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COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE TITSWORTH GAP QUADRANGLE, SWEETWATER COUNTY, WYOMING

(Report includes 12 plates)

By

H. W. Roehler

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 report was compiled to support the land planning work of the Bureau of Land Management's Engergy Minerals Activities Recommendation System (EMARS) program, and to provide a systematic coal resource inventory of federally owned coal lands in Known Recoverable Coal Resource Areas (KRCRA's) in the western United States.

Location

The Titsworth Gap 7½-minute quadrangle is in southern Sweetwater County, Wyoming, 24 mi (39 km) south-southeast of the city of Rock Springs. It is 9 mi (14 km) north of the common boundary of Wyoming, Colorado, and Utah.

Accessibility

Thirty-one mi (50 km) southeast of Rock Springs, Wyoming, an improved gravel road branches southwestward from Wyoming Highway 430. This gravel road enters the northeast part of the quadrangle 8 mi (13 km) from the junction with Highway 430. The quadrangle is also accessible by a gravel road that branches southwestward from Highway 430, 3 mi (5 km) south of Rock Springs. This road crosses Aspen Mountain and enters the north edge of the quadrangle 30 mi (48 km) south of Rock Springs.

Physiography

The Titsworth Gap quadrangle is situated in the southern part of the Rock Springs coal field in the southern part of the Rock Springs uplift. The desert landscape in the area consists of barren rock ridges and alluvium-filled valleys. The vegetation is mostly sparse grass and patches of sage at lower elevations and juniper trees along high ridges. Topographic elevations range from 6,920 ft (2,109 m) on Gap Creek in the northeaat part of the quadrangle to 8,390 ft (2,557 m) on Miller Mountain in the west-central part of the quadrangle. The major drainage is Gap Creek, which flows northward, and its intermittent tributaries, Tommy James Creek and Bean Spring Creek. Salt Wells Creek drains the area along the southeast edge of the quadrangle.

The only industry in the quadrangle is cattle and sheep ranching. Beds of minable coal (more than 5 ft (1.5 m) thick and beneath less than 1,000 ft (305 m) of overburden) are present in the southern half of the quadrangle. The area is being actively explored for oil and gas. The quadrangle is uninhabited except for occupants of the Little Basin Ranch in sec. 22, T. 14 N., R. 104 W.

Climate

The climate in the Titsworth Gap quadrangle is arid and windy. Mean annual precipitation, mostly in the form of snow, is about 9 in. (23 cm)(Root, Glass, and Lane, 1973). Strong westerly winds occur almost daily.

Land Status

The Titsworth Gap quadrangle is 8.6 mi (13.8 km) long, 6.5 mi (10.5 km) wide, and encompasses 55.9 sq mi (145 sq km). Most lands containing minable coal are either privately owned or are Federal lands held by Preference Right Lease Applications (pl. 2). The Federal Government retains the rights to known minable coal lands only in parts of sec. 3, 4, 5, and 6, T. 13 N., R. 103 W., and sec. 34, T. 14 N., R. 103 W.

GENERAL GEOLOGY

Previous Work

The southern part of the Rock Springs coal field, including the quadrangle area, was mapped in 1908, by A. R. Schultz of the U.S. Geological Survey. An uncolored geologic map showing coal outcrops at the scale of 1:250,000, on a planimetric base, was published 2 years later (Schultz, 1910, pl. 14). A detailed geologic map of the quadrangle, on a topographic base, was published by the author (Roehler, 1973).

Stratigraphy

Rocks exposed in the quadrangle are of Quaternary, Tertiary, and Cretaceous ages. They are assigned in descending order to surficial deposits of alluvium that occupy narrow stream valleys and to the underlying Wasatch, Fort Union, Almond, Ericson, Rock Springs, and Blair Formations. The Bishop Conglomerate is present in places along high ridges and on mesas (Roehler, 1973).

Beds of coal 5 ft (1.5 m) or more thick and under less than 1,000 ft (305 m) of overburden are restricted to the Almond Formation. The Almond Formation is about 665 ft (205 m) thick and is composed of gray shale, siltstone, sandstone, carbonaceous shale, and coal (pl. 3). Beds of minable coal in the formation are the Falcon bed, about 20 ft (6 m) below the top of the formation; the Teal bed, about 105 ft (32 m) below the top of the formation; the Waxwing bed, about 215 ft (62 m) below the top of the formation; and the Pintail bed, about 235 ft (70 m) below the top of the formation.

The Almond coal beds were deposited in a tropical climate in brackish-water lagoons that formed on the landward sides of barrier bars that developed along the western coastlines of the Late Cretaceous Lewis Sea (Roehler, 1977). During early stages of development the lagoons had large areas of open water; in late stages they were choked with thick mats of vegetation.

Structure

The quadrangle straddles the southward plunge of the major anticlinal axis of the Rock Springs uplift. Rocks in the eastern part of the quadrangle dip 2^{o} to 5^{o} southeast; those in the western part dip 3^{o} to 7^{o} southwest. Crossing the northeast part of the quadrangle in an east-southeast direction is Salt Wells anticline (Roehler, 1973). Rocks along the axis of the anticline plunge about 2^{o} southeast; dips on the limbs are 2^{o} northeast and 2^{o} to 4^{o} south to southwest. An east-west-trending, southward-dipping, low-angle reverse fault, with about 250 ft (76 m) of displacement, is present on the south limb of the anticline. Plunging southeast, north of Salt Wells anticline, is an unnamed syncline.

COAL GEOLOGY

Eight beds of coal have been mapped in outcrops in the southern half of the Titsworth Gap quadrangle (Roehler, 1973). Four of these coal beds, identified in this report as the Falcon, Teal, Waxwing, and Pintail, are 5 ft (1.5 m) or more thick and under less than 1,000 ft (305 m) of overburden (pl. 1). Of these, the Falcon and Waxwing beds have small areal distribution and are considered economically unimportant. The Pintail coal bed is the only known bed that is situated on lands for which the Federal Government retains the coal rights.

Schultz (1910, p. 243) lists one analysis from a 6.5 ft (2 m) thick weathered coal outcrop, probably either the Pintail or Waxwing bed, in NE¼NE¼ sec. 25, T. 14 N., R. 104 W. On an as-received basis, the sample had 18.6 percent moisture, 29.7 percent volatile matter, 48.1 percent fixed carbon and 3.55 percent ash. It contained 0.41 percent sulfur, 5.38 percent hydrogen, 57.24 percent carbon, 1.28 percent nitrogen and 32.14 percent oxygen. The sample had a heat value of 9,657 Btu/lb (22,462 kJ/kg).

Pintail Coal Bed

The Pintail coal bed is 3 to 12 ft (0.9 to 3.6 m) thick in outcrops in the southeastern part of the quadrangle and 6 to 7 ft (1.8 to 2.1 m) thick in oil-and-gas test wells drilled within 3 mi (4.8 km) of the southern boundary of the quadrangle (pl. 7). The bed is 12 ft (3.6 m) thick in only one small area on a northwest-trending ridge near the center of sec. 19, T. 14 N., R. 103 W. The bed dips southward from 3^{o} to 12^{o} as shown on plate 8. The limited information from which plates 7 and 8 were constructed demonstrates the need for additional core holes in the quadrangle before the economic potential of the bed can be adequately evaluated.

COAL RESOURCES AND RESERVES

Coal resources and reserves were calculated for the Pintail coal bed from an isopach map, plate 7; a mining ratio and overburden map, plate 9; and an areal distribution and identified resource map, plate 10. The coal-bed acreage (measured by planimeter) multiplied by the average isopached thickness of the coal bed, times 1,770 short tons of coal per acre-foot (13,028 metric tons per hectare-meter) for subbituminous coal yielded the Reserve Base tonnage for the reporting category (measured, indicated and inferred, more than 200 ft (61 m) of overburden). The recovery factor applied was 0.50 for underground mining methods. Reserves were determined for the reporting category by multiplying the Reserve Base times the recovery factor.

COAL DEVELOPMENT POTENTIAL FOR SURFACE MINING

Areas where the coal beds are overlain by 200 ft (61 m) or less of overburden are considered to have potential for strip mining. Some of these areas are shown on plates 6 and 9, but there are no coal beds with known potential for surface mining on federally owned coal lands not under preference right lease application in the Titsworth Gap quadrangle. The formula used to calculate mining ratios is as follows:

$$MR = \frac{t_o\ (0.911)}{t_c\ (rf)}$$

where MR = Mining ratio

t_o = Thickness of overburden

t_c = Thickness of coal

rf = Recovery factor

0.911 = Factor for subbituminous coal (yd^3 overburden/ton coal) To convert yd^3/ton to m^3/metric ton, multiply by 0.842.

Areas of high, moderate, and low developlent potential for surface mining have mining-ratio values of 0 to 10:1, 10:1 to 15:1, and >15:1 to 200 ft (61 m) of overburden, respectively.

COAL DEVELOPMENT POTENTIAL FOR UNDERGROUND MINING

The Pintail coal bed has high potential for underground mining in parts of secs. 3, 4, 5, and 6, T. 13 N., R. 103 W., and sec. 34, T. 14 N., R. 103 W. (pl. 12). The bed is 5 to 6 ft (1.5 to 1.8 m) thick in these sections and is under 300 to 1,000 ft (91 to 305 m) of overburden. Underground coal Reserve Base tonnages for the Pintail coal bed are shown in table 1.

Table 1.--Coal Reserve Base data (in short tons) for underground mining methods for Federal coal lands in the Titsworth Gap quadrangle, Sweetwater County, Wyoming.

(To convert short tons to metric tons, multiply by 0.9072)

Coal bed name		High development potential
Pintail		3,630,000
	TOTAL	3,630,000

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