Text to Accompany:

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COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE NORTHWEST QUARTER OF THE SUPERIOR 15-MINUTE QUADRANGLE, SWEETWATER COUNTY, WYOMING

[Report includes 8 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 northwest quarter of the Superior 15-minute quadrangle, Sweetwater County, Wyoming. This report was compiled to support the land planning work of the Bureau of Land Management (BLM) 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 Published and unpublished public information available through April, 1978, was used as the data base for this study.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 northwest quarter of the Superior 15-minute quadrangle which is located in north-central Sweetwater County, approximately 8 miles (13 km) north of the town of South Superior and 23 miles (37 km) northeast of the city of Rock Springs, Wyoming. With the exception of Chilton Ranch located in the northern part of the quadrangle, the quadrangle is unpopulated.

Accessibility

Two improved light-duty roads, one running east-west through the center of the quadrangle and the other running northeast across the northern half of the quadrangle, are the major routes crossing the quadrangle. Several unimproved dirt roads and trails provide access for the remainder of the quadrangle. Interstate Highway 80 passes east-west through southern Wyoming approximately 15 miles (24 km) south of the quadrangle. Wyoming Highway 371 extends north from Interstate Highway 80 to the towns of South Superior and Superior.

The main east-west line of the Union Pacific Railroad passes approximately 15 miles (24 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. A spur from the main line terminates just north of Superior, Wyoming, approximately 6 miles (10 km) south of the quadrangle.

Physiography

The northwest quarter of the Superior 15-minute quadrangle lies on the northeastern flank of the Rock Springs uplift and on the western edge of the Great Divide Basin. The quadrangle is characterized by low rolling terrain, sand dunes, and a few isolated buttes and mesas. In the northern third of the quadrangle, Steamboat Mountain rises approximately 1,300 feet (396 m) above the surrounding landscape. Hague Hill, Endlich Hill, and the eastern half of South Table Mountain are located in the southwestern corner of the quadrangle, forming part of the Leucite Hills. The valley north of Greasewood Wash is covered with sand dunes. Altitudes range from approximately 6,880 feet (2,097 m) on Greasewood Wash in the east-central part of the quadrangle to 8,683 feet (2,647 m) at the summit of Steamboat Mountain.

The Continental Divide extends northeast along the summit of Steamboat Mountain. Table Wash, Greasewood Wash, and Split Rock Canyon, south of the Continental Divide, drain easterly into the Great Divide Basin. The northwestern quarter of the quadrangle, north of the Continental Divide, drains into the Green River Basin through Johnson and Blind Canyons. Numerous springs and several small lakes are located along the stream valleys in the northern half of the quadrangle. All of the streams are intermittent and flow 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 quadrangle include sagebrush, saltbush, mountain mahogany, rabbitbrush, greasewood, juniper, and grasses (U.S. Bureau of Land Management, 1978).

Land Status

The northwest quarter of the Superior 15-minute quadrangle lies on the northern edge of Rock Springs Known Recoverable Coal Resource Area (KRCRA). Approximately ninety percent of the quadrangle lies within the KRCRA boundary, with the Federal government owning the coal rights for approximately half of this land, as shown on plate 2. No outstanding Federal coal leases occur within the KRCRA boundary in this quadrangle.

GENERAL GEOLOGY

Previous Work

Schultz described the geology and coal resources of the northern part of the Rock Springs coal field in 1909 and the geology and structure of the Baxter Basin and surrounding area in 1920. The Superior coal district to the south 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 published analyses for coals in the Rock Springs area. Carey reviewed the geology of the Leucite Hills area including the quadrangle in 1955. Hallock (1960) described the stratigraphy of the Mesaverde Group and the Fort Union Formation. Weimer (1960 and 1961), Douglass and Blazzard (1961) and Smith (1961) discussed the depositional environment of the Upper Cretaceous formations in the Rock Springs area. In 1961, Roehler described the Late Cretaceous-Tertiary unconformity present in the Rock Springs area. Lawson and Crowson (1961) described the stratigraphy of the Wasatch and Fort Union Formations in the Patrick Draw field on the eastern flank of the Rock Springs uplift. Bradley discussed the stratigraphy of the Wasatch and Green River Formations in the Rock Springs uplift in 1964. Gosar and Hopkins (1969) summarized the structure and stratigraphy of Upper Cretaceous and Tertiary formations in the southwestern part of the Rock Springs uplift. Land mapped the Fox Hills Sandstone and associated formations on the eastern flank of the Rock Springs uplift in 1972 and described their stratigraphy and depositional history. Root, Glass, and Lane (1973) compiled geologic and coal resource maps of Sweetwater County. 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. LaPoint mapped part of the quadrangle in 1977 and LaPoint and Pike (1977) prepared lithologic and electric logs of holes drilled in the quadrangle by the U.S. Geological Survey in 1976. Unpublished drill hole data from Rocky Mountain Energy Company (RMEC) also provided coal thickness information.

Stratigraphy

The formations exposed in the northwest quarter of the Superior 15-minute quadrangle range in age from Late Cretaceous to Tertiary. The Almond and Lance Formations, both of Late Cretaceous age, and the Fort Union Formation of Paleocene age contain coal.

The Ericson Sandstone of the Mesaverde Group, present in the subsurface in the quadrangle, ranges in thickness from approximately 665 to 780 feet (203 to 238 m) where measured to the west in the adjacent northeast quarter of the Boars Tusk 15-minute quadrangle. The formation consists of light-gray, massive, fine- to coarse-grained sandstone and conglomerate containing chert pebbles (Hale, 1950, 1955, and Smith, 1961).

The Almond Formation of the Mesaverde Group, conformably overlying the Ericson Sandstone, crops out in the southwestern corner of the quadrangle (Roehler, 1977). It is approximately 660 feet (201 m) thick where measured in the oil and gas wells drilled in the quadrangle. The Almond Formation consists of a lower section of carbonaceous shale, siltstone, mudstone, and sandstone alternating with coal beds of variable thickness and quality, and an upper section of predominately buff-colored to light-gray, thick-bedded to massive, fossiliferous sandstone (Hale, 1950 and 1955).

The Lewis Shale of Late Cretaceous age conformably overlies the Almond Formation and crops out in a northwest-trending band across the southwestern corner of the quadrangle (Roehler, 1977). The Lewis Shale ranges in thickness from 390 to 500 feet (119 to 152 m) where measured in the oil and gas wells drilled in the quadrangle. It consists of dark-bluish-gray gypsiferous silty shale with occasional thin interbeds of sandy limestone and siltstone and a number of thin, widespread bentonite beds. Zones of calcareous concretions are found near the middle of the section with thin ripple-marked sandstones common near the base and top (Hale, 1950, 1955, and Land, 1972).

The Fox Hills Sandstone of Late Cretaceous age conformably overlies the Lewis Shale and crops out in a narrow northwest-trending band across the southwestern corner of the quadrangle (Roehler, 1977). 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 sandstone. The Fox Hills Sandstone ranges in thickness from approximately 80 to 160 feet (24 to 49 m) where measured in the oil and gas wells drilled in the quadrangle (Land, 1972).

The Lance Formation of Late Cretaceous age conformably overlies the Fox Hills Sandstone. It crops out in the southwestern part of the quadrangle (Roehler, 1977) and consists of thin, silty fine-grained sandstone interbedded with carbonaceous shale and coal. The Lance Formation ranges from approximately 720 to 880 feet (219 to 268 m) thick where measured in the oil and gas wells drilled in the northeastern part of the quadrangle. The formation thins rapidly to the southwest across the quadrangle because of depositional thinning and erosion (Hale, 1950, 1955, Land, 1972, and Roehler and others, 1977).

The Fort Union Formation of Paleocene age, unconformably overlying the Lance Formation, crops out in the southern half of the quadrangle (Roehler, 1977). Roehler and others (1977) indicate that the Fort Union Formation ranges in thickness from approximately 1,000 to 1,500 feet (305 to 457 m) in outcrops on the flanks of the Rock Springs uplift. The formation 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 thick beds of coal (Lawson and Crowson, 1961, and Roehler and others, 1977).

The main body of the Eocene-age Wasatch Formation crops out in the northern half of the quadrangle where it conformably overlies the Fort Union Formation (Roehler, 1977). 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, and Roehler and others, 1977). The Wasatch Formation, according to Roehler and others (1977) may range in thickness from 1,500 to 5,000 feet (457 to 1,524 m) on the flanks of the Rock Springs uplift.

The Tipton Tongue of the Green River Formation of Eocene age conformably overlies the main body of the Wasatch Formation in the northern third of the quadrangle (Roehler, 1977). The Tipton Tongue ranges in thickness from 179 feet (55 m) northeast of the quadrangle in T. 24, R. 100 W., to 87 feet (27 m) northwest of the quadrangle in T. 24 N., R. 103 W. This member is characterized by numerous beds of algal deposits, oolite and ostracod marl interbedded with buff-colored papery low-grade oil shale, platy marlstone, gray mudstone, and persistent beds of gray to brown sandstone (Bradley, 1964).

The Cathedral Bluffs Tongue of the Wasatch Formation conformably overlies the Tipton Tongue of the Green River Formation, and crops out in the northern third of the quadrangle (Roehler, 1977). The Cathedral Bluffs Tongue consists predominately of gray mudstone banded with pink and red layers (Bradley, 1964). Stuart (1965) indicates that the Cathedral Bluffs Tongue is approximately 210 feet (64 m) thick in T. 25 N., R. 102 W., north of the quadrangle.

The Laney Shale Member of the Green River Formation crops out in the northern third of the quadrangle (Roehler, 1977), and conformably overlies the Cathedral Bluffs Tongue. In sec. 17, T. 23 N., R. 102 W., this member is approximately 324 feet (99 m) thick (Bradley, 1926). The Laney Shale Member consists of brown and buff-colored marlstone, tuff, sandstone, shale and limestone (Bradley, 1964).

Extrusive leucite-bearing igneous flows of either Quaternary (LaPoint, 1977) or Tertiary age (Carey, 1955) are exposed on Steamboat Mountain and South Table Mountain.

Recent deposits of alluvium cover the stream valleys of Table Wash, Greasewood Wash, Split Rock Canyon, Johnson Canyon and Blind Canyon. A wide band of migrating sand dunes cover Tertiary deposits across the center of the quadrangle (Roehler, 1977).

The Upper Cretaceous formations 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).

Sandstones of the Ericson Sandstone were deposited in stream and floodplain environments with a source area to the northwest (Douglass and Blazzard, 1961, and Gosar and Hopkins, 1969).

The Almond Formation reflects 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).

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

The Tipton Tongue of the Green River Formation contains lacustrine deposits from deep fresh-water lakes which covered the Rock Springs uplift during the Eocene (Bradley, 1964, and Roehler, 1965).

Large quantities of sediment from aggrading streams resulted in the deposition of the Cathedral Bluffs Tongue of the Wasatch Formation in nearshore and shoreline environments including deltaic, flood-plain, and shallow-water (Stuart, 1965).

A return to a deep, quiet water lacustrine environment occurred during the deposition of the basal section of the Laney Shale Member of the Green River Formation while the upper section of the Laney Shale Member was deposited in a shallow lacustrine environment (Roehler, 1965).

Volcanic activity resulted in leucite-rich surface lava flows which covered the fresh-water beds of the Green River Formation (Carey, 1955).

Structure

The northwest quarter of the Superior 15-minute quadrangle lies on the northern edge of the Rock Springs uplift which separates the Great Divide and Green River structural basins. The Rock Springs uplift is a doubly plunging asymmetric anticline with the west limb having the steeper dips (5° to 35° to the west). Dips along the east limb are from 5° to 8° to the east (Roehler and others, 1977). The strike of the coal beds in the northwest quarter of the Superior 15-minute quadrangle is generally northwesterly, with beds dipping gently to the northeast at approximately 3°.

COAL GEOLOGY

Coal beds of the Fort Union and Lance Formations have been identified in this quadrangle along with some minor coal beds of the Almond Formation. The Almond coal zone is, stratigraphically, the lowest of the coal beds or zones exposed in the quadrangle. It is separated from the

Lance coal zone by the overlying Lewis Shale and Fox Hills Sandstone. An erosional unconformity between the Lance and Fort Union Formations has reduced the thickness of the Lance Formation considerably in this area.

Chemical analyses of coal.--Representative chemical analyses for coals in the Almond, Lance, and Fort Union Formations are listed in table 1 (Glass, 1975, Yourston, 1955, and Dobbin, 1944). In general, the coal beds of the Lance and Almond Formations rank as subbituminous B, and the Deadman coal bed of the Fort Union Formation ranks as subbituminous B. These coals are low in sulfur and were 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

Several thin coal beds of the Almond Formation were penetrated in two drill holes in the southwestern corner of the quadrangle. Based on information obtained from adjacent quadrangles, the Almond coal zone is approximately 200 to 300 feet (61 to 91 m) thick with individual coal beds averaging approximately 2 feet (0.6 m) in thickness. The coal beds thicken gradually to the northwest and southeast but rarely exceed 5 feet (1.5 m) in thickness.

Lance Coal Zone

Coal beds of the Lance Formation have been mapped (LaPoint, 1977) in the southwestern corner of the quadrangle. The coal beds are generally thin and lenticular, but range up to 8 feet (2.4 m) thick locally. The Lance coal zone covers a stratigraphic interval of approximately 280 feet (85 m), as shown on plate 3. The coal beds are frequently channeled out and split, and are difficult to correlate (Roehler and others, 1977). In this quadrangle, coal beds of the Lance Formation are mapped as isolated data points (see Isolated Data Points section of this report). Lance Formation coal beds were encountered in neighboring quadrangles to the northwest and southeast, but no appreciable changes in coal bed thickness were noted. Farther south, along the flanks of the

Rock Springs uplift, a few Lance Formation coal beds have been found that maintain thicknesses in excess of 5 feet (1.5 m) (Roehler and others, 1977).

Fort Union Coal Zone

The Deadman coal bed of the Fort Union Formation is the thickest coal bed encountered in the quadrangle. A few thin Fort Union Formation coal beds less than Reserve Base thickness (5 feet or 1.5 meters) were also identified in this quadrangle. An oil and gas well in sec. 10, T. 23 N., R. 102 W., was drilled through 10 feet (3.0 m) of coal in the Fort Union Formation and this location is included as an isolated data point.

Deadman Coal Bed

The Deadman coal bed is the thickest coal bed encountered in the quadrangle. The coal bed is located in the lower 100 feet (30 m) of the Fort Union Formation, just above the regional unconformity between the Fort Union and Lance Formations (Roehler and others , 1977, p. 31). It ranges in thickness from less than 5 feet (1.5 m) to more than 20 feet (6.1 m), generally thickening to the southeast. The coal bed contains minor partings in this quadrangle, but is split to the southeast in both of the southern quarters of the Superior 15-minute quadrangle. In those areas, both Upper and Lower Deadman coal beds are present, separated by variable thicknesses of interburden. In T. 21 N., R. 100 W., the Deadman coal bed exists again as a single bed, and is 30 feet (9.1 m) thick in the Jim Bridger strip mine that provides fuel for the nearby Jim Bridger power plant. Information derived from plate 4 indicates that the coal bed dips less than 5° to the northeast.

Isolated Data Points

In instances where isolated measurements of coal beds thicker than 5 feet (1.5 m) 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 data points used in this quadrangle are listed below. Coal beds identified by bracketed numbers are not formally named but are used for identification purposes in this quadrangle only.

Source	Location	Coal Bed	Thickness
Woods Petroleum	sec. 10, T. 23 N., R. 102 W.	FU	10 ft (3.0 m)
RMEC	sec. 14, T. 22 N., R. 102 W.	La[3]	8 ft (2.4 m)
LaPoint	sec. 10, T. 22 N., R. 102 W.	La[2]	6 ft (1.8 m)
Woods Petroleum	sec. 10, T. 23 N., R. 102 W.	La[1]	8 ft (2.4 m)

COAL RESOURCES

Information from coal test holes drilled by RMEC and the U.S. Geological Survey, as well as oil and gas well information and surface mapping by LaPoint (1977), were used to construct outcrop, isopach, and structure contour maps of the coal beds in this quadrangle. At the request of RMEC, coal-rock data for some of their drill holes are not shown on plate 1 or on the derivitive maps. However, data from these holes have been used to construct the derivitive maps. These data may be obtained by contacting RMEC.

Coal resources were calculated using data obtained from the coal isopach map (plate 4). 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 for the 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 Deadman coal bed are shown on plate 6 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 66,970,000 short tons (60,755,000 metric tons) for the entire quadrangle. This includes 5,530,000 short tons (5,017,000 metric tons) from isolated data points. Reserve Base tonnages in the various development potential categories for surface and subsurface mining methods are shown in tables 2 and 3. The source of each indexed data point shown on plate 1 is listed in table 4.

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

COAL DEVELOPMENT POTENTIAL

Coal development potential areas are drawn 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 potential for surface mining and were assigned a high, moderate, or low development potential based on the mining ratio (cubic yards of overburden per ton of recoverable coal). The formula used to calculate mining ratios for surface mining of coal follows on the next page:

$$MR = \frac{t_o\ (cf)}{t_c\ (rf)}$$

where MR = mining ratio

t_o = thickness of overburden in feet

t_c = thickness of coal in feet

rf = recovery factor (85 percent for this quadrangle)

cf = conversion factor to yield MR value in terms of cubic yards of overburden per short tons of recoverable coal:
0.911 for subbituminous coal
0.896 for bituminous coal

Note: To convert mining ratio to cubic meters of overburden per metric ton of recoverable coal, multiply MR by 0.8428.

Areas of high, moderate, and low development potential for surface mining methods are defined as areas underlain by coal beds having respective mining ratio values of 0 to 10, 10 to 15, and greater than 15. These mining ratio values for each development potential category are based on economic and technological criteria and were provided by the U.S. Geological Survey.

Areas where the coal data is absent or extremely limited between the 200-foot (61-m) overburden line and the outcrop are assigned unknown development potentials for surface mining methods. This applies to the area where no known coal beds of 5 feet (1.5 m) or more thick occur and to those areas influenced by isolated data points. 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 1,660,000 short tons (1,506,000 metric tons) of coal available for surface mining.

The coal development potential for surface mining methods is shown on plate 7. Of the Federal land areas having a known development potential for surface mining methods, 35 percent are rated high, 15 percent are rated moderate, and 50 percent are rated low. The remainder of the Federal lands within the KRCRA are classified as having unknown development potential for surface mining methods.

Development Potential for Subsurface and In-Situ Mining Methods

Areas considered to have a development potential for conventional subsurface mining methods include those areas where the coal beds of Reserve Base thickness are between 200 and 3,000 feet (61 and 914 m) below the ground surface and have dips of 15° or less. Coal beds lying between 200 and 3,000 feet (61 and 914 m) below the ground surface, dipping greater than 15°, are considered to have a 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), 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 to the areas where no known coal beds of Reserve Base thickness occur. The area influenced by isolated data points in this quadrangle contains approximately 3,870,000 short tons (3,511,000 metric tons) of coal for subsurface mining.

The coal development potential for subsurface mining methods is shown on plate 8. All of the Federal land areas classified as having known development potential for conventional subsurface mining methods are assigned a high development potential. The remaining Federal land is classified as having unknown development potential for conventional subsurface mining methods.

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

Table 1. -- Chemical analyses of coals in the northwest quarter of the Superior 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 surface mining methods for Federal coal lands (in short tons) in the northwest quarter of the Superior 15-minute quadrangle, Sweetwater County, Wyoming

Coal Bed or Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Total
Deadman	8,370,000	5,420,000	13,440,000	27,230,000

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

Table 3. -- Coal Reserve Base data for subsurface mining methods for Federal coal lands (in short tons) in the northwest quarter of the Superior 15-minute quadrangle, Sweetwater County, Wyoming

Coal Bed or Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Total
Deadman	34,210,000	--	--	34,210,000

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

Table 4. -- Sources of data used on plate 1 (CRO Map)

Plate 1 Index Number	Source	Data Base
1	Rocky Mountain Energy Co., (no date) unpublished data	Drill hole No. 1, line A
2	↓	Drill hole No. 2, line A
3	LaPoint, 1977, U.S. Geological Survey, unpublished map	Measured Section No. 2
4	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1, line A
5	↓	Drill hole No. 1-D, line A
6	↓	Drill hole No. 2-D, line A
7	LaPoint, 1977, U.S. Geological Survey, unpublished map	Measured Section No. 3
8	↓	Measured Section No. 4
9	↓	Measured Section No. 5
10	↓	Measured Section No. 1
11	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 3-D, line A
12	LaPoint, 1977, U.S. Geological Survey, unpublished map	Measured Section No. 6
13	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1, line A
14	LaPoint, 1977, U.S. Geological Survey, unpublished map	Measured Section No. 7
15	↓	Measured Section No. 8
16	LaPoint and Pike, 1977, U.S. Geological Survey Open-File Report 77-117	Drill hole No. RS 1-S

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Table 4. -- Continued

Plate 1 Index Number	Source	Data Base
17	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 2, line A
18	↓	Drill hole No. 1, line A
19	↓	Drill hole No. 2, line A
20	↓	Drill hole No. 1, line A
21	LaPoint, 1977, U.S. Geological Survey, unpublished map	Measured Section No. 10
22	↓	Measured Section No. 9
23	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1, line A
24	↓	Drill hole No. 2, line A
25	↓	Drill hole No. 1, line A
26	Davis Oil Co.	Oil/gas well No. 1-C Federal
27	Woods Petroleum Corp.	Oil/gas well No. 1 Bunten-Federal
28	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1, line A
29	↓	Drill hole No. 2, line A

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