Text to Accompany:

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COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE MEXICAN FLATS QUADRANGLE, CARBON COUNTY, WYOMING

[Report includes 18 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 Mexican Flats quadrangle, Carbon 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 Published and unpublished public information available through April, 1979, was used as the data base for this study. No new drilling or field mapping was performed, nor was any confidential data used.

Location

The Mexican Flats quadrangle is located in southwestern Carbon County, Wyoming, approximately 25 airline miles (40 km) south of the town of Creston Junction and 16 airline miles (26 km) northwest of the town of Baggs, Wyoming. The Pool Ranch is located in the northeastern corner of the quadrangle.

Accessibility

Wyoming Highway 789 crosses north-south through the northeastern part of the quadrangle connecting Creston Junction and Interstate 80 to the north of the quadrangle boundary with Baggs to the south. An improved light-duty road runs northwest from Wyoming Highway 789, in the northern part of the quadrangle, to Interstate Highway 80, at the town of Wamsutter approximately 22 airline miles (35 km) to the northwest of the quadrangle. A second light-duty road crosses east-west through the southern half of the quadrangle. The remainder of the quadrangle is served by several unimproved dirt roads and trails. Interstate Highway 80 crosses east-west through southern Wyoming approximately 25 miles (40 km) north of the quadrangle (U.S. Bureau of Land Management, 1971; Wyoming State Highway Commission, 1978).

The main east-west line of the Union Pacific Railroad lies approximately 24 airline miles (39 km) north of the quadrangle. This line crosses southern Wyoming, providing railway service between Odgen, Utah, to the west and Omaha, Nebraska, to the east.

Physiography

The Mexican Flats quadrangle lies on the eastern flank of the Washakie Basin. The landscape is characterized by buttes, badlands, low irregular terrain and a large flat-lying central valley named Mexican Flats. Altitudes range from approximately 6,480 feet (1,975 m) on Muddy Creek along the east-central side of the quadrangle, to 6,984 feet (2,129 m) in the southwestern corner of the quadrangle.

Muddy Creek, a tributary of the Little Snake River to the south of the quadrangle boundary, flows south across the northeastern part of the quadrangle. Red Wash and its tributaries (Barrel Springs Draw, Windmill Draw and South Barrel Springs Draw) flow eastward across Mexican Flats into Muddy Creek. Blue Gap Draw, draining the southeastern corner of the quadrangle, also flows into Muddy Creek. With the exception of Muddy Creek, all of the streams in the quadrangle are intermittent and flow mainly in response to snowmelt in the spring.

Climate and Vegetation

The climate of south-central Wyoming is semiarid, characterized by low precipitation, rapid evaporation, and large daily temperature variations. Summers are usually dry and mild, and winters are cold. The annual precipitation in the area averages approximately 10 inches (25 cm). Approximately two thirds of the precipitation falls in the spring and summer during a seven-month period from April through October (Wyoming Natural Resources Board, 1966).

The average annual temperature in the area is 43°F (6°C). The temperature during January averages 21°F (-6°C) and typically ranges from 12°F (-11°C) to 31°F (-0.6°C). During July the average temperature is 68°F (20°C), and the temperature typically ranges from 51°F (11°C) to 84°F (29°C) (Wyoming Natural Resources Board, 1966).

The winds are usually from the southwest and the west-southwest with an average annual velocity of approximately 12 miles per hour (19 km per hr) (U.S. Bureau of Land Management, 1978).

The principal types of vegetation in the quadrangle include grasses, sagebrush, greasewood, saltbush, rabbitbrush, and other desert shrubs.

Land Status

The Mexican Flats quadrangle lies on the western edge of the proposed Rawlins Known Recoverable Coal Resource Area (KRCRA). Approximately one third of the quadrangle lies within the proposed KRCRA boundary and the Federal government owns the coal rights for approximately 80 percent of this area, as shown on plate 2. No outstanding Federal coal leases, prospecting permits or licenses occur within the quadrangle.

GENERAL GEOLOGY

Previous Work

Ball and Stebinger described the geology and mineral resources of the eastern part of the Little Snake River coal field in 1910. The stratigraphy and depositional environments of Upper Cretaceous rocks in Wyoming and adjacent areas were described by Hale (1961), Haun (1961), Lewis (1961), and Weimer (1961). Masursky (1962) included a description of the depositional environments of the Wasatch Formation in a publication on uranium-bearing coal in the eastern part of the Red Desert area. Henderson (1962) described Cretaceous stratigraphy and the geology of the Doty Mountain-Dad area of Wyoming. Welder and McGreevy (1966) conducted a ground-water reconnaissance of the Great Divide and Washakie Basins of southwestern Wyoming and included a regional geologic map of the area. Roehler (1969) discussed the stratigraphy and depositional environments of Eocene rocks in the Washakie Basin. Gill and others (1970) described the stratigraphy and nomenclature of some of the Upper Cretaceous and Lower Tertiary rocks found in south-central Wyoming. Land (1972) discussed the depositional environments of the Fox Hills Sandstone and the Lance Formation. Barclay and Zimmerman (1976) discussed the stratigraphy of the formations that were drilled by the U.S. Geological Survey in the eastern Doty Mountain area during 1975. Edson (1976) and Edson and

Curtiss (1976) reported on the geology and coal resources of the High Point, Seaverson Reservoir, and Fillmore Ranch quadrangles to the north of the quadrangle. Tyler (1978) published correlation diagrams of geophysical logs from drill holes in the Washakie Basin. Recent geologic mapping in this quadrangle was performed by Hettinger (1978c).

Stratigraphy

The formations exposed in the Mexican Flats quadrangle range in age from Late Cretaceous to Eocene and crop out in north-trending bands across the quadrangle. Both the Fort Union Formation of Paleocene age and the Lance Formation of Late Cretaceous age are known to contain coal in this quadrangle. However, the coal beds in the Lance Formation occur at depths greater than 3,000 feet (914 m).

The Lance Formation is present in the subsurface of this quadrangle and ranges in thickness from 920 to 1,400 feet (280 to 427 m) where measured in oil and gas wells. The formation consists of a non-marine sequence of carbonaceous shale, sandstone, and siltstone with coal beds occurring immediately above the contact with the underlying Fox Hills Sandstone (Haun, 1961).

Unconformably overlying the Lance Formation, the Fort Union Formation crops out along the eastern edge of the quadrangle and ranges in thickness from 1,460 to 1,880 feet (445 to 573 m) where measured in oil and gas wells drilled in this quadrangle. At the base of the formation is 550 to 900 feet (168 to 274 m) of white to brown fine- to coarse-grained, massive to thin-bedded, generally cross-bedded sandstone, chert-pebble conglomerate, and ironstone (Henderson, 1962). Above this basal sandstone and conglomerate unit, the formation grades into 780 to 1,150 feet (238 to 351 m) of interbedded light-colored sandstone, brown siltstone, gray sandy shale, dark-gray carbonaceous shale, and coal (Henderson, 1962). All of the major coal beds occur in a zone that ranges from 670 to 760 feet (204 to 232 m) thick and lies immediately above the basal sandstone and conglomerate unit.

The Wasatch Formation of Eocene age conformably overlies the Fort Union Formation and crops out in a northwest-trending band across the western three quarters of the quadrangle. The formation is divided into two parts, the basal main body and the Cathedral Bluffs Tongue. The Cathedral Bluffs tongue is separated from the main body by the Tipton Tongue of the Green River Formation. The main body of the Wasatch Formation is approximately 2,000 feet (610 m) thick where it crops out in the quadrangle and consists primarily of fluviatile red mudstone and sandstone (Roehler, 1969). The Cathedral Bluffs Tongue, consisting of interbedded variegated mudstone and sandstone, overlies the Tipton Tongue of the Green River Formation. A total section of this member is not present in the quadrangle.

The lacustrine Green River Formation in this quadrangle is represented by the Tipton Tongue. This member is overlain by the Cathedral Bluffs Tongue of the Wasatch Formation and underlain by the main body of the Wasatch Formation. It maintains a thickness of approximately 160 feet (49 m) in the quadrangle and consists largely of soft papery low-grade oil shale, but contains a few thin, brownish fine-grained limy sandstone beds and layers of concretionary, sandy, coquinal or oolitic limestone (Bradley, 1964).

Holocene deposits of alluvium cover the stream valleys of Muddy Creek, Barrel Springs Draw, and their tributaries.

The Upper Cretaceous formations encountered in oil and gas wells in the Mexican Flats quadrangle indicate the transgressions and regressions of a broad, shallow, north-south-trending seaway that extended across central North America. These formations accumulated near the western edge of the sea and reflect the location of the shoreline (Weimer, 1960 and 1961).

During the gradual recession of the last Cretaceous sea, marking the close of the Cretaceous period, carbonaceous shales, mudstones, and coal beds of the lower part of the Lance Formation were deposited in broad areas of estuarine, marsh, lagoonal, and coastal swamp environments (Land, 1972), while the uppermost sandstones and siltstones represent the accumulation of sediments in continental-fluvial environments (Beaumont, 1979).

After the final withdrawal of the Cretaceous sea, thick sections of detrital material, eroded from older formations, were deposited as the Fort Union Formation. The coarse sandstones and conglomerate beds of the lower sandy unit indicate a braided stream environment, and the interbedded sandstones, siltstones, shales, and coal beds of the upper part of the formation represent the development of broad, thick floodplain and backswamp deposits (Beaumont, 1979).

The coarse sediments at the base of the main body of the Wasatch Formation were deposited in a fluvial environment that resulted from renewed tectonic uplift to the southwest (Beaumont, 1979). The remainder of the main body, as well as the Cathedral Bluffs Tongue of the formation, was deposited in alternating swamp, lake, and stream environments (Masursky, 1962). The oil shale and limestone beds of the Tipton Tongue of the Green River Formation represent deposition in widespread lacustrine environments. This intertonguing of the Wasatch and Green River Formations represents a series of alternate withdrawals and flooding that interrupted otherwise continuous lacustrine Green River deposition (Roehler, 1969).

Structure

The Mexican Flats quadrangle is located on the southeastern edge of the Wamsutter Arch which divides the Washakie Basin to the south from the Great Divide Basin to the north. Outcrops of beds in the quadrangle strike north and dip 3° to 35° to the west.

Numerous east-west trending normal faults were mapped by Hettinger (1978a) in the southwestern corner of the quadrangle.

COAL GEOLOGY

The Fort Union Formation is the only significant coal-bearing formation in the Mexican Flats quadrangle. The coal beds occur in a zone immediately above the lower sandy unit, and four coal beds have been isopached in this quadrangle.

Chemical analyses of coals.--Chemical analyses were not available for coals in the Fort Union Formation in this quadrangle, but representative analyses from the northwest quarter of the Doty Mountain 15-minute quadrangle are listed in table 1. In general, coals in the Fort Union Formation rank as subbituminous B or C on a moist, mineral-matter-free basis according to ASTM Standard Specification D 388-77 (American Society for Testing and Materials, 1977).

The dotted line on some derivative maps in the quadrangle indicates a limit of confidence beyond which isopach, structure contour, overburden and mining ratio, and areal distribution and identified resources maps are not drawn because of insufficient data, although it is believed that the coal beds may continue to be of Reserve Base thickness (5.0 feet or 1.5 meters) beyond the dotted line.

Coal Beds of the Fort Union Formation

The Fort Union Formation is the most important coal-bearing unit in this and adjacent quadrangles to the north, east and south. Coal beds occur in a zone that crops out in a north-trending band in the north-eastern corner of the quadrangle (Hettinger, 1978c).

Red Rim Coal Bed

The Red Rim coal bed (plate 4) is named for Red Rim ridge located in T. 20 N., R. 90 W., in the northwest quarter of the Bridger Pass 15-minute quadrangle (Edson, 1976). This is, stratigraphically, the lowest isopached coal bed in the Fort Union Formation in this quadrangle. It lies approximately 550 to 900 feet (168 to 274 m) above the unconformable contact of the Fort Union Formation and the underlying Lance Formation. Only one oil and gas well in this quadrangle (sec. 17, T. 16 N., R. 92 W.) penetrated this coal bed at a depth of less than 3,000 feet (914 m). At this location, the coal bed is 12 feet (3.7 m) thick excluding a shale parting that is 2 feet (0.6 m) thick. However, based on data projected into this quadrangle from the adjacent southwest quarter of the Doty Mountain 15-minute quadrangle, it is believed that the coal bed may be as much as 15 feet (4.6 m) thick. Where penetrated by oil and gas wells at depths greater than 3,000 feet (914 m) in the northwest and southern parts of the quadrangle, the coal bed ranges in thickness from 3 to 5 feet (0.9 to 1.5 m).

In general, this coal bed is prominent and widespread in quadrangles to the north, east and south. It has been encountered in oil and gas wells in the Duck Lake quadrangle where it ranges from 3 to 5 feet (0.9 to 1.5 m) in thickness, and it may be as much as 9 feet (2.7 m) thick based on data from the adjacent quadrangle to the east. In the northwest quarter of the Doty Mountain 15-minute quadrangle, the coal bed has a maximum measured thickness of 12 feet (3.7 m) and, in the southwest quarter of the Doty Mountain 15-minute quadrangle, the Red Rim coal bed has a maximum measured thickness of 16.9 feet (5.2 m) with a shale parting 1.6 feet (0.5 m) thick. This coal bed has also been identified at depths greater than 3,000 feet (914 m) in the northwest quarter of the Baggs 15-minute quadrangle to the southeast where the coal bed is 7 feet (2.1 m) thick.

Olson Draw Coal Bed

This coal bed is named for Olson Draw located in T. 18 N., R. 91 W. (Edson, 1976). The Olson Draw coal bed (plate 7) is stratigraphically above and separated from the Red Rim coal bed by approximately 95 feet (29 m) of interbedded sandstone, siltstone and shale. The coal bed was penetrated at a depth of less than 3,000 feet (914 m) by only one oil and gas well in this quadrangle, and the coal bed is 6 feet (1.8 m) thick at that location. Where encountered in other oil and gas wells at depths greater than 3,000 feet (914 m), the coal bed ranges in thickness from 3 to 7 feet (0.9 to 2.1 m). Based on data in the adjacent quadrangle to the east, the coal bed may be as thick as 11 feet (3.4 m) locally along the quadrangle boundary. Although this coal bed persists over a widespread area, it tends to be generally less than Reserve Base thickness in this and adjacent quadrangles. Also, the coal bed contains numerous shale partings in adjacent quadrangles to the east and southeast, but the partings become less prevalent to the north and northeast.

Muddy Creek Coal Bed

The Muddy Creek coal bed (plate 10) was named by Edson (1976) for Muddy Creek, which flows southward across the eastern part of the quadrangle. The coal bed lies approximately 440 feet (134 m) above the Red Rim coal bed and is 9 feet (2.7 m) thick where measured in an oil and gas well located in sec. 17, T. 16 N., R. 92 W. In the southwest quarter of the Doty Mountain 15-minute quadrangle, the Muddy Creek coal bed is generally less than Reserve Base thickness, but thickens locally to 9.3 feet (2.8 m) in sec. 19, T. 14 N., R. 91 W.

Fillmore Ranch Coal Bed

This coal bed was named for Fillmore Ranch (Edson, 1976) located in sec. 6, T. 18 N., R. 90 W. The Fillmore Ranch coal bed is the thickest and most extensive coal bed in the Fort Union Formation in this and adjacent quadrangles. It lies approximately 680 feet (207 m) above the Red Rim coal bed and is split by a rock parting that varies in thickness from 1.3 to 49 feet (0.4 to 14.9 m) in this quadrangle. At depths less than 3,000 feet (914 m), the lower, thicker split of the coal bed (plate 13) ranges in thickness from 6 feet (1.8 m), where measured in an oil and gas well located in sec. 21, T. 15 N., R. 92 W., to a maximum of 14 feet (4.3 m) along the outcrop in the northeast corner of the quadrangle. It also ranges up to 14 feet (4.3 m) thick where penetrated by oil and gas wells at depths greater than 3,000 feet (914 m). Measured thicknesses of the upper split (plate 14) range from 2 to 7.6 feet (0.6 to 2.3 m) at depths less than 3,000 feet (914 m), and at greater depths, the upper split is up to 10 feet (3.0 m) thick.

In the northwest quarter of the Doty Mountain 15-minute quadrangle, the rock parting becomes thinner and less prominent, ranging in thickness from 0.3 to 15 feet (0.1 to 4.6 m) and averaging about 4 feet (1.2 m). The coal below the parting ranges from 7 to 23 feet (2.1 to 7.0 m) thick while the upper split ranges from 5 to 10 feet (1.5 to 3.0 m) thick. Because the rock parting becomes less significant and the splits of the Fillmore Ranch coal bed become thicker, this bed was not isopached as a split coal bed in the northwest quarter of the Doty Mountain 15-minute quadrangle.

In the Duck Lake quadrangle and the southwest quarter of the Doty Mountain 15-minute quadrangle, the rock parting remains quite thick and the Fillmore Ranch coal bed is isopached as a split bed. In the Duck Lake quadrangle, the parting ranges from 1 to 54 feet (0.3 to 16.5 m) thick, the lower coal split varies from 10 to 14 feet (3.0 to 4.3 m), and the upper split ranges from 2 to 9 feet (0.6 to 2.7 m). In the southwest quarter of the Doty Mountain 15-minute quadrangle, the parting ranges in thickness from 2.1 to 19 feet (0.6 to 5.8 m), the lower split from 6 to 10.9 feet (1.8 to 3.3 m), and the upper split 2.3 to 10.9 feet (0.7 to 3.3 m).

COAL RESOURCES

Information from oil and gas wells and a geologic map by Hettinger (1978c), were used to construct outcrop, isopach, and structure contour maps of the coal beds in the Mexican Flats quadrangle. The source of each indexed data point shown on plate 1 is listed in table 4.

Coal resources were calculated using data obtained from the coal isopach maps (plates 4, 7, 10, 13, and 14). 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 each isopached coal bed. Coal beds thicker than 5 feet (1.5 m) that lie less than 3,000 feet (914 m) below the ground surface are included. These criteria differ somewhat from those 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 6, 9, 12, and 17, 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 359.26 million short tons (325.92 million metric tons) for the entire quadrangle. Reserve Base tonnages in the various development potential categories for surface and subsurface mining methods are shown in tables 2 and 3.

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 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 part 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 is shown on the following 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 areas where coal beds 5 feet (1.5 m) or more thick are not known, but may 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 coal development potential for surface mining methods is shown in figure 1. All of the Federal land areas having a known development potential for surface mining methods are rated high. The remaining Federal lands within the proposed KRCRA boundary are classified as having unknown development potential for surface mining methods.

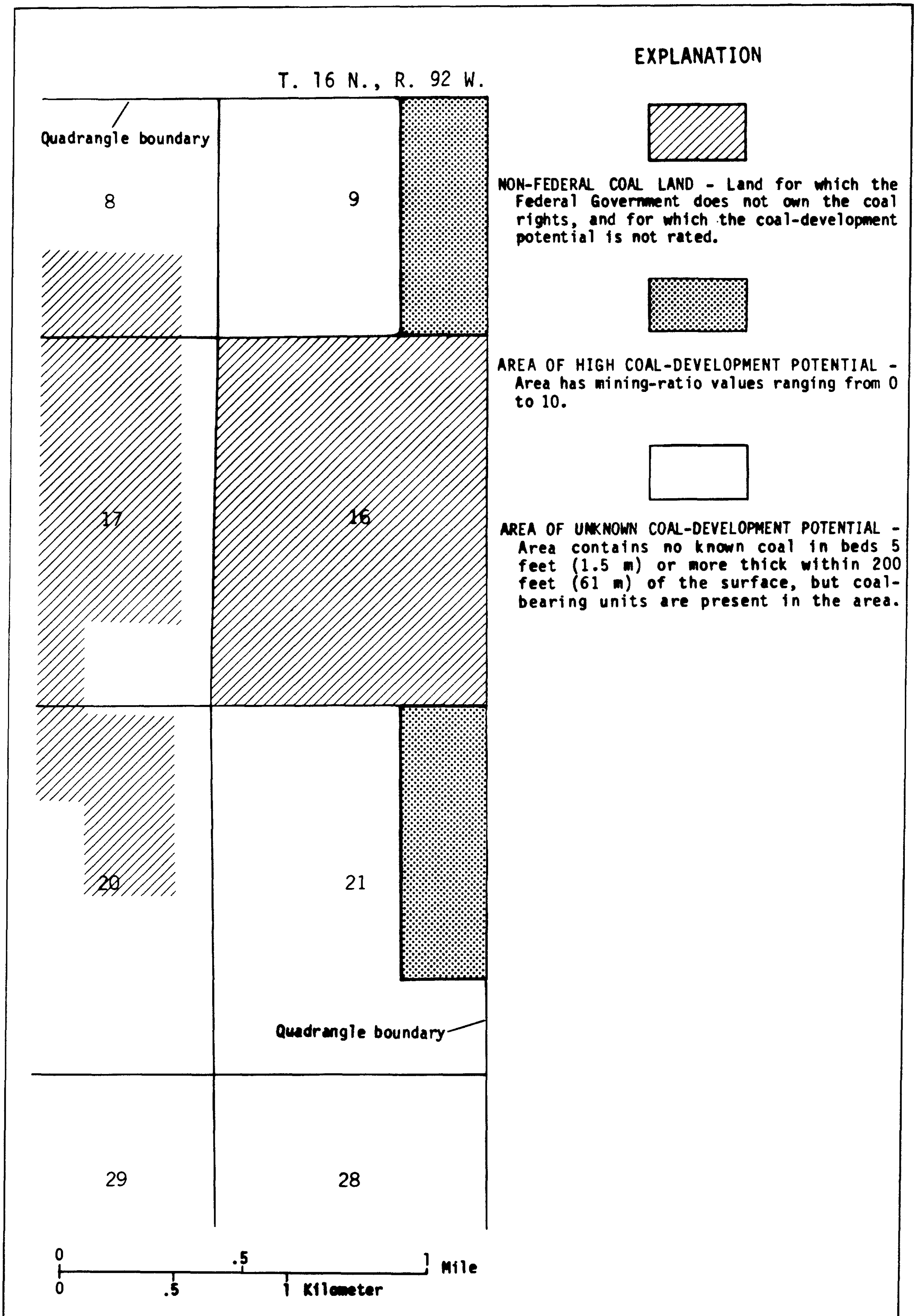

FIGURE 1. — Coal development potential map for surface mining methods.

Development Potential for Subsurface and In-Situ Mining Methods

Areas considered to have a development potential for conventional subsurface mining methods are 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. Unfaulted 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 areas where coal beds of Reserve Base thickness are not known, but may occur.

The coal development potential for subsurface mining methods is shown on plate 18. Of the Federal land areas having a known development potential for conventional subsurface mining methods, 6 percent are rated high, 30 percent are rated moderate, and 64 percent are rated low. The remaining Federal lands within the proposed KRCRA boundary are classified as having unknown development potential for conventional subsurface mining methods.

Based on criteria provided by the U.S. Geological Survey, coal beds of Reserve Base thickness dipping between 15° and 35°, regardless of tonnage, have low development potential for in-situ mining methods. Coal lying between the 200-foot overburden isopach and the outcrop is not included in the total coal tonnages available because it is needed for cover and containment in the in-situ process.

All of the Federal lands where the dip of the coal beds exceeds 15° are rated low for in-situ development potential because faults are present and only approximately 73.79 million short tons (66.94 million metric tons) of coal distributed through four different coal beds are believed to be available for in-situ mining. The remaining Federal lands within the proposed KRCRA boundary are classified as having unknown development potential for in-situ mining methods.

Table 1. Chemical analyses of coals in the Mexican Flats quadrangle, Carbon 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
SW¼, NW¼, sec. 5, T. 17 N., R. 91 W., (RMEC, CB-96)	Fillmore Ranch	A	22.7	30.4	42.1	4.8	0.2	-	-	-	-	-	9,206
		C	0.0	39.3	54.5	6.2	0.3	-	-	-	-	-	11,902
NE¼, NW¼, sec. 33, T. 18 N., R. 91 W., (RMEC, CB-77)	Muddy Creek	A	22.9	30.1	41.7	5.4	0.3	-	-	-	-	-	9,043
		C	0.0	39.0	54.0	6.9	0.4	-	-	-	-	-	11,726
NE¼, NE¼, sec. 5, T. 17 N., R. 91 W., (RMEC, CB-86)	Separation Creek	A	22.3	0.0	0.0	10.1	0.8	-	-	-	-	-	8,699
		C	0.0	0.0	0.0	13.0	1.1	-	-	-	-	-	11,193
NE¼, SE¼, sec. 33, T. 18 N., R. 91 W., (RMEC, CB-81)	Red Rim	A	24.3	29.7	33.5	7.6	0.7	-	-	-	-	-	8,646
		C	0.0	39.2	50.8	10.1	0.9	-	-	-	-	-	11,416

Form of Analysis: A, as received
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 Mexican Flats quadrangle, Carbon County, Wyoming.

Coal Bed	High Development Potential	Moderate Development Potential	Low Development Potential	Unknown Development Potential	Total
Fillmore Ranch	2,020,000	610,000	150,000	-	2,780,000

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 Mexican Flats quadrangle, Carbon County, Wyoming.

Coal Bed or Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Unknown Development Potential*	Total
Fillmore Ranch	9,230,000	62,110,000	163,790,000	21,020,000	256,150,000
Muddy Creek	-	-	150,000	1,210,000	1,360,000
Olson Draw	-	-	1,520,000	4,870,000	6,390,000
Red Rim	110,000	5,210,000	40,570,000	46,690,000	92,580,000
Totals	9,340,000	67,320,000	206,030,000	73,790,000	356,480,000

*Tonnages for coal beds dipping in excess of 15 degrees.

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

Table 4. -- Sources of data used on plate 1

Plate 1 Index Number	Source	Data Base
1	Colorado Interstate Gas Exploration Co.	Oil/gas well No. 18-15-92 CIGE
2	William Moss Properties, Inc.	Oil/gas well No. 10-21-15-92 Blue Gap II
3		Oil/gas well No. 7-13-15-93 Blue Gap Unit
4		Oil/gas well No. 5-23-15-93 Blue Gap II Unit
5	Hettinger, 1978c, U.S. Geological Survey, unpublished map	Measured Section
6		Measured Section
7	Ball and Stebinger, 1910, U.S. Geological Survey Bulletin 381-B	Measured Section
8	Hettinger, 1978c, U.S. Geological Survey, unpublished map	Measured Section
9	Ohio Oil Co.	Oil/gas well No. 1 Dad Unit
10	Hettinger, 1978c, U.S. Geological Survey, unpublished map	Measured Section
11	Kemmerer Coal Co.	Oil/gas well No. 11-2 Barrel Springs Unit 2
12		Oil/gas well No. 13-1 Barrel Springs Unit 2
13	Union Texas Natural Gas Co.	Oil/gas well No. 2 Dad Unit
14	Ambassador National Corp.	Oil/gas well No. 1 Federal-J-Wyoming

Table 4. -- Continued

Plate 1 Index Number	Source	Data Base
15	Kemmerer Coal Co.	Oil/gas well No. 14-1 Barrel Springs Unit
16		Drill hole No. 1 Government
17	Clark Oil and Refining Corp.	Oil/gas well No. 1 Barrel Springs Unit
18	Kemmerer Coal Co.	Oil/gas well No. 15-1 Barrel Springs Unit
19	American Minerals Management Corp.	Oil/gas well Barrel Springs Unit 5
20	True Oil Co.-Mule Creek Oil Co. and N.C.R.A.	Oil/gas well No. 1 Gillis

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