to be 50 gpm.

Inter-mingling of aquifer waters

Intermingling of aquifer waters could occur from dewatering fractures increased localized porosity across aquifers due to subsidence induced fracturing.

Surface Water Quantity

Surface water quantity may be affected by changes to the groundwater system. The interaction of these systems and the geologic system may influence quantiy of surface water flows. Tables 5 present a risk assessment of the potential for a mining related factor to affect the hydrologic system and the potential that a quantity of a use may be affected by these changes. Risk is rated as High (H), Moderate(M), and Low (L). Additional potential changes or site specific information on the hydrologic sytem is also discussed blow.

TABLE 5
SURFACE WATER QUANTITY POTENTIAL IMPACTS

Source	Potential Change in Hydrologic Regime	Mining related factor.	Mining related operations used to minimize impacts or, site specific characteristics affecting potential for impact.	Evidence of existing mining characteristic	Risk that a mining related factor may occur.	Risk to quantity of a water use.
Jewkes Creek	Loss of stream flow	Subsidence induced fractures propagating to the surface.	The mine operations are set up to avoid mining under this stream. And a stream buffer zone has been designated.	This stream has not been mined under in the past.	H	L
		Interception of water from fractures and aquifers that depleat baseflows.	Mine operations were set up to avoid mining into the fracture associated with this stream. Much of the water origionates from spings outside the area proposed to be mined.	No changes in streamflow have been noted on Jewkes Creek related to mining the area.	M-L	L
	Increases in stream-flow.	Increases in streamflow could occur from mine water discharges, increased hydraulic conductivity between aquifers above the coal and, transbasin diversions.	Mine operations can be set up to control discharge rates. Significant aquifers directly above the coal seam have not been identified.	No changes in streamflow have been documented on Jewkes Creek related to previously mining the area.	M	M
	Seasonal Changes	Mine water discharge could potentially increase summer season baseflow. Following reclamation increased conductivity may seasonally increase or decrease discharge based on retention time of the system.	Operations can control sumping locations and thereby control mine discharge rates during mining. Although discharging may be desirable. Clay swelling and setteling of overburden over time time may decrease the hydraulic conductivity of the system following mining.	Excess of in-mine water is predicted to be discharge at a rate of 50 gpm. Because most discharge from Jewkes creek is from springs not expected to be impacted changes following reclamation are not expected.	H	M
Beaver Creek	Decreased Baseflows	Decreased base flow could occur if springs are dewatered or, if streams in connection with fractures are dewatered during mining or, if subsidence propagates fractures to the surface increasing losses.	Massive sandstone units are believed to be important in reducing propagation of fractures to the surface. Clays are believed to swell shut and reduce flow potential in fractures. Where fractures may be dewatered stream losses would be related to the rate of flow through the alluvium to the fracture.	Previous mining has occurred under Beaver Creek without documented losses in baseflow although this is a limited data base.	M	M
	Trans Basin Diversions	Could occur through intercepting surface waters and springs in Beaver Creek which are discharged into the Gordon Creek Basin.	Interception of Springs and surface waters in the Beaver creek drainage is not expected. Increased porosity and dewatering of fractures may increase vertical migration of water and result in losses from the Beaver Creek drainage to Gordon Creek.	No springs or surface waters have been documented to be intercepted through past mining practices although the data base is limited.	M	M

TABLE 5
SURFACE WATER QUANTITY POTENTIAL IMPACTS(cont.)

Source	Potential Change in Hydrologic Regime	Mining related factor.	Mining related operations used to minimize impacts or, site specific characteristics affecting potential for impact.	Evidence of existing mining characteristic	Risk that a mining related factor may occur.	Risk to quantity of a water use.
North Fork Gordon Creek	Decrease in Streamflow	Reduced flows from dewatering fractures and aquifers depleting surface flows.	Relative location downstream of mine operations may result in temporary losses during mining operations and should recharge following reclamation. Mine water discharge may result in no net change if mining intercepts these waters.	No noted decreases have been identified in past operations although data base is limited.	L	L
	Increase in Streamflow	Increases could occur from transbasin diversions. Dewatering perched aquifers and fractures.	The lower stream segment is below the base of the Hiawatha and may receive increased base flow if increased recharged occurs from mining activities.	Mine water discharge has not occurred in previous mining activities but, is predicted to occur. Increased discharge from springs along Coal Canyon have been noted.	M	M
	Seasonal Changes	Seasonal changes could occur due to increased hydraulic conductivity reducing residence time in the aquifers.	The equilibium the system reaches following mining will determine whether seasonal changes may occur. The because the existing sysetem is highly fractured increased conductivity may not significanly affect seasonal flows.	Seasonal changes have not been noted from past mining although the data base is limited.	M	L

Presence of Acid- or Toxic-Forming Materials

Results of the chemical analyses in Table 6-5 summarizes the acid and toxic nature of the CIA. The acid base potential determined from data analyses of the HZ-series drill cores indicate the Hiawatha coal has a potential to be acid-forming. While overburden and underburden have a high neutralization potential (20.3 to 64.0 tons of $CaCO_3$ per 1000 tons).

Tests for Acid and Toxic forming materials were conducted on roof and floor samples in LMC-4 and HZ drill holes from the Hiawatha mine. The acid base potential of each of the three coal samples collected from the HZ-series holes indicate the coal has a potential to be acid-forming with values from -9.1 to -13.6 tons $CaCO_3$ per 1000 tons of material. (Section 6.5.6). Tests for Acid and Toxic forming materials were conducted on roof and floor samples in LMC-4 and HZ drill holes. One sample contained a high pyritic sulfur content of 0.24 percent. Core samples of the coal obtained from the Hiawatha Seam analyses show total sulfur contents from 0.38 % to 0.61 % of which 0.02 % to 0.07% is shown to be Pyritic Sulfur.

Water Quality Impacts

Changes in ground water quality may occur through contamination from the following: acid- or toxic-forming materials, hydrocarbon and chemical contamination, other materials associated with mining activities. Changes in surface water quality may occur due to contamination from the following: acid- or toxic-forming materials, hydrocarbon and chemical contamination, other materials associated with mining such as rockdust, increased sediment yield from disturbed areas, flooding or streamflow alteration.

Increased Sediment Yield from Disturbed Areas.

Increases in Sediment Yield can be expected to occur during construction activities and increases in contributions of coal fines to Jewkes Creek and the North Fork of Gordon Creek during mining activities. Presently (summer of 1996), this system is handling a large amount of sediment contributions from upstream logging activities. Following logging it is expected this condition will decrease to lower rates. The surface mine will contribute coal and sediment to the stream during different phases of operations but, they will not occur at the present rates brought about by logging because erosion control practices will be in place to reduce erosion. The site receives an adequate amount of precipitation to allow establishment of vegetation to minimize erosion following reclamation, assuming all other aspects of reclamation have been adequately addressed.

The Gordon Creek #2, #7, and #8 mine is under reclamation. Some contributions of sediment may be expected from this area until the vegetation is adequately established at the site. Presently while under reclamaton most disturbed area reports to sedimentation ponds on site. One small area does not report to the pond and has proposed alternate sediment control measures. The Gordon Creek #3, and #6 Mine has reached a vegetative state and is nearing bond releases. Contributions of sediment from this mine are probably not greater than in undisturbed areas. .

Acidity

Past mining practices have probably increased pH, rather than increased acidity. Acidity is not considered to be a potential impact from mining in this region. All of the coal will not be removed in the mining process and much of this coal will be in contact with air and water during the mining operations and may cause a lowering in the pH of those waters. Currently water from the old Blue Blaze No.1 mine workings are shown to have a pH of 6.8 to 7.66. In general, these are lower than the surrounding area pH values, but does not fall into a range where the pH would affect a use. Coal will be stored on the surface for short periods and run off from the coal stockpile will be routed through the sedimentation pond where it will mix with run off water that is more alkaline. Acid forming discharges are uncommon in the region and acid forming materials are not known to be extensive in Utah coal mines. Should the presence of pyrite in the mine area cause a decreased pH locally the mixing with higher pH waters in the system would result in localized affects in the permit area and would not likely occur off the permit area due to downstream buffering.

Storage of coal in the mine yard will be short-term. As coals are stockpiled, coals with low acid-base potential will become blended with more alkaline coals and the potentially acid-forming effects will be reduced. Coal fines that are washed from the stockpile will be stopped at the sediment pond and will be subject to the same testing, treatment, and disposal as the rest of the sediment. If precipitation produces acidic run-off from the coal stockpiles, it will tend to be neutralized by the alkaline nature of the mine yard substrate. Runoff will be collected at the sediment pond.

Total Suspended Solids

A probable consequence of surface disturbance is increases in sediment loading and increases in total suspended solids (TSS) from the disturbed area.

Total Dissolved Solids

Contact between; disturbed area runoff and materials exposed to weathering and oxidation; drainage from coal refuse and mine waste storage areas; and discharge of excess mine drainage, may result in increased TDS and in increased individual constituents. Potential increases may be effectively addressed on a short term basis by establishment of the drainage and sediment control system and through compliance with discharge effluent limitations of

the UPDES permit. The present permit limitations for TDS discharged from all mine water and decant operations is limited to one ton per day to Jewkes Creek.

Other Materials Associated with Mining

The road to the mine is maintained as a gravel road, therefore, the use of road salting is not likely to affect water quality. However, the county has requested magnesium oxide as a road dust suppressant which may increase the magnesium present in the system. No longwall mining is proposed so spills from longwall mining fluid is not expected. If a calcium carbonate rock dust is used in-mine it should not change the general signature of the water characterized as a calcium bicarbonate type water. If calcium sulfate is used an increase of sulfates may occur in the surface waters or waters discharged by springs below the mine.

Hydrocarbon Contamination

Diesel fuel, oils, greases and hydrocarbon products will be stored above-ground and may be spilled in the mine and on the surface during mining operations. Proposed concrete containment structures and Spill Prevention and Contamination Control Plan will minimize the potential for impacts.

Flooding or Stream Flow Alteration

The potential for flooding is diminished during operations for those flows within the disturbed area which are less than the 10-year, 24-hour event by reducing peak flows through attenuating water in the sedimentation pond. Upstream drainages will be transported through a bypass culvert below the pad. It is likely that the water flowing through the culvert will have increased flow velocity over the natural velocities for the same discharge rates. Operational designs include a discharge pool downstream of the sedimentation pond and riprap at the culvert outlet to protect streamflow alteration from the 100 year - 6 hour event. Currently the waters that exit from Portal Canyon are collected behind the waste embankment and are evaporated, used by vegetation, or seep through the waste pile. The reclamation of Portal Canyon will return the ephemeral flows from this canyon directly to Jewkes Creek. The reclamation channel will be designed in order to encourage development of riparian vegetation in Jewkes Creek. Other potentials for streamflow alteration include an increased discharge through the operation period due to mine dewatering. This flow may promote downstream vegetative growth that may encourage stability during the operating phase.

Past mining has caused a reduction in streamflow. The Sweets mine is suspected to be intercepting surface waters in Bryner Canyon at the #2, #7 and #8 mine. It is not known where this flow re-issues but, it is suspected that it may re-issue in Sweets Canyon. This water has not been determined to result in contamination diminution or interruption of a legitimate use.

VII. MATERIAL DAMAGE DETERMINATION

The material damage determination is based on the past, present and expected mining and the associated changes that may be expected to occur to the water resources from mining operations. These changes constitute material damage if the change causes the loss of a legitimate use in quantity or quality. Replacement or mitigation for a legitimate use may result in no net loss of the legitimate use. Criteria that are used to determine material damage to hydrologic resources in coal mining programs administered by other states or by the Federal Office of Surface Mining (OSM) include:

- Actual or potential violation of water quality criteria established by federal, state, or local jurisdictions.
- Changes to the hydrologic balance that would significantly affect actual or potential uses as designated by the regulatory authority.
- Reduction, loss, impairment, or preclusion of the utility of the resource to an existing or potential water user.

- Short term (completion of reclamation and bond release) impairment of actual water uses that cannot be mitigated.

- Significant actual or potential degradation of quantity or quality of surface water or important regional aquifers.

Each factor addressed in the Probable Hydrologic Impacts that may affect a water use will be discussed to indicate whether material damage is expected to occur to a legitimate water use. The reasons for the determination of potential for risk to a water use is discussed further.

Adverse Impacts to the Hydrologic Balance:

Ground water Regime

Although fracturing and faulting is abundant in the CIA, mining of areas adjacent to a water bearing fault have been indicated to be dry. Mining through water bearing faults near the Gordon Creek #2 mine has not resulted in any documented loss or dewatering of springs in the CIA. One fracture associated with well HZ-95-1 will be mined under but no documented springs are associated with that fracture. A change in the piezometric surface may dewater springs issuing from the Star Point in Coal Canyon and the canyon west of Coal Canyon, however, it is not known whether these springs are in hydrologic connection with the area to be mined. If the spring water is in connection with the mine, the water pumped from the mine probably would offset the losses from the springs. Due to the location and elevation of the fractures relative to mining, it is likely that water would re-issue from the springs when the potentiometric surface recovers following mining. Therefore, no material damage is expected to occur to the quantity of downstream water use.

Because past mining practices have not resulted in documented decreased springs flow or de-watered springs due to subsidence or due to dewatering a fracture it is assumed these impacts will not occur with the proposed mining.

Increased Discharge in Springs

Increases in discharge of springs below the coal to be mined is possible following mining but, is less likely to occur during mining. Dewatering of water bearing zones that do not issue to surface springs or increased hydraulic connection to aquifers above the coal may increase discharge. Increased discharges may have occurred along a fracture in Coal Canyon as evidenced by a vegetative change to wetland species in the discharge area. Increased discharges has not been demonstrated to adversely affect quantity of legitimate water uses. (Increased ground water recharge and discharge are considered to have similar results and will not be addressed further).

Change in Location of Spring Discharge

Changes in location of discharge might occur at low points of fractures and below the mined area. Currently new springs have issued in a drainage west of Coal Canyon. It is probable that these springs are discharging from a flooded, mined out, area.
Changes in spring locations may also occur due to subsidence. The perched aquifers of the Blackhawk formation are lenticular and localized, the stratigraphic sequence has low over all permeability . If fractures reach the surface the springs may be re- adjusted and discharged at another surface location. Past experience presented no documented cases of relocation of springs due to subsidence, therefore, it is assumed there will be not material damage to legitimate uses associated with springs due to subsidence.

Increased Groundwater Recharge

Propagation of subsidence to the surface could result in increased recharge. Increase recharge to the Sweets mine has probably occurred through surface water interception along Bryner Canyon. This area has been mined with little overburden. The proposed mining operations have a greater depth of cover and mining of the Castle Gate "A" seam and Hiawatha seam with similar overburden has not resulted in any documented cases of subsidence fractures. Increases in recharge to the aquifers above the coal is not likely because those aquifers influenced will probably drain to

the mined area. Increases in recharge of aquifers within and below the coal is likely, but has not adversely effected the quantity of a proposed use.

Changes in Hydraulic Conductivity

Changes in hydraulic conductivity may change the timing and rates of discharge to springs and surface waters. With an increase in hydraulic conductivity the high flow periods could potentially flow at greater rates leaving less water available for low flow rates. Since the stratigraphic sequence has a low overall permeability and is interbedded with clays it is expected that increased hydraulic conductivity above the coal would eventually seal and decrease the hydraulic conductivity over time. The hydraulic conductivity of the mined areas is likely to change where room and pillar mining occurs. These zones will fill and come into equilibrium with the rate of recharge. Since no significant base flow contributions from this zone have been identified it is not expected to have an impact on the surface water in the area following mining and equilibrium with the system.

Surface Water Regime

Jewkes Creek may see increased flows during the period of mining operations due to mine de-watering. The predicted inflows and predicted use suggest this value will change by approximately 50 gpm. The sumping operations, use and consumption of water in mine will dictate the rate of discharge. In most mining operations this has increased water availability during low flow. Thus, no impacts to quantity for a legitimate water use has resulted during operations. Following operations the discharge rates will occur in equilibrium with the system. No losses of quantity of use have been documented for the areas that have previously been mined. Therefore, it is assumed no material damage will occur in the future.

Beaver Creek is located above the area to be mined. Previously Beaver Creek has been under mined for approximately one mile of stream channel. The Beaver Creek Drainage area mined approximately 284 acres under the whole Beaver Creek Drainage, The Consumer's Mine mined under 113 acres of the Beaver Creek Drainage and the Gordon Creek #3 and 6 mine mined under 3 acres. Limited data is available and no losss of flow over time has been documented. However, a citizens complaint has suggested that mining has decreased flows in the stream. The first year of monitoring is established to further assess this potential. The fact that the stream is presently flowing indicates this activity probably will not completely deplete surface flows in Beaver Creek. However, increased vertical flow rates could reduce surface flow and would be controled by the hydraulic conductivity of the alluvium and lower water bearing zones. The rate of increased discharge, if any, would be controled by the system and could not be predicted.

The North Fork of Gordon Creek has been monitored below the Gordon Creek #2, #7 and #8 Mine. The Sweets mine is suspected to be intercepting surface waters in Bryner Canyon at the Gordon Creek #2, #7 and #8 Mine. It is not known where this flow re-issues but, it is suspected that it may re-issue in Sweets Canyon. The water in the North Fork of Gordon Creek has not been determined to result in diminution or interruption of a legitimate use, therefore, no material damage has been identified. Future mining may change the location of discharge to the stream but, is not expected to cause material damage for the quantity of use.

Surface Water Quality

The permanent changes in water quality are expected to be the same as those presently observed. The reason for this assessment is due to the large extent to which mining has occurred in the past. Historical baseline information is not available because mining occurred in this area prior to the enactment of SMCRA, therefore, the changes that may have occurred due to mining can not fully be assessed. No material damage to quality of a use has occurred in this area and is not expected to occur.

An evaluation of the data and information received from the applicant, as well as an analyses of germane studies and reports leads to a conclusion that no significant impact will occur to the hydrologic balance as a result of mining the identified permit area.

The applicant has expressed intentions of securing federal leases north of the proposed permit area, which will likely intersect faults and undermine perennial streams and springs. Mining of this lease can provide source information

otherwise inaccessible through other techniques. At the same time, a well will be destroyed and further data will not be collected at the site.

Future development considerations will implement monitoring strategies to ensure that adequate information and trends are established.

VIII. STATEMENT OF FINDINGS

An evaluation of the data and information received from the applicant, as well as an analyses of germane studies and reports leads to a conclusion that no significant impact will occur to the hydrologic balance as a result of mining the identified permit area.

The applicant has expressed intentions of securing federal leases north of the proposed permit area, which will likely intersect faults and undermine perennial streams and springs. Mining of this lease can provide source information otherwise inaccessible through other techniques. At the same time, a well will be destroyed and further data will not be collected at the site.

Future development considerations will implement monitoring strategies to ensure that adequate information and trends are established.

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ATTACHMENT D

TABLES, FIGURES, AND CORRESPONDENCE

9/4/97

TABLES

Names and Addresses
Record Holders of Legal Interests
Surface Ownership in T13S R8E

1. U P & L - Portions of Sections 9 and 21
   P.O. Box 899
   Salt Lake City, Utah 84110

2. Hidden Splendor Resources - Portions of Sections 8, 17, and 20
   50 West Liberty Street, Suite 880
   Reno, NV 89501

3. J. Mark & James Jacobs - Portions of Sections 8, 9, 16, 17, 18, 19, 20, and 21
   734 S. Cherry Drive
   Orem, Utah 84057

4. Agnes and Robert Peirce - Portions of Sections 17 and 19
   3432 South 500 East
   Price, Utah 84501

5. Steve and Pete (Jr.) Stamatakis - Portions of Sections 4 - 9 and 18
   1111 South 450 West
   Price, Utah 84501

6. United States of America - Portions of Sections 8, 9, 17, 19, 20, and 21
   Bureau of Land Management
   2370 South 2300 West
   West Valley City, Utah 84084

7. R. L. Bird - SW1/4 NE1/4 of Section 20
   1840 East Bryan Avenue
   Salt Lake City, Utah 84108

8. Nielson Ltd. - NW1/4 NW1/4 of Section 20
   P.O. Box 620
   Huntington, Utah 84528

9. Roy M. and Tessie K. Farley - SW1/4 SW1/4 of Section 8, NW1/4 NW1/4 of
   5240 So. Highland Drive Section 17
   Salt Lake City, Utah 84117

10. Robert and Linda N. Jewkes - Portions of Sections 7 and 18
    Wellington, Utah 84542

9/4/97

11. Luke G. and Gene S. Pappas - SW1/4 NW1/4 of Section 21
2030 S. Cave Hollow Way
Bountiful, Utah 84010

12. Milton A. Oman - Portions of Section 21
1714 E. Millcreek Way
Salt Lake City, Utah 84106

13. Utah Division of Wildlife Resources - Portions of Section 16
455 West Railroad Avenue
Price, Utah 84501

14. K.C. Jensen and Tonda Hampton - Portions of Section 4
P.O. Box 957
Price, Utah 84501

15. Carbon County - Roads through the area
Courthouse Building
Price, Utah 84501

16. Arthur J. Anderson, Etal - Portions of Sections 5, 6 and 7
4190 Fortuna Way
Salt Lake City, Utah 84117

17. Utah State Fish and Game - Portions of Section 21
1095 West Motor Avenue
Salt Lake City, Utah 84116

For locations see Figure 4-1.

Coal Reserves

The following parameters were used to calculate in-place reserves:

- 5 feet minimum coal thickness
- 12 feet maximum coal thickness (not required)
- 80 pounds per cubic foot assumed density
- 300 feet barrier pillar around old mine works
- 300 feet barrier pillar from faults to mine workings

Reserve Summary

	Horizon Tract Block A-B (BLM/USA)	Hidden Splender Block A-B (Fee)	Total Block A-B (USA & Fee)
Castlegate "A" – In Place	3,990,000	870,000	4,860,000
Hiawatha - In Place	9,850,000	2,010,000	11,860,000
Total – In Place	13,840,000	2,880,000	16,720,000
Castlegate "A" – Recoverable	1,995,000	435,000	2,430,000
Hiawatha - Recoverable	4,925,000	1,005,000	5,930,000
Total – Recoverable	6,920,000	1,440,000	8,360,000

FIGURES

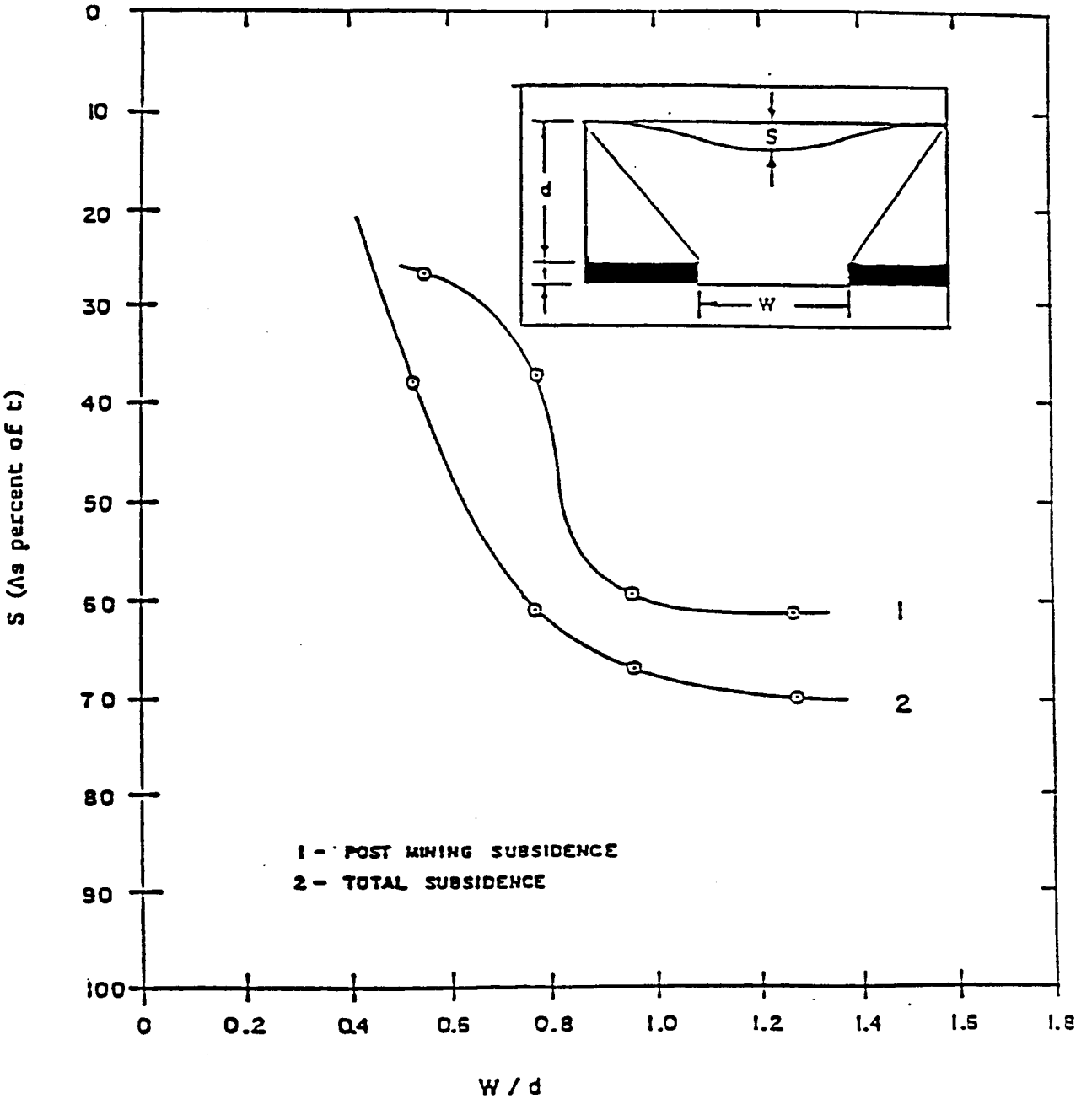
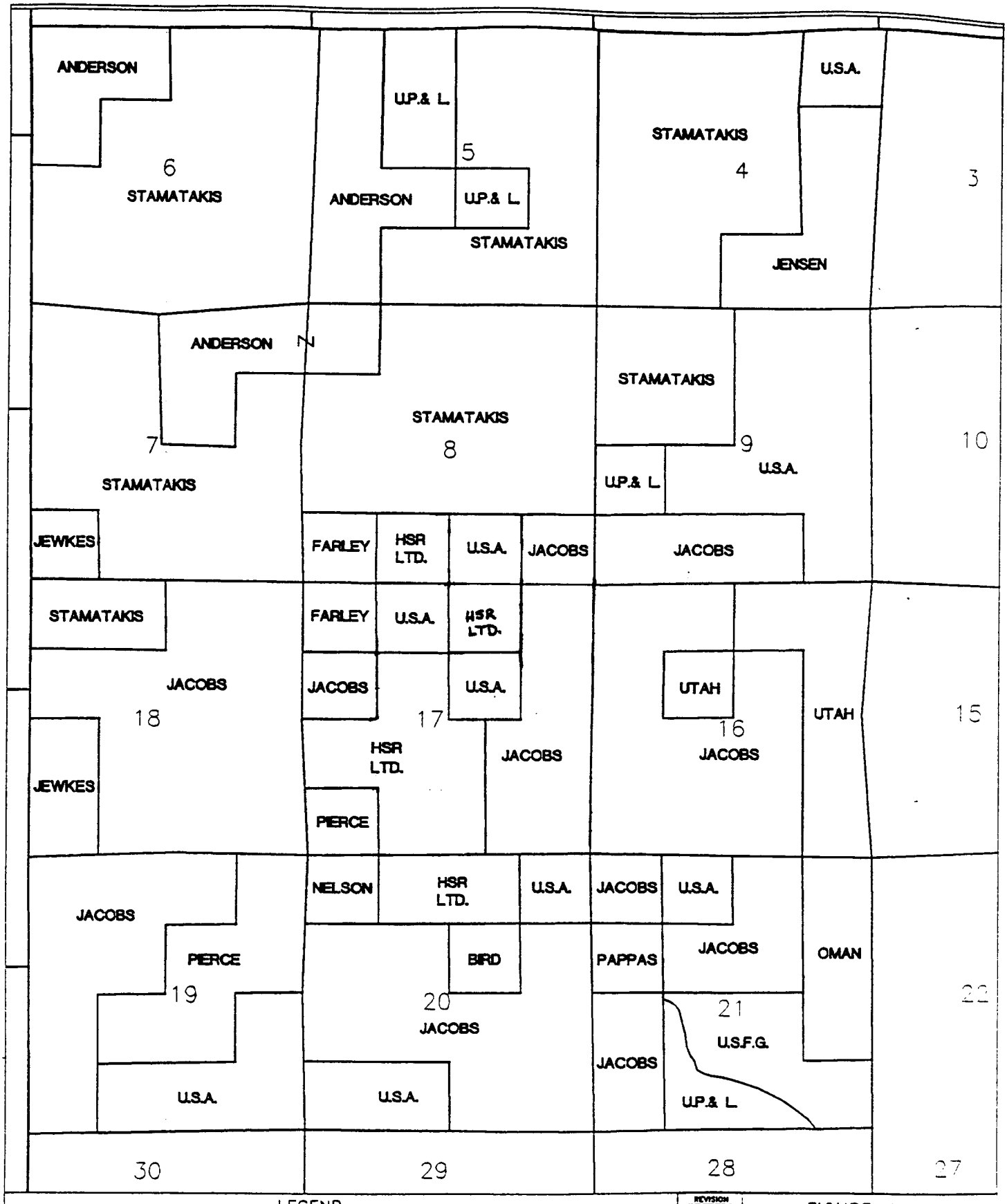


FIGURE 3-5. SUBSIDENCE/SEAM THICKNESS RATIOS (From Dunrud, 1980)



LEGEND

Anderson = Arthur J. Anderson
Bird = R. L. Bird
Farley = Ray M. & Tessie K. Farley
HSR Ltd. = Hidden Splendor Resources Ltd.
Jacobs = J. Mark & James C. Jacobs
Jensen = K. C. Jensen & Tonda Hampton
Jewkes = Robert & Linda N. Jewkes
Nelson = Nelson Ltd.
Oman = Milton A. Oman Trust
Pappas = Luke G. Pappas Et Al
Pierce = Eldred E. & Agnes K. Pierce
Stamatakis = Pete Jr. & Steve Stamatakis
U.S.A. = United States of America
U.S.F.G. = Utah State Fish & Game
U.P.& L. = Utah Power & Light
Utah = State of Utah

0' 2000' 4000'

APPROXIMATE SCALE

N

REVISION	
DATE	BY
6-6-96	SJB

FIGURE 4-1

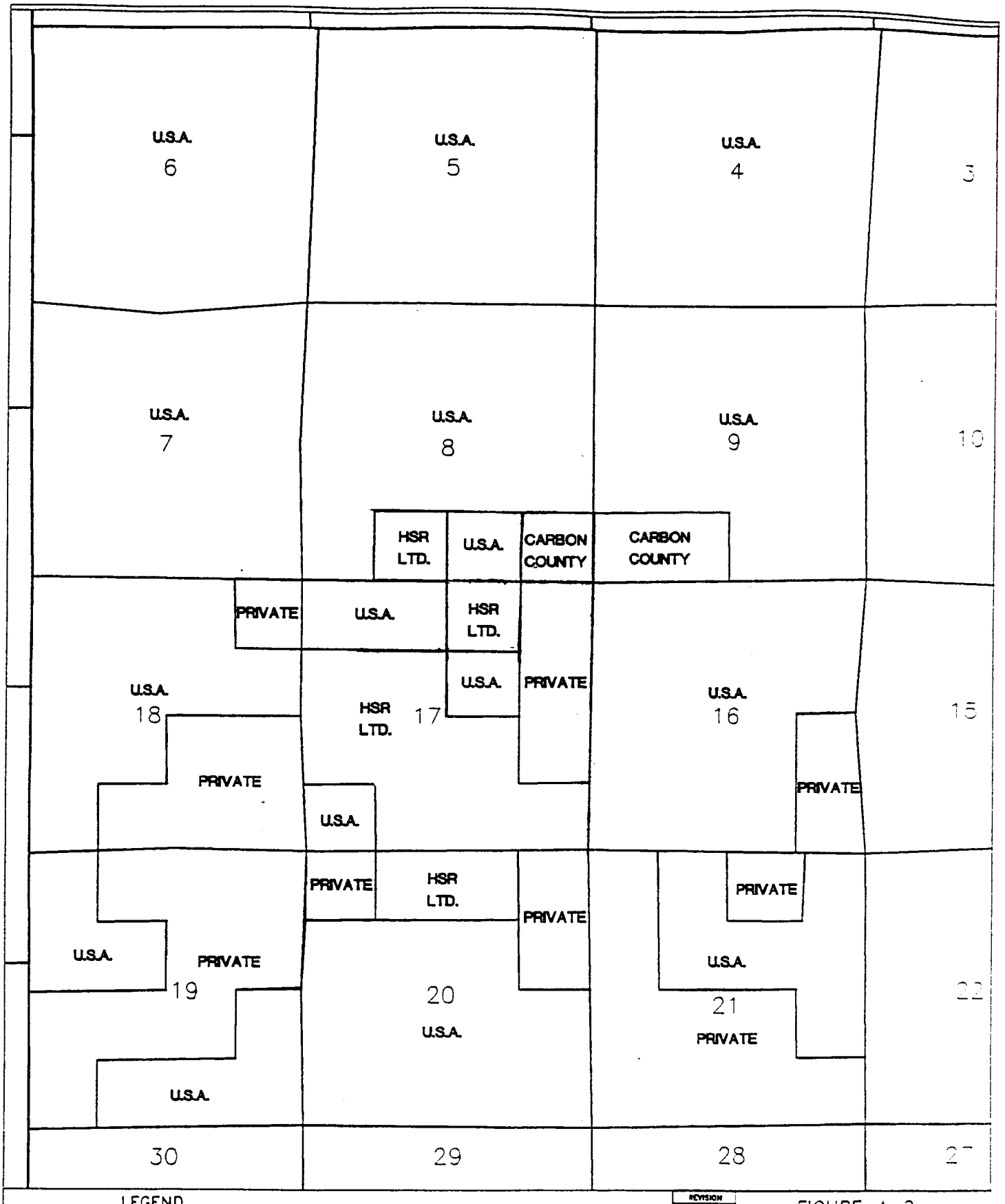
SURFACE OWNERSHIP

HORIZON No. 1 MINE

HORIZON COAL CORPORATION
P.O. BOX 2560
WISE, VIRGINIA 24273

DRAWN BY: VWB CHECKED BY: VWB DATE: 3-1-96
APPROVED BY: SJB AUTOCAD FILE: SURFOWN

BOURQUIN MINERAL ENGINEERING
EARTHFAX ENGINEERING, INC.



LEGEND

U.S.A. = United States of America
HSR Ltd. = Hidden Splendor Resources Ltd.
PRIVATE = Privately Owned Coal Rights

0' 2000' 4000'
APPROXIMATE SCALE

N

REVISION	
DATE	BY
6-6-96	SJB

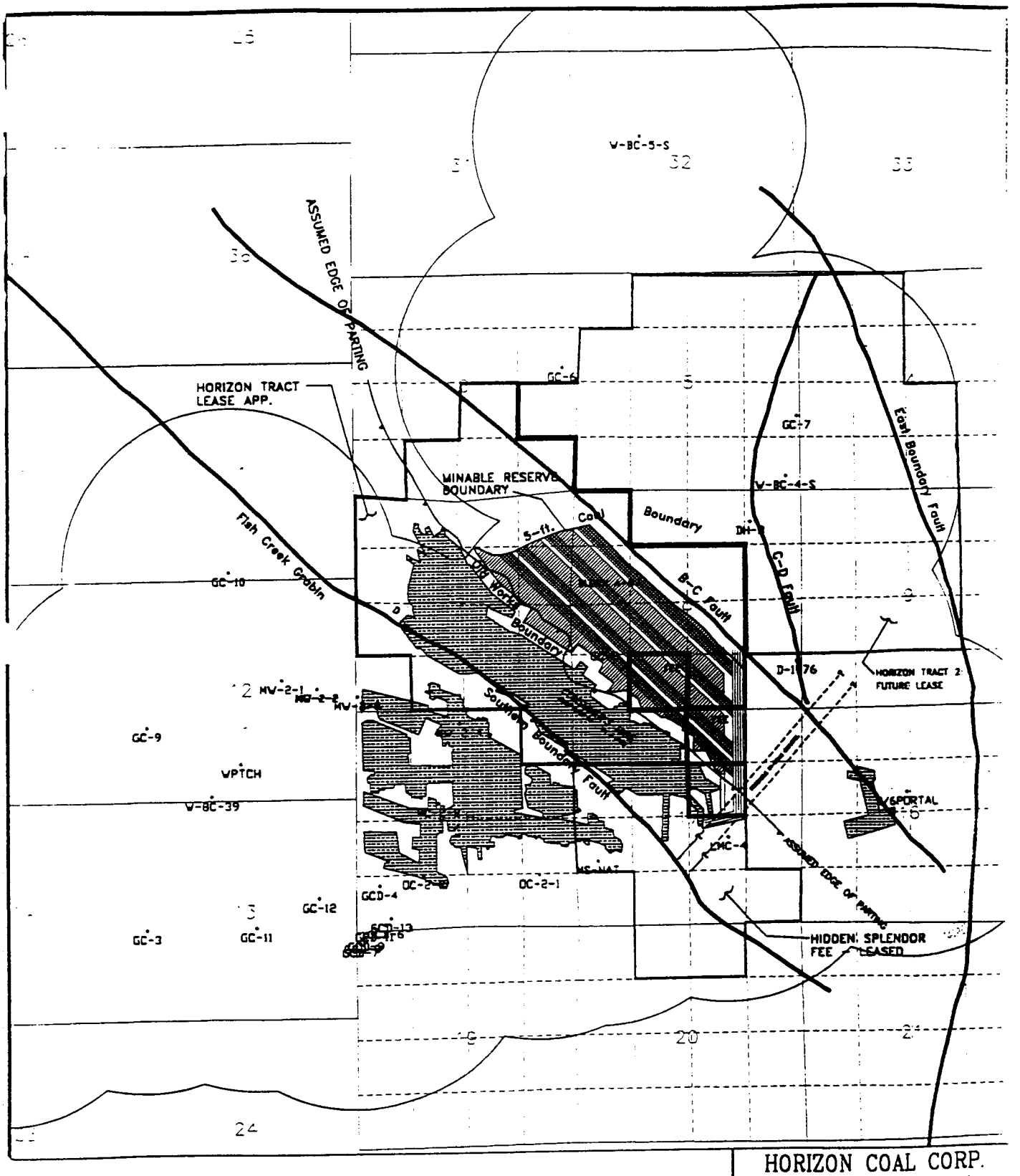
FIGURE 4-2

COAL OWNERSHIP

HORIZON No. 1 MINE

HORIZON COAL CORPORATION
P.O. BOX 2560
WISE, VIRGINIA 24273

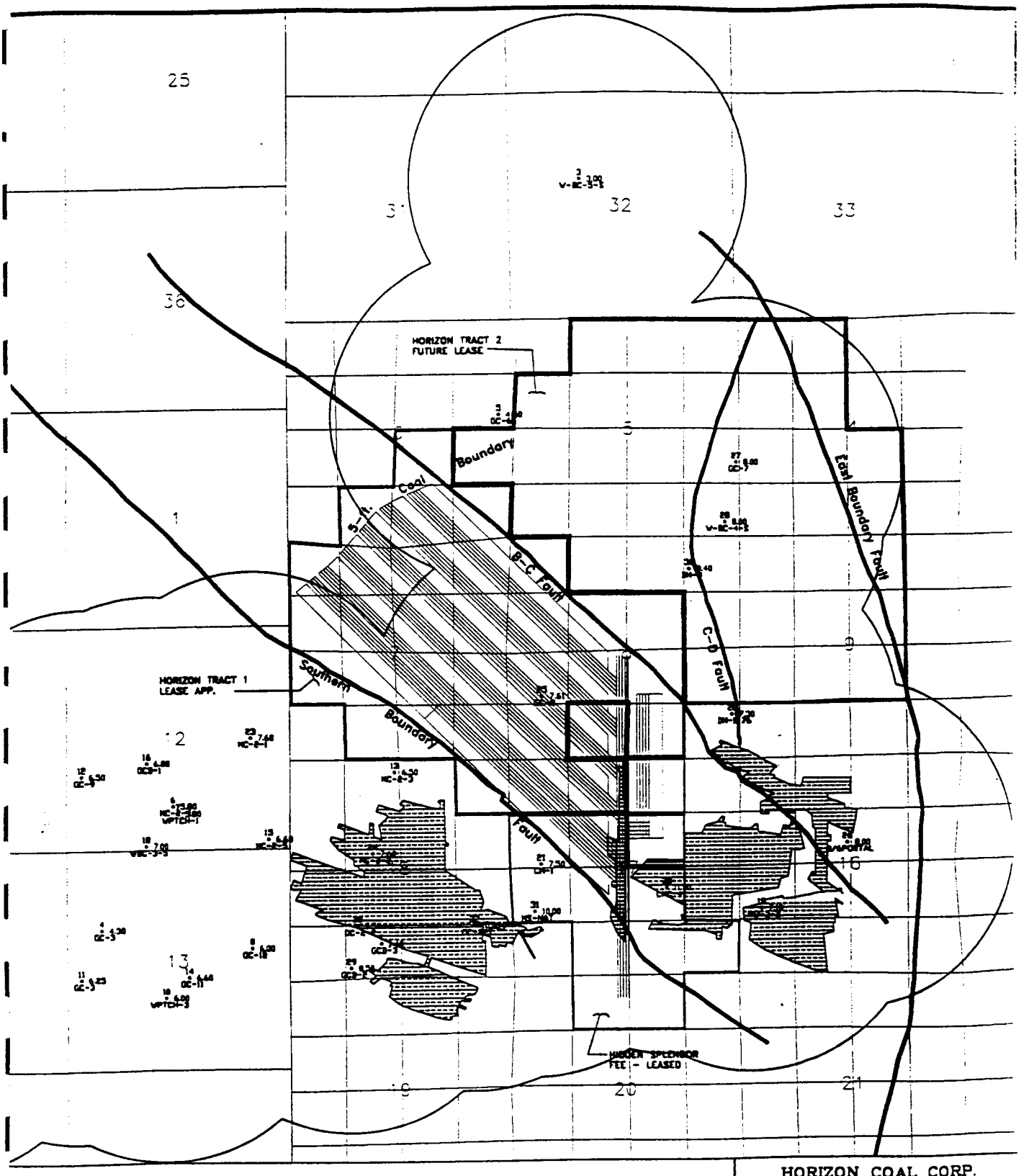
BOURQUIN MINERAL ENGINEERING
EARTHFAX ENGINEERING, INC.



HORIZON COAL CORP.

Demostrated Reserves Area
Castlegate "A"
Map HT3
Date: 8/8/95

BRADLEY J. BOURQUIN, P.E.
MINE CONSULTANT
DRAWN BY:
VICTOR GRAPHICS - DANIEL SYPERSMA



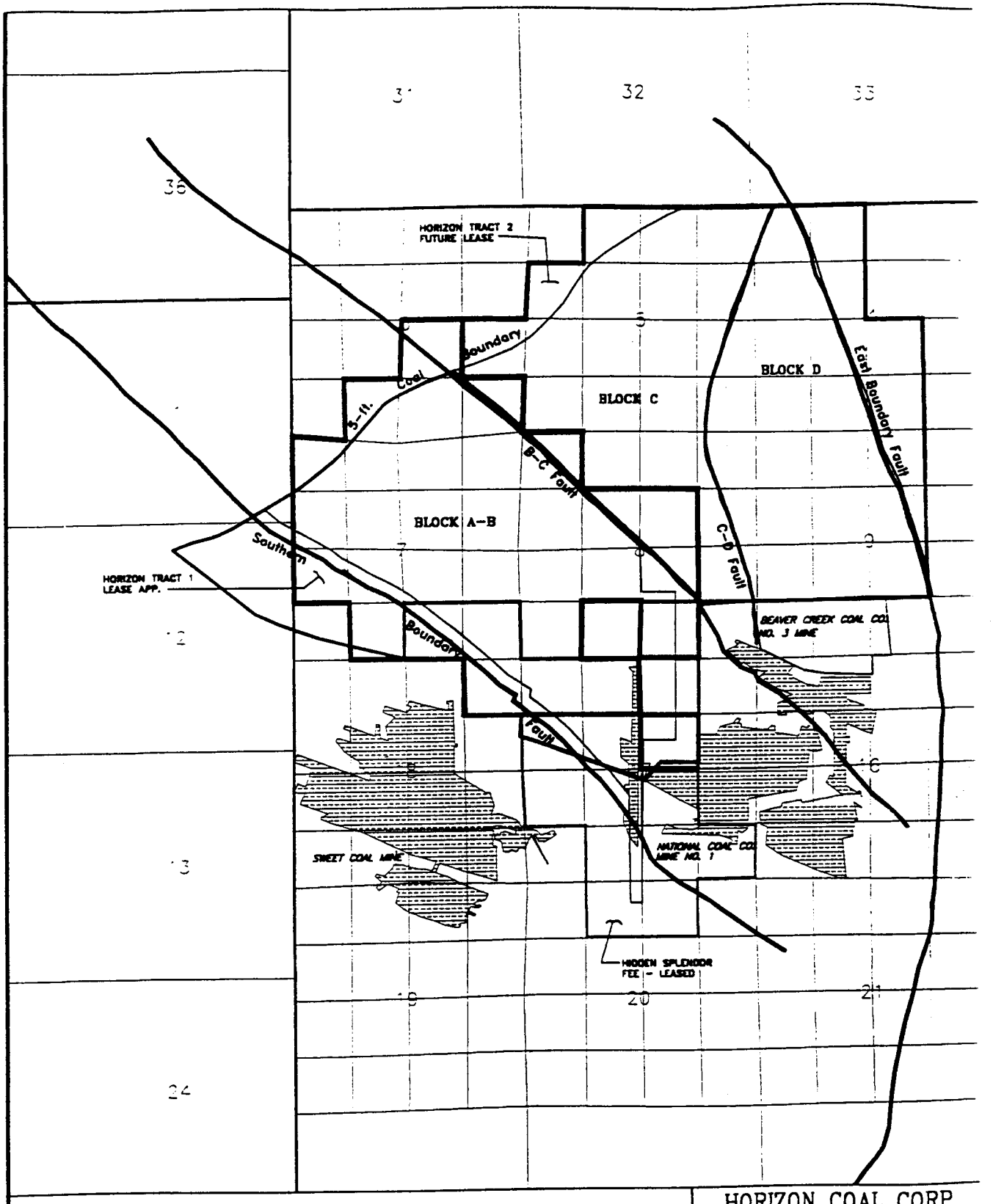
HORIZON COAL CORP.

Demostrated Reserves Area
Hiawatha
Map HT4

Scale: 1" = 3000'

BRADLEY J. BOURQUIN, P.E.
MINE CONSULTANT

DRAWN BY:
VICTOR GRAPHICS - DANIEL SYPERSMA



Map No. HT5
Fault Block Map
Hiawatha Seam

HORIZON COAL CORP.

SCALE: 1"=3000" DATE: 8/8/95

BRADLEY J. BOURQUIN, P.E.
MINE CONSULTANT
DRAWN BY:
VICTOR GRAPHICS - DANIEL SYPERSMA

CORRESPONDENCE

UTE INDIAN TRIBE

UINTAH AND OURAY AGENCY

P.O. Box 190
Fort Duchesne, Utah 84026

In Reply:

June 18, 1997

Earthfax Engineering Inc.
Attn: Ms. Vicky Bailey
7324 S. Union Park Ave, Suite 100
Midvale, UT 84047

Dear Ms. Bailey:

I have reviewed the cultural resource study conducted on the mine area near Gordon Creek, Carbon County, for the Horizon Mine Corporation. I have also spoke with Shane R. Sulz, of Baseline Data, Inc., of Orem, Utah. After these action the Ute Indian Tribe Cultural Rights and Protection department, at this time, have no concerns. If in the event that any cultural resources are located during the project the Ute Indian Tribe would like to comment to the significants of the find to the our Tribe. If I can be of any further assistance I can be contacted at (801) 722-4992.

Sincerely,

Betsy L. Chapoose, Director
Cultural Rights and Protection

BLC:bc

cc: Earthfax File
BLM Moab District
Chrono

United States Department of the Interior
FISH AND WILDLIFE SERVICE
UTAH FIELD OFFICE
LINCOLN PLAZA
145 EAST 1300 SOUTH, SUITE 404
SALT LAKE CITY, UTAH 84115

In Reply Refer To
(CO/KS/NE/UT)

July 16, 1997

Vicky S. Bailey
EarthFax Engineering Inc.
7324 So. Union Park Ave. Suite 100
Midvale, Utah 84047

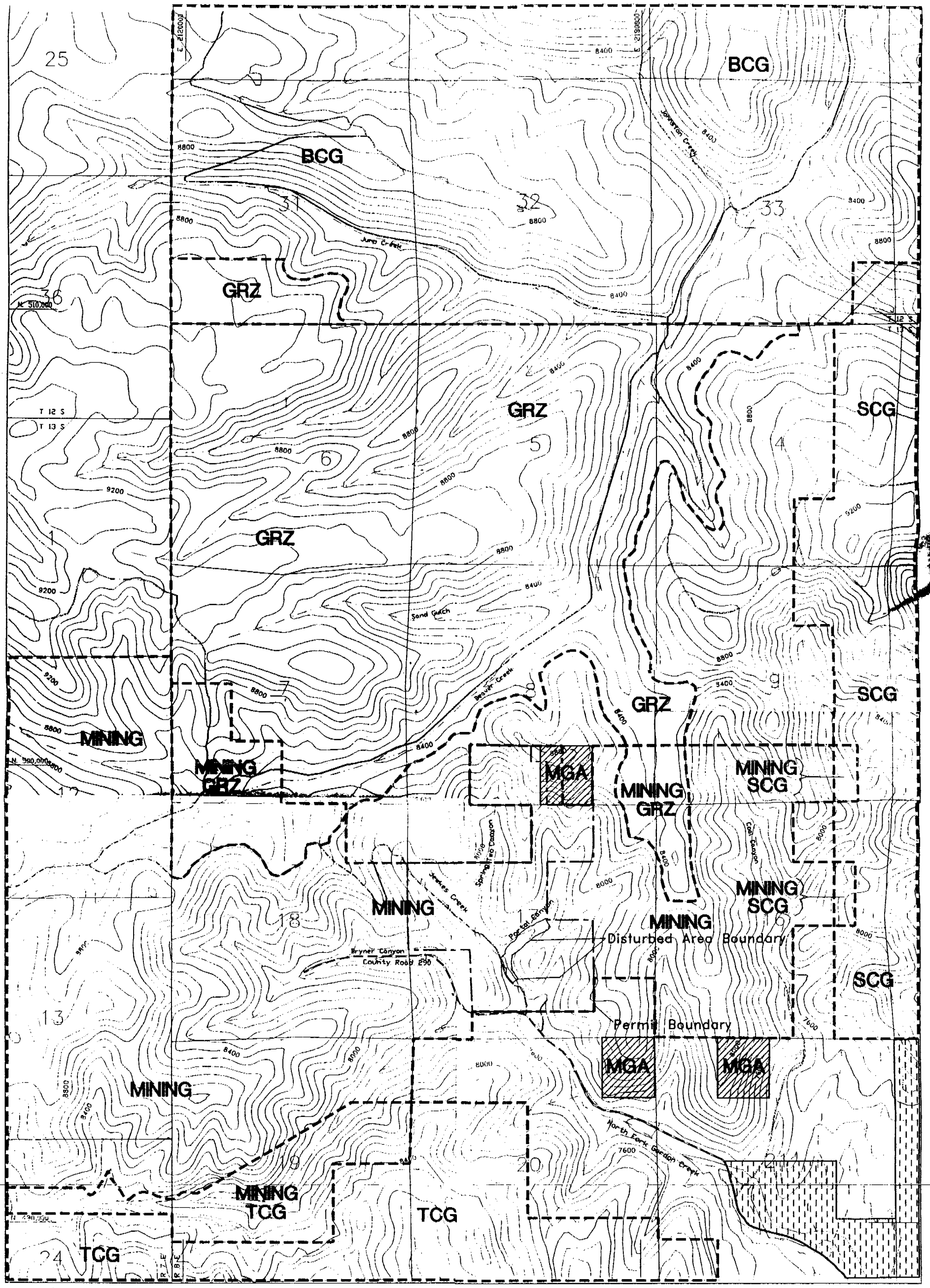
Dear Ms.

We have received and reviewed your letter of July 2, 1997, concerning the development of a proposed coal lease within a portion of Township 13 South, Range 8 East SLBM in Carbon County, Utah. The U.S. Fish and Wildlife Service advises that no federally listed threatened or endangered species are known to occur on the project site. Please advise us if we can be of any further assistance.

Sincerely,

Robert D. Williams
Assistant Field Supervisor

PLATES



LEGEND

- Land Use Boundary Lines
- MGA — Marakis Grazing Allotments (BLM)
- SCG — Spring Canyon Grazing Allotment (BLM)
- MINING — Mining
- GRZ — Grazing (Private)
- TCG — Trail Canyon Grazing Allotment (BLM)
- BCG — Beaver Creek Grazing Allotment (BLM)
- Gordon Creek State Wildlife Management Unit
- Improved Gravel Road
- Unimproved Road
- Jeep Trails
- Streams

NOTE: Unlabeled Areas Not Designated For Specific Land Uses.

REGISTERED PROFESSIONAL ENGINEER No. 7102 RICHARD B. WHITE 8/10/96 STATE OF UTAH

N

0 1000' 2000' APPROXIMATE SCALE

REVISION DATE	BY
5-6-96	BJB
8/10/96	VSB

PLATE 4-1

LAND USE

HORIZON No. 1 MINE

HORIZON COAL CORPORATION
P.O. BOX 2560
WISE, VIRGINIA 24273

DRAWN BY: VSB | CHECKED BY: VSB | DATE: 5-1-96
APPROVED BY: BJB | AUTOCAD FILE: PLATE4_1

BOURQUIN MINERAL ENGINEERING
EARTHFAX ENGINEERING, INC.

S

N

BCCC MC-2-2

ARCO (1980) GC-8

BLUE BLAZE COAL Co. CONSUMERS (1927) DH-3

USGS (1976) W-BC-4-S

ARCO (1980) GC-7

ARCO (1980) GC-6

USGS (1976) W-BC-5-S

BOB WRIGHT

CASTLEGATE A

ABERDEEN SS

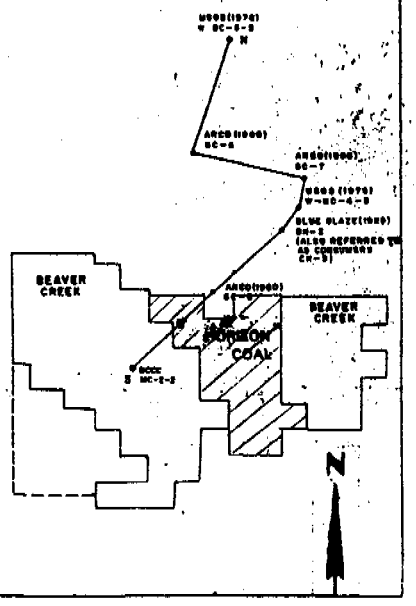
HIAWATHA

STAR POINT SS

BOREHOLE

7000' elevation

INDEX MAP



LEGEND

- 7.0'/9.0' COAL (SEAM THICKNESS/NET COAL)
- FLUVIAL SANDSTONE ≥15'
- MARINE SANDSTONE ≥15'
- SHALE, SILTSTONE, SANDSTONE
- PROJECTED COAL

REGISTERED PROFESSIONAL ENGINEER No. 4548 GUY STATE OF UTAH 2/23/83

Joe E. Shumaker 8/03/90

REVISION DATE	BY

PLATE 6-2

N-S GEOLOGIC CROSS SECTION

HORIZON No. 1 MINE

HORIZON COAL CORPORATION
P.O. BOX 2560
WISE, VIRGINIA 24273

Prepared: A.R. PAPP	Scale: SHOWN
Department: EXPLORATION	Date: 2-21-83
Drawn by: F.S. & B.J.	

ADDENDUM TO ENVIRONMENTAL ASSESSMENT

BEAVER CREEK COAL LEASE TRACT

As a result of public comments received from private land owners, additional analysis of the proposed coal lease tract were evaluated. Concern was raised by the private land owners that previous mining in adjacent lands had disrupted ground water flow and diminished the flow of Beaver Creek. They were concerned that similar surface effects would occur on the new lease tract when mined. Site investigations were made and two reports (one from the BLM and one from Utah Division of Oil Gas and Mining) documenting the areas of concern and the findings were prepared (copies attached). The results of the investigations and conclusions are given. In short, there is no evidence that subsidence from previous mining has impacted Beaver Creek. The proposed tract would lie under Beaver Creek but the depth of mining would be greater than 600 feet. Under past experience and all experts agree that mine subsidence under this depth would not affect the stream. Lease stipulations proposed for the lease still provides assurance for protection of perennial streams. Further assurance and conditions will be provided at the time of mine permitting. The other concerns about mining disrupting and diverting the flows from the Beaver Creek to the Gorden Creek side of the mountain were also analyzed. All existing data and mine workings conclude that mining has not impacted the water regime in the area. It is concluded that underground coal mining has not or will not impact the hydrology of the lease tract area given adherence to established laws and regulations.

EA for Horizon Lease ACT/007/020 #2 Pam

3425
UTU-74804
UT-066

DECISION RECORD/FINDING OF NO SIGNIFICANT IMPACT

EA Log No.: UT-066-95-27

Project Name: Beaver Creek Coal Lease Tract

EA Preparation Date: September 4, 1997

BLM Office: Price River Resource Area

County: Carbon

BLM Office Location: Price, Utah

Phone No.: (801) 636-3600

Applicant: Horizon Coal Corp.

Phone No.: (801) 472-3994

Address: P. O. Box 599
Helper, Utah 84526

EA Preparer: Earthfax Engineering, Inc.

Phone No.: (801) 561-1555

Address: 7324 So. Union Park Avenue
Midvale, Utah 84047

RECORD OF DECISION

Decision:

My decision is to recommend holding a lease sale of the Federal coal lease application with the existing standard lease stipulations. The authority for the lease sale is under the Mineral Leasing Act of 1920, as amended.

Rationale:

1. The action is not adverse to local, state or Federal land use plans for the area.

2. The proposed action is in conformance with the Price River Planning Area Management Framework Plan.

3. The proposed action would not cause any significant environmental impacts.

4. The proposed lease tract would provide access to significant coal reserves

adjacent to existing Federal coal leases where mining applications are under way and would avoid potential coal bypass.

Finding of No Significant Impact: Based on the analysis of potential environmental impacts contained in the attached environmental assessment, I have determined that impacts are not expected to be significant and an environmental impact statement is not required.

Richard L. Manus

Field Manager
Price Field Office

4/2/98
Date

J. William Lamb

State Director
Utah State Office

4/7/98
Date