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COAL RESOURCE OCCURRENCE MAPS AND COAL DEVELOPMENT POTENTIAL MAPS OF THE BLANCO TRADING POST 7 1/2-MINUTE QUADRANGLE, SAN JUAN COUNTY, NEW MEXICO

[Report includes 8 plates]

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BLANCO TRADING POST 7 1/2-MINUTE QUADRANGLE

INTRODUCTION

Purpose

This text is to be used in conjunction with the Coal Resource Occurrence (CRO) Maps and Coal Development Potential (CDP) Map of the Blanco Trading Post quadrangle, San Juan 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) in 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 Blanco Trading Post 7 1/2-minute quadrangle is located in southeastern San Juan County, New Mexico. It is approximately 31 miles (48 km) southeast of Farmington and 69 miles (107 km) northeast of Gallup, New Mexico.

Accessibility

The area is accessible by two State Routes. State Route 44 trends northwest-southeast through the quadrangle, and connects at Blanco Trading Post with State Route 56 which extends into the area from the southwestern corner of the quadrangle. Several light-duty and unimproved dirt roads provide access to the southern and central parts of the area. The nearest rail transportation is the Atchison, Topeka, and Santa Fe Railway, which is approximately 69 miles (107 km) to the southwest at Gallup, New Mexico, and connects Gallup with Grants and Albuquerque.

Physiography

The Blanco Trading Post quadrangle is in the south-central portion of the Central Basin (Kelley, 1950) area of the larger structural depression known as the San Juan Basin. Total relief is approximately 540 ft (162 m), with elevations ranging from 6,460 ft (1,938 m) in Blanco Wash to 7,002 ft (2,100 m) at Nageezi Peak in the southwest. The quadrangle area is characterized by a northeast-sloping topographic bench and several smaller cuestas formed by upturned sandstone beds, which are separated by valleys and low, rounded hills. In general, the erosional escarpments of the cuestas face west or southwest, with the gentler dip-slopes facing northeast. Although some streams have cut through the cuestas, drainage generally flows down the dip-slopes and away from the escarpments. Streams in the area are largely intermittent; those in the northeastern corner empty into Blanco Wash.

Climate

The climate of the San Juan Basin is arid to semi-arid. Annual precipitation is usually less than 10 inches (25 cm), with slight variations across the basin due to elevational differences. Rainfall is rare in the early summer and winter; 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 located in the south-central portion of the San Juan Basin Known Recoverable Coal Resource Area. The Federal Government owns the coal rights for approximately 87 percent of the KRCRA land as shown on Plate 2 of the Coal Resource Occurrence Maps. No Federal coal leases occur within the quadrangle.

GENERAL GEOLOGY

Previous Work

Reeside (1924) mapped the various formations within the quadrangle as part of a study of the Upper Cretaceous and Tertiary formations of the San Juan Basin. More recently, Fassett and Hinds (1971) made subsurface interpretations of the Fruitland Formation coals as part of a larger San Juan Basin coal study.

Geologic History

The San Juan Basin, an area of classic transgressive and regressive sedimentation, provided the ideal environment for formation of coals during Late Cretaceous time. At that time a shallow epeiric sea, which trended northwest-southeast, lay northeast of the basin. The sea transgressed southwesterly into the basin area and regressed northeasterly numerous times; consequently, sediments from varying environments were deposited across the basin. Noncarbonaceous terrestrial deposition predominated during Paleocene and Eocene time.

After its first basin-wide retreat, the Late Cretaceous sea reversed the direction of movement. As a result, the transgressive sequence of paludal Menefee Formation, nearshore Cliff House Sandstone, and marine Lewis Shale was deposited in the quadrangle. Swamps (Menefee) formed southwest (shoreward) of the transgressing beaches (Cliff House). Organic matter deposited in these coastal swamps ultimately formed the coal beds of the Menefee Formation. Further transgression deposited a thin basal sand of the Cliff House. Subsequently, several hundred feet of beach sands of the La Ventana Tongue (Cliff House Sandstone) were deposited over the basal member.

Onlap continued as the sea moved southwestward across the basin area. The transgressing northwest-southeast-trending strandline is represented in the lithologic record by the Chacra Tongue (informal name of local usage) (Cliff House Sandstone), which overlies the La Ventana in the southern part of the area, and part of the Lewis in the north. The marine facies, which developed northeast of the various transgressing strandlines as they moved to the southwest, is the Lewis Shale. In the north, a wedge of Lewis was deposited over the La Ventana sand. A tongue of Chacra was then deposited over this shale wedge. Fluctuations of the sea caused intertonguing of the Chacra and Lewis in this area. As the sea moved southward, Lewis Shale was then deposited over the older Chacra deposits. Deposition of the Lewis Shale marks the last advance of the Late Cretaceous sea.

The first depositional evidence of the final retreat of the Late Cretaceous sea is the nearshore regressive Pictured Cliffs Sandstone. Southwest (shoreward) of the beach deposits, swamps, which were dissected by streams, accumulated organic matter which became coals of the Fruitland Formation. Deposition of organic material was influenced by the strandline as shown by both the continuity of the coal beds parallel to the northwest-southeast strandline and their discontinuity perpendicular to it to the northeast. The less continuous Fruitland coals appear to be noncorrelative, but are lithostratigraphically equivalent in terms of their relative position within the Fruitland Formation.

The brackish-water swamp environment of the Fruitland moved farther to the northeast as the regression continued in that direction. Terrestrial sediments covered the quadrangle as indicated by the lacustrine, channel, and floodplain deposits of the Kirtland Shale. This sequence of events is evidenced by both an upward decrease in occurrence and thickness of Fruitland coals and a gradational change to noncarbonaceous deposits of the Kirtland. Continuous deposition during Late Cretaceous time ended with the Kirtland. The sea then retreated beyond the limits of the quadrangle area, 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.

Terrestrial deposition resumed in the Paleocene as represented by the Ojo Alamo Sandstone and the overlying Nacimiento Formation. Alluvial plain and floodplain deposits of the Ojo Alamo were followed by the thick, lithologically varied deposits of the Nacimiento during continuous nonmarine deposition. The Nacimiento was later exposed to erosion.

The Eocene San Jose Formation was subsequently deposited over the Nacimiento erosional surface, reflecting various nonmarine environments which 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 the present time. A significant amount of erosion has occurred, as indicated by the removal of the San Jose Formation and some of the Nacimiento Formation from the area.

Stratigraphy

The formations studied in this quadrangle range from Late Cretaceous to Paleocene in age. They are, in order from oldest to youngest: (two of the three formations of the Mesaverde Group), Menefee Formation and Cliff House Sandstone; Lewis Shale, Pictured Cliffs Sandstone, Fruitland Formation, Kirtland Shale, Ojo Alamo Sandstone, and Nacimiento 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 oldest coal-bearing formation in the quadrangle is the Menefee Formation of the Mesaverde Group. In previous studies the Menefee has been divided into the Cleary Coal Member, the barren Allison Member, and the upper coal-bearing member (Beaumont and others, 1956). These members were grouped together as undifferentiated Menefee Formation for the purposes of this report only; they were not distinguished because of the difficulty and inaccuracy in determining a consistent division between them on geophysical logs.

The Menefee Formation consists primarily of gray to brown, carbonaceous, slightly calcareous shale with plant fossils, thin, white to tan, calcareous sandstone, and lenticular coal beds. The formation has a thickness of approximately 900 ft (274 m) in the area. Due to the gentle regional dip of 1°+ to the northeast, the entire Menefee Formation is below the 3,000-foot (914-m) overburden study limit in the northernmost portion of the quadrangle area. To the southwest the formation rises in elevation, and, consequently, 25 ft (7 m) of the Menefee are above the study limit in drill hole 39 in section 23, T. 24 N., R. 10 W. Approximately 2 miles (0.6 km) to the south, 375 ft (114 m) of the Menefee Formation are above and 687 ft (209 m) are below the 3,000-foot (914-m) overburden study limit in drill hole 42 in section 35, T. 24 N., R. 10 W.

The Cliff House Sandstone sequence conformably overlies the Menefee Formation. A thin, basal sand member, referred to as "the Cliff House Sandstone" by Fassett (1977), correlates with the thin, undifferentiated Cliff House Sandstone to the northeast. It is about 50 ft (15 m) thick and consists of white to cream, calcareous, poorly indurated sandstone.

Overlying the basal Cliff House member is the La Ventana Tongue. This member is a 670-ft (204-m) thick sequence of light gray, calcareous sandstone with interstitial kaolinite, and interbedded shale increasing in the lower portion.

The upper Cliff House Sandstone member, the Chacra Tongue (informal name of local usage), averages 370 ft (113 m) in thickness in this area. The Chacra thins to the northeast, where it decreases to a thickness of 170 ft (52 m) and intertongues with the marine facies, the Lewis Shale. Consequently, in the northern half of the quadrangle a 200-ft (61-m) thick wedge of Lewis Shale is below the Chacra and above the La Ventana. The Chacra Tongue in this area consists of light gray, slightly calcareous sandstone, with interbedded gray to brown siltstone and shale. This lithology is transitional from the massive nearshore Chacra sandstone south of the quadrangle at Chacra Mesa, the type section, to the overlying marine Lewis Shale.

The Lewis Shale, a marine shale deposit, conformably overlies the Mesaverde Group. In contrast to the underlying Cliff House Sandstone, it is predominantly a light green to gray, slightly calcareous shale, with gray to brown silty sandstone. The average thickness of the Lewis is 300 ft (91 m) in this area. In the northeastern part of the quadrangle the Lewis Shale intertongues with the Chacra Tongue so that a tongue of about 200 ft (61 m) of Lewis Shale is wedged between the Chacra Tongue and the La Ventana Tongue. The upper contact of the Lewis Shale is gradational with the overlying Pictured Cliffs Sandstone and, therefore, a definite contact between the two is difficult to establish.

The Pictured Cliffs Sandstone consists of about 90 ft (27 m) of gray, friable, calcareous, poorly indurated sandstone with interstitial kaolinite. Gray shale is commonly interbedded with the sandstone near the base of the formation where it grades into the Lewis. The upper contact is more sharply defined than the basal. Intertonguing of the overlying

Fruitland Formation results in minor variations in the formation top and the occurrence of local Fruitland coal beds in the upper Pictured Cliffs Sandstone. Nevertheless, the Pictured Cliffs is a consistent formation throughout the basin. The authors have used the consistency and distinctive character of the formation on geophysical logs to establish the top of the Pictured Cliffs Sandstone as a lithologic datum for correlation of the overlying Fruitland coals.

Conformably overlying the Pictured Cliffs Sandstone is the Fruitland Formation, the major coal-bearing unit in the quadrangle. The Fruitland is composed of an average of 255 ft (78 m) of light gray to brown, carbonaceous shale with plant fossils and traces of pyrite; interbedded white to gray sandstone with interstitial kaolinite; and coal beds of varying thicknesses. The thickest and most continuous coal beds occur near the base, while discontinuous and lenticular coal beds are characteristic of the upper portion. The upper contact is gradational from nonmarine, lower coastal plain deposits of the Fruitland Formation to upper coastal or alluvial plain deposits of the Kirtland Shale (Molenaar, 1977).

The freshwater deposits of the Kirtland Shale average 405 ft (123 m) in thickness. They are composed of green to brown shale with local plant fossils and interbedded thin sandstone beds.

Unconformably overlying the Upper Cretaceous rocks is the Paleocene Ojo Alamo Sandstone, which consists of about 140 ft (43 m) of white to gray, very coarse-grained to conglomeratic, arkosic, calcareous sandstone with interstitial kaolinite, interbedded with thin siltstone near the base.

Approximately 1,200 to 1,300 ft (366-396 m) of the nonmarine Nacimiento Formation conformably overlie the Ojo Alamo Sandstone. In contrast with the Ojo Alamo, it consists of light green to brown siltstone with plant fossils and thinly-bedded, white, arkosic, calcareous, friable sandstone with interstitial kaolinite. The lower portion of the Nacimiento is the only unit exposed within the area.

Structure

The Blanco Trading Post quadrangle is located in the Central Basin area (Kelley, 1950) of the major structural depression, the San Juan Basin. The axis of the basin is about 32 miles (51 km) northeast of the quadrangle area and trends in an arcuate pattern across the northern portion of the Central Basin area (Baltz, 1967). Measured regional dip within the quadrangle is 1°+ to the northeast (Reeside, 1924).

COAL GEOLOGY

Two coal zones (Fruitland, Menefee) and one coal bed (Fruitland 1) were identified in the subsurface of this quadrangle (CRO Plate 1). The widely-distributed Menefee coals are grouped together into the Menefee coal zone (Me zone). Since many of these coals are noncorrelative and generally less than reserve base thickness (5 ft [1.5 m]), derivative maps were not constructed. An exception is in drill hole 42 which includes two 5-ft (1.5-m) coal beds.

Menefee Formation coal beds in the southern part of the San Juan Basin are considered to be borderline subbituminous A to subbituminous B in rank. The rank has been determined on a moist, mineral-matter-free basis with calorific values ranging from 10,021 to 11,103 Btu's per pound (23,309-25,826 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 ranging from 14.4 to 19.1 percent, ash content varying from 6.8 to 10.2 percent, sulfur content less than one percent, and heating values on the average of 9,575 Btu's per pound (22,271 kj/kg). Analyses of several Menefee Formation coals are given in Table 1 (Bauer and Reeside, 1921; Dane, 1936; Lease, 1971; Shomaker, 1971a). Although no published analyses of the quality of Menefee coal are available for this quadrangle, information on the quality of coal from the surrounding area is assumed to be similar to that of the coal in this quadrangle.

The Fruitland 1 (Fr 1) coal bed is defined as the lowermost coal bed of the Fruitland Formation; it lies directly above the Pictured Cliffs Sandstone. The upper Fruitland Formation coal beds are grouped together into the Fruitland coal zone (Fr zone) which extends from the top of the Fruitland Formation to the base of the lowermost coal designated, on CRO Plate 3, as a Fruitland zone coal bed. These coals are generally discontinuous, noncorrelative, and less than reserve base thickness (5 ft [1.5 m]). Consequently, derivative maps of the Fruitland zone were not constructed.

Fruitland Formation coals in the southern part of the San Juan Basin are considered to be high volatile C bituminous in rank, although they vary from subbituminous A to high volatile A bituminous. The rank has been determined on a moist, mineral-matter-free basis with calorific values ranging from 11,246 to 14,102 Btu's per pound (26,158-32,801 kj/kg) (Amer. Soc. for Testing and Materials, 1977). The coal is hard, brittle, and black

TABLE 1

Analyses of coal samples from the Menefee 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 Section	T.N.	R.W.	Approx. Depth Interval of Sample (ft.)	Form of Analysis	Proximate, percent Mois-ture	Volatile matter	Fixed Carbon	Ash	Sulfur	Heating Value (Btu)	Remarks
J-57562	Pit Sample	SW¼ 11	22	13	------------	A	14.4	32.6	42.8	10.2	0.9	9,870	
						B	----	38.1	50.0	11.9	1.0	11,530	
						C	----	43.3	56.7	----	1.2	13,090	
J-51245	Channel, Open Pit	NW¼ 9	22	14	------------	A	19.1	33.4	40.7	6.8	0.9	9,280	Noncaking.
						B	----	41.3	50.3	8.4	1.2	11,470	Coal probably
						C	----	45.1	54.9	----	1.3	12,520	weathered

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

with a bright luster. The coal readily slakes with exposure to weather; however, it stocks farily well when protected. The "as-received" analyses indicate moisture content varying from 3.9 to 14.6 percent, sulfur content generally less than one percent, ash content ranging from 13.65 to 35.14 percent, and heating values on the order of 9,627 Btu's per pound (22,392 kj/kg). Analyses of several coals from the Fruitland Formation are given in Table 2 (Bauer and Reeside, 1921; Dane, 1936; Fassett and Hinds, 1971; Shomaker, 1971b).

Fruitland 1 Coal Bed

The Fruitland 1 coal bed, informally named by the authors, represents the lowermost coal bed which occurs near the base of the Fruitland Formation. Although the Fruitland 1 coal bed is correlated and mapped as a consistent horizon, it may, in fact, be several different beds that are lithostratigraphically equivalent, but not laterally continuous.

As illustrated by the structure contour map (CRO Plate 5), the coal bed dips approximately 1.5° to the northeast. Consequently, overburden (CRO Plate 6) increases from less than 1,200 ft (366 m) in the southwest to greater than 1,800 ft (549 m) in the northern portion of the quadrangle. The isopach map (CRO Plate 4) illustrates a trend of increasing thickness from less than 5 ft (1.5 m) in the north to greater than 20 ft (6.1 m) in the southwest.

Chemical Analyses of the Fruitland 1 Coal Bed - No published analyses of the quality of Fruitland Formation coals are available for this quadrangle. However, information from the surrounding area is assumed to be

TABLE 2

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 Section	T.N.	R.W.	Approx. Depth Interval of Sample (ft.)	Form of Analysis	Proximate, percent Mois-ture	Volatile matter	Fixed Carbon	Ash	Sulfur	Heating Value (Btu)	Remarks
*29	Drill Cuttings	NW¼ 5	22	10	------------	A	4.52	-----	-----	13.65	0.59	11,035	
						B	-----	-----	-----	14.30	0.62	11,577	
						C	-----	-----	-----	-----	----	13,485	
*34	Drill Cuttings	SE¼ 9	22	10	------------	A	9.28	29.26	38.42	23.04	0.54	9,240	
						B	-----	32.25	42.35	25.40	0.60	10,185	
						C	-----	-----	-----	-----	----	13,653	
J-63526	Core Sample	NE¼ 15	22	10	269.0-290.2	A	12.4	33.9	37.6	16.1	0.49	9,630	
						B	-----	38.7	42.9	18.4	0.56	10,990	
						C	-----	47.5	52.5	-----	0.68	13,470	
*27	Drill Cuttings	NW¼ 12	22	11	104-110	A	5.01	-----	-----	35.14	0.44	7,740	May be
						B	-----	-----	-----	36.99	0.46	8,148	weathered
						C	-----	-----	-----	-----	----	12,931	sample
*	Drill Cuttings	NW¼ 12	22	11	155-159	A	5.42	------	-----	19.41	0.66	10,427	
						B	-----	------	-----	20.52	0.70	10,835	
						C	-----	------	-----	-----	----	13,634	
J-63220	Core Sample	NE¼ 29	23	11	252.5-283.0	A	12.7	31.9	34.3	21.2	0.3	8,680	
						B	-----	36.5	39.3	24.2	0.4	9,940	
						C	-----	48.2	51.8	-----	0.5	13,120	
J-61645	Core Sample	NE¼ 29	23	11	321.5-330.0	A	14.6	30.8	38.6	16.0	0.34	9,440	
						B	-----	36.1	45.2	18.7	0.40	11,050	
						C	-----	44.4	55.6	-----	0.49	13,600	
*21-A	Drill Cuttings	SW¼ 9	23	12	------------	A	5.28	------	----	18.09	0.59	10,206	
						B	-----	------	----	19.10	0.62	10,775	
						C	-----	------	----	-----	----	13,319	
*23	Core Sample	NE¼ 10	23	12	------------	A	9.39	30.11	43.10	17.41	0.72	9,915	
						B	-----	33.23	47.56	19.21	0.79	10,942	
						C	-----	------	-----	-----	----	13,544	
H-5022	Dorfman Production Nancy Fed. No. 1	SE¼ 12	24	8	2,525-2,535	A	3.9	35.4	33.7	27.0	1.1	9,960	
						B	-----	36.8	35.1	28.1	1.1	10,370	
						C	-----	51.2	48.8	-----	1.5	14,410	

*New Mexico State Bureau of Mines and Mineral Resources

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.

similar to that for the coals of this quadrangle. The results of analyses of several undesignated Fruitland coals are given in Table 2 (Fassett and Hinds, 1971; Shomaker, 1971b).

COAL RESOURCES

Coal resource data from oil and gas wells and pertinent publications were utilized in the construction of isopach and structure contour maps of the coal in this quadrangle. All of the coal beds studied in the Blanco Trading Post quadrangle are more than 980 ft (299 m) below the ground surface and, thus, have no outcrop or surface development potential.

The U.S. Geological Survey designated the Fruitland 1 coal bed for the determination of coal resources in this quadrangle. Coals of the Menefee Formation and the Fruitland zone were not evaluated because the thickness of the coal beds is generally less than the reserve base thickness (5 ft [1.5 m]). In addition, these coals are irregular and noncorrelative, and the Fruitland zone coals are limited in areal extent.

For Reserve Base and Reserve calculations, the Fruitland 1 coal bed was areally divided into measured, indicated, and inferred resource categories (CRO Plate 7) according to criteria established in U.S. Geological Survey Bulletin 1450-B. Data for calculation of Reserve Base and Reserves for each category were obtained from the coal isopach (CRO Plate 4) and areal distribution maps (CRO Plate 7). The surface area of the isopached Fruitland 1 bed was measured by planimeter, for each category, in acres. This number was then multiplied by the average isopached thickness of the coal bed and 1,800 short tons of coal per acre-foot (13,239 tons/hectare-meter), the conversion factor for bituminous coal, which yields the Reserve Base coal, in short tons, for each coal bed. In order to calculate Reserves, a recovery factor of 50 percent was applied to the Reserve Base tonnages for underground coal. However, in areas of underground coal exceeding 12 ft (3.6 m) in thickness, the Reserves (mineable coal) were calculated on the basis of a maximum coal bed thickness of 12 ft (3.6 m). This represents the maximum economically mineable thickness of a single coal bed in this area by current underground mining technology.

Reserve Base and Reserve values for measured, indicated, and inferred categories of coal for the Fruitland 1 coal bed are shown on CRO Plate 7, and are rounded to the nearest hundredth of a million short tons. The total coal Reserve Base, by section, is shown on CRO Plate 2 and totals approximately 621 million short tons (563 million metric tons).

The coal development potential for the Fruitland 1 bed is calculated in a manner similar to the Reserve Base, from planimetered measurements, in acres, for areas of high, moderate, and low potential for subsurface mining methods. The Blanco Trading Post quadrangle has development potential for subsurface mining methods only (CDP Plate 8).

COAL DEVELOPMENT POTENTIAL

Coal beds of 5 ft (1.5 m) or more in thickness which are overlain by 200 ft (61 m) or more of overburden are considered to have potential for underground mining and are designated as having high, moderate, or low development potential according to the overburden thickness: 200 to 1,000 ft (61-305 m), high; 1,000 to 2,000 ft (305-610 m), moderate; and 2,000 to 3,000 ft (610-914 m), low. Table 3 summarizes the coal development potential, in short tons, for underground coal of the Fruitland 1 coal bed.

TABLE 3

COAL RESOURCE DATA FOR UNDERGROUND MINING METHODS FOR FEDERAL COAL LANDS (in short tons) IN THE BLANCO TRADING POST QUADRANGLE, SAN JUAN COUNTY, NEW MEXICO

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

Coal Bed	High Development Potential	Moderate Development Potential	Low Development Potential	Total
Fruitland 1	--	621,270,000	--	621,270,000
TOTAL	--	621,270,000	--	621,270,000

Development Potential for Surface Mining Methods

All coal beds studied in the Blanco Trading Post quadrangle occur 980 ft (299 m) or more below the ground surface, and, therefore, they have no coal development potential for surface mining methods.

Development Potential for Subsurface Mining Methods

Underground coal of the Fruitland 1 bed has moderate development potential throughout the quadrangle, except in three areas in the northeast quadrant and a small, isolated square in the west-central part of the quadrangle (CDP Plate 8) where the coal thickness is less than the reserve base (5 ft [1.5 m]) and development potential is unknown. Coal bed thickness in the moderate development potential area ranges from 5 ft (1.5 m) in the northeast to 20 ft (6.1 m) in the southwest (CRO Plate 4), and overburden thickness increases from 1,200 ft (366 m) in the southwest to more than 1,800 ft (549 m) in the northeast corner of the quadrangle (CRO Plate 6).

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