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COAL RESOURCE OCCURRENCE MAPS AND COAL DEVELOPMENT POTENTIAL MAPS OF THE HUERFANO TRADING POST NW QUADRANGLE, SAN JUAN COUNTY, NEW MEXICO

[Report includes 15 plates]

by

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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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HUERFANO TRADING POST NW 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) Maps of the Huerfano Trading Post NW 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) 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 Huerfano Trading Post NW 7 1/2-minute quadrangle is located in east-central San Juan County, New Mexico. The area is approximately 21 miles (34 km) southeast of Farmington and 74 miles (119 km) northeast of Gallup, New Mexico.

Accessibility

The quadrangle is accessible by State Route 44 which extends across the northeastern corner and connects with State Route 17 at Bloomfield, 16 miles (26 km) to the north. Light-duty and unimproved dirt roads provide access to the more remote areas. The nearest rail transportation is the Atchison, Topeka, and Santa Fe Railway which is approximately 74 miles (119 km) to the southwest at Gallup, New Mexico, and connects Gallup with Grants and Albuquerque to the east.

Physiography

The quadrangle is in the southwestern portion of the Central Basin area (Kelley, 1950) of the larger structural depression known as the San Juan Basin. Total relief in the quadrangle is 620 ft (189 m), with elevations which range from approximately 6,180 ft (1,884 m) at the western extent of Gallegos Canyon to 6,800 ft (2,073 m) at the eastern extent of State Route 44. Numerous intermittent tributary streams of Gallegos Canyon have incised the gently-sloping, dissected plains of the Huerfano Trading Post NW quadrangle, which are characteristic of Central Basin topography. Gallegos Canyon trends northwest-southeast across the southern and western parts of the area and drains into the San Juan River to the north.

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 southwestern part of the basin.

Land Status

The quadrangle is in the central part of the San Juan Basin Known Recoverable Coal Resource area, and the Federal Government owns the coal rights for approximately 93 percent of the KRCRA land within the quadrangle 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 surficial geology of the area 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, was located 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 then reversed the direction of movement. Subsequently, 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 swamps ultimately formed coal in the Menefee Formation. A thin basal sand member of the Cliff House Sandstone was deposited over the Menefee Formation, followed by several hundred feet of beach sands of the La Ventana Tongue (Cliff House Sandstone). Another transgressing northwest-southeast-trending strandline is represented in the lithologic record by the Chacra Tongue (informal name of local useage) of the Cliff House Sandstone. The marine facies which developed concurrently to the northeast of the La Ventana and Chacra strandlines as they moved to the southwest is represented by the Lewis Shale. This thick sequence, which thins to the southwest, intertongues with and overlies the Cliff House Sandstone, and 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 freshwater sediments covered the quadrangle as evidenced 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 floodplain deposits of the Nacimiento during continuous nonmarine deposition (Powell, 1973). 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 erosional processes to the present time. A significant amount of erosion has occurred, as indicated by the removal of the San Jose Formation and part 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) the 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 an unnamed 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 differentiated due to the difficulty and inaccuracy in determining a consistent division between them on geophysical logs.

The Menefee Formation consists primarily of dark gray to brown-gray, carbonaceous shale with local plant fossils, interbedded light gray, calcareous sandstone, and lenticular coal beds. In this area the formation has a total thickness of approximately 900 to 1,000 ft (274-305 m). Due to the regional dip of about 1° to the northeast, the entire Menefee Formation is deeper than the 3,000-foot (914-m) overburden study limit in all but the southwestern part of the quadrangle area. In the southwestern corner of the area (in drill hole 20 in section 22, T. 25 N., R. 11 W.), 671 ft (205 m) of the Menefee Formation are below the study limit.

The Cliff House Sandstone sequence conformably overlies the Menefee Formation. The 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 light gray, slightly calcareous sandstone with subangular to subrounded grains. Overlying the basal member is the La Ventana Tongue, a 660 ft (201 m) thick sequence of light gray, slightly calcareous sandstone with subangular to subrounded grains, traces of pyrite and glauconite, and interbedded dark gray shale with plant fossils which becomes more common in the lower portion.

The uppermost Cliff House Sandstone member, the Chacra Tongue (informal name of local usage), overlies the La Ventana Tongue in the southwestern part of the area and averages 365 ft (111 m) in thickness. It thins consistently to the northeast where it intertongues with the Lewis Shale. Consequently, a wedge of Lewis Shale which is stratigraphically equivalent to the Chacra Tongue overlies the La Ventana Tongue in the northeastern part of the quadrangle. The Chacra consists of gray to gray-brown shale with plant fossils and interbedded gray, slightly calcareous glauconitic sandstone. Such a lithology indicates that the Chacra Tongue in this area is transitional from the massive Chacra sandstone south of the area at the type section, Chacra Mesa, to the overlying marine Lewis Shale.

The Lewis Shale conformably overlies the Mesaverde Group. In contrast to the underlying Cliff House Sandstone, it consists of gray, fissile shale with local plant fossils and silty stringers. The average thickness is 260 ft (79 m) throughout the southwestern part of the quadrangle. In the northeastern part of the area the lower contact is stratigraphically lower and equivalent with the Chacra Tongue, increasing the thickness to 620 ft (189 m). The upper contact is gradational with the overlying Pictured Cliffs Sandstone and, therefore, a distinct contact between the two is difficult to determine.

The Pictured Cliffs Sandstone consists of approximately 140 ft (43 m) of gray, coarse-grained, argillaceous sandstone, commonly interbedded with shale and claystone near the base of the formation where it grades into the Lewis. The upper contact is more sharply defined than the basal contact. Intertonguing with the overlying Fruitland Formation results in minor variations in the formational top which incorporates local Fruitland coal beds in the Pictured Cliffs Sandstone. Nevertheless, the Pictured Cliffs is a fairly 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 as a lithologic datum for correlation of the overlying Fruitland Formation coals.

Conformably overlying the Pictured Cliffs Sandstone is the Fruitland Formation, the major coal-bearing unit in the quadrangle. The

Fruitland consists of an average of 250 ft (76 m) of gray, carbonaceous shale with plant fossils, interbedded siltstone, and coal beds of varying thicknesses. The thickest and most continuous of the coal beds occur near the base of the formation, while discontinuous and lenticular coal beds are characteristic of the upper portion of the formation. The upper contact is gradational from the nonmarine lower coastal plain deposits of the Fruitland to the upper coastal or alluvial plain deposits of the Kirtland Shale (Molenaar, 1977). Many authors have used various criteria to establish the upper boundary, but for the purposes of this report the uppermost coal bed in the Fruitland Formation was used as the contact (after Fassett and Hinds, 1971).

The freshwater deposits of the Kirtland Shale are the youngest Cretaceous strata in the San Juan Basin. They average 710 ft (216 m) in thickness and consist of gray-green siltstone, and interbedded gray, slightly calcareous sandstone with scattered chert grains. The Kirtland Shale has previously been divided into several members by various authors; however, for the purposes of this report the individual members were not differentiated.

Unconformably overlying the Upper Cretaceous strata is the Paleocene Ojo Alamo Sandstone, which consists of about 110 ft (34 m) of white to cream, coarse-grained to conglomeratic sandstone.

The Nacimiento Formation gradationally overlies the Ojo Alamo. The basal section is present, consisting of several hundred feet of gray to green, locally silty shale, and interbedded buff to yellow sandstone and gray siltstone. The Nacimiento Formation is the only formation exposed within the quadrangle area.

Structure

The Huerfano Trading Post NW quadrangle is located in the Central Basin area (Kelley, 1950) of the major structural depression known as the San Juan Basin. The axis of the basin is about 29 miles (47 km) north of the quadrangle area and trends in an arcuate pattern across the northern portion of the Central Basin area (Baltz, 1967). Regional dip in the quadrangle south of the area is 1° to the northeast, as measured by Reeside (1924). To the north of the area Reeside stated that the rocks are "nearly horizontal".

COAL GEOLOGY

Two coal zones (Menefee, Fruitland) and two coal beds (Fruitland 1 and Fruitland 2) have been identified in the subsurface of this quadrangle (CRO Plate 1). The widely-distributed Menefee Formation coal beds are grouped together into the Menefee coal zone (Me zone). These coal beds are generally noncorrelative and less than reserve base thickness (5 ft [1.5 m]). Due to these characteristics, derivative maps were not constructed.

Menefee Formation coals in the central portion of the San Juan Basin are considered subbituminous A in rank. The rank of the coal has been determined on a moist, mineral-matter-free basis with calorific values averaging 11,179 Btu's per pound (26,002 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 (Bauer and Reeside, 1921; Dane, 1936). The "as-received" analyses indicate moisture content averaging 16.9 percent, ash content ranging from 6.6 to 13.0 percent, sulfur content varying from 0.6 to 1.4 percent, and heating values on the order of 9,947 Btu's per pound (23,137 kj/kg). Analyses of several Menefee coals from the outcrop area to the west of this quadrangle are given in Table 1 (Shomaker, 1971). These coals are assumed to be similar in quality and character to the coals of this quadrangle since no known published analyses of Menefee coals from this area are available.

The Fruitland 1 (Fr 1) coal bed is herein defined as the lowermost coal of the Fruitland Formation and is generally directly above the Pictured Cliffs Sandstone. In areas where both coal beds are present, the Fruitland 2 (Fr 2) overlies the Fruitland 1, separated by a rock interval of 13 to 32 ft (4.0-9.8 m). The remaining coals of the Fruitland Formation are grouped together as 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 noncorrelative and less than reserve base (5 ft [1.5 m]) thickness; an exception is a 15-ft (4.6-m) coal bed in drill hole 44.

Fruitland Formation coals in the central portion of the San Juan Basin are considered high volatile A bituminous in rank. The rank of the coal has been determined on a moist, mineral-matter-free basis with calorific values averaging 14,366 Btu's per pound (33,415 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 (Bauer and Reeside, 1921; Dane, 1936). The "as-received" analyses indicate moisture content averaging 2.7 percent, ash content ranging from 12.0 to 19.3 percent, sulfur content less than one percent, and heating values on the order of 12,002 Btu's per pound (27,917 kj/kg). Analyses of several Fruitland Formation coals are given in Table 2 (Fassett and Hinds, 1971).

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			Approx. Depth Interval of Sample (ft.)	Form of Analysis	Proximate, percent					Heating Value (Btu)	Remarks
		Section	T.N.	R.W.			Moisture	Volatile matter	Fixed Carbon	Ash	Sulfur		
J-52142	Channel, Open Pit	SW¼ 27	25	17	-------------	A	17.4	35.5	40.5	6.6	0.6	10,410	Noncaking.
						B	----	43.0	49.1	7.9	0.7	12,600	Coal may have
						C	----	46.7	53.3	----	0.8	13,680	been slightly weathered.
J-61758	Core Sample	SW¼ 36	25	17	-------------	A	15.8	31.6	39.6	13.0	1.2	9,700	
						B	----	37.5	47.1	15.4	1.4	11,510	
						C	----	44.3	55.7	----	1.6	13,610	
J-61759	Core Sample	SW¼ 36	25	17	-------------	A	17.4	31.5	40.4	10.7	1.4	9,730	
						B	----	38.1	48.9	13.0	1.7	11,780	
						C	----	43.8	56.2	----	2.0	13,540	

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

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			Approx. Depth Interval of Sample (ft.)	Form of Analysis	Proximate, percent					Heating Value (Btu)	Remarks
		Section	T.N.	R.W.			Moisture	Volatile matter	Fixed carbon	Ash	Sulfur		
H-12706	Southwest Production Ted Henderson No. 1	NE¼ 5	26	11	1,700-1,705	A	3.6	40.6	39.3	16.5	0.7	11,540	
						B	---	42.1	40.8	17.1	0.7	11,970	
						C	---	50.8	49.2	----	0.8	14,430	
H-3031	Southwest Production Cambell No. 2	NE¼ 26	27	12	1,900-1,910	A	2.6	41.2	40.5	15.7	0.6	11,810	
						B	---	42.3	41.6	16.1	0.6	12,120	
						C	---	50.4	49.6	----	0.7	14,440	
H-5021	British-American Oil Fullerton No. 8	NE¼ 14	27	11	1,920-1,930	A	3.3	40.8	43.9	12.0	0.6	12,370	
						B	---	42.2	45.4	12.4	0.6	12,790	
						C	---	48.1	51.9	----	0.7	14,600	
H-15776	Aztec Oil & Gas Hanks No. 14-D	SW¼ 12	27	10	1,900-1,905	A	2.2	40.4	44.0	13.4	0.6	12,520	
						B	---	41.3	45.1	13.6	0.6	12,790	
						C	---	47.9	52.1	----	0.7	14,820	
H-5472	Aztec Oil & Gas Caine No. 13	NW¼ 16	28	10	1,842-1,853	A	1.6	38.4	40.7	19.3	0.6	11,760	
						B	---	39.0	41.4	19.6	0.6	11,950	
						C	---	48.5	51.5	----	0.8	14,870	
H-24567	Sunray Mid-Continent Gallegos No. 122	NW¼ 18	28	12	1,305-1,315	A	3.0	38.9	44.4	13.7	0.6	12,010	
						B	---	40.1	45.8	14.1	0.6	12,390	
						C	---	46.8	53.2	----	0.7	14,430	

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.

Fruitland 1 Coal Bed

The Fruitland 1 coal bed, informally named by the authors, generally represents the lowermost Fruitland Formation coal bed. Although the coal bed is correlated and mapped as a consistent horizon, it may, in fact, be several different coal 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° to the northeast. Consequently, overburden (CRO Plate 6) increases from less than 1,300 ft (396 m) in the southwest to greater than 2,200 ft (671 m) in the northeast portion of the quadrangle. The isopach map (CRO Plate 4) shows the greatest thickness of the coal bed occurs in the south-central part of the map. In this area the coal is greater than 15 ft (4.6 m) thick. The thickness decreases to the north. The coal bed is absent in the northwest, in a small part of the northeast, and in a small area in the southwest of the quadrangle.

Chemical Analyses of the Fruitland 1 Coal Bed - Analyses of several Fruitland Formation coal beds from this quadrangle and the surrounding area are given in Table 2 (Fassett and Hinds, 1971).

Fruitland 2 Coal Bed

The Fruitland 2 coal bed, informally named by the authors, has been correlated and mapped as a consistent horizon, although it may, in fact, be several different coal beds that are lithostratigraphically equivalent, but not laterally continuous.

As illustrated by the structure contour map (CRO Plate 9) the coal bed dips approximately 1° to the northeast. Consequently, overburden (CRO Plate 10) increases from less than 1,300 ft (396 m) in the southwest to greater than 2,200 ft (671) m in the northeast part of the quadrangle. The isopach map (CRO Plate 8) indicates the coal bed is greater than 15 ft (4.6 m) thick in a small area in the southwest portion of the quadrangle. The thickness decreases in all directions and the coal is absent throughout the central, southern, and eastern parts of the map.

Chemical Analyses of the Fruitland 2 Coal Bed - Analyses of several Fruitland Formation coal beds from this quadrangle and the surrounding area are given in Table 2 (Fassett and Hinds, 1971).

Fruitland Coal Zone

The structure contour map of the Fruitland coal zone is drawn on the top of the Fruitland Formation. As illustrated by the structure contour map (CRO Plate 13) the zone dips approximately 1° to the northeast. Consequently, overburden (CRO Plate 12) increases from less than 1,000 ft (305 m) in the southwest to greater than 2,000 ft (610 m) in the northeast. Also shown on CRO Plate 12 is the total amount of interburden within the Fruitland coal zone. The interburden values vary from zero to greater than 200 ft (91 m). The thickness variation is the result of the number of coal beds and their stratigraphic position within the Fruitland zone since the interburden is the noncoal-bearing thickness from the top of the Fruitland Formation to the top of the lowermost coal designated on CRO Plate 3 as a Fruitland zone coal bed. The isopach map (CRO Plate 10) shows the total thickness of the coals of the Fruitland zone. The greatest thickness occurs in the north-central portion of the quadrangle where the coals total more than 15 ft (4.6 m). The thickness decreases to zero in the northwest, northeast, east, and southwest parts of the quadrangle.

Chemical Analyses of Fruitland Zone Coal Beds - Analyses of several Fruitland Formation coal beds from this quadrangle and the surrounding area are given in Table 2 (Fassett and Hinds, 1971).

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 coals in this quadrangle. All of the coals studied in the Huerfano Trading Post NW quadrangle lie more than 1,100 ft (335 m) below the ground surface, and, thus, have no outcrop or surface development potential.

The U.S. Geological Survey designated the Fruitland 1 and Fruitland 2 coal beds for the determination of coal resources in this quadrangle. Coals of the Fruitland and Menefee zones were not evaluated because they are discontinuous, noncorrelative, and generally less than the reserve base thickness (5 ft [1.5 m]).

For Reserve Base and Reserve calculations, each coal bed was areally divided into measured, indicated, and inferred resource categories (CRO Plates 7 and 11) 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 respective coal isopach (CRO Plates 4 and 8) and areal distribution maps (CRO Plates 7 and 11) for each coal bed. The surface area of each isopached bed was measured by planimeter, in acres, for each category, then multiplied by both 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. This 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 (3.7 m) in thickness, the Reserves (mineable coal) were calculated on the basis of a maximum coal bed thickness of 12 ft (3.7 m), which represents the maximum economically mineable thickness for 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 and Fruitland 2 beds are shown on CRO Plates 7 and 11, respectively, 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 255 million short tons (231 million metric tons).

The coal development potential for each bed was 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 Huerfano Trading Post NW quadrangle has development potential for subsurface mining methods only (CDP Plate 15).

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 and Fruitland 2 coal beds.

Development Potential for Surface Mining Methods

All coals studied in the Huerfano Trading Post NW quadrangle occur more than 1,100 ft (335 m) below the ground surface and, thus, they have no coal development potential for surface mining methods.

Development Potential for Subsurface Mining Methods

Underground coal of the Fruitland 1 coal bed has moderate development potential in the southern and east-central parts of the quadrangle (CDP Plate 15) where the coal bed thickness ranges from 5 to 15 ft (1.5-4.6 m) (CRO Plate 4) and the overburden increases from 1,300 ft (396 m) in the southwest to 2,000 ft (610 m) in the east-central area (CRO Plate 6). The Fruitland 2 coal bed has moderate potential in the southwestern and northwestern corners and in a small area near the center of the northern quadrangle boundary. Coal bed thickness of the Fruitland 2 in these areas varies from 5 to 15 ft (1.5-4.6 m) (CRO Plate 8) and the overburden thickness increases from approximately 1,220 ft (372 m) in the southwest to 1,700 ft (518 m) in the northwest and 2,000 ft (610 m) in the north (CRO Plate 10).

Coal of the Fruitland 1 has low development potential in the northeastern and east-central parts of the quadrangle where the coal varies

TABLE 3

COAL RESOURCE DATA FOR UNDERGROUND MINING METHODS FOR FEDERAL COAL LANDS (in short tons) IN THE HUERFANO TRADING POST NW 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 2	--	48,230,000	3,950,000	52,180,000
Fruitland 1	--	185,400,000	17,510,000	202,910,000
TOTAL	--	233,630,000	21,460,000	255,090,000

in thickness from 5 to 10 ft (1.5-3.0 m) and the overburden ranges from 2,000 to 2,200 ft (610-671 m) thick. The Fruitland 2 bed has low development potential coincident with the Fruitland 1 near the northwest corner of the quadrangle. In this area the Fruitland 2 is 5 to 7 ft (1.5-2.1 m) thick and the overburden is 2,000 to 2,100 ft (610-640 m) thick. Nearly one-half of the area has unknown development potential (north and west-southwest [CDP Plate 15]) where the coal beds are less than the reserve base thickness of 5 ft (1.5 m). Areas with no potential occur where the Fruitland 1 and Fruitland 2 coal beds are not present (northwest and west-central [CDP Plate 15]).

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