ENVIRONMENTAL ANALYSIS

OF THE PROPOSED CHANGES

TO KAIPAROWITS MINES 1 - 5

KANE COUNTY, UTAH

PROPONENT: MONO ET. AL.

9-1267

(Site Specific)

Mono Power, et al.

Kaiparowits Mines Nos. 1-5

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Mono Power, et al.,

Kaiparowits Mines Nos. 1-5

Chapter I: Description of Proposed Action

A. Introduction

The analysis contained in this report is of the changes in mine plans or presentation of new analytical data for the proposed Kaiparowits Nos. 1-5 mines, which are located in southern Utah (fig. 1). The descriptions are limited to treat essentials of the proposed actions and of environmental factors that may be impacted if the proposed actions are implemented. The Kaiparowits 1-5 mine Mining and Reclamation Plan, prepared by Kaiser Engineers in July 1975, was evaluated in the final Kaiparowits power project Environmental Impact Statement (BLM, 1976). The proponents are Mono Power and others (Resources Company, wholly owned subsidiary of Arizona Public Service Company, New Albion Resources Company, wholly owned subsidiary of San Diego Gas and Electric Company, and Mono Power Company, wholly owned subsidiary of Southern California Edison Company). Following completion of the Kaiparowits EIS the proponents withdrew all proposals and applications except the Kaiparowits Mining and Reclamation Plan to mine coal on Federal leases. The mining plan, as originally proposed, has been modified by a submittal to the USGS from Mono Power, et al., dated November 1976. Kaiser Engineers submitted facility location and design changes in February 1977. Only the changes to the original Kaiparowits Mining and Reclamation Plan and updating, where required, of the Kaiparowits Power Project EIS is considered in this environmental impact statement. The only pending Federal action is approval of the mining and reclamation plan.

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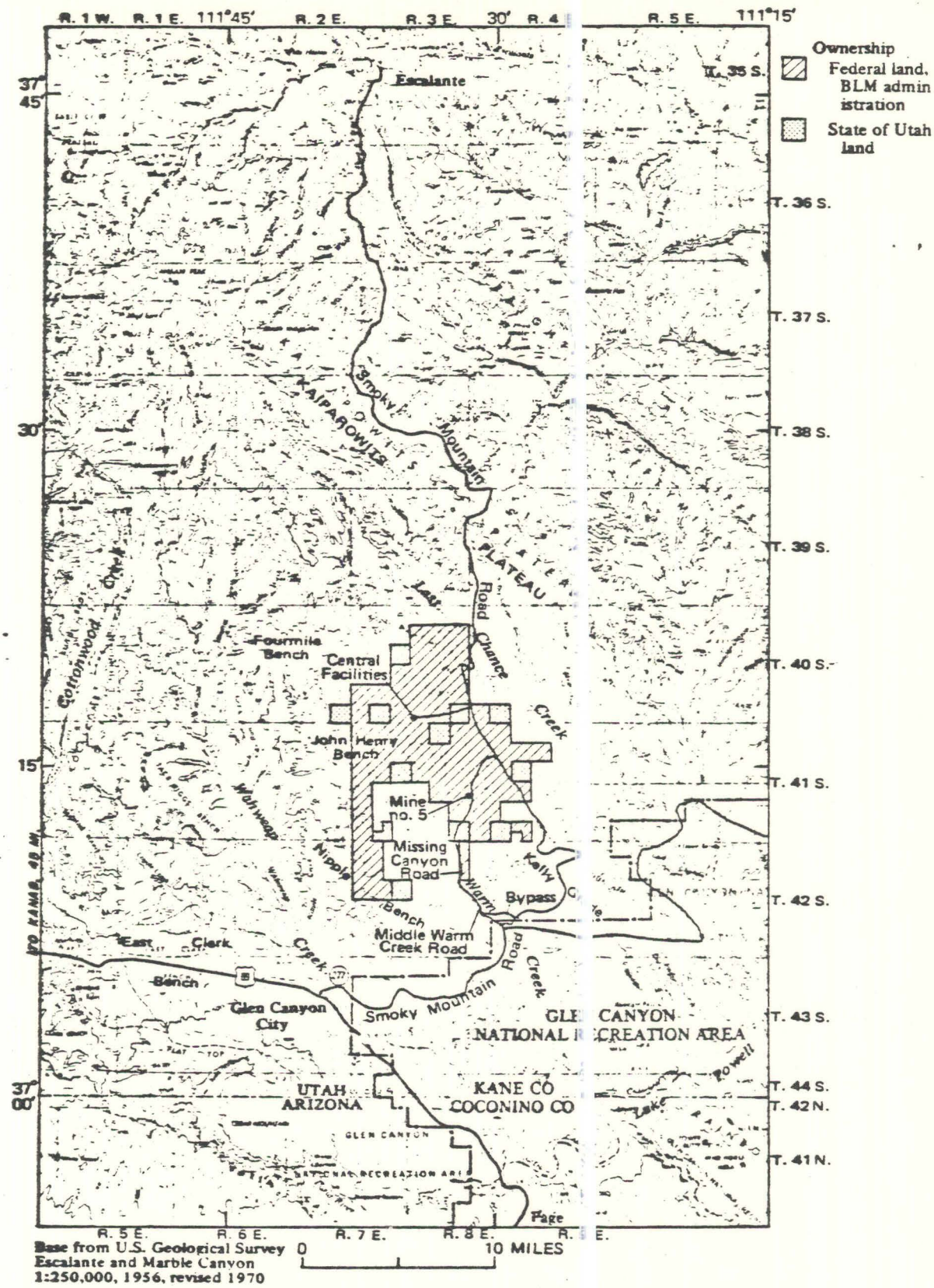


Figure 1-. Map showing location of coal leases, proposed Kaiparowits nos. 1 - 5 mines, Mono Power et al, Kane County, Utah

Mono Power Company, et al., proposes to mine 12 million tons of coal per year (mty) maximum production from 5 underground mines. This production would come from a portion of a total leasehold consisting of 40,277 acres of Federal land and 7,499 acres of State land. The mines would be developed as coal markets become available; the company proposes, however, to place Kaiparowits No. 5 into production as soon as possible. The participants have no sales contract for any of the coal and have no positive plans to supply spot market coal.

Included in the mine plans are preliminary plans for transportation, utilities, and other facilities that will be needed to support the mining operation. Some of these facilities will be off the lease area. The preliminary plans lack detail, permitting analysis only of major impacts. Future Federal actions and additional environmental assessment will be required when applications and detailed plans for these proposals are submitted for approval.

The components of the mining plans now awaiting Federal action and the preliminary proposals requiring Federal action at some later date are given in table 1. The changes in acreage requirements for coal mine surface facilities is shown in table 2.

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Table 1. Summary of Data in the Kaiparowits Nos. 1-5 Mine Plan

	Kaiparowits Nos. 1-4	Kaiparowits No. 5	Total
1. Leasehold area (acres)			
Federal lease	40,277		
State lease	7,499	2/	
Private land	--		
Total	47,776		
2. Proposed Action			
Product	Washed coal	Raw coal	
Market	Unspecified utility companies	Unspecified utility companies	
Estimated coal reserves (million tons)			
In place	1,069 1/	2/	
Recoverable	534		
Expected minimum mine life (years)	35	35	
Production rate (mty)	11	1	
Development schedule (months)			
Initiation to production	12	6	
Initiation to full production	120	12	
Mining method	Underground	Underground	
3. Ancillary facilities 3/	1. Power lines	None	
	2. Water line from Lake Powell	None	
	3. System to transport coal to market or an energy conversion system	Road upgrading from mine to US-89 near Glen Canyon City	
4. Requirements			
Land surface, in acres			
Portal facilities	92	15	107
Coal preparation plant site	1,549	0	1,549
Access 3/			
Transportation	150	20	170
Power	unknown	0	
Total	1,791	35	1,826
Other			
Water acre-ft per year	3,100	13.8	3,100
Lime (rock dust) tons per day 4/	265	25	
Personnel			
Construction	700		
Mine operation 5/	3,190	290	3,480

1/ Total leasehold reserve is 1,600 million tons. The 1,069 million tons is confined to the mine plan area.
2/ No. 5 mine is within the same lease area as Nos. 1-4.
3/ Preliminary plans that will require additional future environmental assessment following a company application for approval.
4/ Discussed in Kaiparowits EIS (BLM, 1976).
5/ Fifteen tons per manshift, 230 manshifts per year (includes support).

Table 2. Changes in Requirements for Kaiparowits Nos. 1-5 Mine Surface Facilities

Item	Original plans 1/		Change		Total	
	Area disturbed in construction (acre)	Area occupied permanently (acre)	Area disturbed in construction (acre)	Area occupied permanently (acre)	Area disturbed in construction (acre)	Area occupied permanently (acre)
Mine portals	92	92	+ 15 2/	+ 15 2/	107	107
Preparation plant (washery) and silos	50	17	--	--	50	17
Central administration complex (including permanent storage and water reservoir)	50	50	--	--	50	50
Coarse refuse dump	550	550	--	--	550	550
Tailings pond	550	550	- 23 3/	- 23	527	527
Clear water pond	23	23	--	--	23	23
Sewage pond	60	60	--	--	60	60
Ventilation fans	4	4	--	--	4	4
Temporary coal storage area	75	--	--	--	75	--
Corridors (roads, conveyor, etc.)	210	140	--	--	210	140
Main access road	150	150	--	--	150	150
Total	1,814	1,636	- 8	- 8	1,806	1,628

1/ Discussed in the Kaiparowits EIS (BLM, 1976).
2/ Increased at Kaiparowits No. 5.
3/ Reduced as a result of improved design.

B. Proposed Action

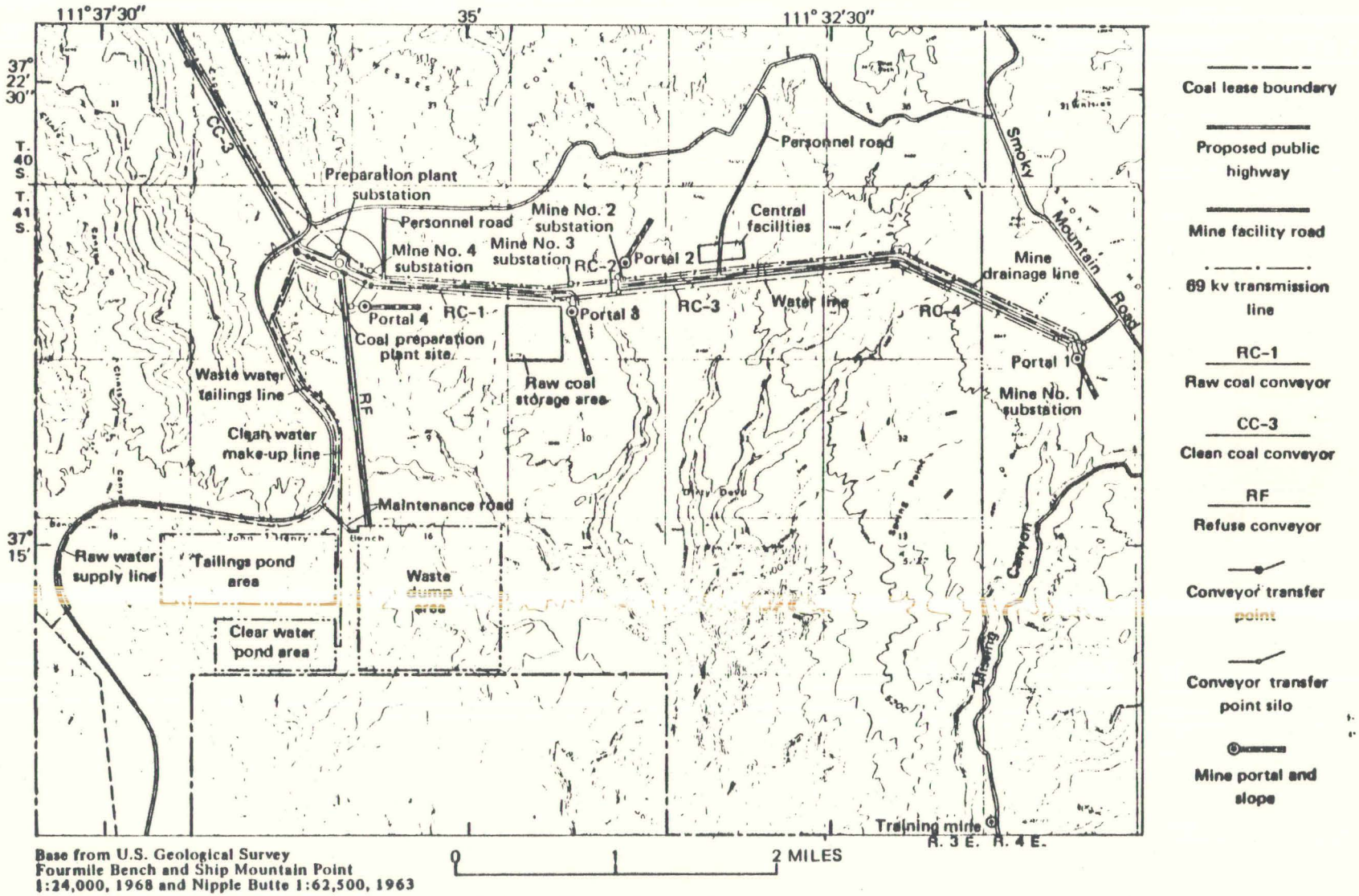
1. 1975 Mine Plan

The following has been extracted dominantly from Mining and Reclamation Plans originally submitted in 1975 by Kaiser Engineers, and the Kaiparowits EIS (BLM, 1976).

Correlation of drillhole data identifies seven lenticular coal beds in the John Henry Member of the Straight Cliffs Formation. The four commercial beds, in descending order, are the Orange, Upper Red, Lower Red, and Brown. Interburden between these beds varies greatly in thickness and in places pinches out laterally. The participants have calculated in-place reserves for the four beds within the 30,000 acre proposed mining area to be 1.069 billion tons and estimate gross in-place reserves of 1.6 billion tons for the 47,776 acre leasehold (fig. 1). The coal lease is about 21 percent of all coal land under lease on the Kaiparowits Plateau (Doelling and Graham, 1972). Based on a 50 percent recovery rate, and no coal mined from beds less than 4 feet thick nor cuts greater than 14 feet thick, the estimated recoverable reserves are 534 million tons.

The company proposed to develop Kaiparowits mines Nos. 1 to 4 by driving 15 to 30 percent "rock slopes" (inclined shafts) to the coal which lies 300 to 900 feet below the surface and in some places within 100 feet of the canyon floors. Planned surface facilities (fig. 2) and underground operations for the four-mine complex and a fifth mine to be used for training purposes, are described in detail in the Kaiparowits EIS (BLM, 1976).

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Base from U.S. Geological Survey
Fourmile Bench and Ship Mountain Point
1:24,000, 1968 and Nipple Butte 1:62,500, 1963

Figure 2-. Map showing the 1975 surface facilities plan of the Kaiparowits Coal Mining Project, Mono Power et al., Kane County, Utah

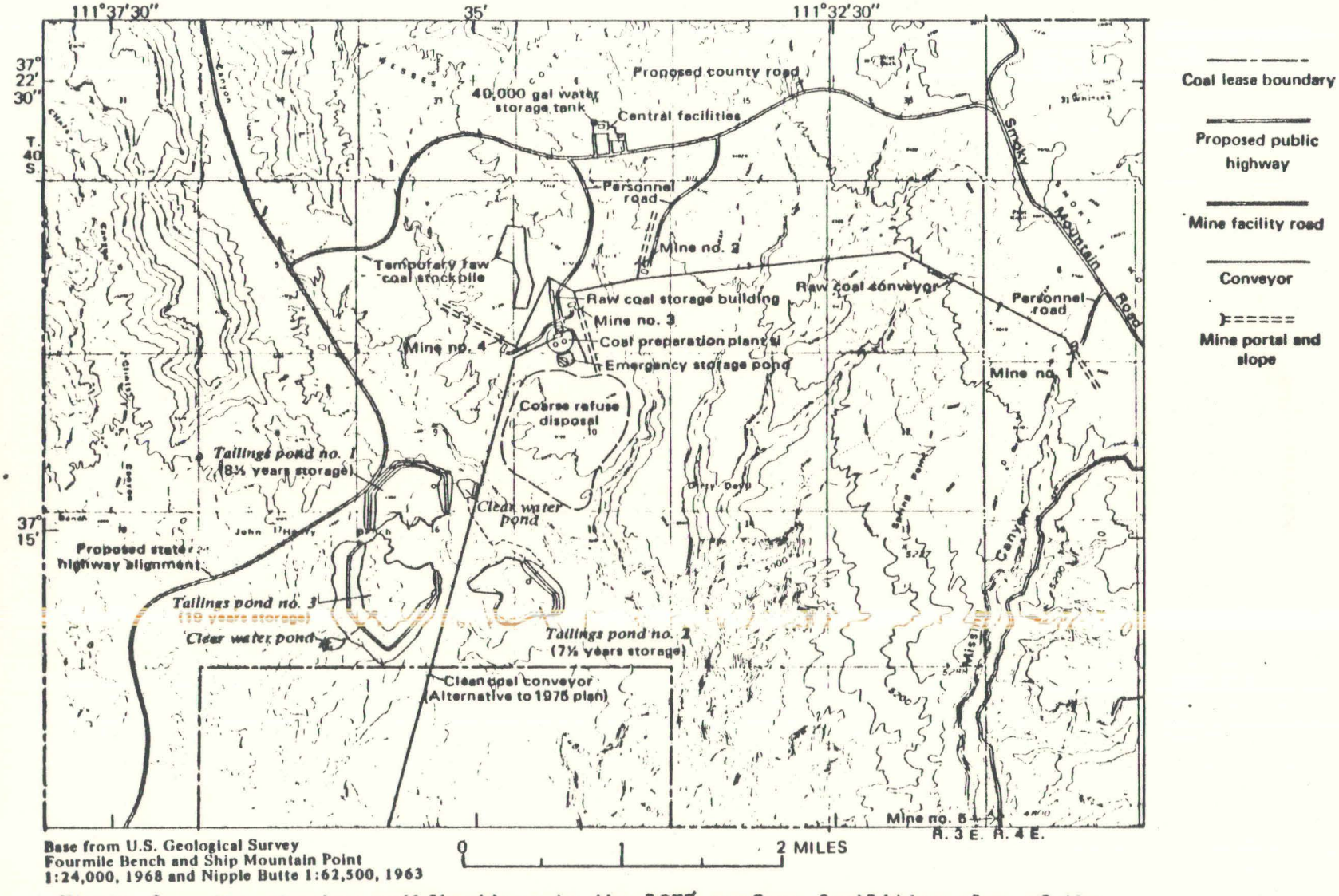
Work-force levels and construction and production schedules for a 35-year life were based on supplying coal to a proposed power-generating station. Mine construction was planned to peak in the fourth year with 700 construction workers, and the complex was to be operating at full capacity by the ninth year, producing 12 million tons of raw coal annually with 2,560 employees. The described production work-force ratio (BLM, 1976) is 20 tons of coal per manshift.

2. 1976 and 1977 Modifications of the 1975 Mine Plan

The original plans have been modified to eliminate the proposed power-generating station and to develop as much as 12 mty coal production capacity in response to available markets. Additionally, the new plans change locations of working portals, raw coal conveyors, tailings and clear water ponds, coarse refuse disposal, coal storage, preparation plant, and central facilities and necessary roadways (figs. 2,3). Proposed access roads and corridors would be changes to accomodate the various facility relocations, but the 290 acres estimated to be required for roads and corridors is unchanged. Total area disturbed by the mine sites, as presently planned, would be about 1,800 acres of which about 1,630 would be occupied over the life of the project.

Proposed mine No. 5 (fig. 4) is converted from a training mine to a production mine and is intended to be the first mine into production. The maximum production would be 1.0 mty. This would be the first mine opened because entry can be made into a coal outcrop which would both reduce the initial expense and time and afford the opportunity to study underground conditions before full development.

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Base from U.S. Geological Survey
Fourmile Bench and Ship Mountain Point
1:24,000, 1968 and Nipple Butte 1:62,500, 1963

Figure 3-. Map showing modifications to the 1975 surface facilities plan of the Kaiparowits Coal Mining Project, Mono Power et al, Kane County, Utah



Figure 4, Picture looking west across Missing Canyon at Mono et.al. Mine No. 5 portal area. Entry would be at the workings in the center of the picture. Storage buildings would be on the flat below middle of the photo. Haul road would go down canyon to the left.

The mining plan is changed very little to accomodate production from mine No. 5; coal would be moved directly to the surface at No. 5 rather than at No. 3 mine (fig. 3). Support facilities at mine No. 5 would be constructed on a 15-acre site in Missing Canyon adjacent to an existing unimproved county road. They include a bathhouse and office, parking area, shop and warehouse, supply yard, truck loadout bin, fan, and conveyor system (fig. 5). A portable electrical power plant would be installed on the site to meet construction and operational needs. The No. 5 mine would be supported by this system until power lines are extended and a truck line is completed to the mine.

Other changes brought the portals for mines No. 3 and No. 4 (fig. 2,3,6) closer together and relocated the principal raw coal conveyor. The present plan utilizes a series of conveyors to replace the original single master conveyor and deletes the proposed clear coal conveyor from the preparation plant to Fourmile Bench (fig. 2). Changes have also been made in the layout of the proposed coal preparation plant (coal crushing and washery) and in the raw coal handling facility. A raw coal storage building is now proposed to replace transfer point silos and the temporary raw coal stockpile has been relocated closer to the raw coal storage building. An emergency storage pond, to be located near the preparation plant is now proposed, should it ever become necessary to empty the coal cleaning vessels.

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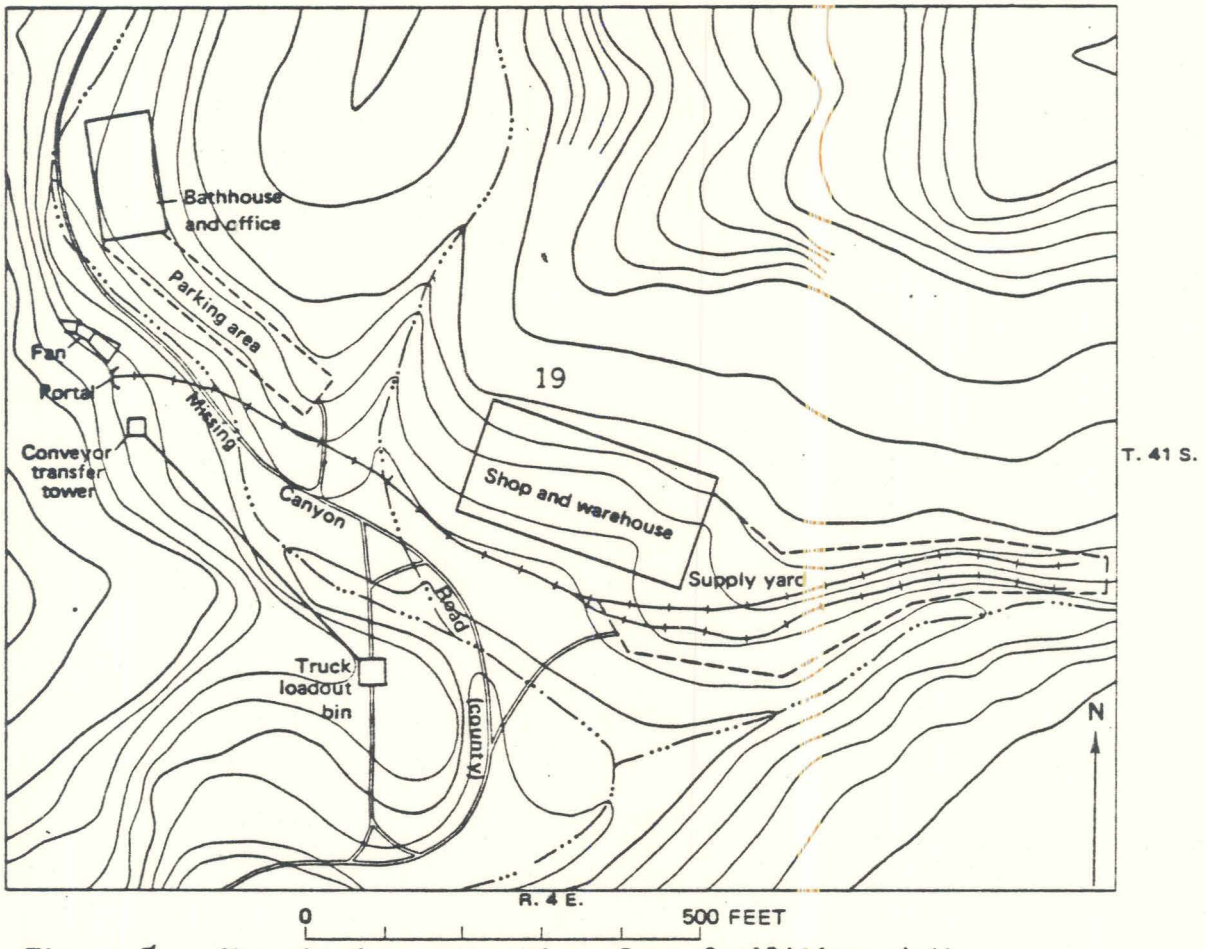


Figure 5-. Map showing proposed surface facilities at the Kaiparowits no. 5 mine site, Mono Power et al, Kane County County, Utah

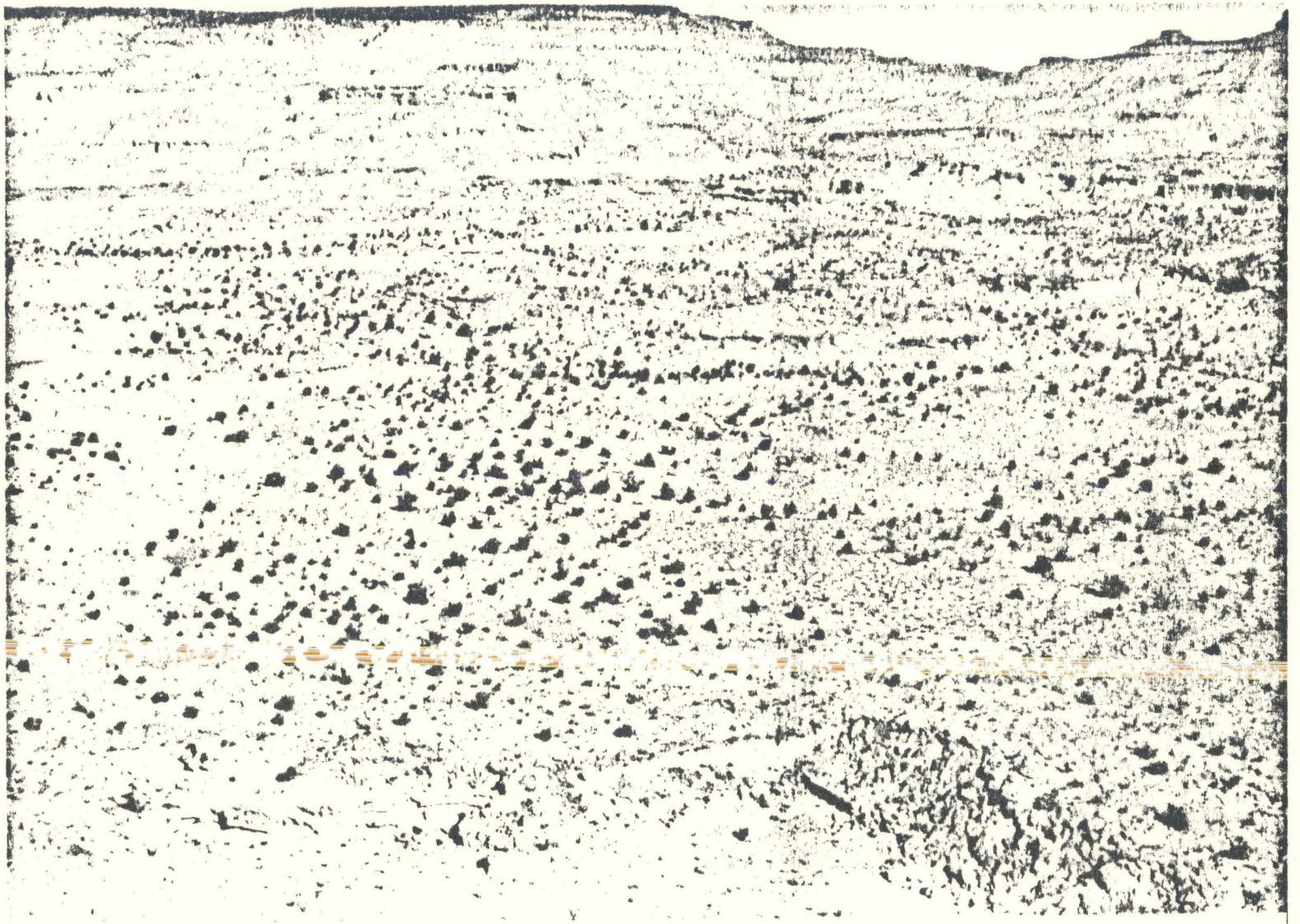


Figure 6 Panoramic view of Mono et. al. preparation plant site area. The plant would be above and left of center. Trailings ponds and waste dump would be in the foreground. Mine No. 4 would be in the flat in the Northwest corner. Mine No. 3 would be below the rock ledge near the road at the right side of the photo.

Three fenced tailings ponds that provide 35-year storage capacity are proposed to replace a single tailings pond. Clear water ponds are located within the fenced areas adjacent to tailings ponds Nos. 1 and 3. Clear water from tailings pond No. 2 would be piped to the clear water pond near tailings pond No. 1. Total area that would be permanently occupied by the proposed ponds has been reduced from 573 to 550 acres.

The proposed central facilities site that includes the administration, training, and shop-storage buildings is closer to the main center of activities. The major change in the central facilities layout is the addition of a 400,000-gallon capacity water storage tank (fig. 3).

Water for construction and mining would be trucked from one or more of three test wells drilled on the leasehold. Application has been made to the State Engineer, and a filing fee has been paid to appropriate 13.8 acre feet of ground water per year. Should one well not be adequate, a second would be pumped until Lake Powell water is available.

The company estimates a workforce of 200 to 250 employees to produce 1.0 mty. At a production rate of 15 tons per man-shift, 290 employees would be required to produce 1.0 mty. This includes both mine and support personnel. This latter ratio is used as the basis for evaluating socioeconomic and other workforce-related impacts described in this report.

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The participants propose to haul the coal from the No. 5 mine to U.S. Highway 89 near Glen Canyon City, using the existing Smokey Mountain county road (fig. 1). This road is inadequate for coal haul traffic. However, the participants plan to provide cooperation and assistance to the Kane County Commission to help the county upgrade the road including the portion through the Glen Canyon National Recreation Area (NRA).

That segment of the proposed haul road that falls within the NRA coincides with or closely parallels the proposed alignment of the Glen Canyon City to Bullfrog Basin Road authorized by section 8 of P.L. 92-593 (86 Stat. 1311) as a "...scenic, low speed road..." to provide for circulation of recreational traffic. The National Park Service (NPS) is preparing a general management plan, wilderness proposal, road study alternatives and EIS for the NRA (DES 77-28). At the present time, use of the upgraded road for coal haul traffic is in unresolved dispute possibly involving the proponents, El Paso Energy Resources Co, the State of Utah, Kane County, BLM and the NPS.

3. Associated Activities Not Pending Federal Action

A 41-mile-long transportation corridor rudely parallel to the Smokey Mountain road is proposed from the mines to a proposed Utah Power and Light Company railroad terminus at Alvey Wash (fig. 7). The corridor would be sufficiently wide to accommodate any of several transportation modes, including railroad, truck-haul, belt conveyor, or slurry pipeline. Neither the exact route nor transportation mode was defined in the proposal.

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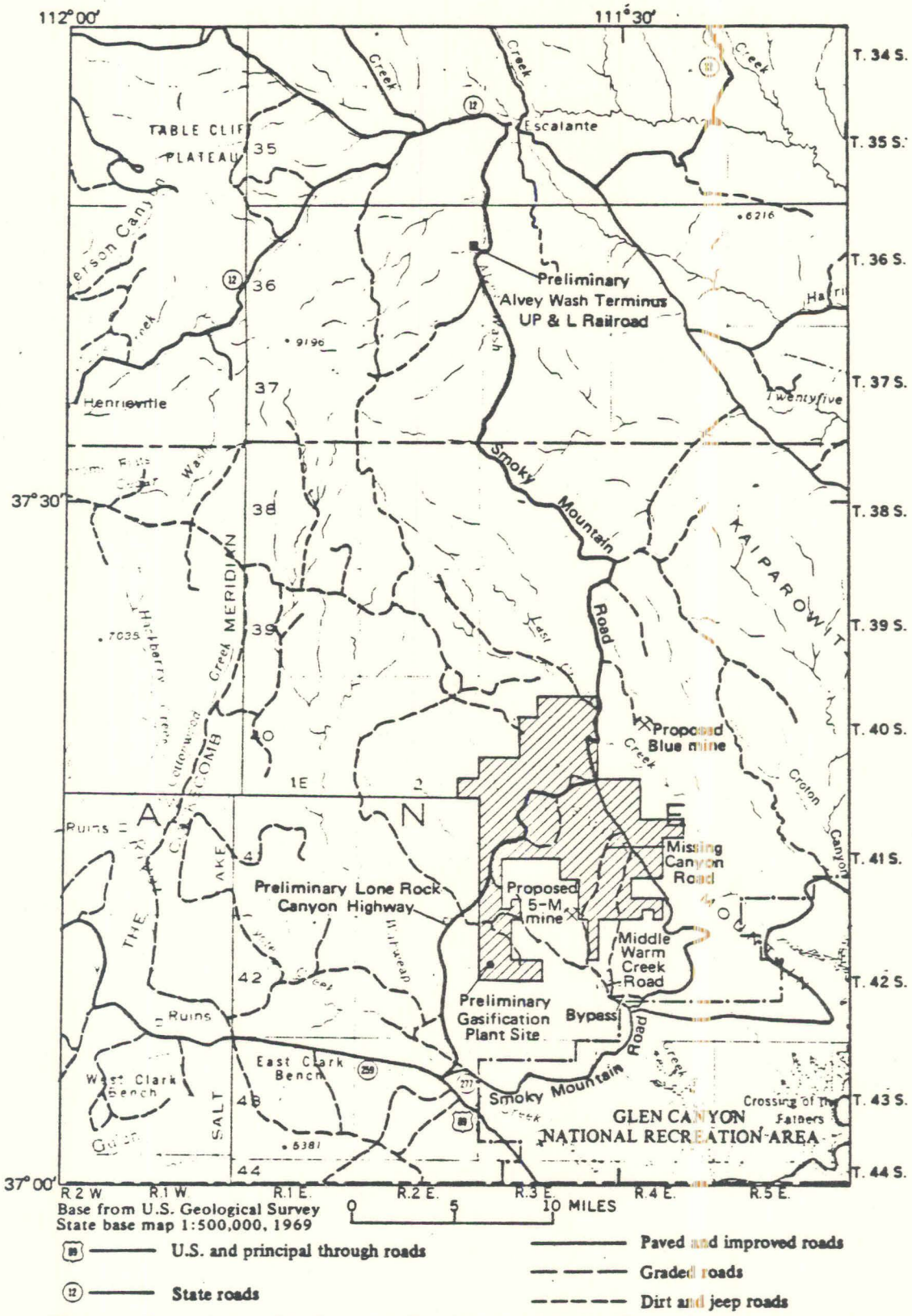


Figure 7-. Map showing preliminary proposals related to the Kaiparowits nos. 1 - 5 mines, Mono Power et al, Kane County, Utah

Powerline routes to the mining complex are described in the Kaiparowits Project EIS.

A 170-mile long 24-inch coal-slurry pipeline requiring about 7,000 acre-feet of water per year and other pipelines and transport schemes have been proposed by the participants as an alternative means of transporting as much as 9 mty of clean coal from the preparation plant to a railroad terminus in the vicinity of Flagstaff, Ariz. or elsewhere (fig. I-2 regional part 1).

The proponants have published a brochure, "Utah coal for Southwest gas markets," which they "...hope will stimulate interest and generate discussions" for producing high-Btu pipeline-quality gas from coal to be mined from the Kaiparowits Plateau. The gasification plant would also be located on the plateau (fig. ~~12~~ 7). No plans or proposals have been submitted for Federal action and major anticipated environmental impacts are described in the regional part 1.

C. Environmental Protection and Reclamation

The mining plans contain the following measures that the company will implement.

In areas of shallow overburden under canyon rims and floors, approximately 50 percent of the in-place coal would be left in the mines as support pillars.

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Waste rock excavated during construction of rock slopes and ventilation shafts would be used as fill for mine portal facilities. Any excess rock would be for road construction or moved to the waste disposal area. After construction, all building sites would be cleaned up; temporary storage areas would be graded to minimize erosion and to conform as closely as possible to natural contours. All construction equipment not adaptable to mining would be removed, and the areas would be revegetated with suitable species.

Observation wells to monitor seepage from disposal areas would be installed during construction. Lateral escape seepage would be monitored by temperature and vertical escape seepage by electrical resistivity. The tailings ponds, to be developed in about 30-acre segments, and the coarse waste dump, to be developed in about 10-acre segments, would be reclaimed after each segment is filled. Surface equipment, pumps, and conveyors would be removed from each filled segment, and topsoil would be replaced and revegetated as the surface stabilizes.

Surface water and ground water would be monitored during the life of the operation to detect accidental contamination of aquifers. Mine operations would be modified if monitoring revealed significant contamination.

Upon mine abandonment, buildings would be razed and all equipment removed. Foundations would be cleared to ground level and used as fill for basements, shafts, and adits. All shafts and portals would be sealed and service roads removed. The entire area utilized for surface structures would be graded to approximate the original contour; a layer of topsoil would be spread, and the area would be revegetated.

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D. Legally Enforcable Mitigations

Regulations that govern and importantly relate to the proposed action are listed in chapter III of the regional part 1. Total mining operations will be conducted in accordance with Federal and State laws, and regulations and State approval of the proposed actions with regard to State environmental laws will be required before approval of the mining plan. The proposed development falls under the provisions of The Department of Interior's Surface Mining Control and Reclamation Act of December 13, 1977 (PL95-87). The act was not in existence at the time the mining plans were submitted, but all applicable regulations of Interior's Surface Mining and Enforcement program (30CFR, part 700) will apply to development of the Kaiparowits mines and their supporting facilities.

Under 30CFR 211, the USGS will add mining-plan stipulations where longwall mining equipment is used, requiring the mine face, where feasible, to be alined and advanced in directions to produce the least amount of surface deformation. Surface areas above all mine workings will be monitored for tension cracks, and if necessary proper fencing and posting will be required to preclude danger to livestock and man. Maximum resource recovery will be required based on sound technical and economic principles.

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Federal mining plan stipulations will require a corridor concept to be used where practical for all transportation and communication facilities within the mining area, and a detailed soil inventory will be made to determine final facility sites and to aid in reclamation. Major drainage channels will be left unimpaired by all facilities where possible. A site-specific threatened and endangered plants survey will be made before construction, and pertinent identified plants and their critical habitat will be protected from negative impact. Reclaimed areas will be fenced and irrigated to aid revegetation, and roads will either be hard-surfaced or sprinkled with 15-acre feet of water per mile per year (estimated) for dust control.

No wastes shall be placed where they will pollute any waters of the State, and no waste water shall be discharged or allowed to enter any waters of the State unless it meets the water quality standards required by the State of Utah (title 73-14-1, et al.), the Office of Surface Mining Reclamation and Enforcement, or EPA, whichever is applicable.

If the flow or yield of any springs, streams, or wells from which water has been appropriated or which are deemed significant to the human environment, is reduced by mining, the company shall replace the water in kind or make restitution, as required by the State of Utah (title 73-3-23) or the Office of Surface Mining Reclamation and Enforcement, whichever is applicalbe. In order to have the information needed to determine the effect of mining on water, the company shall be responsible for inventorying the water resources before mining and for monitoring the flow of springs and streams, the water level in wells, and the chemical quality of these waters during mining.

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All mining developments are subject to the following governmental stipulations regulating the development and use of natural resources. The Management Framework Plan published by BLM for the Paria Planning units 1971-1972 stipulates that vegetative manipulation must provide surface protection assuring maintenance of watershed conditions and overall land surface quality; assure environmental protection of resource values; arrange for conservation of coal resources and proper reclaimation of propósed mining operations. The mineral objectives of this Management Framework Plan are to make coal available on a managed controlled basis consistant with county, State and Federal planning and the National Environmental Policy Act.

The Master Plan for the nearby Glen Canyon NRA (fig. 1) stipulates preservation of scenic, scientific, and historic features contributing to public enjoyment of the area. The plan also requires maintaining high water quality in all bodies and sources and perpetuance of the natural flow of water.

The authorizing office (Bureau of Land Management) would comply with the basic 1906 Federal Antiquities Act (P.L. 59-209; 34 Stat. 225), the Historic Preservation Act of 1966 (P.L. 89-665, 80 Stat. 915), the Archeological and Historical Data Conservation Act of 1974 (P.L. 93-291), and the subsequent Federal regulations which provide legal backing and instructions for cultural resource inventory and protective consideration of sites.

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The Bureau of Land Management, Utah State Director, and the Utah State Historic Preservation Officer have entered into a memorandum of understanding which sets forth measures the Bureau would undertake in regard to the protection of cultural resources on public lands. The principal point in the agreement is that the project proponents will be required to have an intensive survey made for all areas that will be disturbed.

If any archeological sites are found to be of National Register significance, the project would either have to be altered so as to avoid the site(s) or provide for the preservation of data from the site(s).

The revised Utah State Antiquities Act (1977) provides for the preservation and(or) protection of paleontological values on State land. Discovery of such values on Federal land will be brought to the attention of the local BLM land administering office.

When applications are submitted by the county or company for upgrading roads, the BLM could require all access and haul roads be paved, dependent on the anticipated volume of traffic. Using the Aerovironment emission factors (Aerovironment 1977, page A-10) over 98 percent of the emissions from Mono #5 would be from truck and auto travel on unpaved roads. Paving these roads would almost totally eliminate particulate emissions. In addition, impacts in visibility would be substantially reduced.

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Chapter II: Description of the Existing Environment

Only a summary description of the existing environment is presented in this statement. A detailed description is given in chapter II of the Final Kaiparowits Project EIS.

A. Natural environment

1. Climate

The general climate is described in chapter II of part 1. Average monthly temperature at the mine site ranges from about 30° F in January to more than 70° F in July and August. Temperatures range from about 0° to 100° F. Annual precipitation averages 8 inches per year and may range from less than 3 inches to more than 15 inches. The 100-year 6-hour precipitation is 2.4 inches. Evaporation is estimated to be 70 to 80 inches per year, based on records at Page and Wahweap, Ariz.

2. Land resources

a. Land Surface

The proposed mining complex would be on the south edge of the Kaiparowits Plateau, where gently folded sedimentary rocks are eroded into benches bounded by steep cliffs and winding canyons. Maximum relief in the vicinity of the mine portals is about 800 feet and about 1,500 feet across the leasehold. The proposed No. 5 mine entry would be in the steep west wall of Missing Canyon about 300 feet below the proposed plateau sites of the other four entries. A steep rocky canyon between the proposed sites of mines Nos. 2 and 3 is a major limitation to construction.

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b. Geology and mineral resources

The outcropping formations are of Cretaceous age, and the economic coal beds are found in the John Henry Member of the Straight Cliffs Formation (fig. 8). Seven lenticular coal beds, ranging from about 4 to 30 feet in thickness, have been identified.

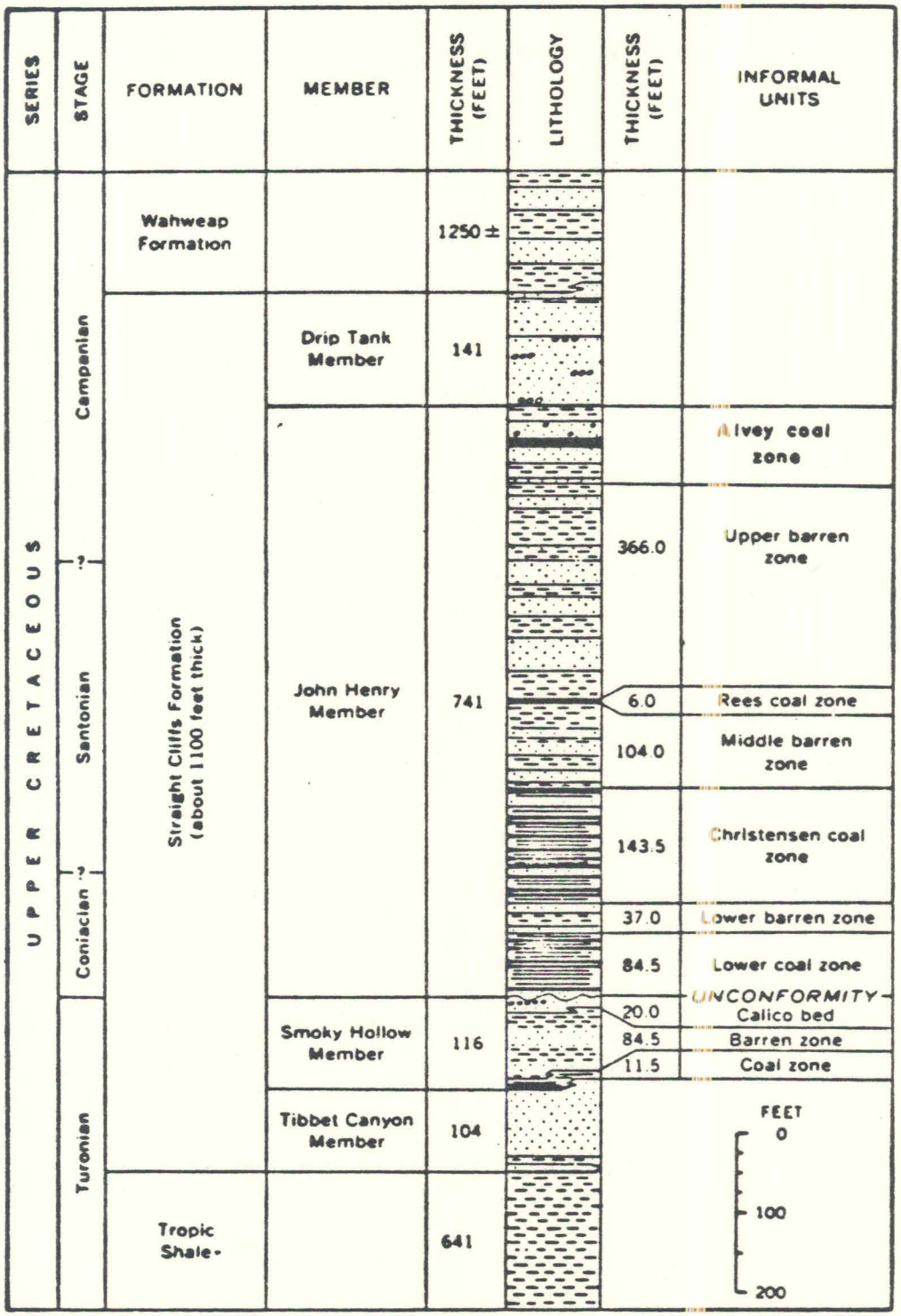
Other mineral resources in the plateau include oil (one field), limestone, aggregate, common clays, and bentonitic mudstones (regional part 1, chapter II).

c. Soils

The soils in the area have formed from sandstone and shale in an arid climate. They can be broadly grouped as shallow to deep plateau soils and badland-rockland soils. Lack of moisture is the major constraint to soil productivity. Erosion hazard is mostly high as a result of the sparse vegetation, infrequent but intense rainstorms, strong winds, and soil characteristics. Revegetation potential is low on all these soils due to the lack of moisture and high salt content, especially on the clayey shale soils.

Proposed mines 1, 2, and 3 are to be located on a plateau where soils range from less than 1 to about 5 feet in thickness. Surface soils are commonly sandy loam, and subsoils are loam in texture. Carbonate accumulates in the subsoil. Sandstone outcrops are common. There are few limitations for construction at these sites. Between mine sites 2 and 3 is a steep rocky canyon where soil is sparse.

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(Modified from Peterson, 1969)

Figure 8-. Composite columnar section of the coal-bearing Straight Cliffs Formation

Mine 4, the coal preparation plant, waste dump, and tailings ponds would be in an area that ranges from the fine textured soils on the Tropic Shale to medium textured soils over sandstone. The soils on shale are grayish brown, are high in soluble salts, clayey, support sparse vegetation, and are actively being eroded. The soils on sandstone are similar to those described at mine sites 1, 2, and 3.

Soils at mine No. 5 site are quite variable, but, in general, they are very stony, shallow to moderately deep and medium textured. Some clayey soils occur locally where shale bedrock is present. The amount of alluvial soils along the bottom is minimal. Erosion hazard is moderate to severe.

The transportation and utility systems would be located on a variety of soils similar to those discussed above.

3. Water resources

a. Water supply

1. Surface water

The Colorado River and Lake Powell are the only significant sources of surface water in the Kaiparowits area. The proposed mines underlie parts of the Warm Creek and Last Chance Creek watersheds, which drain to Lake Powell, about 15 miles distant. Streams are intermittent and flow mainly in response to rainfall or snowmelt. Springs provide small amounts of flow for short distances in some of the channels estimated to be about 160 acre-feet per year (BLM, 1976). The flow is used by livestock and wildlife.

414546

2. Ground water

Ground water occurs in virtually all the rock units underlying the lease area. Because of deeply incised canyons the upper water-tearing units are partly void of water near cliff faces. Ground water may be perched, or impeded from deeper infiltration, by one or more layers of rock having relatively low permeability. Well yields are small to moderate from thin sandstones to large from massive sandstones. The quantity of water available to individual wells varies with depth, formation, and location. Data collected during core drilling indicate that the principal coal beds are above the regional water table, but one or more saturated sandstone strata may occur above or within these beds.

The perched saturated strata are chiefly composed of fine to medium-grained sandstone that yield water slowly (generally from less than 1 to about 20 gpm to springs and small-diameter core holes). These saturated sandstones discharge naturally to alluvium and small streams in the bottoms of larger stream channels. Alluvium receiving flow from these sandstones is highly permeable and may yield water readily to wells, sumps, or infiltration galleries. In most places, however, this alluvium is too thin and restricted in extent to support large continuous withdrawals of water.

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The most extensive and productive aquifer is the Navajo Sandstone where that formation extends beneath the regional water table. The Navajo lies at depths of 2,000 to 4,000 feet beneath Fourmile and Nipple Benches and has not been tapped by wells in those areas. In the lower Wahweap Creek area south-southwest of the lease (fig. 1), where the formation is exposed or just below the surface, several wells have been drilled that, reportedly, yield several hundred to more than 1,000 gpm (BLM, 1976).

Other productive aquifers are contained in the Drip Tank Member and the underlying John Henry Member of the Straight Cliffs Formation. These sandstone aquifers are at or near the surface in part of the lease area, and expected yields to wells are less than about 150 gpm. The overlying Wahweap Formation may yield smaller amounts to wells.

The shallower (upper) saturated sandstones are recharged by downward infiltration of precipitation in the vicinity of the lease. Although the amount of water moving downward through a unit area of the less permeable strata is small (probably less than 5 percent of annual precipitation), the total area involved is large and the amount of water infiltrating is significant (about 20 acre-feet or less per year per square mile). Data are insufficient but head differences indicate that the deeper aquifers are recharged some distance from the lease area, probably from the northwest. Topography and geologic structure seem to control ground-water flow in the upper saturated sandstones. Local direction of ground-water movement flow is problematical, but the regional flow is south and southeastward.

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b. Water quality

Water in the Colorado River at Lees Ferry (fig. 1) contains about 500 mg/l dissolved solids. Water in Lake Powell contains 550 to 815 mg/l dissolved solids (Bureau of Reclamation, written communication, 1975). Water in Warm and Last Chance Creeks contains 3,500 to 5,000 mg/l dissolved solids, which makes it barely suitable for wildlife and livestock use. Available analytical data indicate the absence of heavy metals and trace elements in potentially toxic amounts in area water.

4. Air resources

Particulates are the only pollutants of potential concern as a result of the mining operations (AeroVironment, 1977). Other pollutants such as sulfur dioxide, nitrogen oxides, carbon monoxide, and photochemical oxidants would be significantly below all standards. National ambient air quality standards for particulates are shown in table 3.

Monitoring of total suspended particulates (TSP) in the area is relatively extensive compared to that for many other pollutants for which national standards have been promulgated. Measurements have been made around potential and existing power plant sites by private consultants and in other areas by the Environmental Health Services Branch of the Utah Division of Health. Total suspended particulate data from 10 stations of which five were monitored during 1975, shows that maximum 24-hour concentrations range from 70 to 742 ug/m^3 and the annual average is 26 ug/m^3 (table 4).

2839

Table 3. National and State Ambient Air Quality Standards for Particulates

Emission	National ambient air quality standards		Prevention of significant deterioration increments		
	Primary 5/ (ug/m^3)	Secondary 6/ (ug/m^3)	Class I (ug/m^3)	Class II (ug/m^3)	Class III (ug/m^3)
Particulate 3/					
Annual 1/, 2/	75	60	5	19	37
24-hour	260	150	10	37	75

1/ Annual arithmetic mean.
2/ Not to be exceeded more than once per year.
3/ Annual geometric mean.
4/ Federal standards are quoted in the Utah regulations but have not been formally adopted by the State. The Utah standard calls for total suspended particulate concentrations of less than 90 mg/m^3 (annual average) with the further limitation that not more than 1 percent of the samples collected between April and October, and not more than 5 percent of the samples collected between November and March shall exceed 200 mg/m^3 (24-hour average).
5/ For protection of human health.
6/ For protection of welfare.

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Table 4. Total Suspended Particulates near the Proposed Kaiparowits Nos. 1-5 Mines

data from Aerovironment (1977)

Location	Period of observation	Maximum 24-hour average (ug/m^3)	Annual geometric mean (ug/m^3)
Southern Utah			
Wayne County	Summer 1974	--	12
	Fall 1974	--	21
Bullfrog	6/75-12/75	183	14
St. George	1976	131	22
Cedar City	1975	226	47
Wahweap	1975	342	19
Warner Valley	11/74-5/75	367	19
Page	1975	742	41
Leche-E	1972	78	34
Caineville	8/74-9/74	70	41
Fremont River	1974-1976	90	16
	(3 seasons)	Range	Average
		70-742	26

Although the average annual background TSP concentrations are within the annual ambient air quality standards the short term standards were exceeded periodically by particulates being suspended during strong wind conditions. Exceedances of the primary standard for 24 hours were recorded at three locations and exceedances of the secondary standard were recorded at five locations.

44550

Visibility is generally defined as the distance a person can see (more precisely called the "visual range"). A background visual range of about 60 kilometers was estimated by AeroVironment (1977).

5. Vegetation

The final Kaiparowits EIS (BLM, 1976) adequately covers vegetative aspects for mines 1-4 and the coal preparation plant sites (fig. 6,9,10). The area involved is described as "predominantly salt brush and mixed desert shrub vegetation with sparse ground cover."

Mine 5 is in a valley bottom and a sidehill in the Missing Canyon drainage (fig. 3,4,5). Vegetative cover is sparse and is mainly Desert Shrub type (regional part 1, chapter II). The same type covers the proposed access route and the proposed preparation plant site.

No threatened or endangered plants listed in the Federal Register were located by Welsh (1977). However, the National Park Service lists two critical species that may be found in the area (NPS, 1977). The two species are Astragalus malaioides (endangered) and Astragalus striatiflorus (threatened). These plants may not be negatively impacted (chapter I.D).

6. Wildlife and fisheries

Wildlife of the Kaiparowits Plateau is characterized by diversity of species rather than dense populations. The plateau is in a climatic zone where northern and southern habitat types intermingle. Arid climate and resultant sparse vegetation limit populations of many species.

414551

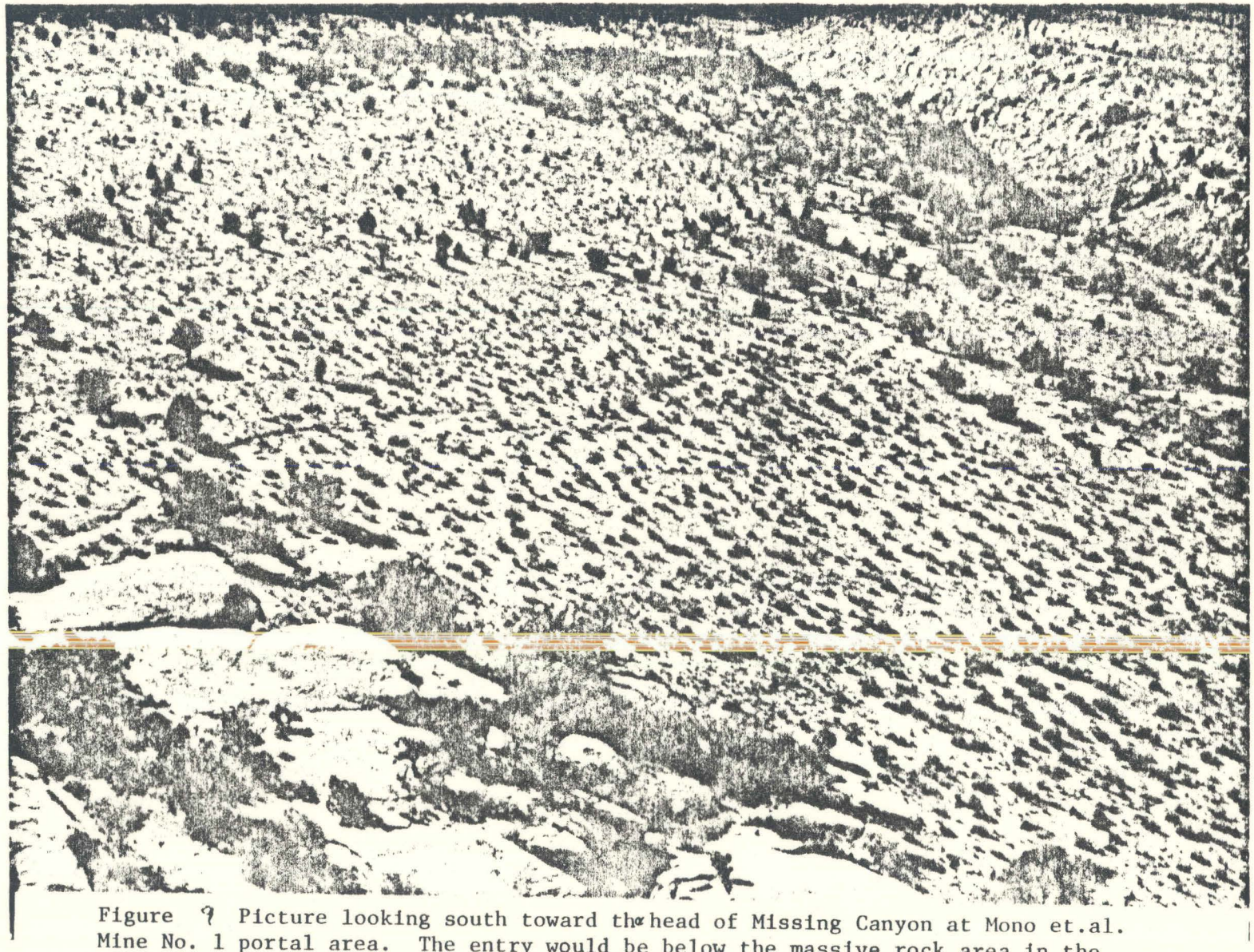


Figure 9 Picture looking south toward the head of Missing Canyon at Mono et.al. Mine No. 1 portal area. The entry would be below the massive rock area in the opening ringed by trees. The main haul conveyor would exit on the right side of the picture.

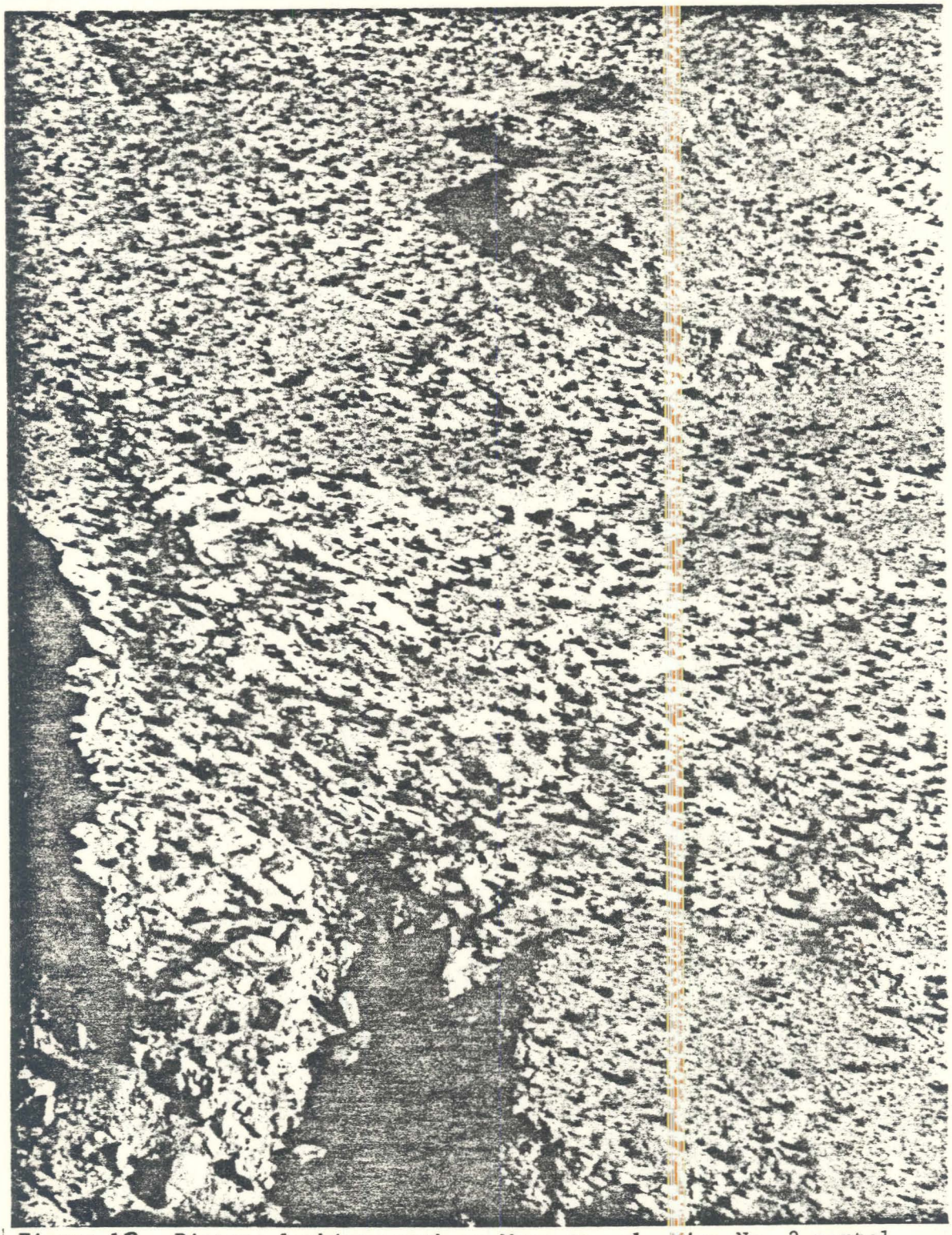


Figure 10, Picture looking north at Mono et. al. Mine No. 2 portal area. The entry would be just above center of the picture. The main haul conveyor would cross the picture just below the elongated rock mound to the upper right corner of the photo.

Deer, pronghorn antelope, mountain lion, coyotes, foxes, and bobcats are the principal large mammals. Over 200 species of birds, including eagles, use the plateau at least seasonally. Thirty species of small mammals and 31 species of reptiles and amphibians occur throughout the plateau. Desert bighorn inhabited the area historically, and the State of Utah plans their reintroduction on Fiftymile Mountain 30 miles east of the proposed mines.

Sport fishery habitat of the plateau area is limited to Lake Powell (fig. 1), which is primarily a warm water habitat, although cold, deep water near the dam supports rainbow trout. The reservior supports excellent populations of largemouth bass, walleye, crappie, bluegill, and catfish. Striped bass were introduced and seem to be making excellent growth. Some larger game fish in Lake Powell have a mercury level exceeding 500 parts per billion. This mercury apparently comes largely from natural sources throughout the watershed. Streams draining the plateau are intermittent and silt laden, supporting no game fish.

Mule deer is the principal big game animal. The herd is of modest size, compared with the major deer herds of Utah. A 1964 big game range inventory report by the Utah Division of Wildlife Resources classifies the pinyon-juniper habitat of Fourmile Bench and adjacent benches of similar elevation as winter range for deer that spend the rest of the year at higher elevations around Canaan Peak to the north. More recent observations by a team from Brigham Young University reveal a small population that occupies the bench tops in the spring but that spends the winter and summer in canyons and breaks below Fourmile Bench. This area is in a climate zone where summer and winter ranges are not always clearly defined.

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Practically all suitable habitat is already used by deer, and the potential for expansion of the range is small. However, population and range surveys by the State suggest that the range could support more animals. The State's herd unit No. 60B-Kaiparowits includes the deer inhabiting the impact area. This unit is open to hunting during the regular statewide deer season.

Much of Utah, including the Kaiparowits area, was once inhabited by bighorn sheep. A few bighorn have been sighted in peripheral parts of the impact area in recent years, but the spread of bighorn into the Kaiparowits area has been hampered by Lake Powell and the Colorado River.

Antelope were eliminated many years ago by uncontrolled hunting and competition from introduced livestock. The animal was reintroduced recently by the State on East Clark Bench (fig. 1) southwest of the mines area. Releases of 22 and 105 animals were made in 1970 and 1971, respectively. The present population is unknown.

If antelope increase and a herd becomes firmly established, the population would likely remain (barring major disturbance) centered around East Clark Bench because of habitat requirements. A few antelope are known to have travelled 30-40 miles north along Cottonwood Creek to the open grasslands near the town of Cannonville. The primary habitat extends roughly from Wahweap Creek on the east to the Paria River on the west and from a few miles north of U.S. 89 south to the Arizona boundary and a few miles beyond, in places. Poaching is probably an important factor in holding down the population, but extremely broken terrain makes much of the Kaiparowits area and the proposed minesites unsuitable for antelope.

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The range of the mountain lion coincides approximately with that of the mule deer; the largest population is located on Fiftymile Mountain, 30 miles east of the proposed mine sites. The inaccessibility of this high bench provides considerable protection from hunters.

Mourning doves are common summer residents throughout most of the Kaiparowits area. They nest in pinyon-juniper woodland, cottonwood trees along the streams, and occasionally on the ground.

Forested mountains north of the Kaiparowits area provide summer breeding habitat for the band-tailed pigeon. This bird is an occasional visitor to the pinyon-juniper woodlands of the higher benches in the northern parts of the impact area.

The desert cottontail is common throughout much of the plateau. Populations are moderate on the principal benches and along the flood plains of perennial streams, particularly Cottonwood Creek.

The deep waters of Lake Powell, bounded by sheer rock cliffs and desert vegetation, do not provide very productive habitat for waterfowl. However, numerous species do use the reservoir for resting during spring and fall migration. A few ducks remain all winter. Most habitat at Lake Powell is in coves where tributaries enter. In these areas, shallower water provides some aquatic vegetation and animal life at depths accessible to waterfowl. Tributaries in the impact area are Wahweap, Warm, and Last Chance creeks.

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Rocky cliffs and ledges of the many steep-walled canyons in the vicinity provide excellent nesting sites for raptors. This, combined with diverse populations of small mammals, seclusion, and relatively little human disturbance, makes much of the Kaiparowits area productive habitat for several birds of prey. The golden eagle is a common year-round resident. The permanent nesting population is joined in the winter by migrants from farther north. The bald eagle is as an uncommon winter resident. Other birds of prey common to the area include the ferruginous, rough-legged, red-tailed and sparrow hawks, the prairie falcon, and several species of owl. The peregrine falcon, an endangered species, is a transient.

Resident populations of eagles, hawks, owls, and vultures are relatively stable at present. Some of the major causes of mortalities, such as collisions with power lines and vehicles and illegal shooting, are largely absent in the Kaiparowits area.

Although large numbers of birds are seldom seen at any one time or place, the total number of species seen in a year throughout the Kaiparowits area is surprisingly large. Two hundred species are found in the area at some time during the year in addition to raptors. The many species of nongame birds have diverse requirements for feeding, nesting, and shelter. Consequently, nearly all of the Kaiparowits area is used by some birds, at least seasonally.

414555
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Coyotes, bobcats, gray foxes, and badgers are the principal nongame carnivores. Populations are relatively stable. However, a recently increased market price for predator pelts, especially for that of the bobcat, has resulted in an increase in hunting and trapping pressure. Yet some parts of the impact area are so remote that predator populations have not been significantly affected.

Most of the predator mammals are widely distributed, except in the most barren terrain. The predators concentrate near major concentrations of rodents and rabbits, which are their main food. These areas primarily include the desert shrub, pinyon-juniper, and grassland habitat of the major benches (including Fourmile) and the narrow belts of riparian canyon-bottom habitat. All the predator mammals are permanent residents of the Kaiparowits area, and seasonal movement is slight. Snow is seldom deep enough on the benches to force migration to lower elevations. Most adapt readily to a variety of habitat conditions, and no single habitat is crucial to their existence.

The harsh, arid terrain supports a surprisingly diverse population of small mammals. Thirty-one different species, exclusive of fur animals, live in the impact area. All small mammal populations are subject to drastic short-term fluctuations with changes in weather, food supply, predation, and disease. However, no long-term population trends are known.

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Woodrats (also called packrats) live on the rocky hillsides and pinyon-juniper benches. The bushy-tailed woodrat is primarily a woodland species found on the higher benches. Some of the mammals range farther down the canyons into the desert scrub. The woodrats are vegetarians, feeding on seeds, grasses, bulbs, bark, and fungi.

Chipmunks live mainly in the pinyon-juniper woodland and feed largely on seeds, berries, and insects.

Ground squirrels, particularly the antelope ground squirrel, are widespread and adaptable, ranging from grassland and desert shrub areas up into the pinyon-juniper woodlands of the higher benches. The squirrels eat grasshoppers, beetles, flies, and larvae, as well as vegetable matter.

The grasshopper mouse normally prefers insects to seeds and vegetation. This mouse consumes many large insects, including grasshoppers.

Whitefooted mice are probably the most common and widespread small rodents. At least one species of this genus is represented in nearly every type of habitat.

All six species of bats in the area feed almost exclusively on insects caught in flight. Stream-side and lake-shore habitat are important sources of night flying insects. Bats find resting places mainly in the rock crevices of the many steep canyon walls. The populations are dispersed, in small groups rather than in one huge colony occupying a single cave.

414557 LT

Cottontails and jackrabbits are widely distributed, occupying riparian grassland, desert shrub, and pinyon-juniper habitats, usually on the more level terrain of the bench tops and canyon floors. These species are completely vegetarian.

The small mammals are adaptable to a broad range of conditions. All the small rodents are capable of going without water for long periods. Water requirements are satisfied with moisture from succulent vegetation and insects in the diet. Some species can synthesize water from dry food. Thus, water supply is not normally a crucial survival factor. These animals occupy essentially the same habitat year-round. Shelter and hiding places are plentiful in the rocky, rugged terrain.

Many different species of insects, other invertebrates, and microorganisms play significant roles in the biological communities. Some are important food for birds, frogs, toads, and small mammals, including bats. Larger insects, such as grasshoppers and beetles, are at times important food for foxes and coyotes. Other aquatic forms enter Lake Powell and become part of the food chain supporting fish life. Many invertebrates influence vegetation of the terrestrial habitat. Some are essential for pollination of plants. Others, such as ants, consume significant amounts of forage, thus competing with other wildlife. Several insects inhibit the growth of certain plants by inflicting injury.

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Thirty-two species of reptiles and amphibians have been identified in the area and on adjacent terrain. These include fourteen lizards, nine snakes, eight amphibians, and one turtle. A few of these species were recorded in earlier studies along the Colorado River before Lake Powell was formed and may no longer be present. Reptiles are widely distributed. Some species live in virtually every type of habitat and topography. Two species of rattlesnakes, the western rattlesnake and the shield-headed rattlesnake, and the collared lizard add interest to the rocky terrain.

B. Cultural environment and land use

1. Land ownership

All land in current leaseholdings is owned and administered by State or Federal agencies (fig. 1). BLM governs surface and mineral rights on 40,277 acres. The State administers surface and mineral rights on 7,499 acres.

Land uses include 14 grazing allotments, recreational activities, and wildlife habitat. No industrial developments are within the leased properties. Access includes 12 graded roads and 2 foot trails. Water improvements include one reservoir and two wells.

Kane County zoning ordinances dated October 13, 1975 permit coal mining on the proposed mining area.

2. Agriculture, range and timber

The final Kaiparowits EIS (BLM, 1976) states that "cattle and big game compete for limited forage." Further, water sources are crucial to the use of the range by these animals.

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Cattle winter graze the proposed sites. The sites supply about 40 AUM's* grazing per year, of which about 2 are supplied by the proposed No. 5 minesite and its access road.

3. Socioeconomic development

Population nearby is 1,500 to 1,700. The area is rural, and Kanab, about 55 miles west of Glen Canyon City (fig. 1), is the nearest large Utah community. The economics of communities near and most likely to be affected by the proposed mines are based essentially on agriculture. A high degree of similarity in life styles, and of community and family stability is characteristic of communities and families in southern Utah. Other similar communities that might be affected are Antimony (113), Cannonville (113), Fredonia, Ariz. (600) and two larger communities within 100 miles--Panguitch and Kanab--with populations of 1,500 to 1,600 each (fig. I-2 Regional part 1). Also likely to be affected is Page, Ariz., about 30 miles south which has a current estimated population of 3,300.

Most residents are of Mormon religious background. Many have part-time jobs, and many of these jobs are seasonal (particularly agricultural, recreational, and tourist oriented jobs). Residents of Page, however, are employed primarily in recreational services, in the nearby Navaho Power Plant, or are retired. The Page population is more diversified in life style and religious background.

* Glossary

4/14/60 LT

4. Transportation

The proposed plant site for mines Nos. 1-4 is 51 miles south of Escalante and 28 miles north of Glen Canyon City (fig. 1). Access is over unimproved secondary county roads, with steep grades and rough stream-bed crossings at washes. Roads are slippery when wet.

The No. 5 mine is near the southeast corner of the lease area, in Missing Canyon, a tributary to Warm Creek Canyon (figs. 4,5). The county road past the mine is classed as a jeep trail. It follows the bottom of Missing Canyon and is currently the only feasible route for trucks onto the Kaiparowits Plateau from the south.

At its south end the road joins the Smoky Mountain county road at the edge of the Glen Canyon Recreation Area. The latter road is a two-lane dry-weather road (FAS-423) that crosses the Glen Canyon NRA to Glen Canyon City (fig. 1).

5. Recreation and esthetic resources

The regional recreation resource that would be impacted by the proposed action is described in the final Kaiparowits EIS (BLM, 1976) and in the regional part 1, chapter II. The following description details information pertinent to an evaluation of the Kaiparowits Nos. 1-5 Mining Plans.

Approximately 6 miles of the present Smoky Mountain county road crosses lands within the Glen Canyon NRA. This segment is heavily used by recreationists to reach dispersed areas of use east of the proposed mines.

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There are no developed recreation services, facilities, or potable water within Missing Canyon or adjacent to the proposed No. 5 mine. Recreation use depends on the primitive road system within the impact area. Present use involves; a.) four-wheel driving and viewing scenery; b.) restricted collection of firewood, petrified wood, and rocks; and c.) hunting small game on-site and to gain access for hunting mule deer on adjacent areas.

On-site recreation use is day oriented, and evidence of overnight or extended recreation visits is scant. Missing Canyon has only restricted potential for back-country recreation pursuits. It is lightly used (less than 250 recreational visits per year) because it lacks potable on-site water, has sparse vegetation cover, and the geologic features are common in the region.

Summarily, the landscape is arid, with strong evidence of past and present erosion and weathering, sparse vegetation, and exceptional visual range. Except for the secondary and primitive road system, minor ORV use indications, and evidence of coal exploration, the natural landscape is undisturbed.

Scenic quality is low to moderate. Sensitivity to viewing, except for the travel corridor in the NRA and in the vicinity of Glen Canyon City is low. The travel corridor within the NRA and near Glen Canyon City has a moderate sensitivity for viewing.

414255

6. Archeologic and historic values

Previous archeological work in the region, as well as the immediate lease area, indicates the presence of an abundance of archeological sites (BLM, 1976). A 10 percent coverage reconnaissance of the lease area by the museum of Northern Ariz. located 26 sites in the mine area. In addition, 35 historic sites were found in the surrounding region. None of these sites are listed in the National Register of Historic Places.

3534

Chapter III: Environmental Impacts

This statement includes a summary of environmental impacts described in Chapter III of the Kaiparowits EIS (BLM, 1976) and details of impacts anticipated because of implementation of the modified mining plan.

A. Natural environment

1. Land resources

a. Land surface

The proposed mining facilities would have minimal land-surface impact. Subsidence is expected above mined-out areas across the proposed 47-square-mile mining unit. Land-surface deformation related to subsidence is described in the regional part 1 and the Kaiparowits EIS (BLM, 1976).

b. Geology and mineral resources

The project would impact energy resources by removing 534 million tons of raw coal. About half the commercial coal in place would be recovered, and about half would be left, either as support pillars or in beds that exceed the 14-foot maximum thickness cut of the mining equipment. The future recovery of this remaining coal and the coal in three beds less than 4 feet thick is not considered feasible by present technology.

Geologic hazards would be created by subsidence tension cracks and by not leaving adequate support where adits enter canyon walls, especially where mining procedes updip, and in areas of shallow overburden under canyon rims and floors. General and regional geologic hazards are described in the regional part 1.

414356

c. Soils

Soil would be disturbed on a total of about 1,800 acres. Estimated annual sediment rates from the mine facilities are given below, in acre-feet per year, for minesites 1-4 (BLM, 1976) and 5. Additional sediment would be generated by constructing utilities and transportation systems.

	Mine sites 1-4	Mine site 5
Before construction	1.20	0.10
During construction	1.47	0.12
After construction	0.31	0.02

Soils disturbed would be difficult to revegetate due to adverse soil and climatic conditions. A general discussion of soil impacts from underground mining and associated support systems and facilities is given in chapter IV of the regional part 1.

2. Water resources

The proposed action would require about 7,600 acre-feet of water per year, 3,100 acre-feet for mining and related activities and 4,500 acre-feet for the domestic needs of the increased population. About half of the water used for domestic purposes (2,250 acre-feet per year) would be discharged as sewage; the other half plus the 3,100 acre-feet needed for mining would be consumptively used each year.

Subsidence and subsequent cracking of earth material overlying the mine may cause some surface water to be diverted into the ground, but the quality cannot be predicted.

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Mining below the water table (perched or regional) would alter flow and occurrence and lower water levels of the intercepted ground water. Reasonable enforcement of mitigations should prevent any degradation of water quality. Water use from wells would decrease groundwater resources and also cause water-level declines. Mining would first decrease hydraulic heads in the Drip Tank and John Henry Members of the Straight Cliffs Formation above the mined coal and later that in the Wahweap Formation (fig. 10).

3. Air resources

Coal mining operations and related activities at the Kaiparowits No. 5 mine would produce approximately 3,200 tons per year of particulate emissions. Of these emissions, over 95 percent would be the result of traffic on gravel roads. These emissions would generally be highly localized, with maximum concentrations occurring within a short distance from the road and decreasing sharply beyond.

Using data in the Aerovironment report (1977) it is estimated that 154 trucks and 290 cars per day could produce concentrations of 130 ug/m^3 above background (26 ug/m^3 within 100 meters of the road assuming a dust control factor to 50 percent from watering or chemical treatment. The resultant atmospheric concentration of about 150 ug/m^3 would be 50 percent of the primary natural ambient air quality standard (table 3). Beyond 2 km from the road, the 24-hr particulate concentration would be less than 5 ug/m^3 which is less than 2 percent of the primary standard.

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The suspended dust would produce an adverse aesthetic impact and a reduction in visibility near the roads, but the impact beyond 2 km would be insignificant.

4. Vegetation

About 1,800 total acres of Desert Shrub type vegetation would be destroyed by mining; about 107 acres by mines Nos. 1-5 portal facilities and 1,700 acres by the Preparation plant and preliminary proposed transportation facilities. The No. 5 minesite and access road (fig. 5) would account for about 35 acres of the total (table 1).

5. Wildlife and fisheries

Kaiparowits mine development would deteriorate wildlife habitat in four ways: physical destruction or alteration, encroachment, harrassment, and depletion of surface-water sources. Many kinds of wildlife would be affected.

Mule deer use would be reduced on 5,800 acres of range in the vicinity beginning during the construction period and continuing through the mining operation. Construction would disturb about 1,800 acres of habitat, and the accompanying disturbance and encroachment associated with construction and mining would reduce deer use on another 4,000 acres. Deer habitat deterioration may increase over the 35-year life of the mine to affect as much as 30,000 acres because of the potential loss of springs and surface water. Scarce water supplies now are a principal cause of moderate and spotty mule deer populations.

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Mountain lions would be affected similarly. Mountain lions are highly dependent on deer for food; therefore, any impact on deer would impact mountain lions.

Land surface disturbance would lower the prey animal (including cottontails) populations. They would be expected to increase after construction is completed, reoccupying approximately 170 acres that were not permanently altered. Predatory mammals and raptors would quit the facilities area because of reduced prey and would shun the vicinity because of increased disturbance.

If surface water sources are depleted, some species would abandon the affected area. Habitat deterioration from this impact would reduce the number of predatory mammals and birds that require available water and that are restricted in travel distance from it. This would reduce predation. Many small prey, which satisfy their water needs from moisture in plant materials, insects, or metabolic water, may, thus, benefit.

The projected new inhabitants in the Kaiparowits vicinity would require extensive homesites and possibly a new community. If the new townsite is established on East Clark Bench, the chance of permanently establishing the recently reintroduced antelope herd there will be greatly reduced.

The demand for game and fish in the vicinity would increase. An increase would be expected in illegal killing and taking of all protected fish and wildlife.

LT 544573

New access roads to the Kaiparowits Plateau would require conversion of an undetermined amount of habitat to roadbeds. The expected traffic on these roads would increase wildlife fatalities from vehicle strikes and would access more remote areas, would increase encroachment, and would increase harassment to wildlife.

New powerlines to the mine would present a strike hazard for all birds.

A water intake structure in Lake Powell would be deep enough under usual operations that it would not present a hazard to fish; however, when the reservoir level is down to levels of 3,550 feet, it could draw fish into the waterline intake. The time-elevation curve for Lake Powell, prepared by the Bureau of Reclamation, shows this low level could be expected about 10 percent of the time during the life of the mine (BLM, 1976).

B. Cultural environment and land use

1. Agriculture, range, and timber

About 40 AUM's of grazing capacity would be lost--perhaps 2 AUM's to the No. 5 mine surface facility and access road. The increased traffic would pose a threat to livestock and would disrupt some of their normal grazing and watering patterns; however, better access would aid in hauling water for livestock use.

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2. Socioeconomic development

The Task Force estimates that the proposed mines at full production would add 21,000 to 22,000 new residents to the region. Forty to sixty percent of the new residents would probably live in mobile homes grouped within new mobile home enclaves. Because of potential transportation problems, mine employees may live in special work camps during the work week. Population increases of this magnitude are characterized by high rates of job and community transciency, high employee turn-over rates, relatively high rates of juvenile delinquency, petty crimes, suicide, and family problems. Associated urbanization would impact most: increased housing, increased school construction and service personnel; a trend toward more cosmopolitan life styles; changes in present local governmental and political organizations; and problems that require taxing and bonding local, county, and(or) State residents to construct, operate, and maintain sewers, water facilities, streets, garbage and trash collection and disposal, and police and fire protection.

If all mines were at full production level, the annual payroll is estimated at forty-two million dollars. This could mean $800-1,500 monthly salaries for most employees. Benefits from higher incomes, the increased tax base, and the increased total regional income would expand the economy in Southern Utah, particularly the Kanab to Page area. Effects of this new payroll will be discussed in chapter IV of the regional part 1.

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3. Transportation

The current road system cannot handle mine-related traffic (table 5). Twelve million tons of coal could not be truck-hauled over present Federal highways. The county road would need to be upgraded to a 24-ft surfaced roadway to meet the transportation needs for portal No. 5 at the proposed one mty production. Upgrading is not part of the company proposal and is in dispute, possibly involving the proponents, the State, Kane County, BLM, NPS, and the El Paso Power Resources Co., proponents of the proposed Red and Blue mines to the north that might use the same access roads. Maximum mine-related traffic at Glen Canyon City could be as great as 3,960 vehicles per day and about 680 vehicles per day from the proposed No. 5 mine. The present average through-traffic on US 89 at Glen Canyon City is 890 vehicles per day.

4. Recreation and esthetic resources

Mining facilities, developments, and activities within the project area would impact the remote, undisturbed character of the environment. Noise nuisances and air pollutants in the form of dust and odors would be introduced or increased, resulting in a loss of solitude and serenity. New populations (21,000 to 22,000 people) within the region to support the proposed (mono 1-5) would generate an additional 196,700 recreation visits and 613,700 recreation visitor days use to national, regional and local recreation use areas and attractions. In comparison to the present use rate in the region of more than 5,029,000 visits and 8,061,000 visitor days use, this increase would not be significant if uniformly distributed to all attractions listed in table RR-2. However, the majority of this use would accrue to the Glen Canyon NRA because of its proximity to projected residential areas to support the proposal.

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Table 5. Traffic Estimates, Proposed Kaiparowits Mines Nos. 1-5

	Mines 1-5	Mine No. 5
Tons/year	12 million	1 million (174-25 ton loads/day)
Marysvale	Not proposed	
Distance miles		212
Trucks/day (25 ton)		174 (one round trip each)
Cedar City	Not proposed	
Distance miles		163
Trucks/day (25 ton)		87 (two round trips each)
Flagstaff	Not proposed	
Distance miles		178
Trucks/day (25 ton)		174 (one round trip each)
Alvey Wash	Not proposed	
Distance miles		44
Trucks/day (25 ton)		29 (six round trips each)
Commuters-Glen Canyon City		
Distance miles	28	24
Vehicles/day	1740 (2 persons/vehicle)	145 (2 persons/vehicle)
Mine service vehicles/day	240 (10 vehicles/day/.5MT annual production)	20 (10 vehicles/day/.5MT annual production)
Mine related vehicle passages at Glen Canyon City	3960	678
Current vehicles/day along route	5	5

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This use, in combination with projected increases in visits and visitor days by non-residents and residents to support other mining activities in the central region could exceed the carrying capacity of the NRA and could cause serious damage to natural ecosystems. In addition, litter, vandalism and overcrowding within the NRA could cause user dissatisfaction and lowering of expected user experience level. It could also create safety hazards to individuals using the lake and transportation facilities within and adjacent to the NRA.

Secondary and primitive road improvement would scar the natural landscape with needed cuts, fills, culverts, borrow areas, etc., and litter and vandalism would increase. Although increased use would result in conflict between recreation and mine traffic on the county road within the NRA, enhanced access would make more area available for recreation use.

The No. 5 mine site would straddle the county road in Missing Canyon and would enable recreationists to see an operating coal mine, even though the mine would intrude on the natural environment. Portals 1-4 and the preparation plant site would be far enough from the county road to go unnoticed by the casual observer (fig. 3).

5. Archeologic and historic values

Archeologic investigations indicate an adverse impact to cultural values by the proposed activities.

Increased population may result in more vandalism of archeological sites. Easier access to the area would also increase vandalism.

No properties listed in the National Register are located in or near the area to be developed.

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Chapter IV: Mitigating Measures

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mine areas, and requirements of the surface-management agencies and the USGS District Mining Supervisor are in the regional part 1, chapter III. These mitigating measures, and those in sections C and D of chapter I shall be required and part of the Kaiparowits Mining Plans.

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Chapter V: Adverse Effects that Cannot be Avoided

Adverse effects cannot be avoided on about 1,800 acres of surface area disturbed by construction and occupied by facilities. Subsidence would occur to some degree across the 47-square-mile proposed project area above mined-out coal beds. Chapter V of the regional part 1 describes general subsidence-related geologic hazards.

Seven coal beds were identified by drilling, and four were considered commercial. At 50 percent recovery, about 534 million tons of non-renewable coal resources, representing about 5 percent of the known reserves on the Kaiparowits Plateau, would be lost. The thinner beds of coal, representing about 4 percent of the total leasehold resource, are considered unrecoverable by present day technology.

Soils would be disturbed on about 1,800 acres by the various activities. General adverse effects from soil disturbance in this region are discussed in chapter V or the regional part 1. About 1,630 acres would be occupied by facilities during the life of the project and the soils taken out of production. Areas covered by waste material and tailings ponds would be difficult to revegetate owing to mixing of materials of various compatibility and to erosion, but they should be reclaimable through proper soil amendments and management. Increased erosion during soil exposure would range from about 2 to 12 tons per acre per year on soils formed from shale and 1 to 6 tons per acre per year on soils formed from sandstone on the plateaus. The eroded product could reach Warm Creek.

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Water requirements would be about 7,600 acre-feet per year. Of the total requirement, 5,350 acre-feet per year would be consumptively used, and 2,250 acre-feet would be discharged as sewage. Mining would disrupt aquifers, alter ground-water flow, and lower water levels above the coal beds and may affect discharge to seeps and springs.

If springflow and streamflow is reduced wildlife habitat will be adversely affected. Also, any loss of fish in Lake Powell at the water intake pumps during low reservoir levels would be unavoidable.

The vegetation lost to mines Nos. 1-5, the coal preparation plant, and the improved access route cannot be avoided. The mining complex would cause an annual 40 AUM's grazing capacity loss (about 2 AUM's annually for mine No. 5.

Airborne dust would be generated from auto and truck traffic on unpaved, gravel haul and access roads to the Kaiparowits No. 5 mine, creating an adverse aesthetic impact and reducing visibility. The degree of impact would be directly related to the success of the water control program.

Unmitigated impacts on transportation would be the same as presented in chapter III.

The present esthetic environment would be adversely affected by upgrading the present road system to handle the proposed mine-related traffic. Industrial modifications, along with associated activities, would reduce the remote, unoccupied, and natural appeal. Recreation use, both on-site and to regional recreation attractions, would increase. Adverse impacts, such as loss of solitude, littering, and some vandalism, could result from this increased use.

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Conflicts between recreation and mining traffic would create safety problems on the county road within the Glen Canyon NRA and would adversely affect the recreation resource. Increased dust, industrial odors, and noise would conflict with recreation use.

Increased population in the area may result in vandalism to archeological and historical sites within the region.

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Chapter VI: Short-Term Use Versus Long-Term Productivity

Subsidence-related geologic hazards would permanently alter the land surface above mined-out areas, should 534 million tons of coal be taken from the four commercial beds. A similar amount of coal in the four commercial beds and coals in the three identified noncommercial beds, the lower bed left intact, would be unrecoverable by present technology.

About 1,630 acres of soils would be occupied by mine facilities and lost to production throughout the project life. Soils would be disturbed on an additional 170 acres, and productivity would be temporarily lost (two to five years). The 1800-acre approximate disturbed area would be restored to a near natural productivity level with prescribed reclamation.

About 266,000 acre-feet of water would be required during the life of the mines; about 188,000 acre-feet would be consumptively used, and 78,000 acre-feet would be discharged as sewage. Any loss of springs and related streamflow due to subsidence or wells on the 47-square-mile mine area would restrict long-term livestock and wildlife use.

The loss of vegetation and grazing capacity previously cited would continue for the project life. In the long-term, after successful reclamation, these areas would be as productive as they are now.

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The mining activities and any housing encroachment upon wildlife habitat would have a long-term adverse effect on wildlife population potentials. Small mammals capable of living independently of open water would have long-term population increases. Reduced prey populations during mine construction would partly recover after construction, but would remain depressed throughout the project life, and fish populations diminished by mine project pumps at times of low water in Lake Powell would probably be recovered in one year with adequate water levels.

Permanent roads constructed to handle mine-related traffic would remain for other uses after mining is completed. Short-term transportation/utilities components on the leasehold would be salvaged and the sites reclaimed.

Improved lease-area access would slightly increase short-term recreation use. Few long-term recreation-resource effects would accrue because of restricted recreation-use potential.

The proposed impact area visual character would be modified from remote-unoccupied to industrial during mining and for sometime after reclamation. The area would eventually return to its present condition, except for permanent roads. Long-term or extensive impacts to the esthetic resources would be minimal.

Any archeological sites disturbed during development of the site would result in a long-term impact to the inplace value of that site. Collection of sites that might be found will insure recording of information that could otherwise be lost to natural forces or vandalism.

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Chapter VII: Irreversible and Irretrievable Commitment of Resources

The 534 million tons of mined coal would be a consumed non-renewable energy resource. About the same amount of coal would remain as an irretrievable resource unless methods could be developed to recover them.

Disturbance of the natural soil by mixing and rearrangement of the soil layers would be an irreversible action. The soil eroded as a result of the project would be irretrievable, as would be the soil amendments and energy used for reclamation.

Disruption of aquifers because of mining would be irreversible.

The vegetation growing on the project area along with the grazing capacity would be irretrievably lost. The 40 AUM's per year for 35 years (minimum project life) make a total of 1,400 AUM's lost. About 70 AUM's would be lost to mine No. 5 over 35 years. Proper reclamation of the disturbed area would prevent any irreversible commitment of the vegetative and grazing resources, except for the proposed access road if upgraded; however, the loss of springflows, streamflows, and the encroachment of housing developments would have an irreversible deteriorating effect on wildlife habitat. Deer, mountain lion, and all other wildlife and their productivity lost from habitat destruction or reduced habitat use because of mining would be irretrievable.

Any loss of fish in the pumps at Lake Powell would be irretrievable. All birds, mammals, reptiles, or other wildlife killed by vehicle strikes, illegally shot, or birds killed in collisons with new powerlines would be irretrievable.

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All energy and resources committed to road construction and to truck hauling as much as 1 million tons of coal (mine No. 5) would be irretrievably lost. At full production, the 3,480 miners commuting to the mines would irretrievably commit the economic lives of about 15,000 cars and small trucks, necessary tires and repairs, and 1.7 million gallons of gasoline per year (61 million gallons in 35 years). The 290 commuters to mine No. 5 would irretrievably commit the economic lives of about 1,250 cars and small trucks, necessary tires and repairs, and about 140,000 gallons of gasoline per year (5 million gallons in 35 years).

Road improvement would commit the area to additional irreversible recreation use. The remote-unoccupied character would be modified and partly lost during the project life. This loss, even after reclamation, would be irretrievable. Esthetic resources would be irretrievably lost to the proposed road system, and future generations would be committed to viewing and using the area with some improved roads in place.

Any cultural resources in the immediate project area probably could not be preserved in place.

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Chapter VIII: Alternatives

The general administrative options available to the Secretary of the Interior are discussed in the regional part 1, chapter VIII.

A. No action

Should none of the proposed mines be developed, the environmental impacts, as described in chapter III, would not occur, and the leasehold surface area would remain essentially as described in chapter II. However, should mining permits be granted to other applicants with leaseholdings in the general area, coal transportation routes, access roads, and power-distribution lines, would be developed in the vicinity of the Mono Power Company leasehold. The regional part 1 analysis anticipated cumulative and regional compacts at several levels of development.

B. Delayed action

Delayed implementation of the proposed action in order to plan and develop regional transportation corridors, identify coal markets, or await advances in mining technology would postpone the impacts described in chapter III. Possibly a higher percentage of the thicker coal beds could be recovered with advanced technology, but other impacts would be as described.

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C. Reject the proposal

The proposed action does not include a transportation plan to move the 12 mty of coal from the mines. Truck-haul is proposed only to move as much as one mty of coal from the No. 5 mine south along county roads crossing the Glen Canyon NRA to Glen Canyon City, Utah. Although a waterline route from Lake Powell and a powerline route have been environmentally assessed in the Final Kaiparowits EIS (BLM, 1976), the participants have withdrawn all easement and rights-of-way applications for these routes, and adequate water and power are not available to the mining complex.

D. Approval with modification

Conflicts between recreation and mine traffic within the Glen Canyon NRA could be mitigated by constructing the originally proposed Lone Rock Canyon highway (fig. 7); however, the haul from the No. 5 mine would be 16 miles longer, with more adverse grade. Visual impacts associated with any road construction could be mitigated to some extent by taking advantage of natural terrain features.

E. Task-Force proposed alternative

Should conflicts with the Glen Canyon NRA be resolved, an alternative to approval of the total mining plan is approval of only the No. 5 mine. The proposed No. 5 mine is presented with provisions for power, water, and coal transportation. The participants estimate recoverable reserves of 534,500,000 tons on the total 30,080-acre mining unit. At this ratio, the 2,500-acre No. 5 mine unit would conceivably have about 44,400,000 tons of recoverable reserves; enough for a 44-year operation at one mty.

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Construction on the 15-acre minesite would cause minimal land-surface impact. Land-surface subsidence is expected above mined-out areas across the 2,500-acre mining unit.

Energy resources would be impacted by removing one mty. About half of the commercial coal in place would be recovered, and about half would be left, either as support pillars or in beds with thicknesses that exceed mining-equipment capabilities.

At one mty production, the water requirement would total 400 acre-feet for the domestic needs of the increased population. About half the domestic water (175 acre-feet per year) would be discharged as sewage.

More than 95 percent of the air quality impact from the Kaiparowits mine operations would result from travel over gravel roads by coal haul trucks and associated autos.

This proposed alternative could add an additional 850 to 900 new residents. The additional population impact would be minimal if most of the miners and their families were to locate in Page, Ariz. Greatest impacts would occur due to urbanization and housing demands in the towns of Page and Glen Canyon City and, possibly, Kanab, Utah.

Following present trends, most of the new residents would probably live in trailer homes, and the trailer home sites might develop anywhere on private lands along U 89 Kanab-Page Corridor. Other impacts are described in chapter III and in chapter IV of the regional part 1.

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Adverse effects cannot be avoided on 15 acres at the minesite and on a 76-acre right-of-way required to upgrade the haul-road from the mine portal to the Smoky Mountain Road. Subsidence effects cannot be avoided above mined-out areas across the mining unit. Other unavoidable adverse effects are detailed in chapter V.

Surface mitigating measures would restore the No. 5 minesite in Missing Canyon to a near natural contour. Prescribed soil and vegetation reclamation mitigations would restore and possibly increase grazing capacity on the 15-acre minesite.

Subsidence-related geologic hazards would permanently alter the land surface above mined-out areas. Over 35 years about 35 million tons of coal would be mined, and a similar amount would be unrecoverable by present technology. Fourteen thousand acre-feet of water would be needed to produce 35 million tons of coal; 8,000 acre-feet would be consumptively used, and 6,000 acre-feet would be discharged as sewage. Other short-term uses versus long-term productivity are described in chapter VI.

The one mty of mined coal would be consumed as a nonrenewable energy resource, and a similar amount would be left in place as an irretrievable resource. Other irreversible and irretrievable commitment of resources are described in chapter VII.

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