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Application For Federal Coal Lease

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Refer to:

- Confidential
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Date _____ For additional information

APPLICATION FOR FEDERAL COAL LEASE

(UNDER SUBPART 3425, COAL REGS.)

U.S. DEPT. OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
UTAH STATE OFFICE
UNIVERSITY CLUB BUILDING
136 E. SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

ATTENTION: MR. MAX NEILSON:

REFERENCE: COAL MANAGEMENT REGULATIONS:
3425.1-1
3425.1-4
3425.1-5
3425.1-7
3473.2-1

GARFIELD COAL COMPANY (A UTAH CORPORATION) HEREBY REQUESTS A FEDERAL COAL LEASE ON THE FOLLOWING LANDS;

SEC 31, 542 ACRES SEC 33, 640 ACRES
T 36 S, R 1 W T 36 S, R 1 W

SEC 30, 541 ACRES SEC 29, 640 ACRES
T 36 S, R 1 W T 36 S, R 1 W

SEC 28, 640 ACRES SEC 25, 480 ACRES
T 36 S, R 1 W T 36 S, R 2 W

SEC 26, 640 ACRES SEC 24, 639 ACRES
T 36 S, R 2 W T 36 S, R 2 W

SEC 19, 540 ACRES SEC 13, 639 ACRES
T 36 S, R 1 W T 36 S, R 2 W

^E 1/4, SEC 35, 160 ACRES M/L
T 36 S, R 2 W

W 1/2, SEC 34, 320 ACRES M/L
T 36 S, R 1 W

SEC 12, 638 ACRES
T 36 S, R 2 W

*Information Copy to -
State of Utah
Dept. of Natural Resources
Division of O.G.M.*

JIM

JUL 07 1982

*File
Garfield Coal Co.*

#2

RECEIVED

JUL 07 1982

DIVISION OF
OIL, GAS & MINING

File in:
 Confidential
 Shelf
 Expandable
Refer to Record No 0002 Date 7-7-82
In C/O17 009 Incoming
For additional information

THESE LANDS WOULD MAKE THE NECESSARY "LOGICAL MINING UNIT" WHICH IS CONTIGUOUS TO OUR UTAH STATE COAL LEASE #23331 CONTAINING 40 ACRES MORE OR LESS, WHICH IS THE SITE OF THE OLD POLLOCK-DAVIES COAL MINE.

WE HAVE DULY NOTIFIED THE STATE OF UTAH OF OUR INTENT TO FILE A MINING PERMIT APPLICATION ON OUR STATE LEASE ON MARCH 27, 1982, REFERENCE UMC-795, "SOAP" (SMALL OPERATOR ASSISTANCE PROGRAM), (COPY OF LETTER ATTACHED)

OUR CORPORATIONS' INTENT IS FOR THE FULL DEVELOPMENT OF OUR "DAVIES" MINE WITH THE PROPER "LMU" PRIOR TO THE COAL BECOMING LOCKED UP AND UN-AVAILABLE UNDER THE WILDERNESS ACT, AFTER DECEMBER 31, 1983. (REFERENCE: PAGE 19 OF THE "SITE SPECIFIC ANALYSIS" OF THE "BLUES" - ATTACHED.)

IN REFERENCE TO 3425.1-7 (2) (VI) WE HEREBY ADVISE YOUR DEPARTMENT THAT WE DO HAVE ADEQUATE SALES FOR THE COAL WE WOULD MINE. IN THE EVENT WE HAVE TO ACCEPT "SOAP" ASSISTANCE (PER COPY OF OUR ATTACHED LETTER TO THE STATE) WE WOULD, OF NECESSITY, HOLD OUR PRODUCTION TO UNDER 100,000 TPY TO QUALIFY. HOWEVER, IT IS MORE LIKELY THAT WE WILL RENEW OUR CONTRACT OF 500,000 METRIC TONS PER YEAR WITH CON-TANK PETROLEUM COMPANY, WHICH THEY HAVE AGREED TO DO, AND MINE THE 500,000 TPY. (COPY OF THEIR LETTER ATTACHED)

COMPLYING WITH 3473.2-1 (A) (1), WE ARE ENCLOSING OUR CHECK FOR \$250.00 AND OUR \$10.00 CHECK TO COMPLY WITH 3473.2-1 (A) (2).

COMPLYING WITH 3425.1-7 (A), TO ASSIST THE AUTHORIZED OFFICER IN CONDUCTING AN ENVIRONMENTAL ANALYSIS, WE REFER HIM TO YOUR OWN BLM PUBLICATION, "UINTA-SOUTHWESTERN UTAH - DRAFT ENVIRONMENTAL IMPACT STATEMENT, COAL", AS WELL AS THE ATTACHED COPY OF THE "SITE SPECIFIC ANALYSIS" BY YOUR CEDAR CITY DISTRICT OFFICE, BLM.

ALL OTHER DATA ATTACHED HAS THE NUMBER OF THE PERTINENT REGULATION IT PERTAINS TOO.

AS PRESIDENT OF THE CORPORATION, I HEREBY CERTIFY THAT THE BOARD OF DIRECTORS HAVE DULY VOTED FOR ME TO TAKE THIS APPLICATION

ACTION, AND WE AWAIT YOUR DECISION IN THIS MATTER.

Alfred L. Foster —

ALFRED L. FOSTER, PRESIDENT
GARFIELD COAL COMPANY
STAR ROUTE
PANGUITCH, UTAH 84776
TELEPHONE (801) 834-5227

MARCH 27, 1982

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 WEST NORTH TEMPLE
SALT LAKE CITY, UTAH 84116

REF: UMC 795, SMALL OPERATOR ASSISTANCE PROGRAM:

GENTLEMEN,

GARFIELD COAL COMPANY HEREBY INFORMS YOUR DIVISION OF OUR INTENT TO FILE A MINING PERMIT APPLICATION ON OUR UTAH STATE COAL LEASE #23831, LOCATED IN GARFIELD COUNTY, TO-WIT: NORTHEAST QUARTER OF NORTHEAST QUARTER OF SECTION THIRTY-SIX, TOWNSHIP THIRTY SIX SOUTH, RANGE TWO WEST, SALT LAKE MERIDIAN, CONTAINING A TOTAL OF FORTY ACRES, MORE OR LESS.

THE NAMES AND ADDRESSES OF THE OFFICERS AND STOCKHOLDERS OF GARFIELD COAL COMPANY (A UTAH CORPORATION) ARE AS FOLLOWS;

ALFRED L. FOSTER, PRESIDENT, 24 1/2 PERCENT OWNERSHIP, STAR ROUTE, PANGUITCH, UTAH, 84759, TELEPHONE 834-5227. (DIRECTOR)

LAURENCE MILLS, VICE PRESIDENT, 17 PERCENT OWNERSHIP, 77 EDGECOMBE DR. SALT LAKE CITY. (DIRECTOR)

MARK K. BOYLE, VICE PRESIDENT (LEGAL), 17 PERCENT OWNERSHIP, 10 BROADWAY BLDG. SUITE 400, SALT LAKE CITY, UTAH 84101. (DIRECTOR)

SAM NESLEN, SEC/TREASURER, 17 PERCENT OWNERSHIP, 1492 EAST 1200 SOUTH, BOUNTIFUL, UTAH 84010. (DIRECTOR)

GARDA DAVIES, STOCKHOLDER, CANNONVILLE, UTAH, 20 PERCENT OWNERSHIP.

WALLACE OTT, STOCKHOLDER, TROPIC, UTAH, 4 1/2 PERCENT OWNERSHIP.

GARFIELD COAL COMPANY WILL BE THE POTENTIAL PERMIT APPLICANT, ALTHOUGH AT SOME FUTURE DATE A QUALIFIED OPERATOR COULD, IN FACT, BE CONTRACTED BY OUR CORPORATION, UPON APPROVAL OF THE BOARD OF DIRECTORS.

OUR ESTIMATED PRODUCTION FOR YEAR ONE, IS 15,000 TPY; YEAR TWO IS 35,000 TPY, AND YEAR THREE IS 50,000 TPY; THEREFORE, OUR PRODUCTION OF COAL WOULD NEVER EXCEED 100,000 TPY DURING ANY YEAR OF MINING UNDER A SMALL OPERATOR ASSISTANCE PROGRAM, (SOAP).

WE REQUEST ASSISTANCE UNDER THE SOAP PROGRAM IN THE EVENT YOUR

DIVISION WOULD EXTENSIVELY REQUIRE;

(A) THE DETERMINATION OF THE PROBABLE HYDROLOGIC CONSEQUENCES OF MINING AND RECLAMATION, UNDER SECTION 40-10-10 (2) (C) OF THE ACT; AND

(B) THE STATEMENT OF PHYSICAL AND CHEMICAL ANALYSES OF TEST BORINGS OR CORE SAMPLES, UNDER SECTION 40-10-10 (2) (D) OF THE ACT;

IN-WHERE, THE ANSWERS TO (A) AND (B) ABOVE BECOME SO INVOLVED, A SIZEABLE FINANCIAL OUTLAY WOULD BECOME NECESSARY.

I BRING TO YOUR ATTENTION, YOUR DIVISION ACCOMPLISHED HYDROLOGY FIELD WORK ON OUR "DAVIES-POLLOCK MINE" SOME TWO OR THREE YEARS AGO, AND FOUND WE WOULD NOT DAMAGE THE HENRIEVILLE CULINARY WATER SYSTEM. I AM SURE YOU ARE AWARE OF THE SEVERAL COMPREHENSIVE, IN-DEPTH STUDIES REGARDING WATER RESOURCES, GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, VEGETATION, THREATENED OR ENDANGERED PLANTS, WILDLIFE, LAND USE, SOCIOECONOMICS, TRANSPORTATION FACILITIES, CULTURAL RESOURCES, SPECIAL DESIGNATION AREAS, VISUAL RESOURCES, RECREATION, POPULATION TRENDS, AND ENVIRONMENTAL CONSEQUENCES, TO NAME A FEW, IN REGARDS TO COAL MINING IN OUR AREA OF CONCERN. I VENTURE TO SAY; OUR GOVERNMENT HAS SPENT MORE MONEY, MAN-HOURS, PUBLICATIONS, CONTRACTED "EXPERTS", ON THE KAIPAROWITS COAL FIELD, THAN ANY OTHER FIELD, IN THE HISTORY OF THE WORLD, AND, WE HAVE NEVER MINED ONE POUND OF COAL FROM KAIPAROWITS!!!!

ALL OF THIS COMPREHENSIVE DATA WILL BE DETAILED IN OUR MINING PERMIT APPLICATION, OF COURSE, BUT FOR THIS "SOAP" INTENT LETTER, IT NEED ONLY BE MENTIONED. WE REFER YOU TO THE "UINTA-SOUTHWESTERN UTAH - DRAFT ENVIRONMENTAL IMPACT STATEMENT, COAL" BY THE U.S. DEPT. OF THE INTERIOR - BLM.

WE WOULD BE MINING IN THE "HENDERSON COAL ZONE" FOUND WITHIN THE NORTH-WEST CORNER OF THE KAIPAROWITS COAL FIELD, BY UNDER-GROUND CONVENTIONAL METHODS, AND THE SURFACE EFFECTS WILL BE BY AERIAL PHOTOGRAPHY, ON CONTOURS, BEFORE AND AFTER THE FACT.

WE UNDERSTAND THE INTENT OF UMC 795.19 APPLICANT LIABILITY AS STATED.

VERY TRULY YOURS,

Alfred L. Foster -

ALFRED L. FOSTER, PRESIDENT
GARFIELD COAL COMPANY
STAR ROUTE
PANGUITCH, UTAH 84759
TELEPHONE 834-5227

COPIES TO ALL DIRECTORS & STOCKHOLDERS:
COPY TO THE GARFIELD COUNTY COMMISSION:

THE BLUES

II. Site Specific Analysis

A. Description of Area

The Blues WSA (Wilderness Study Area), Unit Number UT-040-268, lies north and east of Henrieville and directly south and below Powell Point (see Figure 1). The southern and portions of the eastern boundaries borders State Highway U-12. Tropic Valley lies to the west. There are 19,030 acres of public land and 640 acres of state land enclosed within the WSA.

B. Issues and Concerns Specific to WSA

The major issue of The Blues WSA is the potential for coal development within its boundaries. Also of issue is the low quality and quantity of the mandatory wilderness characteristics found within the unit.

C. Description of Alternatives

1. All Wilderness

Under this alternative all 19,030 acres of public land would be designated as wilderness and managed according to the Wilderness Act and BLM Wilderness Management Policy.

2. No Action

Under this alternative the WSA would be recommended as non-suitable for wilderness classification. Future land use proposals would be evaluated in accordance with the existing land use plans (Paria Management Framework Plan). It is possible that these future land uses could be incompatible with wilderness management. However, flexibility exists within the land use planning process to help protect any scenic, historical, archeological, scientific, ecological, or other wilderness related values that might exist.

3. Partial Wilderness

A partial wilderness alternative was not analyzed because there were no major resource conflicts or needs identified which would benefit from a boundary adjustment. The major conflict, impacts associated with coal development, could not be significantly mitigated since the outstanding wilderness values found within the unit is transposed almost entirely over these coal reserves. By eliminating the land acreage associated with potential coal development from the unit the wilderness values are also foregone. The remaining acreage within the WSA would subsequently be void of any significant wilderness values.

D. Existing Environment

1. Resource Values

a. Air Quality and Climate

Precipitation records from the National Weather Station in Henrieville reveals the average yearly precipitation expected in

The Blues WSA to be approximately 10.30 inches. Highest monthly precipitation occurs during the months of July through December when approximately two-thirds (2/3) of the yearly precipitation falls. High intensive summer thunderstorms are common during the summer months and are triggered by southerly winds carrying moisture from the Gulfs of Mexico and California. Several damaging flash floods have occurred during the past 30 years in the Cannonville/Henrieville area due to these summer convection storm patterns. Winter/spring precipitation is associated with storm systems moving in from the Pacific. These systems continue through early summer causing the Pacific storm tracks to move in a more northerly position which by-passes the area and results in less precipitation.

Temperatures are generally indicative of warm summers and cold winters. July and January are the warmest and coldest months, respectively. Average daily maximum temperatures range from 41° in January to 86° in July, while the average daily minimum range from 15° to 51° during the same months.

Air quality data for this area is quite sparse except for visual observation from Bryce Canyon National Park. This area is known for its excellent air quality and the opportunity to see long distances of unpolluted scenery. The Blues WSA would have similar air quality values. The Blues WSA is presently classified as Class II Air under the Prevention of Significant Deterioration Regulations. This means that air quality deterioration that accompanies moderate, well-controlled growth would not be considered significant.

b. Geology and Topography

The Blues WSA lies within the Colorado Plateau physiographic province along the west side of the Kaiparowits Plateau. Exposed bedrock consists largely of sedimentary rocks of Cretaceous age. The rocks dip gently along the flanks of the Johns Valley and Tropic anticlines and along an intervening syncline. The eastern part of the tract forms the rugged blue-gray bedlands. The western part is composed of dissected sandstone canyonlands. Elevations range from 8150 feet in the northern portion to 6425 feet near the western boundary bordering Tropic Valley. Major drainages in the unit include Pasture, Henderson, Jimmie and Pardner Canyons. These drainages run predominantly in a north to south direction. Slopes are predominantly south facing.

c. Minerals and Energy

The main economic mineral and energy studies pertaining to The Blues WSA are: The Department of Energy's (DOE) Energy-Resource Evaluation of Wilderness Study Areas Administered By The Bureau of Land Management, the Cedar City District, Utah; April 20, 1981 and Southwestern Utah Coal Fields: Alton, Kaiparowits Plateau and Kolob-Harmony; H.H. Doelling and R.L. Graham, 1972. This discussion on the existing mineral and energy resource environment draws heavily on these studies including extensive quotes from the Department of Energy report.

Coal

The main energy resource of The Blues WSA is coal, almost all of which lies within the Kaiparowits Known Recoverable Coal Resource Area (KRCRA).

"Tract 268 lies on the west side of the Kaiparowits coal field. Most of the tract is underlain by the Kaiparowits, Wahweap, Straight Cliffs, Dakota, and Tropic Formations, all of Cretaceous age. However, the Kaiparowits, Wahweap and other Upper Cretaceous rocks are not coal-bearing. In the area near Tract 268, the cumulative thickness of coal is as much as 23 feet, and in some places within the tract individual coal beds up to 12.2 feet thick have been measured (Doelling and Graham, 1972). All the coal within the tract is in the upper part of the Straight Cliffs Formation (the Henderson coal zone in the John Henry Member; see Energy-Resource Potential Map). The Henderson coal zone incorporates the youngest (uppermost) coal-bearing rocks in this part of the Kaiparowits coal field (Doelling and Graham, 1972). We estimate that the maximum depth to the Henderson coal zone is about 3,000 feet in the northeastern part of the tract. Deeper coal-bearing rocks occur in the lower part of the Straight Cliffs Formation, the Tropic Shale and the Dakota Sandstone." (DOE, 1981)

Roughly one half of this tract is underlain by coal with less than 2,000 feet of overburden (Figure 2). The economically extractable coal from this tract is estimated to be roughly 75-100 million tons using an average thickness of 13.9 ft. for the coal in the Henderson Coal Zone (Doelling and Graham), the area with less than 2,000 ft. of overburden and using a 30-50% recovery factor. Almost all of this would be mined by underground methods.

"According to Doelling and Graham (1972), less than 25,000 tons of coal have been removed from the Kaiparowits coal field, and no mines are currently active. A number of mines were active in and near Tract 268, but the cumulative tonnage extracted was probably very small." (DOE, 1981) These mines are the Davies, Shakespear and Pollock. From the largest of these, the Shakespear mine, production "probably totalled a few tens of thousands of tons" (Doelling and Graham, 1972). The Shakespear mine lies within the only existing coal lease in the tract. In 1980, a plan of operations was submitted to the Office of Surface Mining, USDI by Shakespear Coal Corporation. Mining was to commence in November 1980 according to the plan, however, no mining has taken place to date. The Davies Mine lies in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 36 (State section). Only the E $\frac{1}{2}$ NE $\frac{1}{4}$ and the NE $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 36 is underlain by the Henderson coal zone (Doelling and Graham, 1981 - Map page 221). Section 36 does not fall within the area given a favorability of 4 as shown on Figure 2. The other state section (Section 32), however, does fall within this area and is presently leased for coal, gas and oil and all hydrocarbons.

On December 16, 1980 Secretary of Interior, Cecil Andrus, designated a portion of the Alton and Kaiparowits Coal Fields, including portions of this WSA, as unsuitable for coal mining because of the close vicinity to Bryce Canyon National Park. His determination, in part, says "1. I hereby designate as unsuitable for surface coal mining operations, including surface impacts incident to underground mining

which would be visible from Bryce Canyon National Park, all Federal lands in township T 40 S, R 4 W; T 39 S, R 4 W; T 38 S, R 4 W; T 38 S, R 3 W; T 37 S, R 4 W; T 37 S, R 3 W; and T 36 S, R 3 W; of the Salt Lake Meridian; and T 36 S, R 2 W of the Salt Lake Meridian is designated unsuitable only for mining by surface methods;" (Secretary of Interior, December 16, 1980). Consequently, underground mining operations within the WSA would not be precluded by this decision.

"In general, the quality of coal from the Kaiparowits field is poor to moderate. In the immediate area of Tract 268, the coal has an average moisture content of 18.3 percent, an average ash content of 13.6 percent, an average sulfur content of 1.09 percent, and an average heat value of 11,683 Btu/lb (Doelling and Graham, 1972)." (DOE, 1981)

From DOE's report the coal within The Blues WSA would be considered of moderate quality in general and of average quality when compared with just the coal within the Kaiparowits coal field.

"Doelling and Graham (1972) estimate that coal reserves within the entire Kaiparowits field total 15.2 billion short tons, of which one-third to one-half can be mined by underground methods. However, because of problems related to remoteness, accessibility, water availability, high mining and transportation-costs, and competition from nearby coal fields (central Utah, Black Mesa Basin, Arizona and the San Juan Basin, New Mexico), the Kaiparowits coal field will face complex and expensive problems for years to come. These restrictions, however, are not taken into account in assigning the tract a coal favorability rating, but they do influence the tract's Overall Importance Rating. Based on the discussion above, we have assigned Tract 268 a favorability rating of f4 and a certainty of occurrence rating of c4." (DOE, 1981) (See Figure 3 for an explanation of this rating system)

The portion of the Kaiparowits KRCRA which includes this tract is being considered for competitive coal leasing scheduled for December 15, 1983.

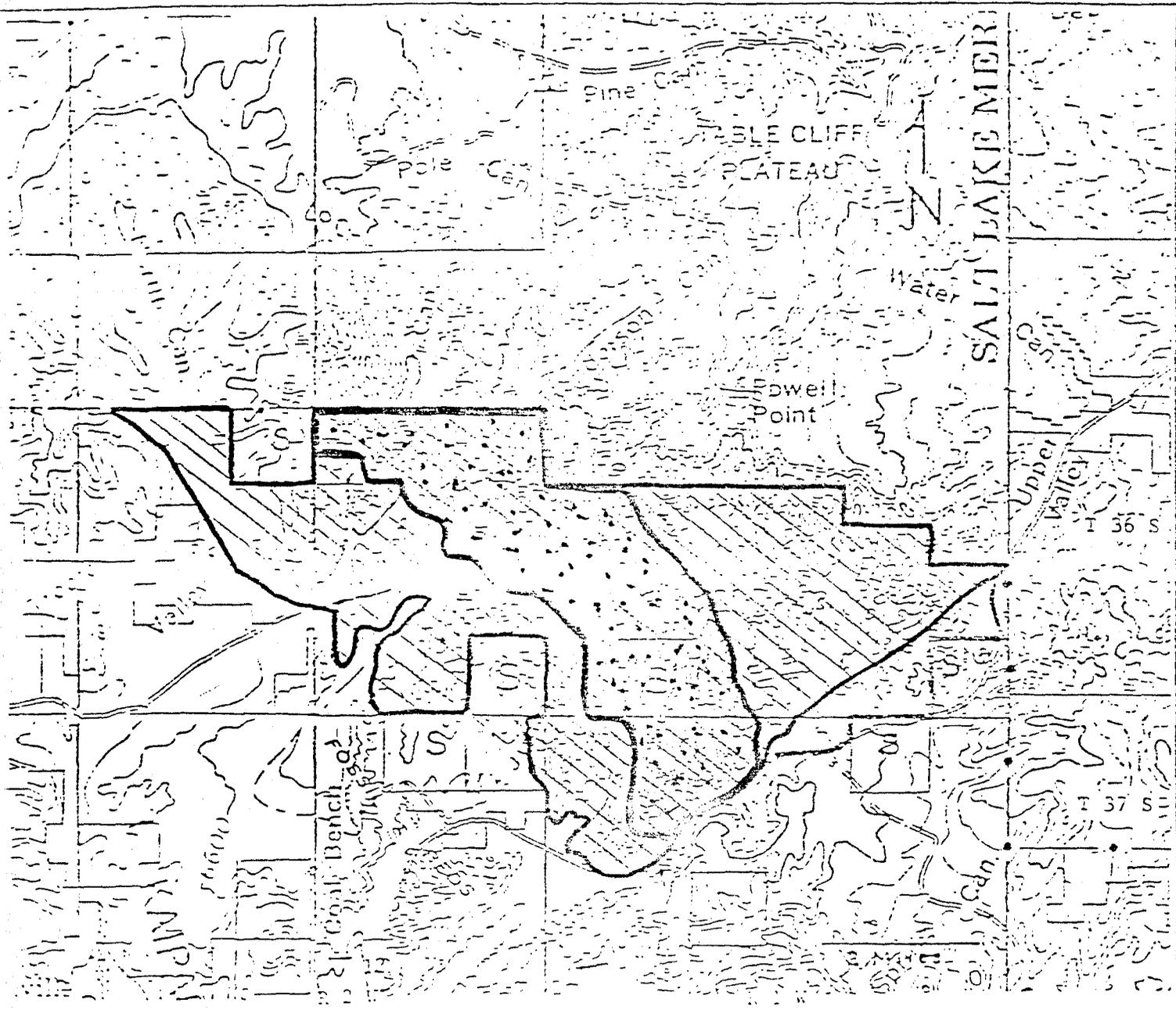
Oil and Gas

The second most important potential energy source of The Blues WSA is oil and gas. Approximately 97 % of the tract, covering 18,450 acres, is held by leases. The tract is in oil and gas leasing category "one" (open to oil and gas leasing without special stipulations, except wilderness protection stipulations).

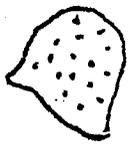
Of the oil and gas leases in this tract, those leases without attached wilderness protection stipulations and those with wilderness protection stipulations which cease to apply after wilderness designation cover _____ acres. Those leases with wilderness protection stipulations which continue to apply after wilderness designation (post December 1979 leases) cover _____ acres.

ENERGY RESOURCE POTENTIAL MAP OF WILDERNESS
STUDY AREA (WSA) 268

SHOWING THE PROJECTED AREAL EXTENT OF EACH
POTENTIAL ENERGY RESOURCE WITH AN ASSIGNED
FAVORABILITY RATING OF 3 OR 4.



EXPLANATION



(Coal seams: shaded area has a coal favorability of F4 (Overburden is less than 2,000 feet thick). Overburden in northeast part of tract is generally 2,000 and 3,000 feet thick.)

FIGURE 2

FIGURE 3

EXPLANATION OF RATING SYSTEM

Each resource is assigned a dual rating (e.g. f3/c2). The first rating, "f3", estimates the "geologic favorability" (f) of the tract for the resource. The second rating, "c2", is the group's estimate, or "degree of certainty" (c), that the resource actually does, or does not, exist within the tract. Favorability and certainty are rated on a scale of 1 to 4 and are defined in the two columns below. Justifications for individual resource ratings are contained in the body of the report.

The "overall-importance rating" is a single-digit rating on a scale of 1 (low importance) to 4 (high importance). Shades of importance within each of the four categories are indicated by plus (+) and minus(-) superscripts. The overall-importance rating attempts to integrate the individual resource evaluations for a tract, with other data such as gross economics or the proposed location of energy corridors, into a summary number that reflects the group's overall assessment of the resource-importance of the tract.

- | | |
|--|--|
| <p>F1: The inferred past and/or current geologic processes operating in the area are believed to preclude the accumulation of the resource.</p> | <p>C1: No direct data (such as mines, producing or abandoned wells, prospects, assays, bore holes, and so on) occur in the broad area surrounding the tract to either support or refute the existence of the resource within the tract.</p> |
| <p>F2: The geologic environment of the area is considered favorable for the accumulation of (1) minor deposits, (2) low-tonnage, low-grade, or low-volume resources, or (3) low-temperature geothermal resources. If these resources exist, they may or may not be economical to extract.</p> | <p>C2: No direct occurrence data are available to support or refute the existence of the resource within or near the tract. However, the tract is fairly close to direct evidence of resource occurrence, and the past geologic conditions responsible for resource accumulation in this nearby area can be inferred, with a limited amount of confidence, to have existed in the tract.</p> |
| <p>F3: The geologic environment of the area is considered favorable for the accumulation of (1) medium-size (tonnage, volume) deposits, or (2) moderate-temperature geothermal resources. If these resources exist, they may or may not be economical to extract.</p> | <p>C3: At least "one piece" of direct evidence (an oil or gas seep, a coal-bed outcrop, a hot spring, a positive assay, and so on) is available from within or very near the tract to support or refute the existence of the resource.</p> |
| <p>F4: The geologic environment of existence of the area is considered favorable for the accumulation of (1) large-size (tonnage, volume) deposits, or (2) high-temperature geothermal resources. If the more conventional resources exist (oil, gas, coal, and uranium), <u>they would probably be economical to extract.</u></p> | <p>C4: Abundant direct evidence is available from within and/or very near the tract to support or refute the existence of the resource. (When a c4 certainty is used with an f1 favorability, this indicates with a high degree of certainty, that the resource <u>does not exist</u> in the tract.)</p> |

"Most oil and gas production in southern Utah is from the Paradox Basin, about 125 miles east of Tract 268. The only current oil production from south-central Utah comes from the Upper Valley field located about 6 miles east of Tract 268. In addition, minor amounts of oil have been produced intermittently from two fields in southwestern Utah.

Oil and gas exploration in southern Utah has been centered in the Paradox Basin and peaked in the late 1950s and early 1960s with the discovery of the giant Aneth field in 1956 and the Lisbon field in 1960. Since then, sporadic wildcat drilling (which has recently increased) has located some small fields, but no major discoveries have been made. The Upper Valley field, a short distance to the east, was discovered in 1964 after 17 years of intermittent drilling. This find stimulated mild drilling activity in similar anticlinal structures in south-central Utah, but to date no commercial oil and gas potential has been identified. Because of the proximity of the Upper Valley field to Tract 268, a detailed description of this field relates directly to the oil and gas favorability of the tract.

Cumulative production through December 1975 at the Upper Valley field was almost 15 million barrels of oil. Production is from four distinct zones within the Timpoweap Formation of Triassic age and the Kaibab Formation of Permian age (Sharp, 1976). The oil reservoir is located along the prominent Upper Valley anticline, but production is offset from the crest of the anticline to the west flank and the southern-plunging nose. Sharp (1976) attributes this offset to a regional, southwest-directed hydrodynamic drive in the Kaibab Formation. If correct, oil accumulations in other anticlines within the region may also be displaced to the south.

The main structural features in and near Tract 268 from east to west are the Table Cliffs syncline, the Johns Valley anticline, an unnamed syncline, and the Tropic anticline (see Geologic Sketch Map). The Johns Valley anticline was tested in 1952 (Kunkel, 1965) and again in 1965 (Young, 1966) approximately 5 miles north of the tract. The 1952 well penetrated the Redwall Limestone of Mississippian age and oil shows were reported from the Moenkopi Formation (Triassic), the Kaibab Limestone, Toroweap Formation, and Queantoweap Formation (all of Permian age), and the Hermosa and Molas Formations (Pennsylvanian). The 1965 well bottomed in the Cedar Mesa Sandstone of Permian age and no oil shows were reported. The Tropic anticline west of the tract was tested in 1964 by Tenneco (Kunkel, 1965). The Queantoweap Formation of Permian age was the deepest formation penetrated and oil staining was reported from the Organ Rock Shale and Cedar Mesa Sandstone, each of Permian age.

We consider the structural favorability of Tract 268 for oil and gas to be low. The Johns Valley anticline plunges southward towards the northern boarder of the tract, but its effects within the tract appear minimal. The east limb of the Tropic anticline encompasses the extreme western part of the tract, but results from drilling farther south along this structure were not promising (Kunkel, 1965).

Major stratigraphic traps within the vicinity of Tract 268 are possible, especially along the unconformity separating Mississippian and Permian rocks. According to maps prepared by Mallory (1972) Pennsylvanian rocks thin rapidly to the west across south-central Utah and are absent about 10 miles west and south of Tract 268. The likelihood that a large oil field exists along this unconformity or within stratigraphic pinchouts in Pennsylvanian rocks, however, is low because potential source rocks would be of pre-Permian, and probably pre-Pennsylvanian age. To date, exploration results from rocks of pre-Pennsylvanian age in south-central Utah have not been encouraging.

Based on the discussion above, we have assigned Tract 268 an oil and gas favorability rating of f2 and a certainty of occurrence rating of c1. Small oil fields could be contained within combination stratigraphic- structural traps, especially in the Kaibab Limestone (Permian). In addition, small oil and gas fields could be contained within stratigraphic pinchouts in rocks of Pennsylvanian age." (DOE, 1981)

Uranium

"The Colorado Plateau is one of the major uranium-producing regions in the United States. The most important deposits occur in conglomerates, sandstones, and mudstones within the Morrison Formation of Jurassic age and in the basal part of the Chinle Formation of Triassic age. Minor production has also been obtained locally from rocks of Permian, Cretaceous, and Eocene age. By far the most productive areas of the plateau are in northern New Mexico and southeastern Utah (DOE, 1979; Doelling, 1975).

The following rock units are considered favorable for uranium in south-central Utah (DOE, 1979): the basal members and the Petrified Forest Member of the Chinle Formation (Triassic), and the Salt Wash Member of the Morrison Formation (Jurassic). The Morrison Formation thickens to the east from the vicinity of south-central Utah, and according to maps prepared by Peterson (1972), the Morrison Formation has been removed by pre-Dakota erosion in the immediate area of Tract 268. However, small erosional remnants of the Morrison may be preserved at depth along the east side of the tract. The depth to the favorable part of the Chinle Formation varies from at least 7,000 feet along the east side of the tract, to about 3,500 feet along the west side of the tract (Hintze, 1973).

Based on the discussion above, the only favorable host-rocks for uranium in the vicinity of Tract 268 are in the Chinle Formation. In south-central Utah, the Chinle Formation (Shinarump and Petrified Forest Members) contains small deposits such as those in the Circle Cliffs area east of Tract 268. We have therefore assigned the tract a uranium favorability of f2 and a certainty of occurrence of c1. (However, the costs of exploring for uranium at depths of at least 3,500 feet in an area where the anticipated payoffs are small make Tract 268 a relatively unappealing target areas." (DOE, 1981)

Geothermal

"Tract 268 lies within the Colorado Plateau. In terms of geothermal resources this province is characterized by a low heat-flow, a long history of relative tectonic stability, and a general lack of thermal springs. Moreover, deep stream incision has caused widespread lowering of the ground water table. As a result, any high-temperature thermal waters that may exist occur only at a considerable depth (Muffler, 1978).

Most investigators consider recent crustal instability, high heat-flow, and young igneous rocks (less than 1 or 2 million years old) as important criteria for a geothermal resource of commercial proportion. Although igneous rocks do occur on the plateau, they are of limited areal extent, and are generally between 17 and 65 million years old (Luedke and Smith, 1978). Younger volcanic rocks occur widely along the margin of the plateau, and most of the plateau's geothermal potential is contained in this zone.

The nearest thermal springs to Tract 268 are approximately 110 miles to the northeast and 100 miles to the southwest, and none of the springs discharge at temperatures greater than 50°C (NOAA, 1979). No young igneous rocks crop out in the vicinity of the tract, nor are any known to occur in the subsurface.

Based on the local and regional geologic setting and on the lack of thermal springs in the vicinity, we have assigned Tract 268 a geothermal favorability rating of f1 and a certainty of occurrence rating of c2." (DOE, 1981)

Other Minerals and Energy Resources

No other critical or stratigic mineral ores or energy resources are known to exist or have potential within this Tract and no mining claims have been staked.

Overall-Importance Rating 3

"Tract 268 has been assigned an Overall Importance Rating of 3+ based largely on the high certainty of thick coal beds. Despite the high favorability and certainty ratings for coal (f4/c4), we have downgraded its importance because of the many problems associated with coal extraction on the Kaiparowits Plateau. These problems include remoteness, poor accessibility, water availability, high mining and transportation costs, and competition from nearby coal fiels in central Utah, Arizona, and New Mexico." (DOE)

d. Soils

The WSA is composed of five (5) soil associations. They are: 1) Ustic Torrifluvents-Ustic Torriorthents - This association consists of well drained, nearly level, deep, fine sandy loam and some loam and gravelly fine sandy loam soils on flood plains and alluvial

slopes. (2) Ustollic Haplargids-Ustollic calciorthids - This association consists of well drained, nearly level to gently sloping deep loam and gravelly loam soils on bench terraces. 3) Badland-Rock Outcrop - This land type association consists of nearly barren, hilly to extremely steep exposed shale, silt stone and bedrock on the terrace breaks and valleys. 4) Ustic Torriorthents-Rock Outcrop - This soil association consists of moderately rolling to very steep, very shallow to deep loam and fine sandy loam soils and interbedded shale and sandstone on mountain slopes and on the plateau, bench and terrace breaks. 5) Ustic Torriorthents-Lithic Ustic Torriorthents - This association consists of well drained, nearly level to gently sloping, very shallow to moderately deep, fine sandy loam, sandy loam and loam soils on plateaus. The Lithic Ustic Torriorthents are commonly associated with the Rock Outcrop and along the outer edges associated with the breaks.

Approximately 75% of the WSA is made up of the Badland-Rock Outcrop and the Ustic Torriorthents-Rock Outcrop associations which produce high sediment yields. Also about 75% of the area is from moderately steep (13% - 25% slope) to very steep (25% - 55% slope). Approximately 95% of the area is in the moderate or severe erosion susceptibility classes. Also, approximately 90% of the soils have an effective rooting depth of 12" or less.

e. Water Resources

Henrieville Creek and Henderson Canyon both run water during most of the year, but is not normally conducive to public drinking. Parts of the other drainages has intermittent water. There is a developed spring and pipeline in Pasture Canyon but these developments have been cherrystemmed out from the unit. There are no reservoirs, lakes or ponds within the WSA. There are also three undeveloped springs in the WSA. Two are located in Section 15 west and north of Pasture Canyon while the other is located on the southern WSA boundary in Section 9 just north of the highway. Three private water applications are pending in The Blues WSA. They are as follows:

- 1) The Henrieville Irrigation Company
- 2) George Thompson and Laurie Dee Holley at Pardner Canyon
- 3) George Thompson and Laurie Dee Holley at Jimmie Canyon

Also BLM has seventeen (17) pending public water right applications.

f. Vegetation

The WSA has four vegetative types within its boundaries. They are as follows (in descending abundance): 1) Pinyon/juniper - This is the most dominant vegetation type. It occurs over approximately 90% of the area and has a sparse understory of shrubs occurring with it. This type is characterized by different northern exposure and southern exposure vegetative associations. The major species of the northern exposures are pinyon-pine, gamble oak, mountain mahogany and serviceberry. The southern exposures are dominated by juniper, cliffrose and silver buffaloberry. The higher elevations

within the WSA also have an intermix of ponderosa pine. 2) Black Greasewood - This ecotype appears on about 5% of the area. It is dominated principally by greasewood, which is a salt tolerant species, occupying saline - alkali soils. 3) Big sagebrush - This type occurs over approximately 4% of the area. It is characterized by a brush mixture canopy, predominately sagebrush, and a sparse grass/ forb understory. 4) Shadscale - This brush type occurs on about 1% of the area with very little understory.

Only about 10% of the total vegetative community is presently suitable for grazing. Approximately 95% of the area has a vegetal - soil factor of either high or moderate. A high or moderate vegetal - soil factor is characterized by soils that are in a deteriorating, erosive or otherwise unstable condition due to steep slopes, soil properties which promote erosion, etc. Land treatment opportunities would be poor to fair on these areas since any soil disturbing activities could lead to erosion problems. Consequently, opportunities for improvement, except through management of the existing vegetation and treatment of the better sites would be considered marginal. No threatened or endangered plants are found within the WSA.

g. Wildlife

An intensive wildlife inventory of The Blues WSA has not been done. However, due to the many different habitat types within the area it is assumed that a diversity of mammal and bird species do exist. The population level of most species though would most likely be low because of the poor habitat condition. The six habitat types are: pinyon-juniper, sagebrush, mountain shrub, desert shrub, ponderosa pine and riparian. The riparian type is located along Henrieville Creek and would produce the greatest diversity of species.

Game animals do not play an important role within the WSA. Henderson Canyon serves as a moderate use area for a residential mule deer herd. No elk, pronghorn or black bear are present within the WSA but there is some suitable pronghorn habitat in the southernmost portion of the unit. There is a moderate and high concentration of rodents and cottontails, respectively, in the Henderson and Pasture Canyon areas. These concentrations fluctuate, sometimes quite drastically, according to the particular year and predator numbers. The remaining WSA has only light concentration of these species. The northern and eastern portions of the unit has spring, summer and fall Blue grouse and band tailed pigeon habitat. The southern and eastern part of the unit has yearlong chukar habitat. Although the habitat is favorable for these species and they are assumed to occupy these areas, their population levels are not known.

h. Livestock and Agriculture

The Blues WSA is within the Headwaters Allotment (Upper Paria). Twenty operators graze cattle within this allotment. At the present time the WSA is used for livestock grazing only on an emergency basis, e.g. during drought years. This is due to the fact that the

large majority of the area is unsuitable for livestock grazing. The unsuitability determination is due to steep slopes, poor forage availability and inadequate water distribution. However, the following areas are used on occasion: Walt Bench, Pasture Canyon, Henderson Canyon, Pardner Canyon, Henrieville Creek and near the northwest corner of the allotment (East Valley Area). Cattle are normally trailed down Henderson Canyon and Henrieville Creek each year in order to go from one grazing unit to another.

i. Forest Resources

A thorough inventory of the woodlands resources within the WSA has not been done. Although the woodland inventory is incomplete, existing range and watershed survey data concerning density and composition information has been compiled. From this available data it is appropriately assumed that the woodland resources be classified as non-commercial. There are some ponderosa pine stands scattered throughout the pinyon/juniper community but none is of commercial value. These stands are located primarily in Section 14 north of the Shakespear Mine and in Sections 19, 20, 21, 28, 29, 30 and 31 north and east of Pardner Canyon.

The vast majority of the WSA is composed of the pinyon/juniper ecotype (approximately 90%). Most of this ecotype has a crown cover of less than 17%. Some of the WSA, however, is quite dense with this woodland type and has a canopy cover of more than 17%. This latter area is found in a one-half ($\frac{1}{2}$) mile swath along a major portion of the Henderson Creek Canyon drainage and north and east of the head of Jimmie Canyon.

Though commercial timber is not recognized within the WSA, the area is somewhat used for firewood, post cutting and Christmas tree cutting. Dry firewood may become scarce near the Bryce Valley communities of Tropic, Cannonville and Henrieville insomuch that this area will likely become more valuable for this resource in future years.

j. Recreation

The WSA has no developed recreational facilities or trails. The majority of the WSA was designated as "open" to Off Road Vehicle (ORV) use in 1980 with the exception of approximately 2,500 acres which were designated as "limited" to existing roads and trails to protect riparian values (see Federal Register Notice, UT-040-002, Vol. 45, No. 188, pg. 63555, 10/25/80). ORV use is usually confined however, to existing roads and trails because of steepness of terrain and topographic features. Consequently, ORV use is very light. The primary recreational activity that takes place within the WSA is general sightseeing from these existing roads and the major highway bordering the unit on the south. The sightseeing opportunities would be quite marginal. The current land use plan identified the potential to develop a scenic overlook on Highway U-12 near "The Blues" badland topography with associated interpretation of geological values. At the present time, however, development of

this facility has been deferred until an identified public demand is evident. No existing data is available concerning the number of hiking or backpacking visitor days within the unit. The Kanab Resource Area Office has not received any inquiries from the public during the past year concerning the hiking possibilities within this WSA.

Hunting opportunities within the WSA is limited mainly to small game and mule deer. No information is available concerning success ratios. Fishing opportunities do not exist. Camping, picnicking, rock and vegetative collecting, and other recreational type opportunities are also marginal. The location of the different recreational activities have been portrayed on overlays found in the Kanab Resource Area Office.

k. Visual Resources

The scenery quality rating for the WSA is in Class B and C. These classes represent the following: 1) Class B areas have interesting landscapes but lack outstanding or dominating features. 2) Class C areas have features which display little variety and tend to be monotonous. The visual sensitivity level corresponds somewhat to the scenery quality rating and is found to be low or medium also. In essence the sensitivity level is an index to the relative importance of visual response to an area.

Approximately 1/3 of the WSA is within the seldom seen or background visual zones. The remaining 2/3 is within the foreground-middleground zone. These zones delineate the WSA as the observer views the area from highways, roads or trails.

The Visual Resource Management system provides guidelines for reducing unwanted visual affects of existing and proposed projects.

Class I Provides primarily for natural ecological change.

Class II Changes in any of the basic elements (form, line, color, textures) should not be evident.

Class III Changes in the basic elements may be evident but should remain subordinate.

Class IV -Changes may subordinate the original composition but must reflect a natural occurrence.

Approximately 3/4 of the WSA is within Visual Management Class IV while the remaining 1/4 is within Class III.

l. Cultural Resources

The WSA, according to present data, does not have any archeological/historical values of any significance. No formal archeological inventory, however, has been conducted for this WSA.

m. Wilderness

Component 1: Quality of Area's Mandatory Wilderness Characteristics

Naturalness Characteristic

The naturalness characteristic is present throughout the 19,030 acres WSA.

Outstanding Opportunities for Solitude Characteristic

The opportunity for solitude in The Blues Wilderness Study Area derives from both vegetative and topographic screening situations. The outstanding opportunities exist where elements of vegetative and topographic screening combine to create a superior opportunity for visitors to avoid the sights, sounds, and evidence of other visitors. In the western portion of the WSA, the area of the 7,950 feet point between Henderson and Pasture Canyons, a small area on the Dixie National Forest boundary west of Pasture Canyon, and a portion of the east wall of Henderson Canyon all possess this attribute. In the central portion of the WSA, the upper reaches of Pardner Canyon and the cliff area to the southeast in section 4 also possess superior natural screening. In The Blues, one area below the South Rim at the National Forest boundary is sufficiently forested to offer an excellent opportunity to avoid other visitors. An outstanding opportunity for solitude is present on 1,576 acres of the unit.

Outstanding Opportunities for Primitive and Unconfined Recreation

The opportunity for primitive and unconfined recreation within the WSA is considered to be outstanding in areas where the number of primitive recreational activities are diverse. The opportunity is also considered to be outstanding where the exploring activity is considered excellent.

The inventory identifies hiking, backpacking, rock climbing, hunting, geological sightseeing, and botanical sightseeing as the six activity opportunities which exist within the WSA. In areas where five or six of the activity opportunities exist together, the opportunity is outstanding. Because such areas exhibit a diversity in the number of possible activities, they thus satisfy the Wilderness Inventory Handbook policy standard at page 14 for outstanding opportunity. Areas which contain a diversity of activities encompass 771 acres of the WSA.

The opportunities for hiking and hunting are considered to exist throughout the WSA. By their very nature, these activities would be area-extensive in this WSA and it would be difficult to identify any specific areas where hikers and hunters would not pursue these activities.

The rock climbing activity is very localized. It is dependent upon high sheer cliffs of the Wahweap or Straight Cliffs sandstones. Cliffs suitable for this activity are found along Henrieville Creek above the gravel pit, on the east wall of lower Pardner Canyon in section 5, and on the 7,950 feet monolith east of Pasture Canyon on the Pasture Canyon-Henderson Canyon divide.

The botanical sightseeing activity is limited to the plant life in The Blues badlands. Observations of the plant associations in the badlands constitute a sightseeing objective in the WSA.

The inventory states that some recreation activities are enhanced by the variation in vegetation and topography within the WSA. The backpacking and geological sightseeing opportunities are influenced by this variety. In fact, geological sightseeing is one of the objectives of backpacking in the WSA and these two activities are considered to exist in identical locations. The backpacking opportunity exists where a full traverse of the WSA's geological variety (landform, stratigraphy, elevational diversity) can be accomplished. The WSA configuration is such that it would be difficult, if not impossible, to experience the variation in vegetation and topography by hiking. Overnight stays are required. Some of the backpacking-geological sightseeing activity of necessity must occur on adjacent National Forest lands and in a State section if the range of topographic and vegetative variation is to be observed. The variation in vegetation and topography within the WSA is best expressed in the following phenomena. From east to west, the variety includes the South Rim overlook of The Blues badlands, the perched ponderosa pine pocket in The Blues in Section 22, The Blues badlands in Dry Creek, the ponderosa pine parks at the heads of Jimmie and Pardner Canyons, the 8,210 feet overlook (highest elevation in eastern portion of WSA) of cliffs at the head of Pardner Canyon, interior of Henderson Canyon and east tributary canyon, the dissection and formations in the unnamed canyon between Pasture and Henderson Canyons, the monolith above the east wall of Pasture Canyon, the amphitheater and bowl area beneath the Paradise-Pasture Canyons divide, and the benchlands between Pasture and Paradise Canyon.

The inventory identifies excellent opportunities for the exploration activity within the WSA. The areas where the exploration activity is excellent represent outstanding opportunities for primitive and unconfined recreation because they meet the WIH policy standard on page 14 of quality of one opportunity. Excellent opportunities for exploration are found in some of the remote and dissected locations of the WSA. These areas do not necessarily exhibit a diversity in landform types nor do they necessarily represent areas of outstanding solitude. Rather, they are rarely visited locations in difficult and confusing topography which would invite exploration. These areas include the upper reaches of Pardner and Jimmie Canyons, a tributary canyon to Henderson Canyon beneath

Powell Point, and the area along the Dixie National Forest boundary west of Henderson Canyon which includes the Pasture Canyon drainage. Excellent opportunities for exploration are found on 2,274 acres of the WSA.

Degree to Which All Mandatory Wilderness Characteristics Are Present

1. Acreage exhibiting all mandatory characteristics - 1,270 = 6.7%
2. Acreage exhibiting two mandatory characteristics - 1,981 = 10.4%
3. Acreage exhibiting only naturalness characteristic- 15,779 = 82.9%

In conclusion 1,270 acres (6.7% of the area) exhibits all the mandatory characteristics of naturalness, outstanding opportunity for solitude and outstanding opportunity for a primitive or unconfined recreation. The latter two qualities are represented on an additional 1981 acres or 10.4% of the area. The remaining 82.9% of the unit exhibits only the naturalness quality. On the basis of the outstanding opportunity characteristics the unit as a whole would be rated low in wilderness quality.

Component 2: Special Features

The Blues portion (eastern portion) of the WSA has an erosive badland topography. Geologically it is interesting but not unique, as this type of topography is commonly found within the Kaiparowits Formation in other locations. Some paleontological evidence (fossils) are found in the area. However, there has been limited professional recovery of fossilized bones from the unit and their extent and scientific nature is unknown. No other ecological, geological or other features of scientific, educational, scenic, or historical values of significant importance are found within the WSA.

Component 3: Multiple Resource Benefits

There are no major multiple resource values (other than wilderness values) presently within the WSA whose continued viability would only be ensured through the protective status of wilderness designation. There are no apparent multiple resource values that do not exist in the area now, but which could occur in the future only as a result of wilderness designation. No specific benefits are likely to accrue to off-site areas not within the boundaries of the WSA. Most of the WSA is presently substantially unused so benefits such as watershed protection, water yield and water quality, etc. would not significantly improve off-site areas.

Component 4: Diversity

2. Human Values

a. Health and Safety

No health or safety problems have been identified for this unit.

b. Land Use and Land Use Plans

Garfield County has a Master Plan for Development dated March 1979 and an addendum adopted on January 12, 1981. Without going into much detail of this plan the Garfield County Commission selected the following general goals for growth and development within the county. These goals reflect the social and economic qualities that the County Commission believes the county should acquire.

These are as follows:

- 1) Stabilize the economy through comprehensive resource development policies.
- 2) Provide opportunities for increasing family incomes.
- 3) Stabilize the level of employment to a consistent, moderate rate of growth.
- 4) Provide trade skill development opportunities for the unemployed and under employed.
- 5) Reduce fluctuations in the economy by promoting balanced economic growth.
- 6) Participate in and prepare for increased demands for community services resulting from growth.

The land use plan stresses that all public lands within Garfield County be open for "multiple use". It specifically identifies the following in regards to The Blues WSA:

- 1) Support the highest, economically allowable development of the Kaiparowits coal reserves.
- 2) Support the installation of railroad spurs to connect Garfield County with rail lines to the north, west and south.
- 3) Maintain all Class B and D roads satisfactorily in order to preserve their class designations.
- 4) Maintain at least present levels of timber lease activity and livestock A.U.M.'s.

c. Socioeconomics and Public Attitudes

Garfield County, Utah is identified as the region most likely to receive socioeconomic impacts related to wilderness designation of The Blues WSA. Garfield is a rural county with a very low average population density. Three communities lie near the WSA: Cannonville, Henrieville, and Tropic. The total population for these three communities is estimated to be 627 (Preliminary 1980 Census). These three small communities are expected to receive most of the direct impacts.

It is difficult to estimate current employment and income in the communities of Cannonville, Henrieville, and Tropic due to the lack of information at the municipality level and restricted disclosure nature of the available data. It is assumed that most of the employment and income in the area is based in the agriculture and services sectors. This is based upon the low number of retail trade outlets in the area. Most of the persons employed by the services sector probably work within the local school system.

Currently there is very little recreational activity taking place on the WSA. It is estimated that current recreation use of The Blues has no socioeconomic impact on the region.

There are no active mines on the area. At the present time there are 18,460 acres held under oil and gas lease. These leases presently provide revenues of one dollar per acre per year. These revenues are divided between the State and Federal government, primarily to benefit energy-related research, mitigation, and reclamation.

The local public's attitude is that resources should be developed where possible to expand the economic status of the county. They also realize that tourism trade is a valid and needed resource for the county. And, as such, are in favor of carefully planned growth so as not to adversely affect the scenic qualities of the area and simultaneously destroy this trade. Generally, the public is not in favor of wilderness designation because they feel this will "lock up" future assets inherent to the county. They feel scenic values can still be preserved while growth and development occurs. The Garfield County Commission has been very adamant against any wilderness designation in the county. They have taken a very active part in the wilderness inventory process and have written numerous letters and reports during the public comment periods to air their concerns. These correspondences are on record opposing wilderness designation of The Blues WSA.

Also, the State of Utah wilderness committee has tentatively recommended that The Blues WSA not be designated as wilderness. Consequently, both local and state opinions have been expressed, sometimes emotionally, that this unit lacks significant wilderness quality and/or would impact other resources if designated as suitable for wilderness protection.

E. Environmental Consequences of Alternatives

1. All Wilderness

a. Impact on Wilderness Values

The outstanding wilderness values would benefit from this alternative. These values would be preserved in their present condition. Some wilderness values may increase, but probably only insignificantly since the present WSA boundaries has very little activity occurring within it now. Consequently making it a wilderness area would not

really be excluding any substantial present activity. The impacts of mineral and energy resources, however, would have an impact on the wilderness values. Even if the WSA was designated wilderness the latter activities could occur.

If development did occur then wilderness values would be severely compromised since the economic coal reserves lie right below the most outstanding wilderness values within the unit.

Development of the one existing coal lease (as per the "Final Wilderness Management Policy"), the Shakespear Mine, would have an impact on wilderness values. The main impacts would be from surface activities supporting the underground mining. The surface impacts would be from development of ventilation shafts for every 1-2 miles of underground drifts and would entail road building and drill pad construction. Other impacts would be from a permanent service road to each ventilation shafts and from a small equipment shed covering each shaft. The housed equipment would produce motor noises which may be audible up to approximately one half mile away (personal communications, USGS, Salt Lake). Land subsidence would generally be minimal where overburden depth is close to 2,000 feet and coal thickness is less than 15 feet. Where coal thickness is greater and/or where overburden thickness is less than surface subsidence would be somewhat greater (personal communication, USGS, Salt Lake).

Regarding additional leasing, according to present BLM policy, wilderness protection stipulations, which went into affect in December 1979, are being applied to all new mineral leases in wilderness study areas. These stipulations limit lease activities by requiring "complete recontouring of cuts and fills", "the replacement of top soil" and revegetation with native plant species. Additionally these stipulations require that "any temporary impact caused by the activity must, at a minimum, be capable of being reclaimed to a condition of being substantially unnoticeable in the wilderness study area (or inventory area) as a whole by the time the Secretary of the Interior is scheduled to send his recommendations on that area to the President,....." Furthermore the stipulations state "When the activity is terminated, and after any needed reclamation is complete, the areas's wilderness values must not have been degraded so far, compared with the area's values for other purposes, as to significantly constrain the Secretary's recommendation with respect to the area's suitability or nonsuitability for preservation as wilderness." (Interim Management Policy and Guidelines for Lands Under Wilderness Review, December 12, 1979).

These stipulations would continue to apply even after wilderness designation subject to modification by the Act of Congress designating the land as wilderness.

These impacts on wilderness values from coal development should be low under these lease stipulations subject to the above mentioned modifications of these stipulations by Congress.

The impact of oil and gas exploration on wilderness should be minimal due to the low favorability for this resource within the WSA (DOE, 1981). However, because 97% of the tract is presently held by lease, which would not be precluded from development under the 1964 Wilderness Act, the possibility of significant oil and gas development along with its impacts on wilderness can not be ruled out. Due to the low favorability for economic uranium occurrence (DOE, 1981) and lack of any claims within the tract to date, the impacts on wilderness resources are expected to be very low. No other economic minerals or energy resources are known within this tract. Consequently, any attendant impacts associated with them would be of a very low significance, also.

Maintenance of existing livestock facilities (3 3/4 miles of fence, 1 mile pipeline, 1 spring development and 1 12,000 gallon storage tank) would also have an impact but probably only insignificant. Livestock use would continue as in the past but the WSA area is presently used only during emergency situations, such as drought, except for yearly trailing of livestock. Consequently wilderness values would not be significantly impacted due to livestock use and/or maintenance of existing facilities.

In regards to the watershed resource, if mining does occur, as stated above, then erosion and watershed damage would be directly proportional to the rehabilitation that occurs on these sites. The amount of sediment yield to existing streams would also be affected but can not be projected.

Other "valid existing rights impacts" that could affect the wilderness values, even though wilderness is designated, include a forest service road (#U-24122) granted under 44LD513 which extends up Henderson Canyon past the Shakespear Mine northeasterly to the forest service boundary. Presently, the road is not cherrystemmed clear through because the last portion is substantially unnoticeable. Under the grant the Forest Service could conceivably upgrade the road which would substantially impair wilderness values.

Two electric transmission line grants (U-013006 and U-044012), a telephone line grant (U010813) and a pipeline grant (U-0143769) also encroach upon the WSA. Presently, our records show that no transmission or telephone lines exist within portions of these existing grants i.e. the actual lines were eliminated from the unit during the inventory stage. The existing rights-of-way, however, do encroach upon the unit even though no lines are evident in a portion thereof. There are no expiration dates on any of these appurtenances except the telephone line (U-010813) which expires on 12/31/2004. Conceivably, an extension of the right-of-way could be granted.

Because of the potential to mine coal in this area an assortment of rights-of-way for access, slurry lines, stockpiling and other facilities associated with an underground coal mine would be required.

A 640 acre section belonging to the State of Utah is located within the boundaries of the study area. Whether the state has an implied right-of-way for egress and ingress of any kind and whether development can proceed on the section without BLM action first has not yet been determined. The ramifications of inholdings have not been sufficiently addressed by the courts.

b. Impacts on Energy and Critical Mineral Resource Values

Wilderness designation could have considerable impact on coal development within this tract by preventing additional leasing in designated wilderness areas after December 31, 1983. This is significant because there is only one existing coal lease (covering 280 acres) on federal lands within this tract. Should no additional coal lands be leased before the area is designated as wilderness, most of the 75-100 million tons of minable coal would become unavailable under the Wilderness Act. However, interested parties may get a chance for competitive leasing in this part of the Kaiparowits Known Recoverable Coal Resource Area (KRCRA) by December 15, 1983. Currently the tracts offered for leasing have not been determined.

Regarding additional leasing, according to present BLM policy, wilderness protection stipulations which went into affect in December 1979 are being applied to all new mineral leases in wilderness study areas. These stipulations limit lease activities by requiring "complete recontouring of cuts and fills," "The replacement of top soil" and revegetation with native plant species. Additionally these stipulations require that "any temporary impacts caused by the activity must, at a minimum, be capable of being reclaimed to a condition of being substantially unnoticeable in the wilderness study area (or inventory area as a whole by the time the Secretary of the Interior is scheduled to send his recommendations on that area to the President,...". Furthermore the stipulations state "When the activity is terminated, and after any needed reclamation is complete, the area's wilderness values must not have been degraded so far, compared with the areas values for other purposes, as to significantly constrain the Secretary's recommendation with respect to the area's suitability or non-suitability for preservation as wilderness." (Interim Management Policy and Guidelines for Lands Under Wilderness Review, December 12, 1979).

These stipulations would continue to apply even after wilderness designation subject to modification "by the Act of Congress" designating the land as wilderness.

The impact of wilderness designation on coal development would be to limit surface disturbances to those which conform to the reclamation requirements stated above.

These lease stipulations could substantially limit coal development.

The impact of wilderness designation on oil and gas exploration and development is expected to be low due to the low favorability for this resource within this tract (DOE, 1981). Wilderness designation would not preclude oil and gas exploration and development for most of the lands within this tract because 97% of the track is already held by oil and gas lease.

However it should be noted that oil and gas leases in WSAs contain either no wilderness protection stipulations (pre June 1978 leases); wilderness protection stipulations which cease to apply after formal designation as wilderness (leases issued from June 1978 to December, 1979); or stipulations which continue to apply after the date of wilderness designation subject to modification by Congress in the designating Act (post December 1979 leases). The pre December 1979 leases (acres of this tract) will be managed by provisions of the Wilderness Act of 1964. These leases will be subject to the wilderness use concept of the Act which allows, on valid rights existing as of the date of designation as wilderness, activities such as mining and lease development which may be non-conforming to wilderness protection. However, post December 1979 leases (acres of this tract) will continue to be subject to the wilderness protection stipulations attached to the lease. Thus the post December 1979 leases are more restrictive in accepted wilderness use than the pre December 1979 leases.

After December 31, 1983 all designated wilderness areas are to be withdrawn from further mineral leasing.

Due to the low favorability for economic uranium occurrence (DOE, 1981) and lack of any mining claims within the tract to date, the impacts on this resource are expected to be very low. No other economic minerals and energy resources are known to occur within this tract. consequently, any attendant impacts associated with them would be of a very low significance, also.

c. Impact on Other Resources

1) Wildlife - Wilderness designation would conflict with a proposal to chain and seed approximately 1248 acres of pinyon-juniper to improve habitat conditions for wildlife, primarily mule deer. No other wildlife vegetative treatment or water development facilities have been proposed.

Wilderness designation would benefit the riparian habitat in Henderson Canyon which is not presently cherrystemmed from the Unit. It would eliminate ORV use into this area of the canyon which would provide wildlife diversity. At the present time this has not been a problem but designation would ensure a future problem did not occur.

2) Forestry - Wilderness designation would prohibit future cutting of pinyon-juniper trees for use for posts and firewood. This would affect approximately 16,870 acres of pinyon-juniper woodland. Since

the WSA is very near the towns of Tropic, Cannonville and Henrieville the elimination of this practice could bring some inconvenience upon these communities since firewood cutting has been increasing over the years and could become scarce in other nearby areas. Also future revenue may be lost to the BLM for commercial sales of both firewood and posts. The total amount of timber that would be lost for both free use permits and commercial cutting is not known as this detailed data is not available. The impact on this resource would most likely be insignificant in the short term (20 years) but could increase in significance over the long term. One positive impact of designation would be that any illegal cutting of Ponderosa Pine in the area would be stopped. Ponderosa Pine is prime habitat for some wildlife species and they would benefit from total closure to cutting.

3) Cultural Resources - Wilderness designation would most likely preserve the existing cultural resource values. It is possible that designation could cause an increase in the use of the area which in turn could cause minor destruction of these resource values, but this is not known.

4) Livestock Grazing - Wilderness designation would preclude the potential plowing and seeding of approximately 2170 acres of land within the WSA. This would amount to a loss of approximately 327 animal unit months (AUMs). This in turn would result in an economic loss to both the local economy and revenues to the BLM. The WSA is covered by an existing Allotment Management Plan (Headwaters Allotment) which have the following projects already constructed: 3 3/4 miles of fence, 1 mile of pipeline, 1 spring development and 1 12,000 gallon storage tank. Wilderness designation would not affect use of these projects since their maintenance is provided for in the BLM Wilderness Management Regulations. Also there are three reservoirs and one half mile of pipeline proposed to be constructed in the WSA to help distribute cattle grazing. Under the existing regulations these projects could be developed to protect the range resource. No additional forage would be granted by construction of these projects, only better dispersal. Although these projects have been proposed their priority is quite low and it may well be that they are not implemented.

5) Soil, Water, Air - These resources would benefit somewhat by wilderness designation. For example, it would be closed to ORV use which in turn would reduce ORV erosion occurrences, but present use is low at this time anyway so the benefit would most likely be insignificant. Consequently, no real impacts would be apparent under this alternative.

6) Recreation - Recreation values associated with non-motorized equipment would probably not be affected by wilderness designation. Values such as backpacking, hiking, horseback riding, sightseeing, photography, camping, etc. would stay much the same as it is now. Motorized vehicle use, however, would be eliminated from the unit.

Presently ORV use has not been very extensive, except with certain activities such as hunting and woodcutting. And even these activities are not monitored in order to determine actual visitor use days that would be precluded.

7) Other Resources - Climate, visual resources, soils, vegetation, geology and topography would not be impacted by designating the unit as wilderness, except where otherwise noted in this report. Pinyon-juniper invasion could, over a long period of time, encroach onto other community types, but this may or not be a detrimental impact.

8) Besides the basic impacts due to the biological and physical resources there is also an additional impact that needs to be identified. The August 1980 Kaiparowits Coal Development and Transportation Study for Southern Utah identified a number of transportation corridors and truck haul routes. The objective of the study was to select coal transportation corridors areas where it would be possible to construct and operate future coal transportation systems within the restrictions of general environmental and engineering constraints. Corridor segments were required to contain at least one potential route for a railroad or coal slurry pipeline. Specific routes, however, were not identified. By selecting corridors between 2 and 15 miles in width, maximum flexibility for future location was retained. Corridor route C-13 would encompass the entire WSA. In the study it stated that natural topographic features like The Blues Mountains would be avoided by the proposed coal slurry line or railroad line. If the unit is designated as wilderness it would preclude either a railroad or a slurry line through the unit.

- d. Consistency With Other Plans - The Garfield County Master Plan favors "multiple use" of the public lands. Other addendums and planning type documents refer somewhat to the wilderness alternative but not in a direct way. For example, the county planning efforts cite that existing roads should be left open to the three existing coal mines in the unit. Also it addresses that the county is in favor of coal development within the Kaiparowits Plateau of which a portion is found within the Unit. It addresses concerns over the Clean Air Act/Wilderness designation controversy. These and other concerns, although they do not directly state wilderness objectives for the county, project a general disfavor for wilderness designation with The Blues WSA. From these concerns it suggests that wilderness designation would be incompatible, if not inconsistent, with county planning.
- e. Local and Regional Socioeconomic Effects - The adoption of The Blues into the national wilderness system should have little socioeconomic impact on the region, unless coal development occurs. Barring the development of Kaiparowits coal and the entry of any major industries, there are no major changes expected in the structure of the regional economy. Some population growth may continue but this growth is expected to occur at a relatively even rate.

Wilderness designation is not expected to significantly increase recreation use of the area. Recreationists should cause little or no socioeconomic impacts to the area.

At the present time there are 18,460 acres held under oil and gas lease. Designation of the WSA as a wilderness area would probably result in the expiration of all leases within ten years if no development takes place. This would result in a \$18,460 annual loss in revenues which would be felt primarily by State energy-related research and mitigation, and by Federal reclamation funds. (There is proposed regulations being formulated at the present time which would increase the rental rate from \$1.00/acre to \$3.00/acre). Little or no noticeable direct impacts would occur within the local area.

Designation of The Blues as a wilderness area could possible present some conflicts with the development of coal. A direct impact of designation could prohibit the removal of the estimated 75-100 million tons of recoverable coal from development. This would prevent some mining-related growth in the Cannonville, Henrieville, and Tropic area. An indirect impact would occur if the designation of the area should prevent or hinder construction of any possible Kaiparowits coal transportation system. The entire WSA lies within the proposed transportation corridor. However, soil types throughout much of the WSA may not be suitable for major construction (Environmental Research & Technology, 1980). It is very likely that construction of the proposed transportation system could bypass the entire WSA and result in only a small increase in construction costs and little additional regional economic impact.

Also, the proposed land treatments in the WSA would be prohibited which would cause a loss of 327 AUMs. This pre-emption would result in the loss of \$755.37 in annual revenues using the current AUM price of \$2.31.

- f. Manageability - There are a number of problems conducive to the manageability of The Blues WSA. First, there are 2 sections of state land contiguous to that portion of the unit identified as being the most outstanding as regarding solitude and/or primitive and unconfined recreation. Ingress and egress in and out of these lands could impair the wilderness character of the contiguous public lands. Also the one state section inside the WSA boundary provides some of the most outstanding wilderness character in the unit. Any development or construction on this section would definitely impair ones wilderness experience.

Secondly, any coal development of the existing mines would have a dramatic effect on the area. It would be very difficult to manage for a wilderness experience when outside sites, sounds and distractions are evident. Furthermore it is reasonable to assume that further coal leasing in the unit could occur until January 1, 1984 or until the date the area is formally designated as wilderness if after December 31, 1983. This would only add to the impacts identified earlier and make manageability more difficult.

Thirdly, the Forest Service road right-of-way (U-24122) goes right through the middle of some of the most outstanding wilderness character. If the Forest Service upgraded this substantially unnoticeable way it would drastically impair wilderness character of the unit and manageability would be severely compromised.

Fourthly, there are four substantially noticeable ways and one road cherrystemmed within the unit. This amounts to approximately 5½ miles of ways and 2½ miles of road excluding the additional 1 mile of substantially unnoticeable way granted to the USFS. Also, the unit is adjacent to US Highway 12 for approximately three miles on the southern border.

Overall, there are approximately 3250 acres of public land identified as having outstanding wilderness character within the unit. Up to 1/3-1/2 of this acreage could be compromised by impacts already identified which would leave only a small portion of the unit remaining that could be managed properly for a wilderness experience. With these impacts inherent to the WSA there is no reasonable certainty that the WSA could be managed as wilderness over the long run based on the present knowledge of the resources and associated existing rights.

g. Public Comment

The public comment analyses will be reviewed and included herein at a later date when this report is made available to them.

2. No Action

a. Impact on Wilderness

Identified wilderness values could be lost or impaired under this alternative, primarily from potential coal development activities, such as construction facilities, access roads, stockpiling areas and other support facilities.

Little impact on wilderness values is expected in the short term due to the economic constraints on coal development in the area. However, in the long term if transportation, water, and market constraints are overcome and development should take place, then impact on wilderness would be anywhere from light to severe depending on the degree of development. Once the coal is depleted it is likely that the impacts of many of the service roads and shaft sites would be noticeable even after reclamation because of the rugged topography and difficulty in complete recontouring.

Potential land treatment opportunities for the range and wildlife resources may also have an impact. Motorized vehicle use, whether on or off existing roads, would have a small impact on wilderness

values. Wood cutting may also have an impact. Except for coal development in the area the other impacts upon wilderness under this alternative would be subjective and a matter of ones point of view. For example, a land treatment development may not be distracting nor undesirable to some people, but to others it may be an unsightly intrusion. Consequently, the degree of the impact upon wilderness character in most instances would vary from person to person.

b. Impact on Energy and Critical Mineral Resource Values

Under this alternative, mineral activities would be managed under the existing land use plan for the Resource Area. Leasing, location, and development of these resources will be guided by existing policy and regulations.

c. Impact on Other Resources

1) - Wildlife - The wildlife habitat would be susceptible to any detrimental ORV use as well as potential mineral exploration and development. Reclamation of the latter would eventually restore wildlife habitat back to a comparable, if not better, status. The riparian areas would be the most susceptible in the short term. The actual impact upon the existing wildlife in the area is not known. It is possible that any disturbed specie would locate to other nearby habitats of similar composition.

Under this alternative it would be allowable to complete the two proposed land treatment sites analyzed in the Management Framework Plan (MFP). This would result in additional forage for wildlife species.

2) Forestry - Firewood cutting and post cutting would continue as in the past with no impacts, except for the possible illegal cutting of ponderosa pine.

3) Cultural Resources - There would be only an insignificant impact on this resource under this alternative. Present environmental constraints and regulations adequately provide for their protection. Some minor destruction could occur if large scale projects, such as mining or land treatment, was accomplished even after clearances had been conducted,

4) Livestock Grazing - The MFP decisions would allow for the identified land treatments and water facilities to take place.

5) Soil, Water, Air - The proposed land treatments would increase sediment yield and air born particulates during the first year, but should be relatively minor. Mineral development on the other hand could have a slight to severe effect on these resources depending upon the degree of development. Some erosion could take place from ORV use.

6) Recreation, Climate, Soils, Vegetation, Geology and Topography

There would be no significant impact to these resources unless extensive mineral development occurred.

c. Consistency With Other Plans

This alternative would be consistent with the Garfield County Master Plan recommendation of "Multiple Use" of the public lands. Also the USFS, under their RARE 2 studies, did not find their adjacent lands to be suitable for inclusion in the NWPS.

e. Local and Regional Socioeconomic Effects

Little socioeconomic change is expected to occur in the designated impact region during the next few years. Preliminary 1980 Census figures show a growth in the total population of Cannonville, Henrieville, and Tropic of a little more than seven percent. These numbers, however, may be misleading due to the effect one or two new families may have in increasing the population total of small communities. It is expected that future population growth in the area will be minimal.

Based upon the projection of little population growth and assuming no entrance of new industry, the employment and income of the area are not expected to change significantly in coming years. The one exception to this projection is the possible development of a transportation system for the shipping of coal mined on the Kaiparowits Plateau.

The entire WSA lies within the transportation corridor proposed in a study prepared by Environmental Research & Technology (1980). If this transportation system is developed there would be major socioeconomic impacts on the region. These impacts would be greatest during construction of the system but there would be continuing impacts resulting from necessary maintenance and operation of the system.

Proposed range improvements would yield an estimated increase of 327 AUMs. This increase would yield additional annual revenues of \$755.37 using the current AUM price of \$2.31. The range treatments necessary to achieve this increase would cost approximately \$29.50 per acre on 2,179 acres for a total of \$64,015. The additional 327 AUMs annually would continue for approximately 30 years before retreatment is necessary.

Oil and gas leases would probably continue under the no wilderness alternative. Revenues collected from these leases would continue to aid the State energy-related impact research and mitigation programs along with contributing to Federal funds.

The WSA does contain a sizeable amount of mineable coal, an estimated 75-100 million tons. This coal is of relatively good

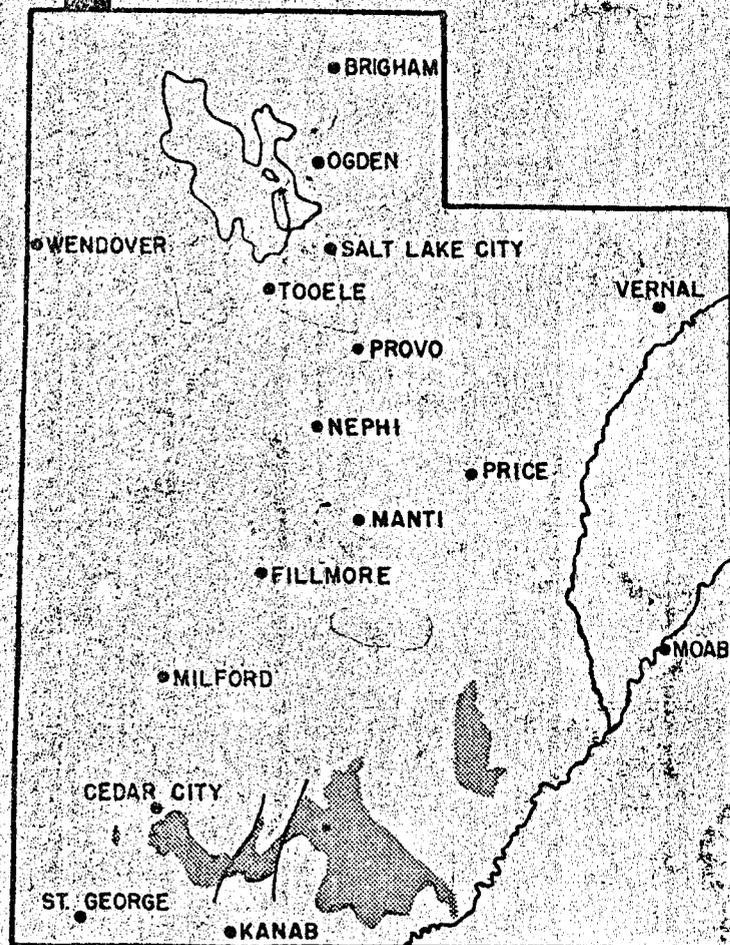
quality having both a low sulfur content and high level of BTUs. Whether or not this coal will ever be extracted is difficult to say. Two major factors enter into the decision to mine the deposit: 1) Will the price of coal reach a level making the mining of the deposit economically feasible, and 2) Will a transportation system be developed allowing the shipping of the coal to markets? While consumption of coal is projected to increase in future years there is little information regarding the future price of coal - the key factor in the decision to develop the resource.

If the price of coal does reach a point which would allow both the development of coal on the Kaiparowits Plateau and the construction of a transportation system it is extremely likely that The Blues will be considered for coal development. However, development of coal on any portion of the Kaiparowits Plateau depends upon a suitable transportation system. If coal development should become feasible there would be major changes in the structure of the regional economy.

By *Clair*

M. G. H.
Herrington

PROGRESS REPORT ON THE COAL RESOURCES OF SOUTHERN UTAH — 1963



Utah Geological and Mineralogical Survey
Special Studies 7

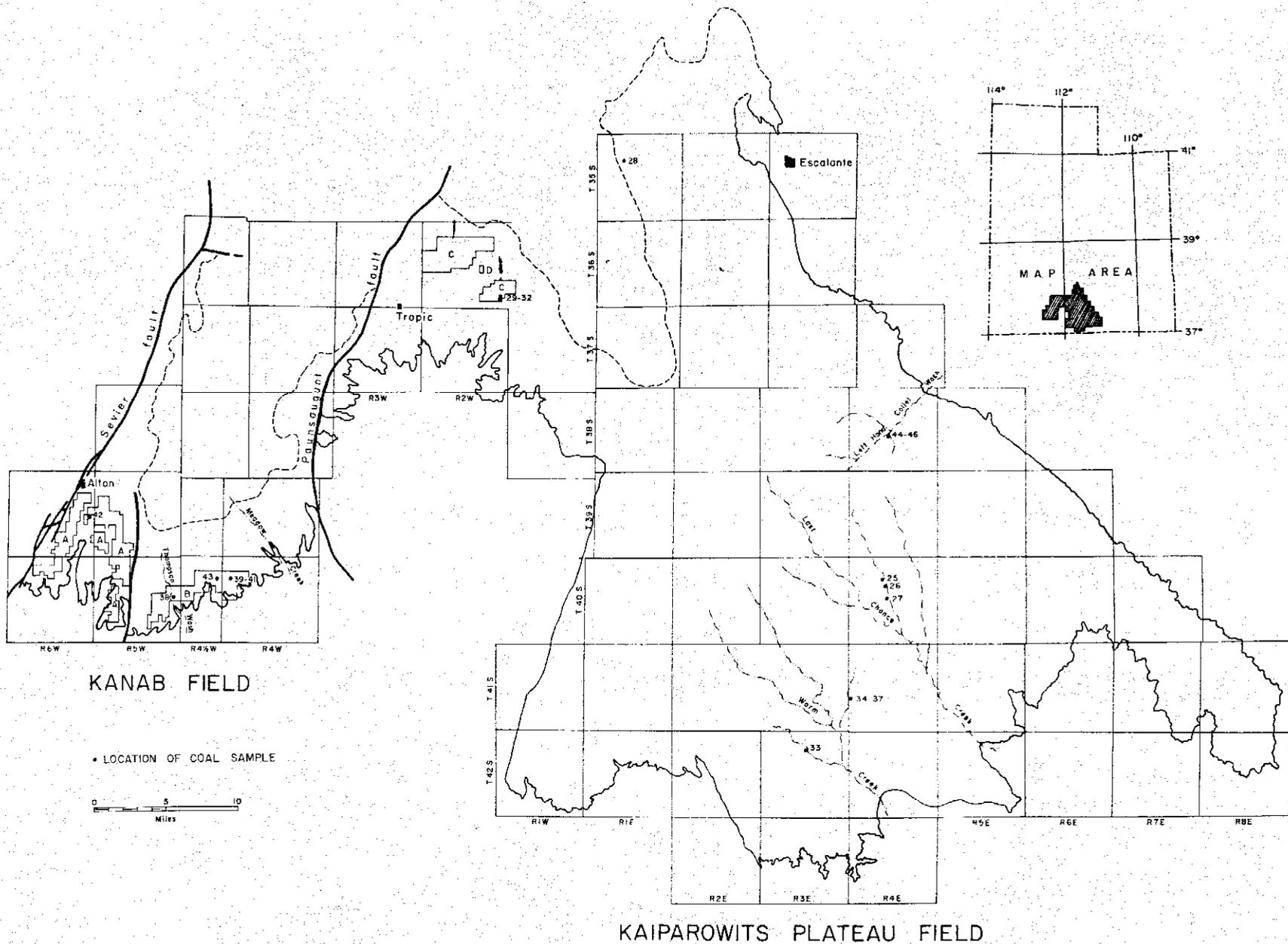


Figure 5. Map showing locations of coal samples collected during 1963. Boundaries of the Kanab and Kaiparowits Plateau coal fields are based on the trace of the Sevier and Paunsagunt faults, base of the Dakota Formation, and approximate top of the Wahweap Formation. Some lands covered by coal leases or prospecting permits are identified by letters as follows: A—leased to Nevada Electric Investment Company, B—prospecting permits issued to Utah Construction Company, C—leased or prospecting permits issued to Byron Davies and L. M. Duncan, and D—leased to Alton Shakespear. Many other federal prospecting permits or state leases have been issued, especially for the south-central part of the Kaiparowits Plateau, but these are not plotted because of the numbers and constant changes that are in progress.

CONTANK PETROLEUM & GAS CO., S. A.

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5TH. FLOOR, SANJYU BLDG.
2-4 3-CHOME, HATCHOBORI,
CHUO-KU, TOKYO, JAPAN.

TEL: 551-3184 /5
CABLE: "CONTANKCORP"
TELEX: 2522437

7 October 1980

Garfield Coal Company
Star Route
Panguitch, Utah 84759

Gentlemen:

We thank you for your offer of a long term supply of Utah Origin Steam Coal that we may purchase for our account.

Please be informed that it is our confirmed and irrevocable position to purchase from you a minimum of 500,000 metric ton of steam coal FOB-1st our vessels Long Beach, California, for three years at a price one dollar below world prices as determined by mutual agreement and as adjusted on a quarterly basis. We understand that the present world price for steam coal FOB-LST Long Beach, California, is USD47.50 per metric ton based on the product having 12,000 BTU and one percent maximum sulphur. We will accept product yielding less than 12,000 BTU with a negotiated penalty but we will not accept product having a BTU yield less than 11,000 and having greater than one percent sulphur.

Upon you advise of readiness to ship we will open a confirmed and irrevocable letter of credit with Garfield Coal Company as beneficiary within 30 days before load of each 50,000 metric ton shipment. This letter of credit will be payable to your account on the sight presentation of quality and quantity of product loaded at the shippingport as determined by a world recognized surveyor. Any demurrage costs incurred by either buyer and seller must be bank guaranteed payable on demand.

We understand that you will be in position to start delivery of product within six to nine months.

This firm and irrevocable offer to purchase defined product is to be deemed invalid if not accepted in written by you within 30 days and if you cannot deliver within one year.

Our bank reference is as follows:

The Bank of Tokyo Trust Co.
100 Broadway, New York, N. Y. 10005
Attn: Mr. S. Muratsuchi
Assist Vice President

A/C Contank Petroleum & Gas Co. S. A. and Contank Maritime Corp S. A.

Contank Petroleum & Gas Co. S. A.

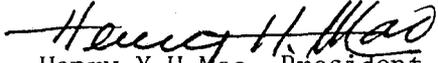

Henry Y H Mao, President



Figure 1. Outcrops of three coal beds near head of Coal Canyon, eastern Kanab field, Sec. 7, T. 40 S., R. 4 W.

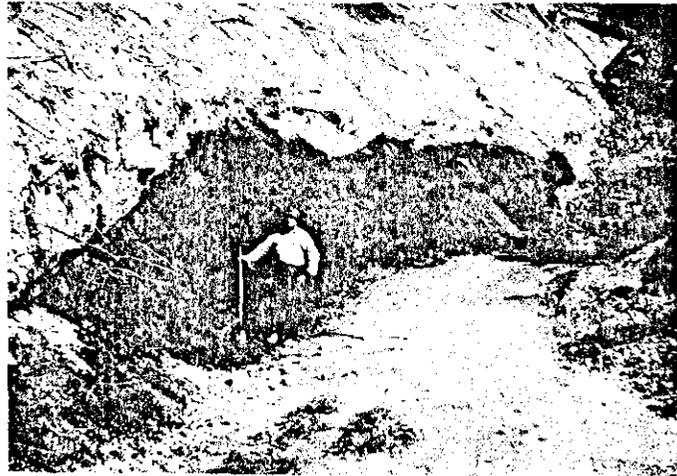


Figure 2. Ten-foot exposure of coal in the eastern Kanab field, Sec. 9, T. 40 S., R. 4½ W. Upper part of the coal bed has been removed by erosion, and subsequently covered by mud and gravel.

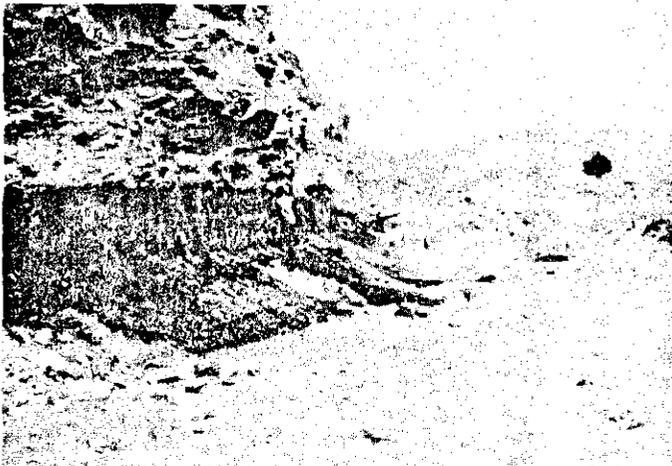


Figure 3. Nine-foot exposure of coal in Dry Canyon, Kaiparowits Plateau field, Sec. 9, T. 40 S., R. 4 E. Base of the bed is unexposed.

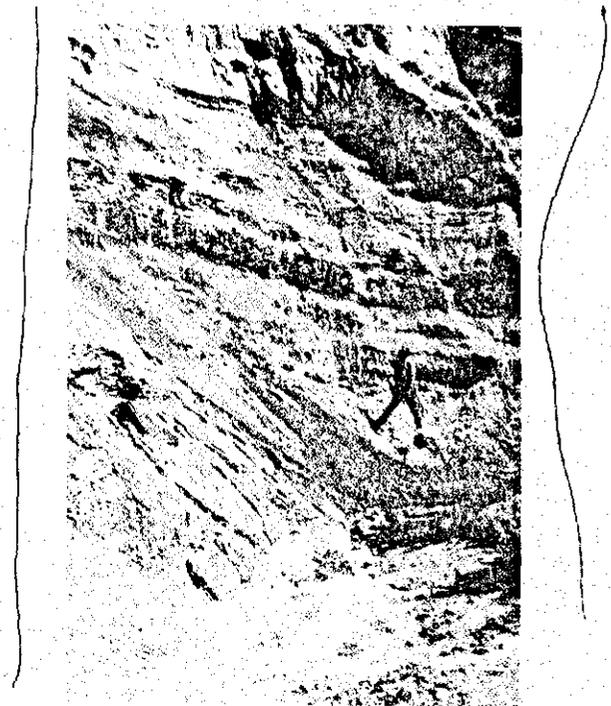


Figure 4. Coal Section exposed near Davies Mine in the northwest part of the Kaiparowits Plateau field, Sec. 36, T. 36 S., R. 2 W.

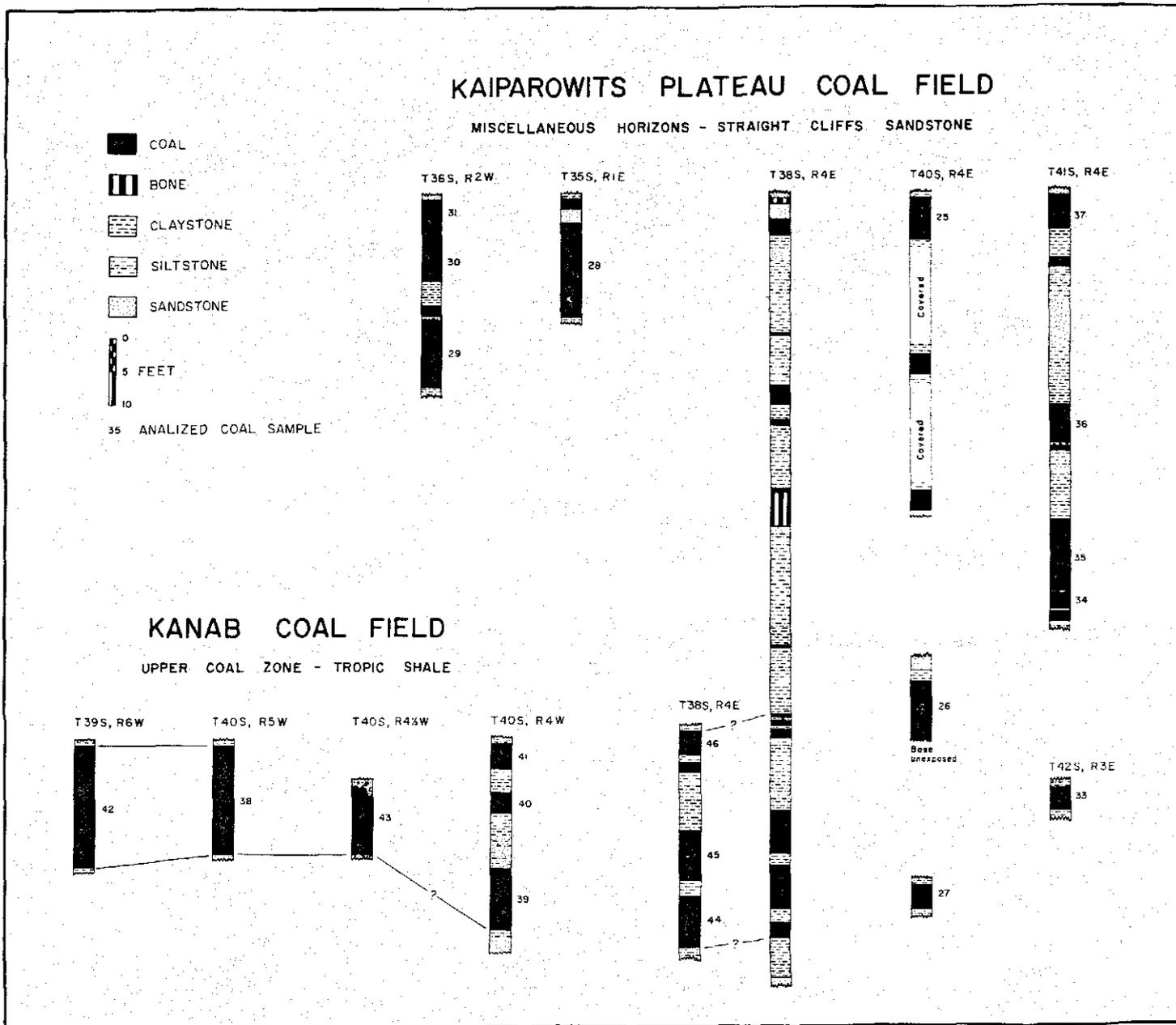


Figure 6. Sections of coal beds from the Kanab and Kaiparowits Plateau coal fields that were sampled during 1963.

Analyses of Coal Samples

BLACK & DEASON

Assayer and Chemists

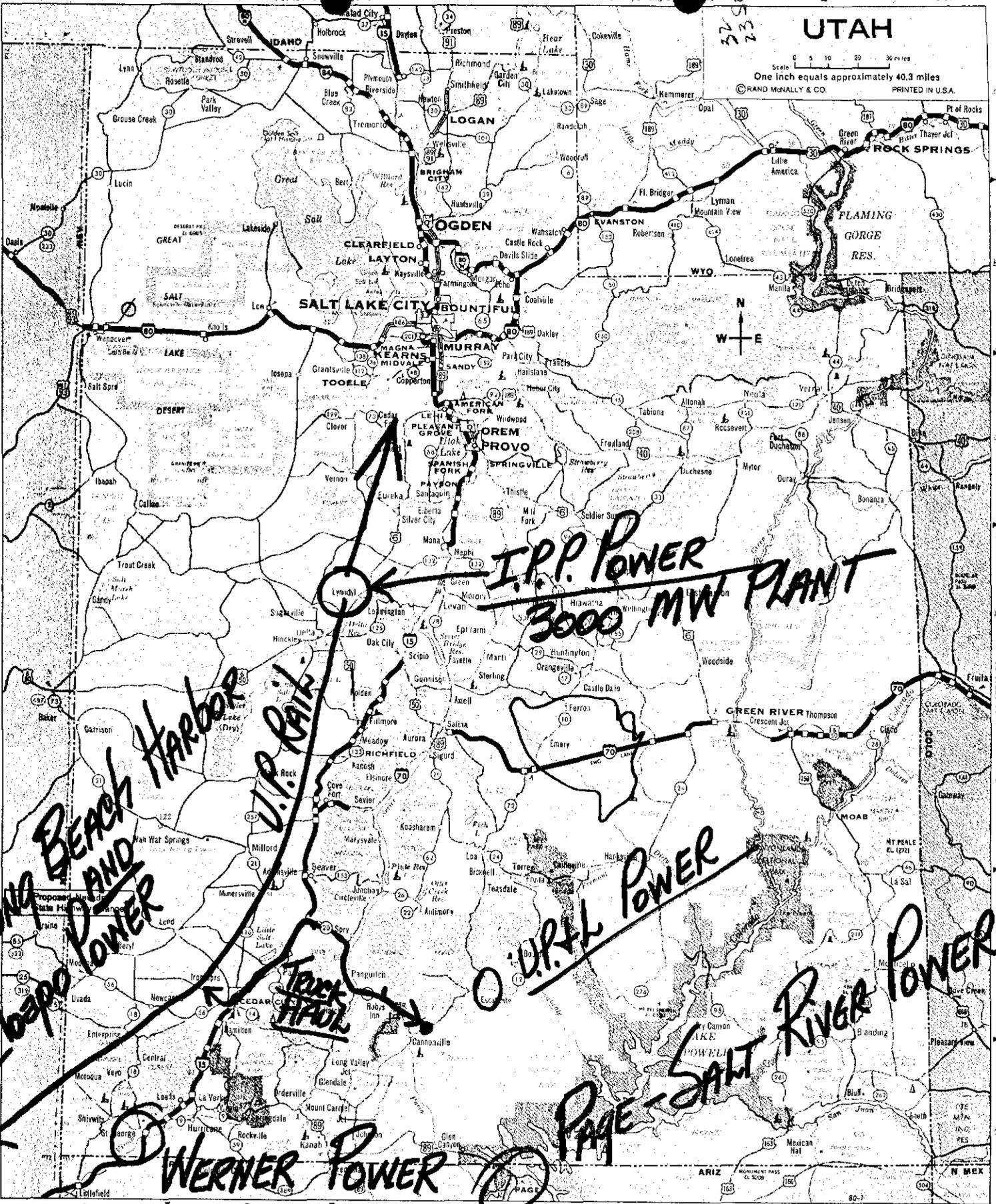
Assay Report

No.	%Moisture	% Volatile Combustible Matter	%Fixed Carbon	%Ash	%Sulphur	B.T.U.
#25 Dry		49.2	38.6	12.2	1.6	11056
As received	23.7	37.6	29.5	9.2	1.2	8453
#26 Dry		46.4	45.3	8.3	1.5	11562
As received	12.3	40.8	39.6	7.3	1.1	10142
#27 Dry		45.8	47.9	6.3	1.5	11848
As received	12.4	40.1	42.0	5.5	1.3	10372
#28 Dry		48.4	46.0	5.6	1.1	11920
As received	15.1	41.1	39.1	4.7	0.9	10125
#29 Dry		46.6	44.5	8.9	1.0	11475
As received	19.2	37.6	36.0	7.2	0.8	9260
#30 Dry		47.7	39.3	13.0	1.6	10994
As received	22.0	37.2	30.6	10.2	1.3	8542
#31 Dry		48.3	41.4	10.3	1.0	11342
As received	16.3	40.4	34.7	8.6	0.9	9506
#32 Dry		46.1	44.1	9.5	1.0	11363
As received	11.0	41.3	39.2	8.5	0.9	10126
#33 Dry		46.8	49.3	3.9	1.1	12756
As received	3.7	45.1	47.4	3.8	1.05	12297
#34 Dry		47.3	44.8	7.9	1.1	11582
As received	24.2	35.9	33.9	6.0	0.9	8778
#35 Dry		45.8	45.7	8.5	1.4	11468
As received	21.6	35.9	35.8	6.7	1.1	8992
#36 Dry		45.3	43.2	11.5	1.3	11163
As received	12.0	39.8	38.1	10.1	1.2	9820

Samples of DAVIES MINE —

UTAH

Scale 0 5 10 20 30 miles
One inch equals approximately 40.3 miles
© RAND McNALLY & CO. PRINTED IN U.S.A.



UTAH	
Population: 1,059,273 (1970 Census)	
Area: 84,916 Sq. Miles	
Capital: Salt Lake City	
Cities and Towns	
American Fork.....C-3	Bluff.....G-6
Beaver.....F-3	Bountiful.....B-3
Bicknell.....F-3	Brigham City.....A-3
Black Rock.....E-2	Callao.....C-1
Blanding.....F-8	Cannonville.....C-3
	Castle Dale.....D-4
	Cedar City.....F-2
	Clearfield.....B-3
	Coalville.....B-4
	Copperton.....C-3
	Dallas.....D-2
	Duchesne.....C-5
	East Carbon City.....D-3
	Ephraim.....D-3
	Escalante.....F-3
	Fairview.....D-3
	Farmington.....D-3
	Ferron.....E-4
	Fillmore.....E-3
	Garrison.....E-1
	Glen Canyon.....G-3
	Grantville.....E-3
	Green River.....E-5
	Grouse Creek.....A-1
	Gunnison.....D-3
	Hanksville.....E-4
	Heber City.....C-4
	Helper.....C-4
	Hurricane.....G-2
	Junction.....F-3
	Kanab.....G-2
	Kaysville.....B-3
	Lakeville.....B-2
	La Sal.....F-6
	Layton.....B-3
	Lehi.....C-3
	Loa.....A-3
	Logan.....E-3
	Magna.....B-3
	Newcastle.....F-1
	Oak City.....D-3
	Ogden.....B-3
	Orangeville.....D-4
	Orderville.....G-2
	Orem.....C-3
	Panguitch.....F-3
	Park City.....C-3
	Parowan.....F-2
	Payson.....C-3
	Pleasant Grove.....C-3
	Price.....D-4
	Provo.....C-3
	Randolph.....E-4
	Richfield.....E-3
	Richmond.....A-3
	Roosevelt.....C-1
	St. George.....G-5
	Salina.....E-3
	Salt Lake City.....B-3
	Santaquin.....D-3
	Scipio.....D-3
	Shivwits.....G-1
	Sigurd.....F-3
	Smithfield.....A-3
	Snowville.....A-2
	Spanish Fork.....C-3
	Springville.....E-4
	Teasdale.....E-4
	Tooele.....C-3
	Tremonton.....A-3
	Trout Creek.....D-7
	Vernal.....C-8
	Vernon.....C-3
	Wellington.....D-3
	Wellsville.....D-3
	Wendover.....B-1