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COAL RESOURCE OCCURRENCE MAPS OF THE TAYLOR RANCH QUADRANGLE, SANDOVAL COUNTY, NEW MEXICO

[Report includes 3 plates]

by

Dames & Moore

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TAYLOR RANCH 7 1/2-MINUTE QUADRANGLE

INTRODUCTION

Purpose

This text is to be used in conjunction with the Coal Resource Occurrence (CRO) Maps of the Taylor Ranch quadrangle, Sandoval County, New Mexico. These maps were compiled to provide a systematic coal resource inventory of Federal coal lands in Known Recoverable Coal Resource Areas (KRCRA's) of the western United States. The work has been performed under contract with the Conservation Division of the U.S. Geological Survey (Contract No. 14-08-0001-17172).

The resource information gathered in this program is in response to the Federal Coal Leasing Amendments Act of 1976 and is a part of the U.S. Geological Survey's coal program. The information provides basic data on coal resources for land-use planning purposes by the Bureau of Land Management, state and local governments, and the public.

Location

The Taylor Ranch 7 1/2-minute quadrangle is located in north-central Sandoval County, New Mexico. The area is approximately 74 miles (119 km) southeast of Farmington and 76 miles (122 km) northwest of Santa Fe, New Mexico. The Jicarilla Apache Indian Reservation is located in the northern third of the quadrangle.

Accessibility

The Taylor Ranch quadrangle is accessible by New Mexico State Route 44 which extends northwest-southeast across the northeastern corner of the quadrangle. Unimproved dirt roads provide access to other parts of the quadrangle from Route 44. The Atchison, Topeka, and Santa Fe Railway operates a route approximately 74 miles (119 km) to the southeast which passes through Albuquerque, New Mexico.

Physiography

This quadrangle is located in the southeastern corner of the Central Basin area (Kelley, 1950) of the structural depression known as the San Juan Basin. Elevations range from 6,920 ft (2,109 m) in the southeast portion of the quadrangle to 7,593 ft (2,314 m) along the Continental Divide, which trends east-west across the center of the quadrangle. The area is incised by numerous intermittent washes and arroyos. Ceya Pelon Mesa is located in the southwestern corner of the quadrangle.

Climate

The climate of the San Juan Basin is arid to semi-arid. Annual precipitation is usually less than 10 inches (25 cm) but varies across the basin due to elevational differences. Rainfall is rare in the early summer; most precipitation is received in July and August as intense afternoon thundershowers. Annual temperatures in the basin range from below

0°F (-18°C) to above 100°F (38°C). Snowfall occurs from November to April with an average of 18 inches (46 cm) in the southern part of the basin.

Land Status

The quadrangle is in the southeastern corner of the San Juan Basin Known Recoverable Coal Resource Area. The Federal Government owns the coal rights for lands covering approximately 70 percent of the quadrangle as shown on Plate 2 of the Coal Resource Occurrence Maps. No Federal coal leases occur within the area.

GENERAL GEOLOGY

Previous Work

Dane (1936) mapped the Tertiary strata within the southern part of the quadrangle as part of a study of the geology and fuel resources of the southern San Juan Basin. Baltz (1967) has studied the stratigraphy of the southeastern San Juan Basin and mapped the geology of the area. A more recent publication by Fassett and Hinds (1971) includes subsurface interpretations of Fruitland Formation coal occurrences in the San Juan Basin.

Geologic History

The San Juan Basin, an area of classic transgressive and regressive sedimentation, provided the ideal environment for deposition of coals during

Late Cretaceous time. The final retreat of the Late Cretaceous sea began with the deposition of nearshore sediments of the regressive Pictured Cliffs Sandstone. Large swamps dissected by streams developed behind the regressive shoreline; organic matter which later became coal in the Fruitland Formation was deposited in these swamps. Deposition of individual coal beds appears to have been influenced by the northwest-southeast depositional strandline in that the coals display a higher degree of continuity parallel to the strandline. In a northeasterly direction, perpendicular to the depositional strandline, the coals are discontinuous and wedge out rapidly. Many of the Fruitland coals appear to be noncorrelative but are stratigraphically equivalent in terms of their relative position within the Fruitland Formation.

As the Cretaceous sea continued to retreat, the brackish-water swamp environment gradually shifted toward a freshwater environment with deposition of lacustrine, channel, and floodplain sediments. This is evidenced by both an upward decrease in occurrence and thickness of Fruitland coals and a gradational change into the noncarbonaceous deposits of the Kirtland Shale. Final deposition of the Kirtland Shale marked the end of continuous deposition during Late Cretaceous time. The sea then retreated to the northeast, and modern basin structure began to develop.

An erosional unconformity developed in a relatively short time as part of the Cretaceous Kirtland Shale was removed. Deposition resumed during the Paleocene with alluvial plain and floodplain deposits of the Ojo Alamo Sandstone, followed by deposition of the thick, lithologically varied nonmarine Nacimiento Formation. The Nacimiento Formation was later exposed to erosion. The Eocene San Jose Formation was subsequently deposited over the Nacimiento erosional surface as various nonmarine environments developed across the basin. Deposition and structural deformation of the basin then ceased, and the warped strata of the San Juan Basin have been exposed to erosional processes to the present time.

Stratigraphy

The formations studied in this quadrangle range from Late Cretaceous to Eocene in age. They are, in order from oldest to youngest: the Pictured Cliffs Sandstone, undivided Fruitland Formation and Kirtland Shale, Ojo Alamo Sandstone, Nacimiento Formation, and San Jose Formation. A composite columnar section on CRO Plate 3 illustrates the stratigraphic relationships of these formations and is accompanied by lithologic descriptions of the individual formations.

The Pictured Cliffs Sandstone averages 80 ft (24 m) thick. It consists consists of a gray to brown fine-grained sandstone, interbedded with gray shale near the base of the unit. Because the formation is present throughout most of the San Juan Basin and has a distinctive character on geophysical logs, the top was chosen as the datum (CRO Plate 3) for Fruitland coal correlations.

The major coal-bearing unit in the quadrangle, the Fruitland Formation, conformably overlies the Pictured Cliffs Sandstone. Due to an indistinct upper contact of the Fruitland Formation with the Kirtland Shale the two formations have not been divided in this area. The average combined thickness is about 200 ft (61 m) in this quadrangle. The rocks primarily consist of a gray to brown carbonaceous to noncarbonaceous shale with interbedded white to brown coarse-grained sandstone and siltstone, and lenticular coal beds.

The Paleocene Ojo Alamo Sandstone, which unconformably overlies the Kirtland Shale, is a cream to light gray, locally conglomeratic, slightly calcareous sandstone with interbedded gray-brown micaceous siltstone. The upper contact with the Nacimiento Formation is gradational in places and, therefore, is difficult to establish. The average thickness of the Ojo Alamo in the area is 125 ft (38 m).

Approximately 1,090 ft (332 m) of the Paleocene Nacimiento Formation overlie the Ojo Alamo Sandstone. These rocks are exposed in the extreme southern edge of the quadrangle and consist of gray to brown to green siltstone and white to buff sandstone.

The San Jose Formation of Eocene age unconformably overlies the Nacimiento Formation and crops out over most of the quadrangle. It consists of gray to orange-brown, fine- to coarse-grained, locally conglomeratic sandstone, and interbedded shale and siltstone.

Structure

The Taylor Ranch quadrangle is in the Central Basin area (Kelley, 1950) of the San Juan Basin. The axis of the basin is about 16 miles (26 km) northeast of the quadrangle area and trends in an arcuate pattern across the northern portion of the Central Basin (Baltz, 1967). Regional dip within the quadrangle is to the northeast at approximately 1° to 2°.

COAL GEOLOGY

One coal bed (Fruitland 1) and a coal zone (Fruitland) were identified in the subsurface of this quadrangle (CRO Plate 1). The Fruitland 1

(Fr 1) coal bed is defined as the lowermost coal of the Fruitland Formation; it is generally directly above the Pictured Cliffs Sandstone. The upper Fruitland Formation coals have been designated as the Fruitland zone (Fr zone) because these coals are generally noncorrelative and less than reserve base thickness of 5 ft (1.5 m).

Fruitland Formation coal beds in the southeastern part of the San Juan Basin are considered high volatile C bituminous in rank, although the coals vary from subbituminous A to high volatile A bituminous. The rank of the coal has been determined on a moist, mineral-matter-free basis with calorific values ranging from 11,358 to 14,545 Btu's per pound (26,419-33,832 kj/kg) (Amer. Soc. for Testing and Materials, 1977). The coal is hard, brittle, and black with a bright luster. The coal readily slakes with exposure to weather; however, it stocks fairly well when protected. The "as received" analyses indicate moisture content varying from 2.1 to 13.48 percent, ash content ranging from 19.86 to 30.49 percent, sulfur content less than one percent, and heating values on the order of 8,888 Btu's per pound (20,673 kj/kg). Analyses of several undesignated Fruitland Formation coals are given in Table 1 (Dane, 1936; Fassett and Hinds, 1971; Shomaker and Lease, 1971).

Since the coal of the Fruitland 1 bed and Fruitland zone are less than reserve base thickness (5 ft [1.5 m]) in this quadrangle, no derivative maps were constructed.

TABLE 1

Analyses of coal samples from the Fruitland Formation

(Form of analysis: A, as received; B, moisture free; C. moisture and ash free)

U.S. Bureau Mines Lab No.	Well or Other Source	Location			Approx. Depth Interval of Sample (ft.)	Form of Analysis	Proximate, percent					Heating Value (Btu)	Remarks
		Section	T.N.	R.W.			Mois-ture	Volatile matter	Fixed Carbon	Ash	Sulfur		
+TH-55298	Core Sample	------	19	3	----	A	9.44	27.40	32.67	30.49	0.57	8,161	
						B	-----	30.26	36.07	33.67	0.63	9,012	
+TH-55672	Core Sample	------	19	4	----	A	11.50	36.57	32.07	19.86	0.67	9,473	
						B	-----	41.32	36.24	22.44	0.76	10,704	
+TH-57167	Core Sample	------	19	5	----	A	13.13	32.63	32.46	21.75	0.49	9,003	
						B	-----	37.56	37.37	25.07	0.56	10,364	
+TH-57168	Core Sample	------	19	5	----	A	12.05	30.39	27.96	29.60	0.59	7,870	
						B	-----	34.55	31.79	33.66	0.67	8,948	
+TH-57166	Cuttings Sample	------	19	5	----	A	13.48	29.55	28.05	28.92	0.50	7,829	
						B	-----	34.15	32.42	33.43	0.58	9,049	
H-32405	El Paso Nat. Gas Lindrith No. 42	NE¼ 22	24	3	3,194-3,205	A	2.1	38.7	36.7	22.5	0.7	10,990	
						B	-----	39.5	37.5	23.0	0.7	11,230	
						C	-----	51.3	48.7	----	1.0	14,580	

+analysis by Commercial Testing and Eng. Co.

To convert Btu's/lb. to kj/kg, multiply Btu's/lb. by 2.326.
To convert feet to meters, multiply feet by 0.3048.

COAL RESOURCES

Coal resources were not calculated for the Fruitland 1 and Fruitland zone coal beds because they are discontinuous, noncorrelative, and less than the reserve base thickness of 5 ft (1.5 m).

COAL DEVELOPMENT POTENTIAL

Coal development potential maps were not developed for this quadrangle because the coal beds within the KRCRA are less than the reserve base thickness (5 ft [1.5 m]) and, therefore, have unknown coal development potential.

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