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COAL RESOURCE OCCURRENCE MAPS AND COAL DEVELOPMENT POTENTIAL OF THE NORTH BAXTER QUADRANGLE, SWEETWATER COUNTY, WYOMING

[Report includes 2 plates]

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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INTRODUCTION

Purpose

This text is to be used in conjunction with Coal Resource Occurrence (CRO) Maps of the North Baxter 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 Published and unpublished public information available through June, 1978, was used as the data base for this study.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

The North Baxter quadrangle is located in central Sweetwater County, Wyoming, approximately 5 miles (8 km) northwest of the city of Rock Springs, Wyoming. The quadrangle is unpopulated.

Accessibility

Interstate Highway 80 passes southwesterly across the southeastern corner of the quadrangle, and the Winton Cutoff, an improved light-duty road, crosses the northwestern corner of the quadrangle. A second improved light-duty road, connecting with Interstate Highway 80 south of the quadrangle boundary, crosses northerly through the southwesten part of the quadrangle to serve the North Baxter Basin oil and gas field. Numerous secondary dirt roads and trails provide access through the remainder of the quadrangle.

The main east-west line of the Union Pacific Railroad passes across the southeastern corner of the quadrangle and provides railway service across southern Wyoming. It connects Ogden, Utah to the west with Omaha, Nebraska to the east.

Physiography

The North Baxter quadrangle is located in the north-central part of the Rock Springs uplift and on the northeastern edge of the Baxter Basin. The landscape in the quadrangle is characterized by a relatively flat-lying terrain in the southwestern two thirds of the quadrangle. The northeastern third of the quadrangle becomes more rugged with buttes and steep escarpments. Altitudes in the quadrangle range from approximately 6,320 feet (1,926 m) on Bitter Creek along the south-central edge of the quadrangle to 7,560 feet (2,304 m) in the northeastern corner of the quadrangle.

Bitter Creek, a tributary of the Green River to the west of the quadrangle, flows southwesterly across the southeastern corner of the quadrangle. A tributary, Salt Wells Creek, flows westerly across the southeastern corner of the quadrangle into Bitter Creek. The northern half of the quadrangle drains into several small playa lakes in the southern half of the quadrangle. All streams in the quadrangle flow intermittently 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 greasewood, sagebrush, saltbush, rabbitbrush and grasses (U.S. Bureau of Land Management, 1978).

Land Status

The North Baxter quadrangle lies in the north-central part of the Rock Springs Known Recoverable Coal Resource Area (KRCRA). Only a small part of the quadrangle, less than 1 percent, lies within the KRCRA boundary. The Federal government owns the coal rights for approximately 15 percent of this small area, as shown on figure 1. No outstanding Federal coal leasees, prospecting permits, or licenses occur within the quadrangle.

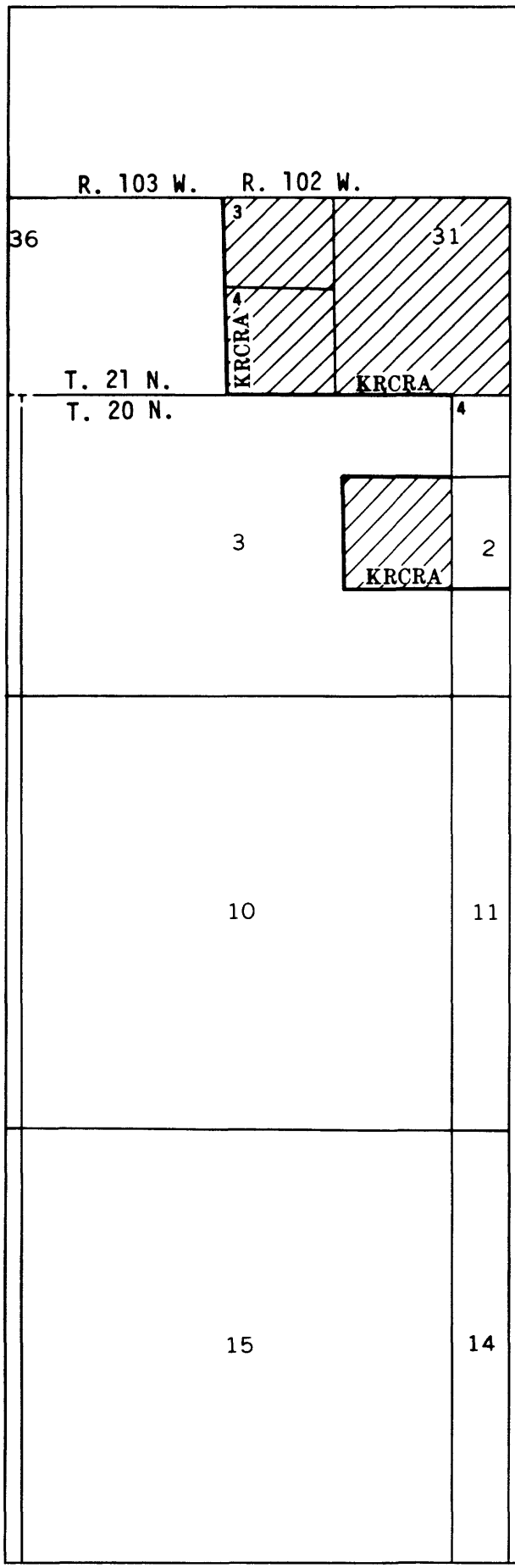
GENERAL GEOLOGY

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 northeast was mapped and described by Dobbin in 1944. Lindeman also mapped the northern part of the Rock Springs coal field in 1947. Hale described the stratigraphy and depositional history of the formations cropping out on the flanks of the Rock Springs uplift in 1950 and 1955. Weimer (1960, 1961), Smith (1961), Lewis (1961), Douglass and Blazzard (1961), and Keith (1965) described the stratigraphy and discussed the depositional environment of Late Cretaceous-age formations in the Rock Springs area. Reese (1968), and Gosar and Hopkins (1969) summarized the structure and stratigraphy of Late Cretaceous- and Tertiary-age formations. Roehler and others described the geology and coal resources of the Rock Springs uplift in 1977. Roehler prepared a geologic map of the Rock Springs uplift and adjacent areas in 1977 and stratigraphic correlations in 1978.

Stratigraphy

The Baxter Shale of Late Cretaceous age, and the Blair and Rock Springs Formations, part of the Mesaverde Group of Late Cretaceous age,

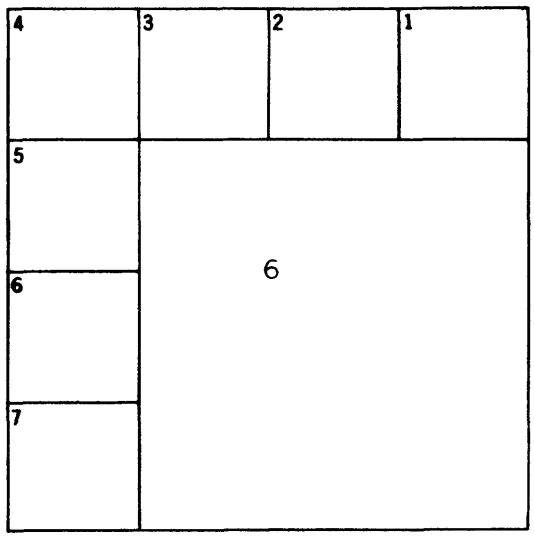


EXPLANATION

KRCRA

KRCRA BOUNDARY – Label within KRCRA boundary.

NON-FEDERAL COAL LAND–Land within the KRCRA boundary for which the Federal Government does not own the coal rights.



SECTION OF LAND–Showing lots and lot numbers; and tracts and tract numbers.

NOTE: BLM Coal Ownership Data current as of August 1, 1977.

Figure 1. — Boundary data map

crop out in the North Baxter quadrangle. They occur within the KRCRA boundary at depths of less than 3,000 feet (914 m). The Aspen Shale and Frontier Formation, shown on the composite columnar section on plate 2, occur in the subsurface. These formations were encountered in the oil and gas wells drilled within the quadrangle approximately 7 miles (11 km) southwest of the KRCRA boundary. Only the Rock Springs Formation contains coal within the KRCRA boundary.

The Baxter Shale forms a topographic basin, the Baxter Basin, within the core of the Rock Springs uplift. It crops out over the southwestern two thirds of the quadrangle. The Baxter Shale does not crop out within the KRCRA boundary in this quadrangle, but occurs in the subsurface. It consists of approximately 3,700 feet (1,128 m) of soft, dark-gray, gypsiferous, slightly sandy shale where measured in the oil and gas wells drilled in adjacent quadangles. The Airport Sandstone unit occurs approximately 800 feet (244 m) below the top of the formation and consists of a ridge-forming gray sandstone (Hale, 1950, 1955, and Smith, 1961).

The Blair Formation conformably overlies the Baxter Shale and is approximately 1,100 feet (335 m) thick where measured in the oil and gas wells drilled in the adjacent southeast quarter of the Boars Tusk 15-minute quadrangle. It crops out in a broad northwest-trending band across the northeastern part of the quadrangle and occurs in the subsurface within the KRCRA boundary. The Blair Formation is composed of a series of light-brown, thin-bedded, fine- to medium-grained sandstones overlain by light-brownish-gray arenaceous siltstone and brownish-gray silty to sandy shale. The upper part of the formation consists of light-brown sandy shale, occasional thin coal beds and thin brown sandstone which grade upward into the sandstones of the Rock Springs Formation (Hale, 1950, 1955, Smith, 1961, and Keith, 1965).

The lower part of the Rock Springs Formation, conformably overlying the Blair Formation, crops out in the northwestern corner of the quadrangle. It consists of buff-colored to light-gray, fine-grained cross-

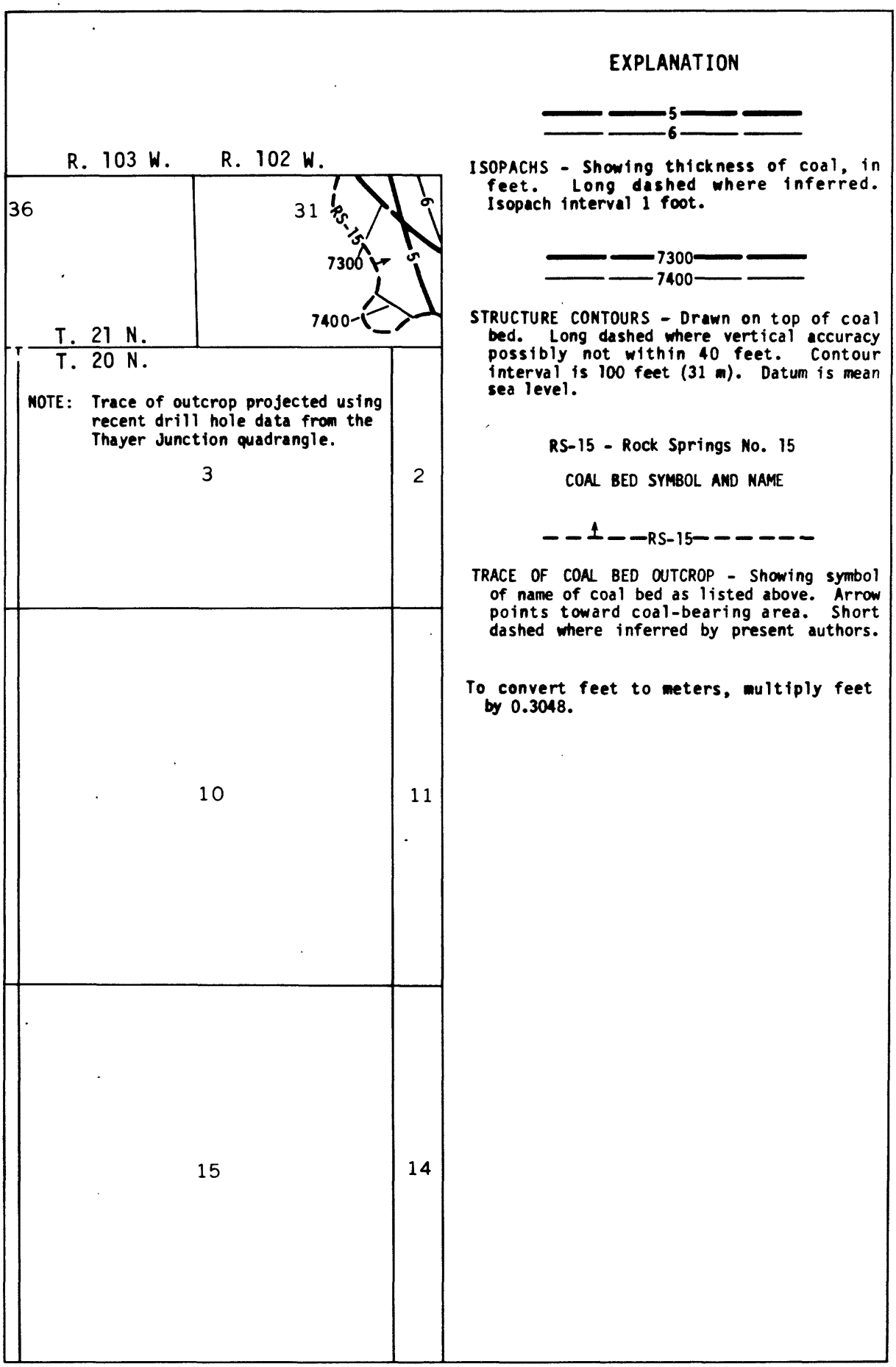


Figure 2. — Isopach and structure contour map of the Rock Springs No. 15 coal bed

bedded sandstone overlain by a sequence of interbedded carbonaceous shale, siltstone, sandstone and coal beds (Hale, 1950, 1955, and Smith, 1961).

Recent deposits of alluvium cover the stream valleys of Bitter Creek and Salt Wells Creek.

The Baxter Shale was deposited in an offshore marine environment as the Late Cretaceous Baxter sea moved westward. The Blair Formation, composed of intertonguing nearshore sandstones and offshore marine shales, formed in a shallow-water marine environment as the sea regressed eastward. The coal-bearing facies of the Rock Springs Formation was deposited in paludal, deltaic, lagoonal and fluvial environments (Hale, 1950, Douglass and Blazzard, 1961, and Gosar and Hopkins, 1969).

Structure

The North Baxter quadrangle lies on the northeastern flank of the Rock Springs uplift which separates the Great Divide and Green River structural basins. The strike of the beds in the northeastern corner of the quadrangle is generally to the northwest, with the beds dipping approximately 6° to the northeast. Several faults perpendicular to the strike of the beds have been mapped by Schultz (1909) and Reese (1968).

COAL GEOLOGY

The Rock Springs Formation contains the only coal beds that lie within the KRCRA boundary at depths of less than 3,000 feet (914 m). The Frontier Formation coal beds are shown on plate 2 for descriptive purposes only. These coal beds do not occur within the KRCRA at depths of less than 3,000 feet (914 m). The Rock Springs No. 15 (or Van Dyke) coal bed has been projected into the northeastern corner of the quadrangle (figure 2) using data from drill holes in the Thayer Junction and the southwest quarter of the Superior 15-minute quadrangles. The Rock Springs No. 15 coal bed attains a thickness of approximately 6.0 feet (1.8 m) in the North Baxter and Thayer Junction quadrangles. It is 7.0 feet (2.1 m) thick where measured in a drill hole located in sec. 31, T. 21 N., R. 102 W., in the southwest quarter of the Superior 15-minute quadrangle. As

calculated from figure 2, the Rock Springs No. 15 coal bed dips to the northeast at approximately 6° and the overburden thickness increases in the same direction (figure 3).

Chemical analyses of coal.--No chemical analyses were available from coals in this quadrangle. However, an analysis of a Rock Springs Formation coal from the southeast quarter of the Boars Tusk 15-minute quadrangle is shown in table 1 (U.S. Bureau of Mines, 1931). In general, the Rock Springs and Frontier Formations contain bituminous coal (Roehler and others, 1977).

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

COAL DEVELOPMENT POTENTIAL

Areas where coal beds of Reserve Base thickness (5 feet or 1.5 meters) or greater are overlain by 3,000 feet (914 m) or less of overburden are considered to have development potential for either surface or subsurface mining methods. In the North Baxter quadrangle, coal beds of Reserve Base thickness are not known to be present on Federal land. Therefore, all Federal lands within the KRCRA boundary in this quadrangle have been classified as having an unknown development potential for surface and subsurface mining methods.

The source of each indexed data point shown on plate 1 is listed in table 2.

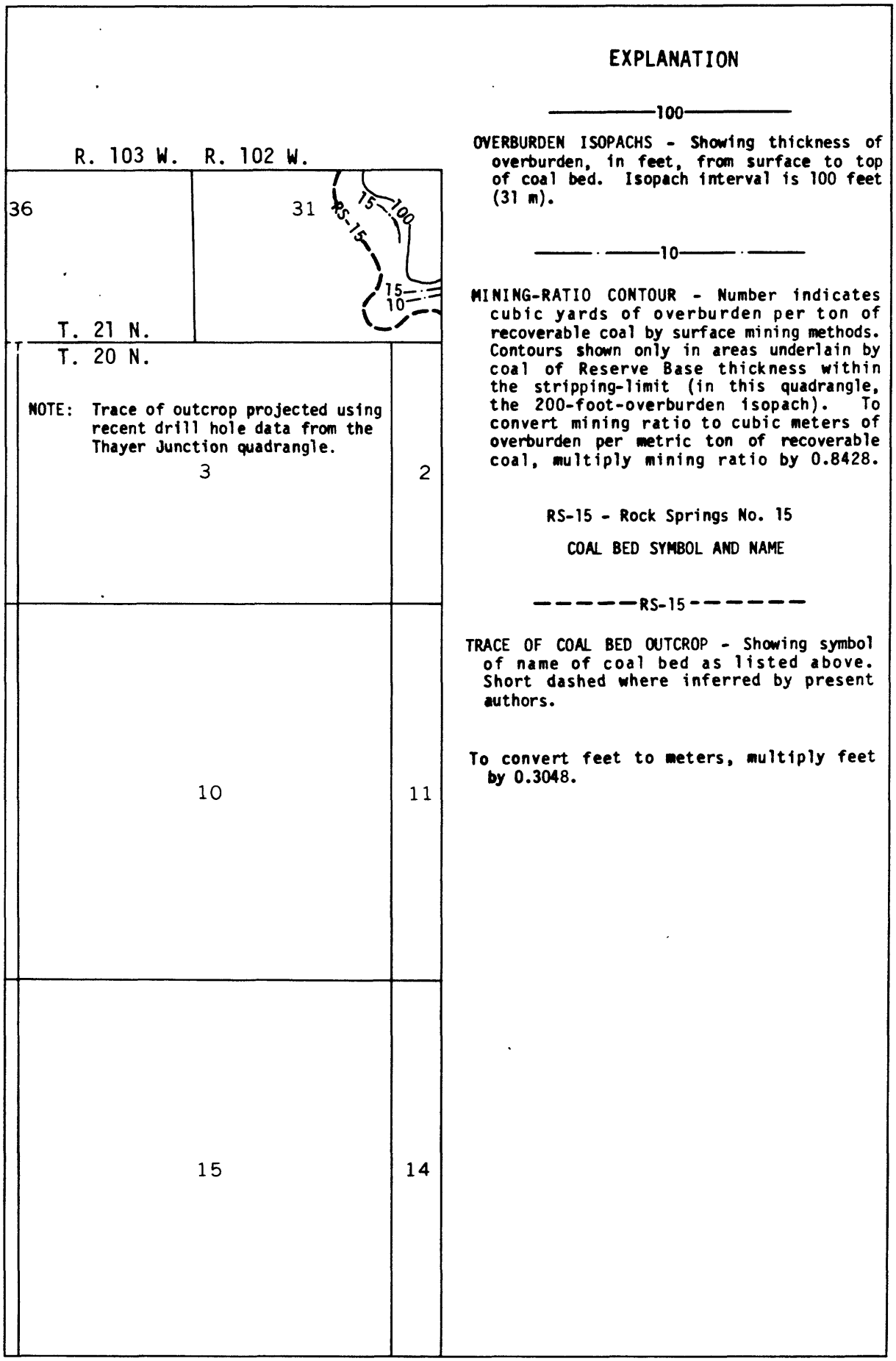


Figure 3. — Overburden isopach and mining ratio map of the Rock Springs No. 15 coal bed

Table 1. Chemical analysis of coals in the North Baxter 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
Sec. 3, T. 21 N., R. 103 W., Prospect Pits (U.S. Bureau of Mines, 1931)	Rock Springs, undifferentiated	A	13.8	31.7	49.5	5.0	0.9	-	-	-	-	-	10,790
		C	0.0	36.8	57.4	5.8	1.0	-	-	-	-	-	12,520

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. -- Sources of data used on plate 1

Plate 1 Index Number	Source	Data Base
1	Mountain Fuel Supply Co.	Oil/gas well No. 3 Cappers
2	Amoco Production Co.	Oil/gas well No. 1 Amoco-No. 137 Champlin
3	Mountain Fuel Supply Co.	Oil/gas well No. 3 Union Pacific
4	↓	Oil/gas well No. 2 Cameron-U.P.
5	↓	Oil/gas well No. 4 U.P.R.R.
6	Transcal Petroleum Co.	Oil/gas well No. 1 U.P.
7	Mountain Fuel Supply Co.	Oil/gas well No. 1-C Clark
8	↓	Oil/gas well No. 2 U.P.
9	↓	Oil/gas well No. 14-1 Federal
10	↓	Oil/gas well No. 2 U.P.R.R.
11	↓	Oil/gas well No. 3 Featherstone
12	↓	Oil/gas well No. 2 O.F. Featherstone Gov't
13	↓	Oil/gas well No. 1 U.P.

Table 2. -- Continued

Plate 1 Index Number	Source	Data Base
14	Mountain Fuel Supply Co.	Oil/gas well No. 4 G.W. Cappers
15		Oil/gas well No. 5 G.W. Cappers
16		Oil/gas well No. 1-B Amoco-No. 103 Champlin
17		Oil/gas well No. 35-1 U.P.R.R.
18	John L. Kemmerer, Jr.	Oil/gas well No. 32-1 Federal
19	True Oil Co.	Oil/gas well No. 24-36 Bradshaw-State

REFERENCES

Dobbin, C. E., 1944, The Superior district of the Rock Springs Coal Field, Sweetwater County, Wyoming: U.S. Geological Survey unpublished report.

Douglass, W. B., Jr., and Blazzard, T. R., 1961, Facies relationships of the Blair, Rock Springs, and Ericson Formations of the Rock Springs uplift and Washakie Basin, in Symposium on the Late Cretaceous rocks of Wyoming and adjacent areas, Wyoming Geological Association Guidebook, 16th Annual Field Conference, 1961: p. 81-86.

Gosar, A. J., and Hopkins, J. C., 1969, Structure and stratigraphy of the southwest portion of the Rock Springs uplift, Sweetwater County, Wyoming, in Geologic Guidebook of the Uinta Mountains, Intermountain Association of Geologists and Utah Geological Association Guidebook, 16th Annual Field Conference, September 4, 5, and 6, 1969: p. 87-90.

Hale, L. A., 1950, Stratigraphy of the Upper Cretaceous Montana group in the Rock Springs uplift, Sweetwater County, Wyoming, in Southwestern Wyoming, Wyoming Geological Association Guidebook, 5th Annual Field Conference, 1950: p. 49-58.

_____ 1955, Stratigraphy and facies relationship of the Montanan group in south-central Wyoming, northeastern Utah and northwestern Colorado, in Green River Basin, Wyoming, Wyoming Geological Association Guidebook, 10th Annual Field Conference, 1955: p. 89-94.

Keith, R. E., 1965, Rock Springs and Blair Formations on and adjacent to the Rock Springs uplift, Sweetwater County, Wyoming, in Rock Springs uplift, Wyoming, Wyoming Geological Association Guidebook, 19th Annual Field Conference, 1965: p. 42-53.

Lewis, J. L., 1961, The stratigraphy and depositional history of the Almond Formation in the Great Divide Basin, Sweetwater County, Wyoming, in Symposium on the Late Cretaceous rocks of Wyoming and adjacent areas, Wyoming Geological Association Guidebook, 16th Annual Field Conference, 1961: p. 87-95.

Lindeman, H. B., 1947, Map of the Rock Springs coal field - northern part, Sweetwater County, Wyoming: U.S. Geological Survey, unpublished map, scale 1:60,000.

Reese, D. L., 1968, Gas fields of Rock Springs uplift, Sweetwater County, Wyoming, in Natural gases of North America: American Association of Petroleum Geologists Memoir 9, v. 1, p. 803-816.

Roehler, H. W., 1977, Geologic map of the Rock Springs uplift and adjacent areas, Sweetwater County, Wyoming: U.S. Geological Survey Open-File Report 77-242, scale: 1:126,720.

References--Continued

_____ 1978, Correlations of coal beds in the Fort Union, Almond, and Rock Springs Formations in measured sections on the west flank of the Rock Springs uplift, Sweetwater County, Wyoming: U.S. Geological Survey Open-File Report 78-395.

Roehler, H. W., Swanson, V. E., and Sanchez, J. D., 1977, Summary report of the geology, mineral resources, engineering geology and environmental geochemistry of the Sweetwater-Kemmerer area, Wyoming, part A, geology and mineral resources: U.S. Geological Survey Open-File Report 77-360, 80 p.

Schultz, A. R., 1909, The northern part of the Rock Springs coal field, Sweetwater County, Wyoming, in Coal fields of Wyoming: U.S. Geological Survey Bulletin 341-B, p. 256-282.

_____ 1920, Oil possibilities in and around Baxter Basin, in the Rock Springs uplift, Sweetwater County, Wyoming: U.S. Geological Survey Bulletin 702, 107 p.

Smith, J. H., 1961, A summary of stratigraphy and paleontology in upper Colorado and Montanan Groups in south-central Wyoming, northeastern Utah, and northwestern Colorado, in Symposium on the Late Cretaceous rocks of Wyoming and adjacent areas, Wyoming Geological Association Guidebook, 16th Annual Field Conference, 1961: p. 101-112.

U.S. Bureau of Land Management, 1978, Draft environmental statement, proposed development of coal resources in southwestern Wyoming: U.S. Department of the Interior, v. 1 to 3.

U.S. Bureau of Mines, 1931, Analyses of Wyoming coals: U.S. Bureau of Mines Technical Paper 484, pp. 68-75, 139-150.

Weimer, R. J., 1960, Upper Cretaceous stratigraphy, Rocky Mountain area: American Association of Petroleum Geologists Bulletin, v. 44, no. 1, p. 1-20.

_____ 1961, Uppermost Cretaceous rocks in central and southern Wyoming, and northwest Colorado, in Symposium on the Late Cretaceous rocks of Wyoming and adjacent areas, Wyoming Geological Association Guidebook, 16th Annual Field Conference, 1961: p. 17-28.

Wyoming Natural Resources Board, 1966, Wyoming weather facts: Cheyenne, p. 34-35.