



United States Department of the Interior

SL-066490

To Tamm T.

OFFICE OF THE SECRETARY

JIM

FEB 12 1982

Minerals Management Service
Office of the District Mining Supervisor
2040 Administration Building
1745 West 1700 South
Salt Lake City, Utah 84104

February 10, 1982

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

Dear Mr. Feight:

Kaiser Steel Corporation has submitted a proposed coal exploration plan for operations on Federal coal leases SL-066490, SL-069291, U-0126947, & U-014217 (Sunnyside south leases). Kaiser plans to drill 11 holes and conduct 9.2 miles of seismic survey. Copies of the plan have been sent to the Office of Surface Mining and the Bureau of Land Management. An onsite inspection will be arranged with all parties as soon as the plan has been distributed.

Please review the plan and submit any concerns to this office. Stephen Falk will be handling this program and arranging an onsite inspection. Please contact him or myself if you have any questions or concerns.

Sincerely yours,

Jackson W. Moffitt
District Mining Supervisor

Enclosures

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PROPOSED SUNNYSIDE SOUTH LEASE

EXPLORATION PLAN

EMERY COUNTY, UTAH

PREPARED BY:

KAISER STEEL CORPORATION

February 4, 1982



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PROPOSED SUNNYSIDE SOUTH LEASE EXPLORATION

PLAN - EMERY COUNTY, UTAH

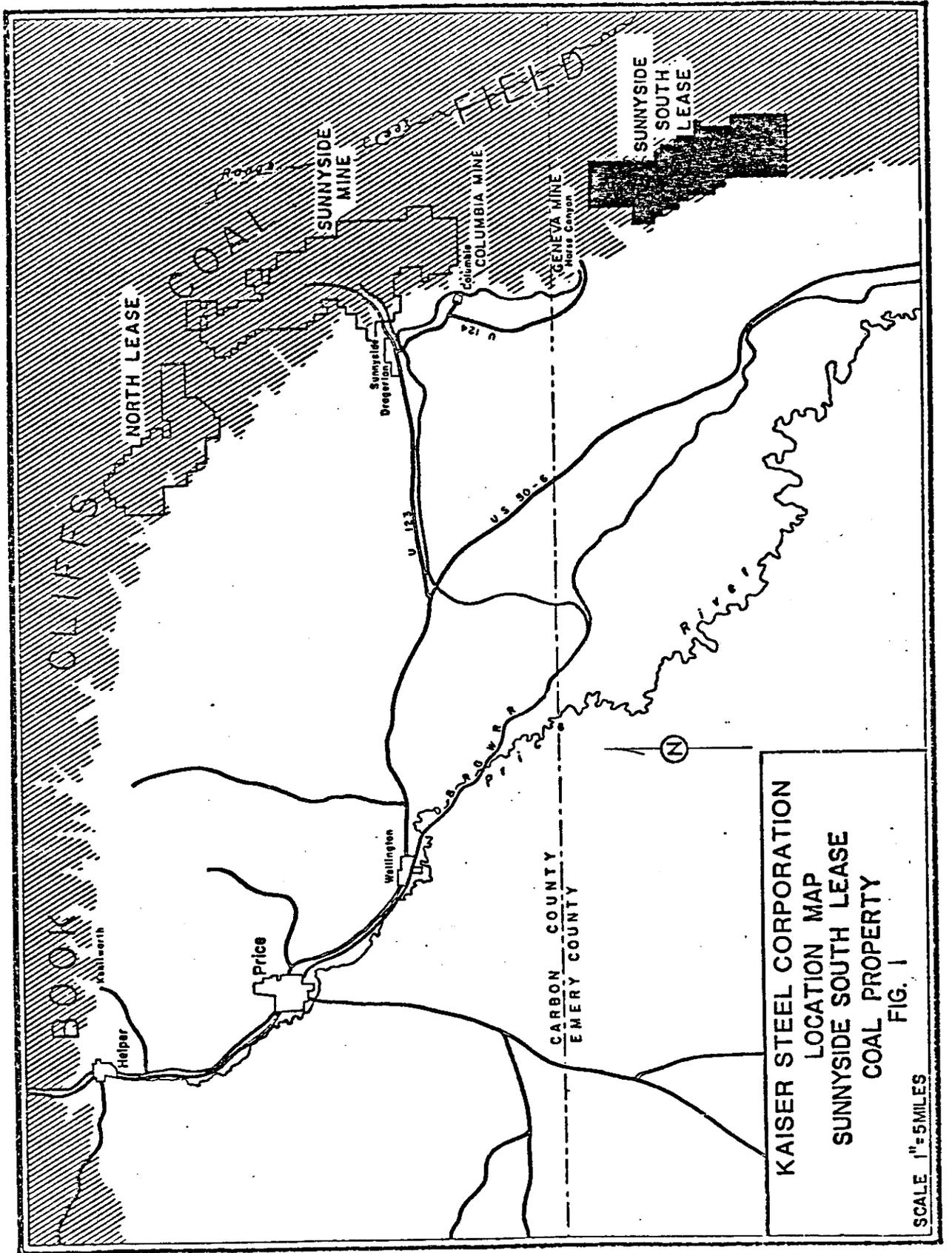
INTRODUCTION

Kaiser Steel Corporation proposes to drill 11 exploratory core holes, to conduct 9.2 miles of seismic surveys, and to construct support roads on the Company's "Sunnyside South Lease" property in Emery County, Utah. The Sunnyside South Lease is being investigated as a potential site for development of an underground coal mine.

The purpose of the drilling and seismic is fivefold:

- 1) To further prove the reserves of coal in the Sunnyside main coal seam.
- 2) To describe the quality of the coal seam with respect to its use for steam generation.
- 3) To more accurately determine faulting.
- 4) To define the general mining conditions of the coal seam (i.e., roof, floor, gas, water, seam thickness, and seam continuity).
- 5) To furnish additional preliminary data to permit mine design.

Location of the Exploration Area - The Sunnyside South Lease coal property, near the coal mining town of Sunnyside, Utah, is located 125 miles southeast of Salt Lake City, 25 miles east of Price and adjacent to the U.S. Steel Corporation's Geneva Mine (Figure 1). The South Lease is an 8,931 acre contiguous block of Federal and State coal rights. Access to the area is provided by U.S. Highway 50-6, Utah Highways 123 and 124, Horse Canyon Road and by the Denver Rio Grande Western Railroad.



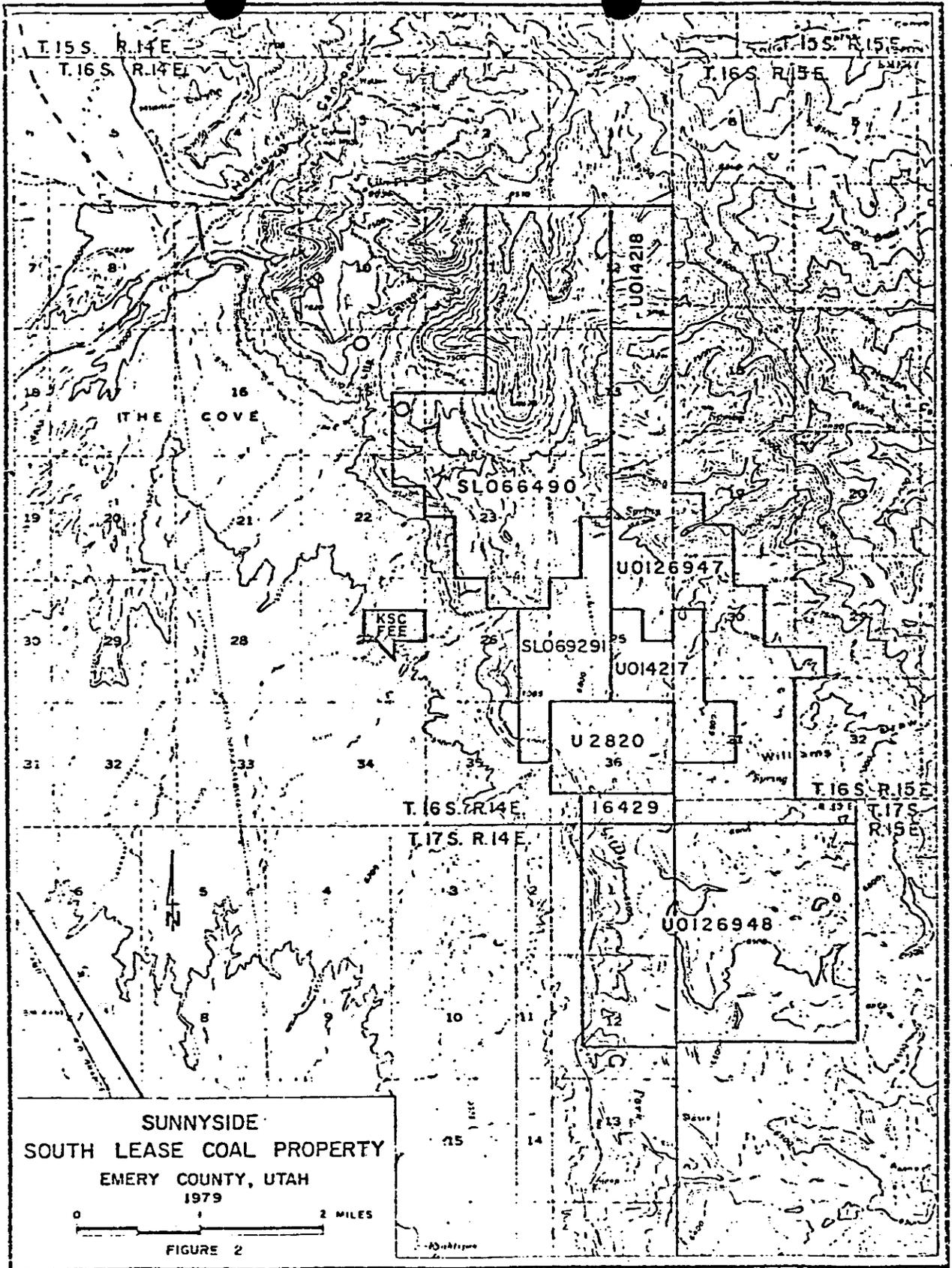
KAISER STEEL CORPORATION
 LOCATION MAP
 SUNNYSIDE SOUTH LEASE
 COAL PROPERTY
 FIG. 1

Other investigations of the lease during the period 1946 to 1979 include surface and geologic mapping, core drilling of 23 holes and washability testing of the cores for metallurgical coke making. Nine coreholes were drilled in 1980-81 in the southern part of the property. However, the information acquired thus far is not sufficient to raise the total reserve to a proven status and does not furnish sufficiently accurate information for preliminary mine design of the total reserve.

Coal Ownership - The coal in the South Lease area is owned by the Federal government except for Section 36, Township 16 South, Range 14 East, which is owned by the State of Utah. Figure 2 illustrates the coal ownership in the South Lease. All 11 holes to be drilled during the proposed exploration program and the seismic survey will be located in coal owned by the Federal government.

Surface Ownership - The surface of the South Lease area is largely public domain, with approximately 240 acres being privately owned. The private surface is in the northeast one-quarter of Section 11, T 16 S, R 14 E and is owned by George and Jane Porter, Box 1042, East Carbon, Utah 84520 (unlisted telephone). The State of Utah controls approximately 760 acres of surface and the Federal government controls the remainder through the BLM. All 11 proposed holes and seismic lines will be located on surface owned by the Federal government.

Leased Coal - The Sunnyside South Lease area consists of State and Federal coal leases totaling 8931.31 acres. Kaiser Steel Corporation acquired the first 2,400 acre coal lease in 1947. Seven additional State and Federal



leases were obtained in subsequent years, completing the present South Lease block. In Township 16 and 17 South, Range 14 and 15 East, Emery County, Utah, Kaiser controls Federal leases SL-066490, SL-069291, Utah-014217, Utah 014218, Utah 0126947, Utah-0216948 and State of Utah leases 16429 and 2880. Figure 2 illustrates the location of each lease in the South Lease block.

Kaiser Steel Corporation's address is as follows:

Kaiser Steel Corporation
300 Lakeside Drive
P.O. Box 58
Oakland, CA 94604
(415) 271-2711
Attn: J.T. Taylor

Application - Kaiser Steel Corporation hereby applies for permission to conduct the exploration program described herein, in compliance with CFR 211.10 and 211.20.

THE NATURAL ENVIRONMENT

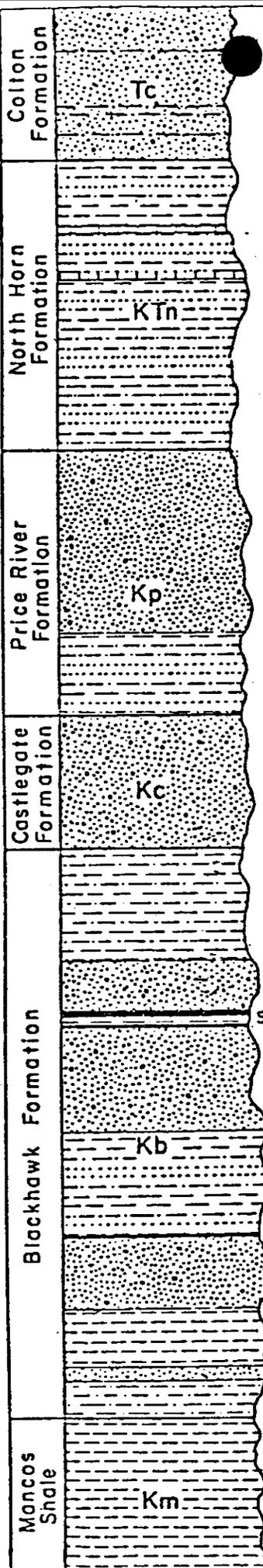
Climate - The climate of the lease area is typically continental with cold winters and hot summers. Average monthly temperatures range from 25 degrees Fahrenheit in January to 70 degrees Fahrenheit in July. Precipitation averages 12 inches per year, and potential evaporation averages 36 to 40 inches per year. Winds are generally light to moderate with average speeds below 20 mph.

Geology - The Sunnyside South Lease occupies the higher elevations of two dominant local physiographic features, the Book Cliffs and the overlying Roan Cliffs. Escarpment generally coincides with the western edge of the property and rises nearly 1,000 feet above the lowlands to the west. The lease is situated primarily in a broad valley known as Little Park.

Displayed across the lease area is a complex of Upper Cretaceous and Lower Tertiary strata, of which the Book Cliffs and overlying bench comprise the Upper Cretaceous units, and the Roan Cliffs comprise the Tertiary units. Below and to the west of the cliffs is a broad, topographic low named Castle Valley formed in the Mancos Shale. Rising abruptly from this lowland are the Book Cliffs, which are composed of the lower members of the Mesa Verde Group - the cliff-forming Blackhawk Formation and Castlegate Sandstone. The more easily eroded, Late Cretaceous Price River and North Horn Formations have weathered into the ledges and gentle slopes across Little Park above the Book Cliffs escarpment. The Colton Formation (Tertiary) has formed steep canyons and cliffs in the more rugged Roan Cliffs to the north and east. A generalized lithologic section of the South Lease area is presented in Figure 3.

UPPER CRETACEOUS

MESAVERDE



Tc

COLTON FORMATION: Upper Member—Siltstone and siltstone beds mostly maroon; forms cliffs and very steep slopes. Lower Member—Channel-fill deposits, lens-shaped siltstone deposits interbedded with mudstones; mostly gray and maroon; beds thinner than in the Upper Member; forms ledges and steep slopes. Thickness of formation: Up to 3,000 feet.

KTn

NORTH HORN FORMATION: Interbedded siltstone, sandstone, mudstone, and limestone; beds mostly thin and lens-shaped; forms gentle slopes and ledges. Limestone beds rich in invertebrate fossils. Thickness of formation: 300 to 350 feet.

Kp

PRICE RIVER FORMATION: Bluecastle Sandstone Member—Fine- to medium-grained sandstone; a single bed composed of fluviatile, channel-fill deposits; forms cliffs and ledges. Mudstone Member—Interbedded and discontinuous mudstone, siltstone, and sandstone; mostly dark gray to dark brown; forms slopes and low ledges. Locally contains vertebrate fossils. Thickness of formation: 275 to 300 feet.

Kc

CASTLEGATE SANDSTONE: Fine- to medium-grained sandstone; local concentrations of clay galls at various horizons; forms high, abrupt cliffs and bare sandstone dip slopes. Thickness of formation: 145 to 160 feet.

Kb

BLACKHAWK FORMATION: Upper Mudstone Member—Mudstone and discontinuous sandstone, siltstone, and claystone; Sunnyside coal bed at base. Sunnyside Member—Arenaceous siltstone and very fine-grained to medium-grained sandstone, grading downward from coarser to finer; forms cliffs; sharp upper contact; transitional lower contact. Lower Mudstone Member—Mudstone and discontinuous siltstone, sandstone, and claystone; Rock Canyon coal bed at base. Kenilworth Member—Siltstone and very fine-grained to medium-grained sandstone; forms lower part of Book Cliffs. Thickness of formation: 550 to 600 feet.

Km

MANCOS SHALE: Dark gray fissile mudstone containing discontinuous layers of claystone and limy concretions. Intertongues with lower members of the Blackhawk Formation. Thickness of formation: 3,000 to 4,000 feet.

GEOLOGIC DESCRIPTIONS DERIVED FROM USGS MAP 1-798, 1974

KAISER STEEL CORPORATION
GENERALIZED LITHOLOGIC SECTION
SUNNYSIDE SOUTH LEASE

EMERY COUNTY, UTAH
 1979
 FIGURE 3

The coal measures in the lease area dip eastward at 11 to 14 percent. A major system of transverse, easterly trending normal faults has been mapped. The pattern of the faults forms a series of horsts and grabens. Displacements across the faults range from a few feet to 205 feet.

The coal measures are present in the Blackhawk Formation. The principal economically recoverable coal seam is the Sunnyside main seam, which outcrops in the Book Cliffs escarpment approximately 550 to 700 feet from the base of the cliffs. For the most part, the Sunnyside main seam is under less than 1,500 feet of cover throughout the lease, extending over the entire length of the property and varying in thickness from 45 inches to more than 12 feet.

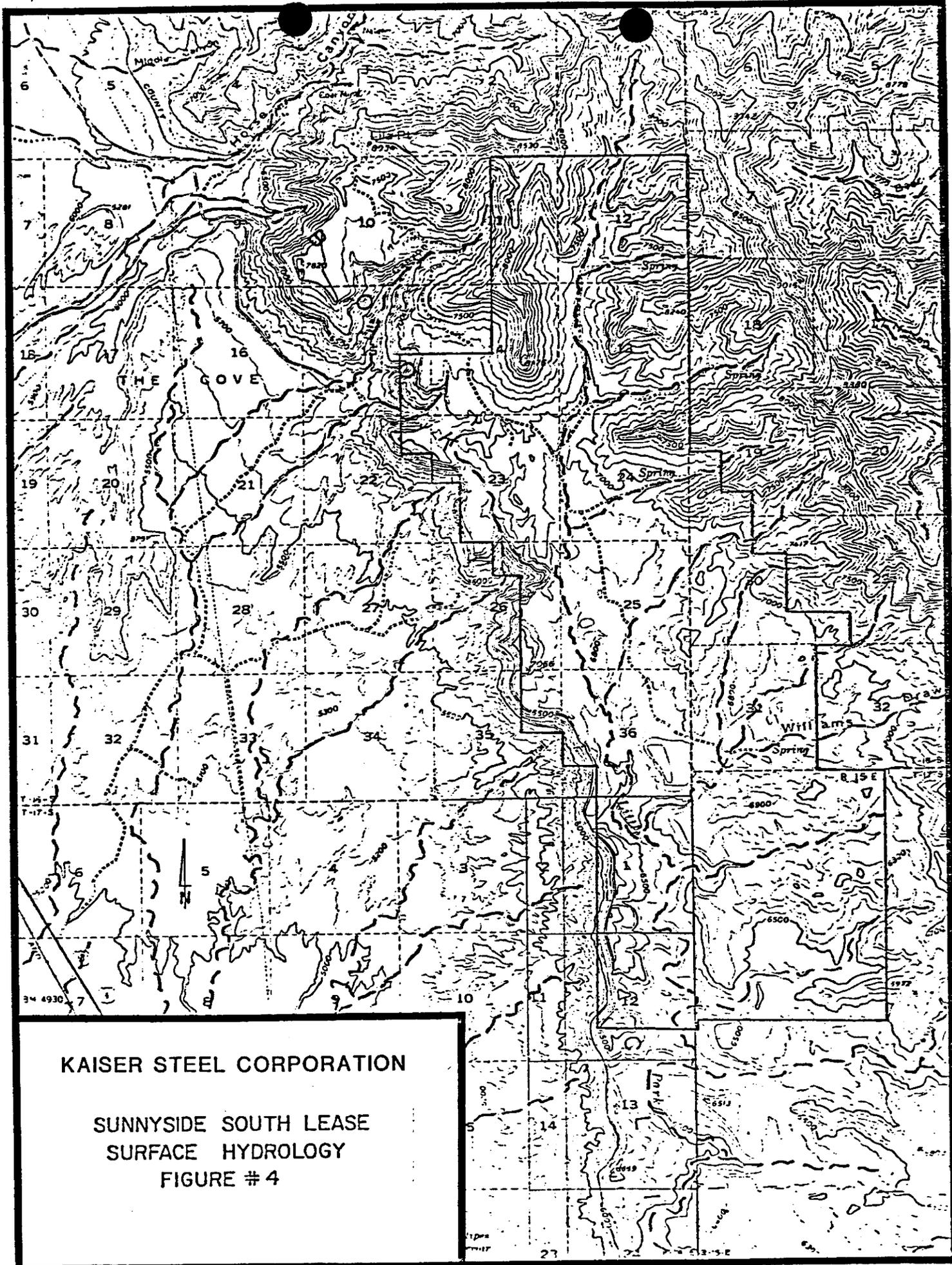
Soils - The soils along the Book Cliffs and in the associated canyons are derived primarily from parent materials of sandstone and shale. They are typically medium textured, thin to moderately thick, and cobbly and stony. They are well to excessively drained.

Above the Book Cliffs the slopes form gentle to rolling benches. Soils in this area are dominantly dark-colored soils of the mountains and plateaus that are usually moist in some parts during the summer. The soils have formed from sandstone, shale and limestone. They commonly have a silt loam to loam surface and a loam to clay loam subsoil. In some areas, bedrock is exposed with little or no soil cover. If care is taken in locating drill sites, soil conditions should not be a limiting factor in site reclamation.

Surface Water - The lease area is drained almost in total by Little Park Wash, a tributary of the Price River (Figure 4) lying between the Book Cliffs and Roan Cliffs. A small portion of the area along the face of the Book Cliffs is drained by unnamed tributaries of the Price River. Little Park Wash drains in a southerly direction parallel to the Book Cliffs. Approximately seven miles of Little Park Wash passes through the lease area, with the headwaters located in the northern portion of the exploration area. Little Park Wash has an intermittent flow primarily in response to rainfall and snowmelt. However, unnamed, spring-fed tributaries contribute some flow.

Groundwater - Formations which are potentially water-yielding aquifers are thought to contain little or no water near their outcrops along the Book Cliffs due to drainage or water movement downdip, generally northeastward. Groundwater in the soil or shallow aquifers may be perched, or impeded from deeper infiltration by one or more layers of rock having relatively low permeability. Permeable strata in most of the formations above the Mancos Shale, including the coal-bearing Blackhawk Formation, probably contain water at depths of 1,500 feet or greater. Springs in the area fed by groundwater are found along the westward-facing outcrops on the east side of Little Park Wash (Figure 4). The springs are probably located either above less permeable strata or along fracture zones caused by faults. Four springs are known to exist along the eastern boundary of the proposed exploration area. Three of these springs are within the lease area and are probably important sources of water for wildlife.

Vegetation - Vegetation in the lease area is indigenous to that of a semi-arid climate, and has been classified in the pinyon-juniper woodland



KAISER STEEL CORPORATION

SUNNYSIDE SOUTH LEASE
SURFACE HYDROLOGY
FIGURE # 4

vegetation type. Conifers of the juniper and pinyon pine species are common, with ponderosa pine predominantly on the highest slopes. Range grasses and sagebrush flourish over nearly all of the Little Park area. Cottonwoods have become established in zones of higher moisture, such as fault traces, or in the washes near springs. No endangered plant species are known to exist in the area.

Fish and Wildlife - A variety of wildlife species inhabit the lease area. Mule deer, cougar, black bear, coyote, red fox, gray fox, bobcat, raptors, chukar partridge, sage grouse, jack rabbits and cottontail rabbits are some of the species which would be anticipated in the area. No endangered species are known to inhabit the area. Mule deer is the most numerous big game species in the area. The lease area is within the Utah Division of Wildlife Resource's deer management area 27B and is classified as winter range for mule deer.

The Little Park Wash is the principal drainage in the lease area. However, due to its highly intermittent flow it is not thought to support any significant fish populations.

Land Use and Cultural Resources - The principal land uses in the area are grazing and recreation. All land in the proposed exploration area is leased for grazing except for 10 acres of Federal lands and approximately 240 acres of private land for which there is no record of leasing surface rights in the Court House of Emery County. The principal use of the area for recreation is thought to be hunting mule deer and small game.

The prehistory of the Central Utah Coal Region spans 12,000 to 14,000 years, and previous study by the Archaeological-Environmental Research Corporation under contract with the U.S.G.S. has identified a variety of archaeological site types in the region. However, a detailed survey of the lease area is in progress to determine the presence of any sites. A check of the National Register of Historic Places reveals no cultural features in the lease area.

PROPOSED EXPLORATION PLAN

The exploration/evaluation program proposed by Kaiser Steel Corporation will consist of two phases to be conducted in late winter, 1982, before the spring thaw. This is necessary in order to adhere to externally imposed scheduling. Phase I will consist of the seismic work, followed by the drilling in Phase II. All efforts will be limited to the northern half of the property. Snow cover and inclement weather are expected.

Phase I: Seismic Survey - Kaiser proposes to conduct 9.2 miles of shallow, high resolution reflection seismic lines. 7.1 miles of primary and 2.1 miles of alternate lines are shown on Plate I. The alternate lines are shown in the event it is not possible to run seismic surveys along some of the primary lines. It may be necessary to conduct additional surveys along some alternate lines to better define anomalies resulting from the original 7.1 miles of lines, but this is currently planned only as a contingency.

The possibilities for the signal source include small explosive charges and small handheld or vehicle-mounted vibrators. The use of explosives seems most likely. Experimentation on site will be necessary, but possible means of placing explosive charges (1 to 5 lbs. per shot) include surface (unlikely), shallow - auger holes, (most desirable), and shallow drill holes (most expensive). Charges will be small enough so the cuttings replaced in the holes above the charges will not be blown out. There will be about 26 shot points per mile. The geophones, or sensing devices, will be clustered in groups of 6 to 12, with 36-48 clusters in a linear arrangement and 40-50 feet between clusters. They are held in place on the surface by means of a short, built-in spike, but frozen ground may preclude that approach and may require simply pushing them down into the snow.

TABLE I

PHASE I: SEISMIC SURVEY

<u>LINE NUMBER</u>	<u>LENGTH (FT.)</u>	<u>LENGTH MILES</u>
Primary:		
A	16,500	3.1
B	8,700	1.6
C	5,280	1.0
D	3,650	0.7
E	3,500	<u>0.7</u>
		7.1
Secondary:		
F	6,000	1.1
G	5,280	<u>1.0</u>
		2.1

A seismic line is first roughly surveyed and then shot points created and geophones placed. All placements are then accurately surveyed and the shot is made. One or several shots may be made for each arrangement of geophones and then the sequence activities is repeated. The shots and signals from the geophones are recorded on equipment in a truck located near the line.

Depending upon conditions of soil cover and shallow lithology, drillholes for shots may vary in depth from five to eighty feet. The equipment which may be used includes hand-held or tractor-mounted power augers, truck-mounted vibroseis, and small rotary drill rigs. It is possible that all of these methods will be used. Barring weather-induced delays, the seismic fieldwork should require less than one month, starting as soon as possible after permission is granted by the appropriate agencies.

Phase II: Drilling - Kaiser proposes to drill 11 coreholes following the seismic fieldwork. Plate I shows the proposed locations of the 11 drill-holes, together with an additional 6 alternate locations. The alternate locations are shown in the event it is not possible to drill in some of the primary locations. It may be necessary to drill holes in some of the alternate locations to better define anomalies resulting from the primary location holes. In this case, some primary holes would probably be deleted to keep the total at 11 holes, but events could transpire to cause the total to exceed 11 by a few. However, this is neither desirable nor expected. Table 1 shows approximate elevations and depths. The primary holes will probably be drilled in numerical sequence. Hole locations are shown on the attached map.

TABLE II

PHASE II: DRILLING DEPTHS

<u>Drillhole</u>	<u>Surface Elevation (Ft.)</u>	<u>Core Point (Ft.)</u>	<u>Total Depth (Ft.)</u>
<u>PRIMARY HOLES</u>			
1	7,010	6,015	1,040
2	6,890	6,015	920
3	6,820	6,265	600
4	6,700	6,165	580
5	7,125	6,265	905
6	6,710	5,965	790
7	7,150	5,415	1,780
8	6,880	5,565	1,360
9	6,810	5,765	1,090
10	6,780	5,465	1,360
11	7,015	5,565	<u>1,495</u>
			<u>11,920</u>
<u>ALTERNATE HOLES</u>			
12	7,030	6,165	910
13	7,120	6,065	1,100
14	6,890	5,965	970
15	6,890	5,715	1,220
16	6,810	5,765	1,090
17	6,900	5,565	<u>1,380</u>
			<u>6,670</u>

Access Roads - Access roads will be constructed to 9 of the 11 proposed primary holes while 3 of the alternate holes would require new roads. The preferred routes to these holes require a total of 4 miles of new road. However, it must be emphasized that these new roads will not necessarily require excavation and grading. Access roads will be located to the extent possible where vehicles and equipment can pass overland without grading and excavation being necessary. Width of the access roads will be the minimum necessary for drilling equipment, and will not exceed 14 feet. Newly constructed and existing roads, including the Horse Canyon/Little Park roads, will be regraded as needed. For existing roads, appropriate procedures for road-use applications will be followed. If necessary, drainage ditches will be constructed in conjunction with new access roads to reduce soil erosion and road surface deterioration. Snow conditions will require plowing of the access roads initially and maintenance by a plow or other equipment of the roads only as long as is necessary to drill a given hole or to conduct a specific seismic survey line.

Equipment - The proposed seismic work will involve some type of shot hole drilling apparatus, possibly including man-portable augers, tractor-mounted augers, and/or truck-mounted rotary drill rigs. Only the rotary rig would use a circulating medium which would probably be air. If a rotary rig is used, it will probably be smaller than that described below. The seismic crew will use 4-wheel drive pickup trucks for transporting equipment and personnel, and the recording truck will probably be a van or small truck.

The proposed drilling will be completed with two rigs, working on a 24-hour per day schedule. Both rigs will be truck-mounted of the general size of a 1500 Midway with 3-axle drive. The gross weight of one rig is about

25 tons. These rigs will be outfitted with Sullair 750 (or similar type) air compressors capable of compressing a maximum of 750 cubic feet per minute, averaging 425-250 cubic feet per minute, and lifting a load of 250 pounds per square inch. Auxiliary equipment to the rigs will be three or four 1250 gallon water trucks, two pipe trailers, a winch and casing truck, flatbed truck, two doghouses, two foreman's pickup trucks, four crew trucks, two fuel trailers, six geologists' trucks, and a geophysical logging truck. For preparation of access roads and drill sites and backfilling and grading during reclamation, backhoes and D-6 to D-8 size bulldozers will be used.

Snow conditions may dictate use of snowmobiles, especially along the seismic lines where access is expected to be a problem. Use of all vehicles, including snowmobiles, will be restricted to the designated and approved access roads and seismic lines. The initial plowing of roads will probably be with a bulldozer, with subsequent maintenance by a road grader.

Drilling Sites, Drilling Fluid, and Mud Pits - The drilling fluids to be used are non-toxic, biodegradable foam, and bentonitic compounds, and will be contained in mud pits while drilling proceeds. Two mud pits, averaging about 6 x 8 x 8 feet each will be dug for each drill hole. If the two mud pits are not large enough to contain all the drilling fluid, then an additional sump(s) will be dug to trap the excess. At drill sites where mud pits are left unattended, temporary fencing will be constructed around the pits to protect wildlife and livestock.

Drill sites will be constructed only of a size sufficient to accommodate the rig and necessary support facilities. If surficial material needs to be removed for construction of a drill site, it will be stockpiled for redistribution on those sites. Drill sites probably will average 50 x 60 feet, with a probable maximum disturbance area of 50 x 100 feet.

Average penetration rates characteristic of drilling in this area would require a rig to occupy a site three days on the average. This includes anticipated normal delays due to mobilization, set up and demobilization. Inclement weather could lengthen this time.

Drill Hole Dimensions - Maximum depth of drilling will not exceed 2100 feet. Rotary hole size will normally be 5 7/8 to 6 1/4 inches with a 3.0 inch core being taken through the Sunnyside coal seams. All holes will be cased at the surface for 20-50 feet with down hole casing used if needed. Casing will require a hole diameter of 8 to 9 inches, with a smaller diameter hole below. All casing will be retrieved after drilling, if possible, although its placement will probably require grouting, making retrieval uncertain. Each hole will initially be an open hole drilled with air and foam injection. If these methods prove to be inefficient with the increased depth of the hole, the method of drilling will then be switched to mud circulation. Mud circulation would then be used until the completion of the hole. Approximately the bottom 50 feet of each drill hole will be cored.

Drill Hole Data - Geophysical logs will be run in each hole drilled. These logs may include but not be limited to a gamma ray, gamma-gamma (density), resistivity, neutron, sonic, spontaneous potential and caliper log. Other drill hole data will include driller's and geologist's

lithologic logs, and laboratory analyses taken from the coal cores. All of the above data will provide information concerning water-bearing zones, lost circulation area, mineral constituents of coal, roof, and floor, and general lithology.

Water - Water may be obtained from a variety of sources, including Geneva Mine waste water, Range Creek, Price River, and Green River. Before any water is taken from these sites, Kaiser will either obtain its own water rights or draw up an agreement for compensation with individual owners. Anticipated water needs for the proposed drilling could be as high as four truckloads per day per hole.

PROPOSED RECLAMATION PLAN

It is the objective of Kaiser to conduct the proposed exploration program in a manner which promotes minimal disturbance of the natural environment. To the extent possible, exploration activities have been proposed in areas of existing access. However, this is not possible in some areas and in such instances, access roads, drill sites, and seismic activities will be located so that disturbance of the natural vegetation and existing land forms will be minimal. The lasting impact of necessary disturbances on the natural environment will be minimized by responsible reclamation.

Access Roads - Access shall be restricted to existing and designated new roads. Existing roads will be maintained in good condition throughout the life of the exploration program. At completion of the program, existing roads will be abandoned in a condition equal to or better than they existed prior to the exploration activities. For drill sites and seismic lines located away from existing roads, access roads will be routed through those areas which will have minimal impact on the natural environment. Roads will be routed over the most stable slopes available to minimize erosion. Access roads will be located to the extent possible where vehicles and equipment can pass overland without grading or excavation being necessary. The overall grade of access routes will not exceed 10 percent. Access roads will meander to the extent necessary to avoid excessive damage to vegetation and other obstacles. Access roads will not be located in wet, steep or unstable areas where complete restoration is not possible.

In those areas where development of access roads requires grading or excavation, surficial material will be removed and stockpiled. In the event it is necessary to cross flowing streams or wet areas, temporary

culverts will be installed. It is hoped that frozen ground will preclude this. All access roads will be maintained sufficiently to ensure minimal erosion for the life of the road.

Immediately after a constructed access road is no longer needed for operations or reclamation it will be closed to all vehicle traffic. Constructed access roads, including temporary culverts, will be completely removed and the land affected regraded to the approximate original contour. Surficial material will be redistributed, and the area seeded. Access roads will be reclaimed as promptly as possible upon the completion of operations. All disturbed areas will be reclaimed prior to abandonment of the area. Reclamation will logically be delayed until late spring, or at least until the area is dry enough to achieve reclamation.

Drill Sites - Drill sites have been selected which permit drilling operations without requiring extensive leveling and excavation to the extent possible. For those areas where excavation is required, such as mud pits, surficial material will be removed and stockpiled for redistribution.

When drilling is completed, and after the spring thaw, mud in the mud pits will be allowed to dry to a solid prior to backfilling and grading. If time does not permit complete drying of the mud, it will be pumped out, hauled off the lease, and disposed of in a location approved by federal, state, and local authorities. When it is necessary to abandon mud pits temporarily prior to backfilling, they will be fenced to protect livestock and wildlife. Waste materials from the drilling operation, unsuitable for use in reclamation, including excess drill cuttings, will be removed from the

property and disposed of at a site approved by federal, state and local authorities.

Groundwater encountered during drilling will be drained into the mud pit. However, should excessive amounts of water be produced, a small impoundment will be constructed to receive the water. The water will be allowed to evaporate prior to backfilling and seeding.

Hole Plugging - Abandonment of drill holes in Phase II will be done by cementing from bottom to top. A cement slurry will be pumped through the drill stem under pressure to assure proper cementation. Present plans are to have the two rigs do their own cementing. However, as an alternative, the services of an independent contractor may be employed to cement the holes.

At completion of abandonment, a numbered steel washer or tag will be embedded at the top of each hole for future identification. Due to the shallow depth expected for the seismic shot holes, abandonment will consist of refilling holes with cuttings and installing a permanent surface cap, probably five feet of cement. The proposed method of plugging should provide adequate protection from contamination of groundwater aquifers and for future underground mining in the area.

Reclamation - Upon completion of drilling operations, and at a time acceptable to the BLM, all disturbed areas will be backfilled and graded to approximate original contour. Surficial materials will be redistributed over the disturbed area. The disturbed area will then be seeded with a

mixture of species which have a history of success in revegetation of disturbed lands, provide palatable forage for livestock, and have food and cover values for wildlife. Unless the BLM designates a different one, a seeding mixture similar to the following is proposed at the rates specified:

Fairway Crested Wheatgrass	2 lb./acre	PLS
Standard Crested Wheatgrass	1 lb./acre	PLS
Pubescent Wheatgrass	2 lb./acre	PLS
Intermediate Wheatgrass	2 lb./acre	PLS
Russian Wild Rye	2 lb./acre	PLS
Smooth Broom	2 lb./acre	PLS
Orchard Grass	1 lb./acre	PLS
Yellow Sweet Clover	<u>2 lb./acre</u>	PLS
TOTAL	14 lb./acre	PLS

Seeding will be done by hand. Fertilizer will be applied as determined necessary to successfully revegetate disturbed areas. Mulch will be applied as determined necessary to control erosion. Additional erosion control structures, such as water bars, will be installed if deemed necessary.

Reclamation Schedule - Reclamation will be completed as promptly as conditions permit and at the time designated by the BLM. All disturbed areas will be reclaimed prior to late fall of 1982.

Air Quality - The proposed exploration program will have a negligible affect on the ambient air quality. The only source of potential pollution

of any significance would be fugitive dust from vehicles traveling in the area. However, due to the minimal amount of travel in the lease area, the low speeds which will be maintained and the conditions of snow cover, this is considered to be a negligible impact.

Hydrology - The proposed exploration program has given careful consideration to protection of the hydrologic regime. Potential sources of pollution include open drill holes, erosion from disturbed areas and extended exposure of potentially toxic materials. Drill holes will be sealed promptly upon completion of drilling to avoid contamination of groundwaters. Appropriate measures for erosion control will be incorporated in each phase of the program, and potentially toxic materials will be removed from the area. Therefore, impacts of the proposed exploration program on the hydrologic regime will be minimal.

Fish and Wildlife - Any impact of the proposed exploration program on the wildlife resources of the lease area would result from increased activity in the area and disturbance of the natural vegetation. Any such impacts can be minimized by restricting exploration activity to those areas specified in the proposed exploration plan and revegetating disturbed areas as soon as possible with species of value to wildlife for food and cover.

The value of the lease area for winter range for mule deer will not be diminished. Exploration activities will be short in duration and localized. Therefore, the proposed activities should not have a significant impact on the winter deer herd.

No significant populations of fish are known to exist in the lease area. However, streams and water bodies will be protected by incorporating the appropriate measures of erosion control into each phase of the proposed exploration program.

Considering the small scale of the proposed activities in the lease area, impacts upon the fish and wildlife resources should be minimal. The proposed reclamation and environmental protection measures should further minimize any impact on the fish and wildlife resources of the lease area.

Endangered Species - No endangered species of plants or animals are known to inhabit the lease area. An exceedingly small area will be disturbed by construction of access roads, drill sites, and seismic lines. The chances of impacting threatened or endangered species are remote.

Archaeology - A formal survey of archaeological sites within the lease area is in progress. No sites on the National Register of Historic Places are known to be present, nor would any be disturbed.

Fire - No burning or open fires will be permitted on the lease area. In the event of fire, equipment such as fire extinguishers, picks, shovels, and water will be available at the site for fire control. The winter conditions should further minimize fire danger.

Public Health and Safety - No phase or specific act of the proposed exploration program will create a hazard to public health and safety.