Text to Accompany:

Open-File Report 79-130

1979

COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE SOUTHWEST QUARTER OF THE TWELVEMILE WELL 15-MINUTE QUADRANGLE, SWEETWATER COUNTY, WYOMING

[Report includes 36 plates]

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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This report has not been edited
for conformity with U.S. Geological
Survey editorial standards or
stratigraphic nomenclature.

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INTRODUCTION

Purpose

This text is to be used in conjunction with Coal Resource Occurrence (CRO) and Coal Development Potential (CDP) Maps of the Twelvemile Well 15-minute quadrangle, Sweetwater County, Wyoming. This report was compiled to support the land planning work of the Bureau of Land Management to provide a systematic coal resource inventory of Federal coal lands in Known Recoverable Coal Resource Areas (KRCRA's) in the western United States. This investigation was undertaken by Dames & Moore, Denver, Colorado, at the request of the U.S. Geological Survey under contract number 14-08-0001-17104. The resource information gathered for this report is in response to the Federal Coal Leasing Amendments Act of 1976 (P.L. 94-377). Published and unpublished public information available through June, 1978, was used as the data base for this study. No new drilling or field mapping was performed, nor was any confidential data used.

Location

In this report, the term "quadrangle" refers only to the southwest quarter of the Twelvemile Well 15-minute quadrangle which is located in central Sweetwater County, approximately 11 airline miles (18 km) east of the town of South Superior and 5 airline miles (8 km) northeast of the town of Point of Rocks, Wyoming. The area is unpopulated.

Accessibility

An improved light-duty road crosses the northeastern corner of the quadrangle. Two unimproved dirt roads cross the central third of the quadrangle and Rigby Road, another unimproved dirt road, runs across the northwestern part of the quadrangle. Several trails branch from these roads to provide access through the remainder of the quadrangle. Interstate Highway 80 runs east-west approximately 6 miles (10 km) south of the quadrangle boundary.

The main east-west line of the Union Pacific Railroad passes approximately 9 miles (14 km) south of the quadrangle. This line provides railway service across southern Wyoming connecting Ogden, Utah to the west with Omaha, Nebraska to the east.

Physiography

The southwest quarter of the Twelvemile Well 15-minute quadrangle lies along the northeastern flank of the Rock Springs uplift and the southwestern rim of the Great Divide Basin. The landscape is characterized by low rolling terrain and badland topography. The Continental Divide, crossing the southern half of the quadrangle, marks the boundary between the Rock Springs uplift and the Great Divide Basin. The ridge forming Tenmile Rim crosses the southeastern corner of the quadrangle. Altitudes range from approximately 6,700 feet (2,042 m) in the northwestern corner of the quadrangle, to 7,320 feet (2,231 m) along the Continental Divide on the eastern edge of the quadrangle.

Tenmile Draw and Ninemile Wash, tributaries of Bitter Creek, drain the area south of the Continental Divide. In the northern half of the quadrangle Twelvemile Gulch and several unnamed streams flow northeasterly into the Great Divide Basin. All of the streams are intermittent, flowing mainly in response to snowmelt in the spring.

Climate and Vegetation

The climate of southwestern Wyoming is semiarid and is characterized by low precipitation, rapid evaporation, and large daily temperature changes. Summers are usually dry and mild, and winters are cold. The annual precipitation averages 9 inches (23 cm), with approximately two thirds falling during the spring and early summer months.

The average annual temperature is 42°F (6°C). The temperature during January averages 18°F (-8°C), with temperatures ranging from 8°F (-13°C) to 28°F (-2°C). During July temperatures range from 54°F (12°C) to 84°F (29°C), with an average of 69°F (21°C) (U.S. Bureau of Land Management, 1978, and Wyoming Natural Resources Board, 1966).

Winds are usually from the west-southwest and southwest with an average velocity of 11 miles per hour (18 km per hr) (U.S. Bureau of Land Management, 1978).

Principal types of vegetation in the area include sagebrush, greasewood, rabbitbrush, saltbush, and grasses (U.S. Bureau of Land Management, 1978).

Land Status

The southwest quarter of the Twelvemile Well 15-minute quadrangle lies on the northeastern edge of the Rock Springs Known Recoverable Coal Resource Area (KRCRA). Only the western half of the quadrangle lies within the KRCRA boundary. Although the Federal government owns the coal rights for less than half of this land, this report will cover the entire quadrangle. One active coal lease is present within the KRCRA boundary, as shown on plate 2.

GENERAL GEOLOGY

Previous Work

Schultz described the geology and coal resources of the northern part of the Rock Springs coal field in 1909. The Superior coal district to the west of the quadrangle was mapped and described by Dobbin in 1944. Hale described the stratigraphy and depositional history of the formations cropping out on the flanks of the Rock Springs uplift in 1950 and 1955. Yourston (1955) described the structure and stratigraphy of the coal-bearing formations in the Rock Springs coal field and reported chemical analyses for Rock Springs area coals. Weimer (1960 and 1961) described the stratigraphy (1960) and discussed the depositional environment of Upper Cretaceous formations in the Rock Springs area. Roehler (1961) described the Late Cretaceous-Tertiary unconformity present in the Rock Springs area. Lawson and Crowson described the stratigraphy of the Wasatch and Fort Union Formations in the Arch unit of the Patrick Draw field on the eastern flank of the Rock Springs uplift in 1961. Bradley (1964) discussed the stratigraphy of the Wasatch and Green River Formations in the Rock Springs uplift, and Gosar and Hopkins (1969) summarized the depositional history of Late Cretaceous- and Tertiary-age formations in the Rock Springs area. Land (1972) described the stratigraphy and depositional history and mapped the Fox Hills Sandstone and associated formations on the eastern flank of the Rock Springs uplift. Coal analyses and measured sections of coals in the Rocks Springs coal field were reported by Glass in 1975. Roehler, Swanson, and Sanchez described the geology and coal resources of the Rock Springs coal field in 1977. Roehler also prepared a geologic map of the Rock Springs uplift and adjacent areas in 1977. Unpublished data from Rocky Mountain Energy Company (RMEC) also provided coal thickness information.

Stratigraphy

The formations in the southwest quarter of the Twelvemile Well 15-minute quadrangle range in age from Late Cretaceous to Eocene and crop out across the quadrangle in northwest-trending bands. The Almond and the Lance Formations, both of Late Cretaceous age, and the Fort Union Formation of Paleocene age contain coal.

The Almond Formation, the uppermost formation of the Late Cretaceous-age Mesaverde Group, is present in the subsurface and ranges in thickness from approximately 310 to 410 feet (94 to 125 m) where measured in the oil and ges wells drilled in the quadrangle. The lower section of the formation consists of carbonaceous shale, siltstone, mudstone, and sandstone alternating with coal beds of variable thickness and quality. The upper section of the formation is predominately buff-colored to light-gray, thick-bedded to massive, fossiliferous sandstone (Hale, 1950, 1955, and Roehler, 1977).

The Lewis Shale of Late Cretaceous age, conformably overlying the Almond Formation, is also present in the subsurface. This formation ranges in thickness from approximately 830 to 1,100 feet (253 to 335 m) where measured in oil and gas wells drilled in the quadrangle. The formation consists of dark-bluish-gray gypsiferous silty shale with occasional thin interbeds of sandy limestone and siltstone; a number of thin, widespread bentonite beds; zones of calcareous concretions; and thin ripple-marked sandstones. Thick sections of deltaic sandstone, siltstone, and silty sandstone form the upper section of the Lewis Shale (Hale, 1950, 1955, Weimer, 1961, Land, 1972, and Roehler, 1977).

The Fox Hills Sandstone of Late Cretaceous age intertongues with the underlying Lewis Shale and is present in the subsurface in this quadrangle. The formation is composed of a lower light-brown, very fine to fine-grained, thin-bedded, cross-bedded silty sandstone overlain by a light-tan to very light gray, fine- to medium-grained massive sandstone (Land, 1972). The thickness of the Fox Hills Sandstone ranges from approximately 85 to 190 feet (26 to 58 m) where measured in the oil and gas wells drilled in the quadrangle.

The Lance Formation of Late Cretaceous age conformably overlies the Fox Hills Sandstone. It crops out in the southwestern part of the quadrangle and consists of thin, silty fine-grained sandstone interbedded with shale and coal. The formation ranges from approximately 780 to 1,190 feet (238 to 363 m) thick where measured in the oil and gas wells drilled in the quadrangle (Hale, 1950, 1955, Land, 1972, Roehler, 1977, and Roehler and others, 1977).

The Fort Union Formation of Paleocene age, unconformably overlying the Lance Formation, crops out in a wide northwest-trending band in the southern half of the quadrangle. It consists of light-gray shale, sandy shale and siltstone, thick beds of gray-white to white, coarse-grained unconsolidated sandstone, gray and brown carbonaceous shale, and coal. The occurrence of coal and carbonaceous material is more pronounced in the lower half of the formation (Lawson and Crowson, 1961, Roehler, 1977, and Roehler and others, 1977).

The main body of the Wasatch Formation of Eocene age crops out in the northeastern half of the quadrangle where it conformably overlies the Fort Union Formation. It consists of gray sandstone and siltstone with interbedded gray, green and red mudstone; gray and brown partly carbonaceous shale; and sparce thin beds of gray limestone (Bradley, 1964, Roehler, 1977, and Roehler and others, 1977).

Roehler and others (1977) state that the Fort Union Formation is between 1,000 feet (305 m) and 1,500 feet (457 m) thick in outcrops on the flanks of the Rock Springs uplift and that the Wasatch Formation may range in thickness from 1,500 (457 m) to 5,000 feet (1,524 m).

Recent deposits of alluvium cover the stream valleys of Tenmile Draw, Ninemile Wash, and Twelvemile Gulch.

Formations of Cretaceous age in this quadrangle indicate the transgressions and regressions of a broad, shallow, north-south-trending seaway that extended across central North America. They accumulated near the western edge of the Cretaceous sea and reflect the location of the shoreline (Weimer, 1960 and 1961).

The Almond Formation reflect deposition in fresh-water coastal swamps, brackish-water lagoons and shallow-water marine environments (Hale, 1950).

The Lewis Shale is composed of neritic shale and siltstone deposited in water depths ranging from a few tens of feet to several hundred feet (Land, 1972). The sandstone, siltstone and silty sandstone in the upper section of the Lewis Shale are interpreted by Weimer (1961) to be a part of a major upper Lewis and Fox Hills delta.

The Fox Hills Sandstone was deposited in estuary, littoral and shallow neritic environments as the Cretaceous sea regressed eastward (Land, 1972).

The Lance Formation, consisting of swamp, lagoonal, floodplain and channel sand deposits, was deposited on the landward side of the Cretaceous sea shoreline as the sea retreated to the east (Gosar and Hopkins, 1969, and Roehler and others, 1977).

After the final withdrawal of the Cretaceous sea, the Fort Union Formation was deposited mainly in a paludal or fresh-water swamp environment across the Rock Springs uplift (Roehler, 1961).

The main body of the Wasatch Formation was deposited in an intermontane basin in fluvial and fresh-water swamp environments (Bradley, 1964, Roehler, 1965, and Roehler and others, 1977).

Structure

The southwest quarter of the Twelvemile Well 15-minute quadrangle is located on the northeastern flank of the Rock Springs uplift which separates the Great Divide and the Green River structural basins. The Rock Springs uplift is a doubly plunging asymmetric anticline with the west limb having the steeper dips (5° to 30° to the west). Dips along the east limb are from 5° to 8° to the east (Roehler and others, 1977).

None of the major faults associated with the Rock Springs uplift extend into this quadrangle. The beds in this quadrangle generally strike northwesterly and dip gently to the northeast (Roehler, 1977).

COAL GEOLOGY

Three coal-bearing formations have been identified in the southwest quarter of the Twelvemile Well 15-minute quadrangle. The thin coal beds of the Almond Formation are, stratigraphically, the lowest coal beds in the quadrangle. The Lance Formation coal beds lie approximately 1,100 to 1,200 feet (335 to 366 m) stratigraphically above the Almond Formation. The Fort Union Formation, uppermost of the coal-bearing formations in this quadrangle, contains the Deadman and a few other coal beds in the lower half of the formation.

Chemical analyses of coal.--No chemical analyses were available from this quadrangle for the coals in the Almond and Lance Formations, but representative analyses from the Black Buttes and Point of Rocks quadrangles to the south and southwest are listed in table 1 (Yourston, 1955, and Dobbin, 1944). An analysis of the Deadman coal bed of the Fort Union Formation sampled from the Jim Bridger strip mine, which extends into this quadrangle, is included in table 1 (Glass, 1975).

In general, the coal beds of the Almond and Lance Formations rank as subbituminous B, and the Fort Union Formation coal beds rank as subbituminous B or C. All of the coals in this area are low in sulfur and have been ranked on a moist, mineral-matter-free basis according to ASTM Standard Specification D 388-77 (American Society for Testing and Materials, 1977).

Almond Coal Zone

Coal beds in the Almond Formation occur in the subsurface and do not crop out in this quadrangle. They tend to be thin, lenticular and of limited areal extent, both within this quadrangle and where they can be traced to the northwest and south beyond the quadrangle boundaries. Measurements exceeding 5 feet (1.5 m) in thickness were not reported in this quadrangle.

Lance Coal Zone

Outcrops of the coal beds in the Lance Formation can be traced from the Bitter Creek NW quadrangle into the Point of Rocks quadrangle and the southeast quarter of the Superior 15-minute quadrangle. The Lance coal beds are lenticular and frequently channeled out, making correlations difficult over long distances (Roehler and others, 1977). The lower section of the Lance Coal Zone contains the thicker, more persistant coal beds, including the Hall, Narwell, Gibralter, and Overland, which have been identified in the subsurface in this quadrangle.

Hall Coal Bed

The Hall coal bed (Roehler and others, 1977), stratigraphically located at or near the base of the Lance Formation, crops out to the south in the Bitter Creek NW quadrangle where it averages 5 to 9 feet (1.5 to 2.7 m) thick. Local thickenings of this coal bed have been mapped in the subsurface near the center of this quadrangle, as shown on plate 4, where it attains a thickness of 7 feet (2.1 m). Measurements derived from the structure contour map (plate 5) indicate that the bed is dipping less than 5° to the northeast.

Maxwell Coal Bed

The Maxwell coal bed (Roehler and others, 1977) is located approximately 60 feet (18.3 m) stratigraphically above the Hall coal bed and has been isopached on plate 8. The coal bed attains a thickness of 10 feet (3 m) where measured in an oil and gas well in sec. 11, T. 21 N., R. 100 W. The Maxwell coal bed crops out both in the Bitter Creek NW and Black Buttes quadrangles to the south where it thickens locally to 6.5 and 9 feet (2.0 and 2.7 m). Measurements derived from the structure contour map (plate 9) indicate that the coal bed dips less than 5° to the northeast.

Gibralter Coal Bed

The Gibralter coal bed (Roehler and others, 1977) is located approximately 160 feet (49 m) above the base of the Lance Formation and has been mapped in the subsurface near the center of the quadrangle. The coal bed thickens locally to 6 feet (1.8 m), as shown on plate 12, but is generally less than 5 feet (1.5 m) thick in this quadrangle and in the quadrangles to the south.

Overland Coal Bed

The Overland coal bed (Roehler and others, 1977) occurs in the subsurface and is shown on plate 16. It is 13 feet (4.0 m) thick where measured in sec. 25, T. 22 N., R. 100 W. The Overland coal is usually one of the less-persistant of the Lance coal beds and is generally less than 5 feet (1.5 m) thick to the south.

Fort Union Coal Zone

Coal beds of the Fort Union Formation are the only mapped coal beds cropping out within the quadrangle. The coal zone, approximately 600 feet (183 m) thick, occurs in the lower section of the Fort Union Formation.

Deadman Coal Bed

The Deadman coal bed is the thickest and most important coal bed within the Fort Union Coal Zone. Stratigraphically, it lies approximately 50 to 500 feet (15 to 152 m) above the unconformity between the Fort Union and Lance Formations. This coal bed is actively mined in the southwestern corner of the quadrangle at the Jim Bridger strip mine, which provides coal for the nearby Jim Bridger power plant.

The name Deadman, as used by Roehler and others (1977), refers to both splits of the coal bed which are called the Upper Deadman and Lower Deadman coal beds. In this quadrangle, the two coal beds are separated by approximately 17 feet (5.2 m) of shale near the Jim Bridger mine, but the separation increases to 50 feet (15.2 m) or more down dip to the northeast. The Lower Deadman coal bed attains a maximum thickness of 14 feet (4.3 m) in sec. 10, %. 21 N., R. 100 W., but thins gradually down dip. The Upper Deadman coal bed maintains a thickness of 15 feet (4.6 m) near the Jim Bridger mine and thins down dip. Measurements derived from plates 9 and 13 indicates that both splits dip less than 5° to the northeast.

The Deadman coal bed or its splits can be traced for many miles along the eastern flanks of the Rock Springs uplift. To the west in the southeast quarter of the Superior 15-minute quadrangle, the Deadman coal bed is usually a single coal bed up to 30 feet (9.1 m) thick where exposed. As the coal bed is traced southeastward, into the Bitter Creek NW quadrangle, the split character predominates.

Fort Union [13], [14], and [15] Coal Beds

Three thinner coal beds lying above the Deadman coal bed have been identified in geophysical logs from oil and gas test holes. These coal beds have been given bracketed numbers for identification purposes in this quadrangle only. The Fort Union [13] coal bed locally attains a maximum thickness of 9 feet (2.7 m) in sec. 8, T. 21 N., R. 99 W., while the Fort Union [15] coal bed thickens to 11 feet (3.4 m) in the northeastern corner of the quadrangle. The Fort Union [14] coal bed is 6 feet (1.8 m) thick near the center of the quadrangle (plate 32). No outcrops were located for these coal beds due, most probably, to thinning up dip. Subsurface information from the Bitter Creek and Bitter Creek NE quadrangles to the southeast indicate several coal beds in the same general stratigraphic location as the Fort Union [13], [14], and [15] coal beds, but gaps in the data prevent definitive correlations.

Isolated Data Points

In instances where isolated measurements of coal beds of Reserve Base thickness (greater than 5 feet or 1.5 meters) are encountered, the standard criteria for construction of isopach, structure contour, mining ratio, and overburden isopach maps are not available. The lack of data concerning these beds limits the extent to which they can be reasonably projected in any direction and usually precludes correlations with other, better known, beds. For this reason, isolated data points are included on a separate sheet (in U.S. Geological Survey files) for non-isopached coal beds. The isolated points used in this quadrangle are listed below.

Source	Location	Coal Bed	Thickness
Terra Resources	sec. 17, T. 21 N., R. 99 W.	FU	8 ft (2.4 m)
Terra Resources	sec. 17, T. 21 N., R. 99 W.	La	8 ft (2.4 m)
Davis Oil	sec. 14, T. 21 N., R. 100 W.	DmU	6 ft (1.8 m)

COAL RESOURCES

Information from oil and gas wells, and from coal test holes drilled by RMEC and Pacific Power & Light Company (PP & L), as well as surface mapping by Schultz (1909), were used to construct outcrop, isopach, and structure contour maps of the coal beds in the southwest quarter of the Twelvemile Well 15-minute quadrangle. At the request of RMEC, coal-rock data for two of their drill holes are not shown on plate 1 or on the derivative maps. However, data from these holes have been used to construct the derivative maps. These data may be obtained by contacting RMEC.

Coal resources were calculated using data obtained from the coal isopach maps (plates 4, 8, 12, 16, 20, 24, 28, and 32). The coal bed acreage (measured by planimeter) multiplied by the average isopached thickness of the coal bed and by a conversion factor of 1,770 short tons of coal per acre-foot (13,018 metric tons per hectare-meter) for subbituminous coal, yields the coal resources in short tons of coal for each isopached coal bed. Coal beds of Reserve Base thickness (5 feet or 1.5 meters) or greater that lie less than 3,000 feet (914 m) below the ground surface are included. These criteria differ somewhat from that used in calculating Reserve Base and Reserve tonnages as stated in U.S. Geological Survey Bulletin 1450-B which calls for a maximum depth of 1,000 feet (305 m) for subbituminous coal.

Reserve Base and Reserve tonnages for the isopached beds are shown on plates 7, 11, 15, 19, 23, 27, 31, and 35, and are rounded to the nearest 10,000 short tons (9,072 metric tons). Coal Reserve Base tonnages per Federal section are shown on plate 2 and total approximately 339.20 million short tons (307.72 million metric tons) for the entire quadrangle, including tonnages from isolated data points. Reserve Base tonnages in the various development potential categories are shown on table 2. The source of each indexed data point shown on plate 1 is listed in table 3.

Dames & Moore has not made any determination of economic recoverability for any of the coal beds in this report.

COAL DEVELOPMENT POTENTIAL

Coal development potential areas are drawn so as to coincide with the boundaries of the smallest legal land subdivisions shown on plate 2. In sections or parts of sections where no land subdivisions have been surveyed by the BLM, approximate 40-acre (16-ha) parcels have been used to show the limits of the high, moderate, or low development potentials. A constraint imposed by the BLM specifies that the highest development potential affecting any portion of a 40-acre (16-ha) lot, tract, or parcel be applied to that entire lot, tract, or parcel. For example, if 5 acres (2 ha) within a parcel meet criteria for a high development potential, 25 acres (10 ha) a moderate development potential, and 10 acres (4 ha) a low development potential, then the entire 40 acres (16 ha) are assigned a high development potential.

Development Potential for Surface Mining Methods

Areas where the coal beds of Reserve Base thickness are overlain by 200 feet (61 m) or less of overburden are considered to have development potential for surface mining. Since all of the Federal land areas where known coal beds of Reserve Base thickness are within 200 feet (61 m) of the ground surface have been leased, the remaining Federal lands have been classified as having unknown development potential for surface mining methods.

Development Potential for Subsurface and In-Situ Mining Methods

Areas where the coal beds of Reserve Base thickness lie between 200 and 3,000 feet (61 and 914 m) below the ground surface with dips of 15° or less are considered to have development potential for conventional subsurface mining methods. Coal beds of Reserve Base thickness lying between 200 and 3,000 feet (61 and 914 m) below the ground surface, dipping greater than 15°, are considered to have development potential for in-situ mining methods.

Areas of high, moderate, and low development potential for subsurface mining methods are defined as areas underlain by coal beds at depths ranging from 200 to 1,000 feet (61 to 305 m), 1,000 to 2,000 feet (305 to 610 m), and 2,000 to 3,000 feet (610 to 914 m) below the ground surface, respectively.

Areas where the coal data is absent or extremely limited between 200 and 3,000 feet (61 and 914 m) below the ground surface are assigned unknown development potentials. This applies to those areas influenced by isolated data points and the areas where no known coal beds of Reserve Base thickness occur. Limited knowledge pertaining to the areal distribution, thickness, depth, and attitude of the coals in these areas prevents accurate evaluation of the development potential in the high, moderate, or low categories. The areas influenced by isolated data points in this quadrangle contain approximately 3.65 million short tons (3.31 million metric tons) of coal available for subsurface mining.

The coal development potential for conventional subsurface mining methods is shown on plate 36. Of those Federal land areas having known development potential for conventional subsurface mining methods, 25 percent are rated high, 65 percent are rated moderate, and 10 percent are rated low. The remaining Federal lands within the quadrangle are classified as having unknown development potential for subsurface mining methods.

Because the coal beds in this quadrangle have dips less than 15°, all Federal land areas within the quadrangle have been rated as having unknown development potential for in-situ mining methods.

Table 1. Chemical analyses of coals in the southwest quarter of the Twelvemile Well 15-minute quadrangle, Sweetwater County, Wyoming.

Location	COAL BED NAME	Form of Analysis	Proximate				Ultimate					Heating Value	
			Moisture	Volatile Matter	Fixed Carbon	Ash	Sulfur	Hydrogen	Carbon	Nitrogen	Oxygen	Calories	Btu/Lb
NW¼ NW¼ sec. 20, T. 21 N., R. 100 W., Jim Bridger Mine (Glass, 1975)	Deadman bed, Fort Union Formation	A	19.5	32.6	42.0	5.9	0.5	--	--	--	--	--	9,270
		C	0.0	40.5	52.1	7.4	0.6	--	--	--	--	--	11,520
SW¼ sec. 16, T. 18 N., R. 100 W., Rock Springs-Gibraltar Mine (Yourston, 1955)	Lance Formation undifferentiated	A	20.8	28.4	47.1	3.7	0.4	--	--	--	--	--	9,910
		C	0.0	35.8	59.5	4.7	0.5	--	--	--	--	--	12,510
SW¼ sec 26, T. 20 N., R. 101 W., Point of Rocks Mine (Dobbin, 1944)	Lower bed, Almond Formation	A	16.6	30.2	44.0	9.2	0.7	--	--	--	--	--	9,410
		C	0.0	36.3	52.7	11.0	0.8	--	--	--	--	--	11,290

Form of Analysis: A, as received
B, air dried
C, moisture free

Note: To convert Btu/pound to kilojoules/kilogram, multiply by 2.326

Table 2. -- Coal Reserve Base data for subsurface mining methods for Federal coal lands (in short tons) in the Southwest quarter of the Twelvemile Well 15-minute quadrangle, Sweetwater County, Wyoming.

Coal Bed or Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Unknown Development Potential	Total
Fu {15}	230,000	19,630,000	-	-	19,860,000
Fu {14}	10,000	3,000,000	-	-	3,010,000
Fu {13}	11,990,000	35,330,000	-	-	47,320,000
Upper Deadman	18,800,000	16,610,000	-	2,260,000	38,670,000
Lower Deadman	12,930,000	86,030,000	-	-	98,960,000
Overland	-	-	36,850,000	-	36,850,000
Gibralter	-	4,310,000	16,790,000	-	21,100,000
Maxwell	-	7,750,000	47,640,000	0	55,390,000
Hall	-	260,000	17,390,000	-	17,650,000
Isolated Data Points	-	-	-	1,390,000	1,390,000
Total	43,960,000	172,920,000	118,670,000	3,650,000	339,200,000

NOTE: To convert short tons to metric tons, multiply by 0.9072.

Table 3. -- Sources of data used on plate 1

Plate 1 Index Number	Source	Data Base
1	Texas Oil & Gas Corp.	Oil/gas well No. 1 Federal "F"
2	Terra Resources Corp.	Oil/gas well No. 13-8 Ten Mile Draw
3	↓	Oil/gas well No. 8-17 UPRR, Ten Mile Draw
4	Statewide Oil Corp. & Winona Oil Co.	Oil/gas well No. 1-18 Govt.
5	Texas Oil & Gas Corp.	Oil/gas well No. P-1 Federal Ten Mile Draw
6	Texas National Petroleum Co.	Oil/gas well No. 1-30 Govt.
7	Davis Oil Co.	Oil/gas well No. 1 Dotson-Federal
8	Texas Oil & Gas Corp.	Oil/gas well No. 1 TXO-Amoco-A
9	Davis Oil Co.	Oil/gas well No. 1-A Federal
10	Amoco Production Co.	Oil/gas well No. 1 Champlin No. 142 Amoco
11	Davis Oil Co.	Oil/gas well No. 1 Roser-Federal
12	Rocky Mountain Energy Co., (no date), unpublished data	Pacific Power & Light Co. Drill hole No. 116
13	↓	Pacific Power & Light Co. Drill hole No. 117-A
14	↓	Pacific Power & Light Co. Drill hole No. 119-C

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Table 3. -- Continued

Plate 1 Index Number	Source	Data Base
15	Colorado Oil & Gas Co.	Oil/gas well No. 1 Federal-Roser
16	True Oil Co.	Oil/gas well No. 41-26 True-Bluewater-Colorado -Federal
17	Coquina Oil Corp.	Oil/gas well No. 1 Amoco-UPRR
18	Rocky Mountain Energy Co., (no date),. unpublished data	Pacific Power & Light Co. Drill hole No. 122
19		Drill hole No. 1, line A
20		Drill hole No. 2, line A
21		Pacific Power & Light Co. Drill hole No. 121
22		Pacific Power & Light Co. Drill hole No. 157
23	Sinclair Oil & Gas Co.	Oil/gas well No. 3 Unit, Black Rock Creek
24	Chandler & Simpson Co.	Oil/gas well No. 1 McMullen-Gov't
25	Lion Oil Co. (Monsanto)	Oil/gas well No. 2 Black Rock
26	Burlington Northern Inc.	Oil/gas well No. C-25 Amoco-UP
27	Davis Oil Co.	Oil/gas well No. 1-Z Garfield-Federal

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