UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Text to accompany:

OPEN-FILE REPORT 79-627

1985

FEDERAL COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE CERRO PARIDO 7 1/2-MINUTE QUADRANGLE, McKINLEY AND SANDOVAL COUNTIES, NEW MEXICO

[Report includes 8 plates]

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INTRODUCTION

Purpose

This text complements the Coal Resource Occurrence (CRO) and Coal Development Potential (CDP) maps of the Cerro Parido 7 1/2 minute quadrangle, McKinley and Sandoval Counties, New Mexico. These maps and reports are part of an evaluation of fifty-six 7 1/2 minute quadrangles in northwestern New Mexico which were completed under U. S. Geological Survey Contract No. 14-08-0001-17459 (see figs. 1 and 2).

The purpose of this Coal Resource Occurrence-Coal Development Potential program, which was conceived by Congress as part of its Federal Coal Leasing Amendments Act of 1976, is to obtain coal resource information and to determine the geographical extent of Federal coal deposits. In addition, the program is intended to provide information on the amount of coal recoverable by various mining methods and to serve as a guide for land-use planning.

The U. S. Geological Survey initiated the program by identifying areas underlain by coal resources. These areas were designated Known Recoverable Coal Resource Areas based on the presence of minable coal thicknesses, adequate areal extent of these coal deposits, and the potential for developing commercial quantities of coal at minable depths.

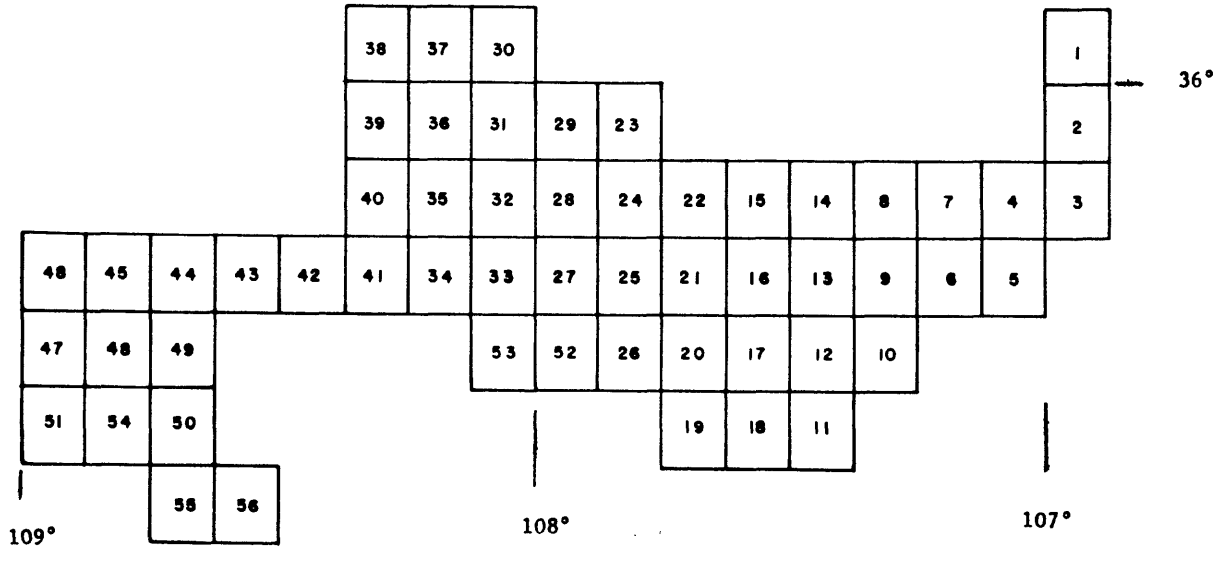
This report is limited to coal resources which are 3,000 ft (914 m) or less below ground surface. Published and unpublished public information was used as the data base for this study. No new drilling or field mapping was performed as part of this study, nor were any confidential data used.


LOCATION OF PROJECT AREA
PROJECT AREA
AREA OF THIS REPORT
COLORADO
ARIZONA
FARMINGTON
ALBUQUERQUE
Bloomfield
Bernalillo
Grants
SCALE IN MILES

FIGURE 1

FIGURE 2.--Index to USGS 7 1/2-minute quadrangles and coal resource occurrence/ coal development potential maps for the southern San Juan Basin area, New Mexico

Map No.	Quadrangle	Open-file report
1	Cuba	79- 623
2	San Pablo	79- 624
3	La Ventana	79-1038
4	Headcut Reservoir	79-1043
5	San Luis	79-1044
6	Arroyo Empedrado	79-1045
7	Wolf Stand	79-1046
8	Tinian	79- 625
9	Canada Calladita	79- 626
10	Cerro Parido	79- 627
11	El Dado Mesa	79- 628
12	Mesa Cortada	79- 629
13	Mesita del Gavilan	79- 630
14	Rincon Marquez	79- 631
15	Whitehorse Rincon	79- 632
16	Mesita Americana	79- 633
17	El Dado	79- 634
18	Cerro Alesna	79- 635
19	San Lucas Dam	79- 636
20	Piedra de la Aguila	79-1039
21	Hospah	79- 637
22	Whitehorse	79-1040
23	Seven Lakes NE	79- 638
24	Kin Nahzin Ruins	79- 639
25	Orphan Annie Rock	79-1041
26	Mesa de los Toros	79-1122
27	Laguna Castillo	79- 640
28	Seven Lakes	79-1042
29	Seven Lakes NW	79-1123
30	Kin Klizhin Ruins	79-1047
31	Nose Rock	79- 641
32	Becenti Lake	79-1124
33	Heart Rock	79- 642
34	Crownpoint	79-1125
35	Antelope Lookout Mesa	79-1376
36	Milk Lake	79-1377
37	La Vida Mission	79-1378
38	The Pillar 3 SE	79-1379
39	Red Lake Well	79-1380
40	Standing Rock	79-1381
41	Dalton Pass	80- 026
42	Oak Spring	80- 027
43	Hard Ground Flats	80- 028
44	Big Rock Hill	80- 029
45	Twin Lakes	80- 030
46	Tse Bonita School	80- 031
47	Samson Lake	80- 032
48	Gallup West	80- 033
49	Gallup East	80- 034
50	Bread Springs	80- 035
51	Manuelito	80- 036
52	Borrego Pass	80- 037
53	Casamero Lake	80- 038
54	Twin Buttes	80- 039
55	Pinehaven	80- 040
56	Upper Nutria	80- 041



Location

The Cerro Parido 7½ minute quadrangle includes acreage in Tps. 15 and 16 N., Rs. 4 and 5 W. of the New Mexico Principal Meridian, McKinley and Sandoval Counties, northwestern New Mexico (see figs. 1 and 2).

Accessibility

No paved roads pass through the Cerro Parido quadrangle. Unimproved dirt roads traverse most portions of the area. State Highway 197 is the nearest paved road and passes about 12.5 mi (20.1 km) NNE. of the quadrangle. The Atchison, Topeka, and Santa Fe Railroad line parallels Interstate Highway 40 about 31 mi (50 km) south of the Cerro Parido quadrangle (see fig. 1).

Physiography

The Cerro Parido quadrangle is in the Navajo section of the southernmost part of the Colorado Plateau physiographic province (U. S. Geological Survey, 1965). The topography of the quadrangle is mesa-and-canyon. Mesa Chivato is a basalt-capped mesa in the southern two-thirds of the area.

No perennial streams are present in the area. Local drainage is provided by several intermittent arroyos, including Arroyo la Azabache, Cañon Blanco, and Cañada Lagunita. Elevations within the quadrangle range from 6,080 ft (1,853 m) in the northeastern corner to over 8,400 ft (2,560 m) at Cerrito del Relampago in the eastern part of the quadrangle.

Climate

The climate of this area is semiarid to arid. The following temperature and precipitation data were reported by the National Oceanic and Atmospheric Administration for the Torreon Navajo Mission Station. The Cerro Parido quadrangle is about 12.0 mi (19.3 km) SSW. of the Torreon Navajo Mission Station. Average total annual precipitation for thirteen of the previous fifteen years is 9.94 in. (25.25 cm). Intense thunderstorms in July, August, and September account for the majority of precipitation. The area is susceptible to flash flooding associated with these thunderstorms. Mean annual temperature for eleven of the previous fifteen years is 49.5°F (9.7°C). The average daily temperatures in January and July are 27.4°F (-2.6°C) and 72.7°F (22.6°C), respectively.

Land status

The Federal Government holds coal rights to approximately 40 percent of the Cerro Parido quadrangle. For the specific coal ownership boundaries, see plate 2. It is not within the scope of this report to provide detailed land-surface ownership. The northern one-third of the quadrangle is within the La Ventana Known Recoverable Coal Resource Area. About 45 percent of the area is within the Ignacio Chavez land grant. As of October 26, 1978, there were no Federal coal leases, coal preference right lease applications or coal exploration licenses within the Cerro Parido quadrangle.

GENERAL GEOLOGY

Previous work

Early reports on the area include that of Gardner (1910) who mapped the area and noted coal outcrops. Hunt (1936) reported Menefee Formation coal outcrop measurements in the area. Shomaker, Beaumont, and Kottlowski (1971) dealt with potential strippable coal resources, and noted the mesa-and-canyon topography would restrict mining feasibility in the area. Tabet and Frost (1979) mapped the surface geology including coal outcrops and conducted exploration drilling in the area. Their study was completed after the compilation of these maps and should be consulted for additional coal data in this area.

Stratigraphy

Within the San Juan Basin, the shoreline positions of the Cretaceous seaways changed innumerable times. The overall regional alignment of the shorelines trended N. 60^{o} W. - S. 60^{o} E. (Sears, Hunt, and Hendricks, 1941). The transgressive and regressive shoreline migrations are evidenced by the intertonguing relationships of continental and marine facies. Rates of trough (geosynclinal) subsidence and the availability of sediment supplies are the major factors that controlled the transgressive-regressive shoreline sequences.

Exposed rock units in the Cerro Parido quadrangle include some of the sedimentary units of Upper Cretaceous age. Tertiary basalts, which

are over 100 ft (30 m) thick in some areas, cap Mesa Chivato. There is Quaternary alluvium along drainages in the area.

The Point Lookout Sandstone is a prominent sandstone marker in most of the San Juan Basin and represents nearshore or littoral deposits which formed during the most extensive northeastward retreat prior to the final withdrawal of the Cretaceous seaways in the San Juan Basin (Sears, Hunt, and Hendricks, 1941). Light gray to reddish-brown, fine-to medium-grained sandstone with interbedded shales comprises the lithologies of the unit which averages 100 ft (30 m) thick locally. The continental sediments deposited inland from the beach area during deposition of the Point Lookout Sandstone compose the overlying Menefee Formation.

The Menefee Formation consists of dark gray to brown carbonaceous to noncarbonaceous shales, light gray sandstones, and coal beds, and is divisible into the basal Cleary Coal Member and the upper Allison Member. A massive channel sandstone sequence defines the boundary between the two members. The Cleary Coal Member contains all of the identified coal beds in this quadrangle. Average thickness of the Cleary Coal Member is 450 ft (137 m) locally, although only the lower 300 ft (91 m) contains coal in this quadrangle. Portions of the Allison Member may be present in the area, but no geophysical well logs are available to confirm its presence.

Depositional environments

The Cretaceous System sedimentary units in the quadrangle represent transgressive and regressive depositional conditions. There were innumerable minor cycles of widely varying duration and extent within the major sedimentary sequences. The paucity of data in this quadrangle and the intended scope of this report permit only general interpretations of the depositional environments.

The Cretaceous coal deposits of the San Juan Basin are products of former coastal swamps and marshes. These swamps and marshes were supported by heavy precipitation and a climate conducive to rapid vegetal growth in moderately fresh water. Due to the relatively low sulfur contents of the San Juan Basin coals, Shomaker and Whyte (1977) suggest the coals formed in fresh water environments.

Most of the coal-bearing units were deposited in coastal plain environments. The majority of the peat deposits formed in a transition zone between lower and upper deltaic sediments during periods of relative shoreline stability. Coals also formed in lake margin swamps inland from the coastal area. Shoreline oscillations and the subsequent influx of continental or marine debris upon the peat accumulations produced the vertical buildup or "stacking" of peat deposits. This sediment debris represents variable ash contents, rock partings, and splits within the coal seams.

The peat accumulated in lenses or pods which were generally parallel to the ancient shorelines. The coals in the lower portions of the coal-bearing units represent regressive depositional conditions (Sears, Hunt, and Hendricks, 1941). The coals in the upper portions of these units are relatively sporadic in occurrence.

Structure

The Cerro Parido quadrangle is in the Chaco Slope and Acoma Sag (Baltz, 1967) structural divisions in the southern portion of the structural depression known as the San Juan Basin (Kelley, 1950). There are no known major structural features within the quadrangle. The uplifted and eroded San Miguel Creek Dome is about 5 mi (8 km) west of the quadrangle. Basalts which cap Mesa Chivato conceal any structural features which may be present in the southern two-thirds of the quadrangle. Hunt (1936) mapped a minor fault in the northeastern corner of the quadrangle. The rock units dip about 1^{o} NE. to NW. within the mapped area.

COAL GEOLOGY

In this quadrangle, the authors identified three coal beds and one coal zone in well logs from Tabet and Frost's (1979) coal test holes and Hunt's (1936) surface mapping. All of these coals are within the Cleary Coal Member of the Menefee Formation. These beds and zone coals are here informally called the Menefee Cleary No. 1, No. 2, and No. 3 coal beds, and the Menefee Cleary coal zone.

The Menefee Cleary No. 1 coal bed is the first persistent coal bed above the Point Lookout Sandstone. It occurs 1 to 2 ft (0.3 to 0.6 m) above the Point Lookout Sandstone in the Cerro Parido quadrangle, but is known to occur as much as 15 ft (5 m) above the Point Lookout Sandstone in nearby quadrangles. The Menefee Cleary No. 2 coal bed is the second persistent Cleary Coal Member bed and is 12 ft (4 m) above the Point Lookout Sandstone in this quadrangle. The Menefee Cleary No. 1 and No. 2 beds were identified in one coal test hole (plate 3) and consequently their areal extent is unknown in this area.

The Menefee Cleary No. 3 bed is the third persistent Cleary Coal Member bed and is 50 to 80 ft (15 to 24 m) above the Point Lookout Sandstone in this area. The coal beds are inferred to be continuous although they may be several different beds that are stratigraphically equivalent. The Menefee Cleary coal zone contains four beds which may be correlated for limited distances in portions of the area but lack sufficient continuity with poorly defined stratigraphic position and cannot be designated as persistent coal beds.

There are no published coal quality analyses for coal beds from the Cerro Parido quadrangle. Analyses of three Allison Member coal core samples (from one drill hole) taken about 12 mi (19 km) north of the quadrangle have been reported by Shomaker and Whyte (1977) and are shown in table 1. The Allison Member beds analyzed are probably similar in quality to the Cleary Coal Member beds in this quadrangle. Rank of the Cleary Coal Member seams is probably high volatile C bituminous in this area.

Table 1. - Analyses of coal samples from the Allison Member of the Menefee Formation.
(Core test hole from NE 1/4 NE 1/4 NE 1/4 of Sec 11, T. 18 N., R. 5 W.)
[Form of analysis: A, as received; B, moisture free; C, moisture and ash free]
from Shomaker and Whyte, 1977

Sample	Form of Analysis	Proximate analysis (percent)				Sulfur	Heating Value (Btu/lb)
		Moisture	Volatile Matter	Fixed Carbon	Ash		
1	A	12.0	34.1	39.9	14.0	0.3	10,410
	B	---	38.7	45.4	15.9	0.4	11,830
	C	---	46.1	53.9	---	0.5	14,070
2	A	13.0	34.7	33.8	18.5	0.3	9,550
	B	---	39.8	39.0	21.2	0.4	10,980
	C	---	50.6	49.4	---	0.5	13,940
3	A	11.0	34.4	35.1	19.5	0.4	9,800
	B	---	38.7	39.4	21.9	0.5	11,020
	C	---	49.5	50.5	---	0.6	14,100

Remarks:

A moist, mineral-matter-free (MMMF) calculation, using the Parr formula (American Society for Testing and Materials, 1973), yields heating values of 12,270 Btu/lb (28,540 kJ/kg; Sample 1), 11,940 Btu/lb (27,772 kJ/kg; Sample 2) and 12,432 Btu/lb (28,917 kJ/kg; Sample 3). No agglomerating characteristics are available for these analyses.

Menefee Cleary No. 3 coal bed

The Menefee Cleary No. 3 coal bed crops out in the northern portion of the Cerro Parido quadrangle. Hunt's (1936) three measured sections and data from Tabet and Frost's (1979) coal test hole indicate the bed is 2.0 to 4.0 ft (0.6 to 1.2 m) thick. The Menefee Cleary No. 3 coal bed is inferred where there is structural potential for outcrops in areas that are between data points which indicate the presence of coal. The inferred outcrop trace has been adjusted to fit modern topography, and differs from outcrops mapped by Hunt (1936). Because Menefee Formation coals are known to be lenticular in the area, the bed is inferred to pinch out where there is structural potential for outcrops in areas that are not between data points. Existence and character of the coal bed in the southern two-thirds of the quadrangle are unknown because of insufficient data. The insufficient data line represents the boundary between areas of adequate data control and areas with little or no data.

COAL RESOURCES

The U. S. Geological Survey requested a resource evaluation of the Menefee Cleary No. 3 coal bed, where the bed is 3.0 ft (0.9 m) or more thick. The evaluation is restricted to Federal coal lands.

The following procedures were prescribed by the U. S. Geological Survey for the calculation of reserve base. Criteria established in U. S. Geological Survey Bulletin 1450-B were used to areally divide the bed into measured, indicated, and inferred reserve base categories. Reserve base was calculated for each category, by section, using data from the isopach and overburden maps (plates 4 and 6). The acreage in each category (measured by planimeter) multiplied by the average coal bed thickness and a bituminous coal conversion factor (1,800 tons of coal per acre-ft) yields the reserve base for that category. Coal beds with the 3.0 ft (0.9 m) minimum thickness are included in reserve base and reserve data rather than the 28 in. (71 cm) minimum thickness prescribed in U. S. Geological Survey Bulletin 1450-B. Reserve figures are derived from reserve base totals by applying a recovery factor of 85 percent for coal beds 0 to 200 ft (0 to 61 m) deep. All reserve base and reserve values are rounded to the nearest 10,000 short tons (9,072 t).

Total reserve base data, which include all reserve base categories, are shown by section on plate 2. Reserve base and reserve data in the various categories are shown on plate 7.

COAL DEVELOPMENT POTENTIAL

The factors used to determine the development potential are the presence of a potentially coal-bearing formation, and thickness and overburden of correlative coal beds. The U. S. Geological Survey supplied the criteria to evaluate the coal development potential for Federal lands

in this quadrangle. These criteria are based on current industry practice, U. S. Geological Survey Bulletin 1450-B, and anticipated technological advances. All available data were utilized for the surface and subsurface coal development potential evaluations.

Any area underlain by a potentially coal-bearing formation with 200 ft (61 m) or less of overburden has potential for surface mining. The U. S. Geological Survey designated the 200 ft (61 m) maximum depth as the stripping limit. Areas where a potentially coal-bearing formation is overlain by more than 200 ft (61 m) of overburden have no potential for surface mining. Areas with no correlative coal beds or a correlative coal bed less than 3.0 ft (0.9 m) in thickness and overlain by 200 ft (61 m) or less of overburden have unknown surface mining potential. Areas which have a correlative coal bed 3.0 ft (0.9 m) or more thick with surface mining potential are assigned a high, moderate or low development potential based on the mining ratio (cubic yards of overburden per short ton of recoverable coal). The formula used to calculate mining ratios is:

$$MR = \frac{t_o\ (C)}{t_c\ (Rf)}$$

Where MR = Mining ratio

t_o = Thickness of overburden in feet

t_c = Thickness of coal in feet

Rf = Recovery factor

C = Volume-weight conversion factor

(.896 yd^3/short ton for bituminous coal)

(.911 yd^3/short ton for subbituminous coal)

High, moderate, and low development potential areas are underlain by a coal bed 3.0 ft (0.9 m) or more thick and have respective surface mining ratio values of 0 to 10, 10 to 15, and greater than 15.

Any area underlain by a potentially coal-bearing formation with 200 to 3,000 ft (61 to 914 m) of overburden has potential for subsurface mining. Areas where a potentially coal-bearing formation is overlain by more than 3,000 ft (914 m) of overburden have no subsurface mining potential. Development potential for subsurface mining is unknown where a potentially coal-bearing formation within 200 to 3,000 ft (61 to 914 m) of the surface contains no identified correlative coal bed or a correlative coal bed less than 3.0 ft (0.9 m) thick. The no and unknown surface development potential boundaries (plate 8) are defined at the contact of the coal-bearing Menefee Formation with the underlying noncoal-bearing Point Lookout Sandstone. This contact is approximated due to the inaccuracies of adjusting old geologic maps to modern topographic bases.

Boundaries of coal development potential areas coincide with the boundaries of the smallest legal land subdivision (40 acre lot). When a land subdivision contains areas with different development potentials, the potential shown on the map is that of the areally largest component area. When an area is underlain by more than one bed, the potential shown on the map is that of the bed with the highest potential.

Reserve base (in short tons) in the various development potential categories for surface mining methods is shown in table 2.

The coal development potential map is subject to revision. Map boundary lines and reserve base values are based on coal resource occurrence map isopachs, overburden isopachs, and coal bed correlations that are interpretive and subject to change as additional coal information becomes available.

Development potential for surface mining methods

The coal development potential for surface mining methods in the Cerro Parido quadrangle is shown on plate 8. Based on coal development criteria, all Federal coal lands have high, moderate, low, unknown or no development potentials for surface mining methods. Refer to table 3 for reserves and planimetered acreage, by section, for Federal coal lands with surface mining potential.

Development potential for subsurface mining methods and in situ gasification

The Menefee Cleary No. 3 coal bed has not been shown to underlie Federal coal lands at depths of 200 to 3,000 ft (61 to 914 m) with thicknesses of 3.0 ft (0.9 m) or more in the Cerro Parido quadrangle. The Menefee and Crevasse Canyon Formations are potentially coal-bearing in this area. Based on development potential criteria, all Federal coal lands have unknown development potential for subsurface mining methods in the Cerro Parido quadrangle.

In situ gasification of coal has not been done on a commercial scale in the United States and criteria for rating the development potential of this method are unknown.

Table 2. - Reserve base data (in short tons) for surface mining methods for Federal coal lands in the Cerro Parido quadrangle, McKinley and Sandoval Counties, New Mexico.

[Development potentials are based on mining ratios (cubic yards of overburden/ton of underlying coal). To convert short tons to metric tonnes, multiply by 0.9072; to convert mining ratios in yds^3/ton coal to m^3/t, multiply by 0.842].

Coal Bed	High Development Potential (0-10 Mining Ratio)	Moderate Development Potential (10-15 Mining Ratio)	Low Development Potential (greater than 15 Mining Ratio)	Total
Menefee Cleary No. 3	810,000	220,000	130,000	1,160,000
TOTAL	810,000	220,000	130,000	1,160,000

Table 3. - Reserves and planimetered acreage, by section, for Federal coal lands in the Cerro Parido quadrangle with surface mining potential.

[To convert acres to hectares, divide acres by 2.471; to convert short tons to metric tonnes, multiply short tons by 0.9072].

Potential category	Coal bed	Sec.	T. N.	R. W.	Acres (planimetered)	Reserves (in short tons)
High	Menefee Cleary No. 3	13	16	5	55.3	260,000
		14			47.3	260,000
		15			27.7	170,000
		11			1.3	less than 10,000
Moderate	Menefee Cleary No. 3	11	16	5	2.7	10,000
		14			35.1	190,000
Low	Menefee Cleary No. 3	11	16	5	2.7	10,000
		14			16.2	90,000

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coal bed--A stratified sequence of coal, composed of relatively homogeneous material, exhibiting some degree of lithologic unity and separated from the rocks above and below by physically rather well defined boundary planes.

coal bed separation line--A line on a map plate separating areas where different coal beds or zones are mapped.

coal bench--One of two or more divisions of a coal bed separated by rock.

coal conversion factor--A factor used to convert acre-feet of coal into short tons of coal; bituminous coal is 1800 tons/acre-ft; subbituminous coal is 1770 tons/acre-ft.

coal development potential--A subjective determination of the comparative potential of Federal coal lands for development of a commercially viable coal mining operation.

coal exploration license--An area of Federal coal lands in which the licensee is granted the right, after outlining the area and the probable methods of exploration, to investigate the coal resources. An exploration license has a term not to exceed 2 years and does not confer rights to a lease.

coal lease--An area of Federal coal lands in which the Federal Government has entered into a contractual agreement for development of the coal deposits.

coal split--A coal bed resulting from the occurrence of a noncoal parting within the parent coal bed which divides the single coal bed into two or more coal beds.

coal zone--A distinctive stratigraphic interval containing a sequence of alternating coal and noncoal layers in which the coal beds may so lack lateral persistence that correlating individual beds in the zone is not feasible.

Federal coal land--Land for which the Federal Government holds title to the coal mineral rights, without regard to surface ownership.

hypothetical resources--Undiscovered coal resources in beds that may reasonably be expected to exist in known mining districts under known geologic conditions. In general, hypothetical resources are in broad areas of coal fields where points of observation are absent and evidence is from distant outcrops, drill holes or wells. Exploration that confirms their presence and reveals quantity and quality will permit their reclassification as a Reserve or Identified Subeconomic Resource.

identified resources--Specific bodies of coal whose location, rank, quality, and quantity are known from geologic evidence supported by engineering measurements.

indicated--Coal for which estimates for the rank, quality, and quantity have been computed partly from sample analyses and measurements and partly from reasonable geologic projections.

inferred--Coal in unexplored extensions of demonstrated resources for which estimates of the quality and quantity are based on geologic evidence and projections.

isopach--A line joining points of equal bed thickness.

Known Recoverable Coal Resource Area (KRCRA)--Formerly called Known Coal Leasing Area (KCLA). Area in which the Federal coal land is classified (1) as subject to the coal leasing provisions of the Mineral Leasing Act of 1920, as amended, and (2) by virtue of the available data being sufficient to permit evaluation as to extent, location, and potential for developing commercial quantities of coal.

measured--Coal for which estimates for rank, quality, and quantity can be computed, within a margin of error of less than 20 percent, from sample analyses and measurements from closely spaced and geologically well known sample sites.

mining ratio--A numerical ratio equating the in-place volumes, in cubic yards, of rocks that must be removed in order to recover 1 short ton of coal by surface mining.

overburden--A stratigraphic interval (composed of noncoal beds and coal beds) lying between the ground surface and the top of a coal bed. For coal zones, overburden is the stratigraphic interval lying between the ground surface and the structural datum used to map the zone.

parting--A noncoal layer occurring along a bedding plane within a coal bed.

Preference Right Lease Application (PRLA)--An area of Federal coal lands for which an application for a noncompetitive coal lease has been made as a result of exploration done under a coal prospecting permit. PRLA's are no longer obtainable.

quality or grade--Refers to measurements such as heat value; fixed carbon; moisture; ash; sulfur; phosphorus; major, minor, and trace elements; coking properties; petrologic properties; and particular organic constituents.

rank--The classification of coal relative to other coals, according to degree of metamorphism, or progressive alteration, in the natural series from lignite to anthracite (Classification of coals by rank, 1973, American Society for Testing and Materials, ASTM Designation D-388-66).

recovery factor--The percentage of total tons of coal estimated to be recoverable from a given area in relation to the total tonnage estimated to be in the Reserve Base in the ground.

reserve--That part of identified coal resource that can be economically mined at the time of determination. The reserve is derived by applying a recovery factor to that component of the identified coal resource designated as the reserve base.

reserve base--That part of identified coal resource from which Reserves are calculated.

stripping limit--A vertical depth, in feet, measured from the surface, reflecting the probable maximum, practical depth to which surface mining may be technologically feasible in the forseeable future. The rock interval, expressed in feet, above the stripping limit is the "strippable interval."

structure contour--A line joining points of equal elevation on a stratum or bed.
