UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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1985

FEDERAL COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE HEART ROCK 7 1/2-MINUTE QUADRANGLE, McKINLEY COUNTY, NEW MEXICO

[Report includes 4 plates]

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HEART ROCK QUADRANGLE
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INTRODUCTION

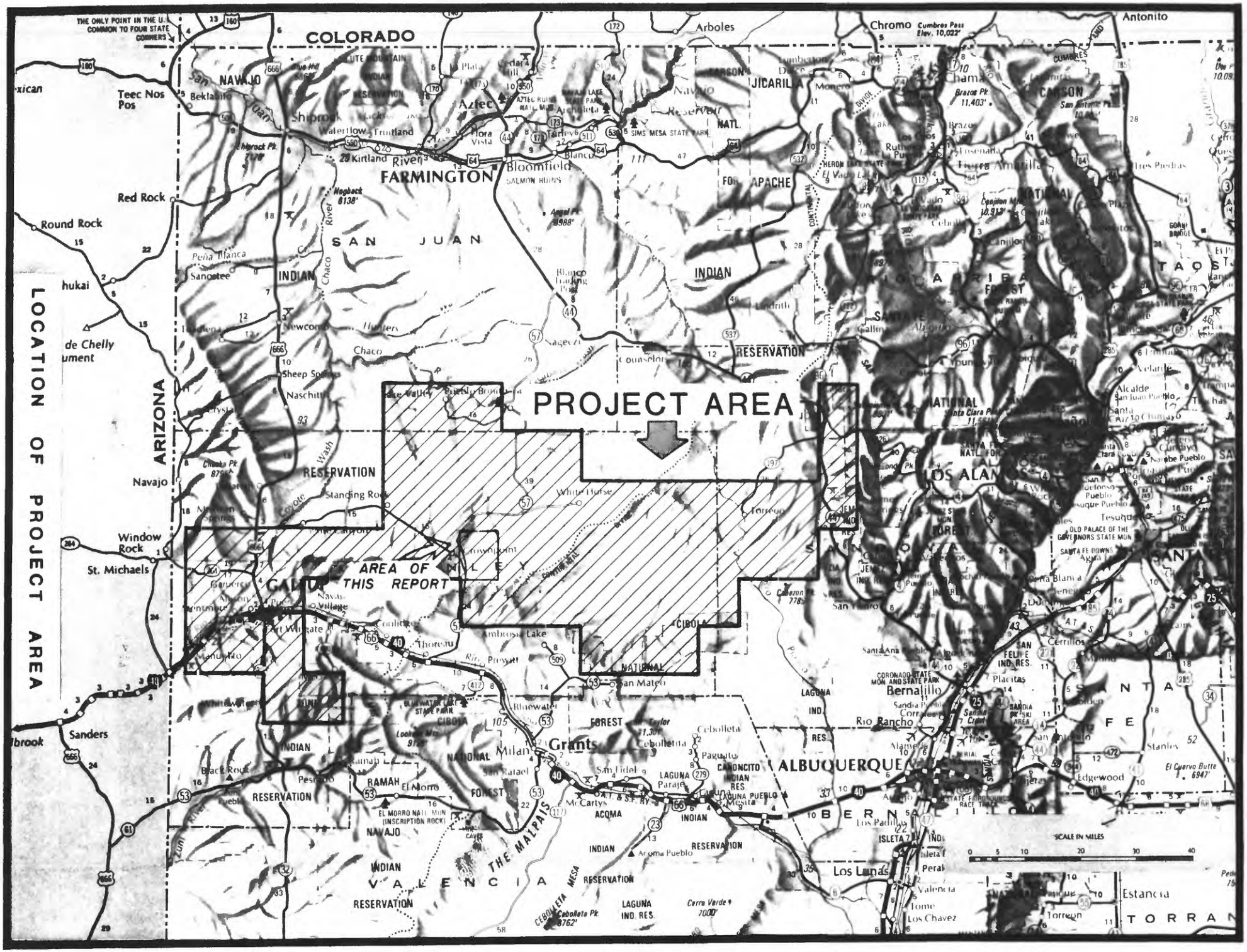
Purpose

This text complements the Coal Resource Occurrence (CRO) and Coal Development Potential (CDP) maps of the Heart Rock 7½ minute quadrangle, McKinley County, New Mexico. These maps and report are part of an evaluation of fifty-six 7½ 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 Published and unpublished public information was used as the data base for this study.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

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
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8	Tinian	79- 625
9	Canada Calladita	79- 626
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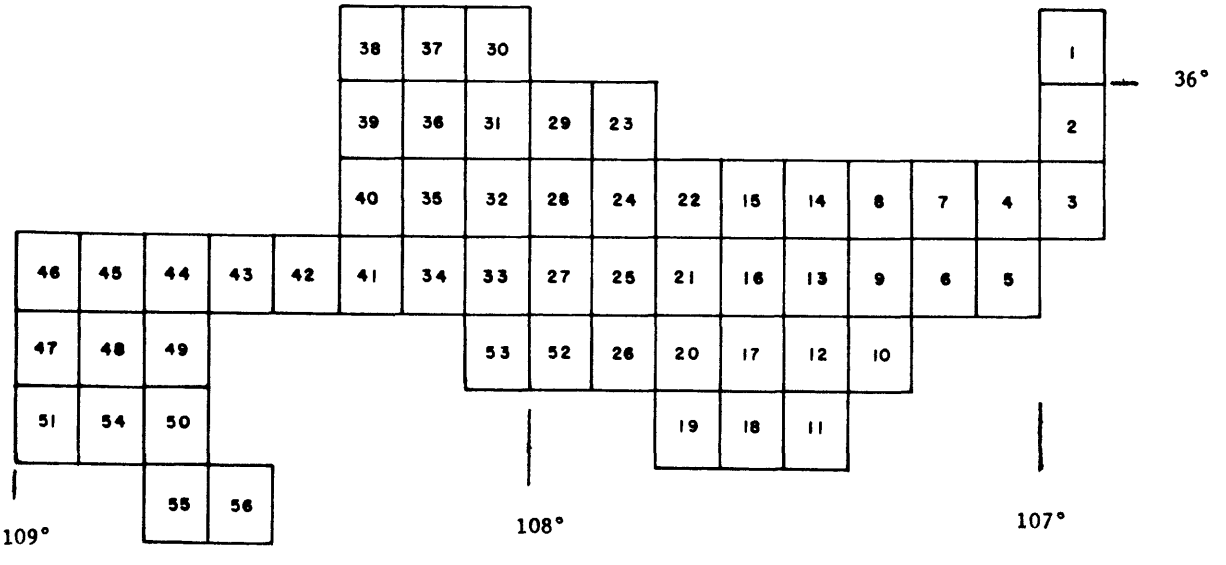
12	Mesa Cortada	79- 629
13	Mesita del Gavilan	79- 630
14	Rincon Marquez	79- 631
15	Whitehorse Rincon	79- 632
16	Mesita Americana	79- 633
17	El Dado	79- 634
18	Cerro Alesna	79- 635
19	San Lucas Dam	79- 636
20	Piedra de la Aguila	79-1039
21	Hospah	79- 637
22	Whitehorse	79-1040
23	Seven Lakes NE	79- 638
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 Heart Rock 7½ minute quadrangle includes acreage in Tps. 16, 17, and 18 N., Rs. 11 and 12 W. of the New Mexico Principal Meridian, McKinley County, northwestern New Mexico (see figs. 1 and 2).

Accessibility

Access to the quadrangle is provided by State Highway 57 from the town of Thoreau, 20 mi (32 km) southwest, and from the town of Crownpoint, 2 mi (3 km) west of the area. Several light-duty maintained roads and unimproved dirt roads traverse the area. The Atchison, Topeka, and Santa Fe Railroad line passes about 18 mi (29 km) due south of the quadrangle (see fig. 1).

Physiography

The Heart Rock 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. Satan Pass is a major canyon in the southwestern part of the quadrangle.

No perennial streams are present in the area. Local drainage is provided by several intermittent arroyos. Elevations within the quadrangle range from 6,500 ft (1,981 m) in the northeast to 7,280 ft (2,219 m) west of Satan Pass.

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 Thoreau 5 ENE Station. The Heart Rock quadrangle is about 13 mi (21 km) NNE. of the Thoreau 5 ENE Station. Average total annual precipitation for thirteen of the previous fifteen years is 10.84 in. (27.53 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 thirteen of the previous fifteen years is 49.4°F (9.7°C). The average daily temperatures in January and July are 30.8°F (-0.7°C) and 70.9°F (21.6°C), respectively.

Land status

The Federal Government holds coal rights to approximately 50 percent of the Heart Rock 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. All but about 8,400 acres (3,399 ha) in the northern part of the quadrangle are within the Crownpoint Known Recoverable Coal Resource Area. As of October 26, 1978, there were no Federal coal leases, coal preference right lease applications or coal exploration licenses within the Heart Rock quadrangle.

GENERAL GEOLOGY

Previous work

Early reports on the area include that of Gardner (1909) who mapped the area, although he did not report any coals within the Heart Rock quadrangle. Dobbin (1932) mapped the northern portion of the area and reported Menefee Cleary coal outcrops. Sears (1934) measured outcrops of the Gibson Coal Member within the quadrangle. Shomaker, Beaumont, and Kottlowski (1971) studied the area, but made no strippable reserve estimates.

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 Heart Rock quadrangle include some of the sedimentary units of Upper Cretaceous age. There is Quaternary alluvium along drainages in the area. Based on all publicly available geophysical and outcrop data, the Dakota Sandstone which contains coals in areas nearby was not mapped in the Heart Rock quadrangle due to insufficient data.

A major northeastward regression of the Cretaceous seaways resulted in the deposition of the Gallup Sandstone in a beach or littoral environment.

The Gallup Sandstone is composed of pink to gray, fine-to medium-grained massive sandstone with interbedded gray shales, and ranges from 100 to 180 ft (30 to 55 m) in thickness locally. The Dilco Coal Member of the Crevasse Canyon Formation overlies the Gallup Sandstone and represents the continental deposits which formed inland from the beach area during the deposition of the Gallup Sandstone. Medium to dark gray siltstone with interbedded medium-grained tan sandstones, and coal beds comprise the lithologies of the Dilco Coal Member, which averages 230 ft (70 m) in thickness locally. The coals occur in the lower part of the Dilco Coal Member in this quadrangle.

Increased rates of trough subsidence caused the regression to gradually slow, and finally stop. The seaways deepened and the shorelines advanced southwestward during the succeeding transgressive phase. The Mulatto Tongue of the Mancos Shale overlies the Dilco Coal Memeber and formed from the marine sands, silts, and muds, and is composed of light gray to tan silty shale with interbedded reddish-tan, very fine-grained sandstone. Thickness of the unit averages 190 ft (58 m) in this area. The transitional contact of the Mulatto Tongue with the overlying Dalton Sandstone Member of the Crevasse Canyon Formation indicates the gradual reversal from transgressive to regressive depositional conditions.

The Dalton Sandstone Member is composed of yellowish-gray, very fine-grained quartzose sandstone which formed in a nearshore environment and averages 100 ft (30 m) in thickness locally. The Gibson Coal Member of the Crevasse Canyon Formation overlies the Dalton Sandstone Member and represents the continental deposits which formed inland from the beach area during the deposition of the Dalton Sandstone Member. Medium gray carbonaceous siltstone

with interbedded gray to tan sandstone, and coal beds comprise the lithologies of the Gibson Coal Member, which averages 280 ft (85 m) in thickness locally. When the Cretaceous seas were relatively stable with an approximate balance between basinal subsidence and deposition, the remainder of the Gibson Coal Member was deposited. As this balance was overcome by increased subsidence, the Hosta Tongue of the Point Lookout Sanstone was deposited as the seaways advanced southwestward. The Hosta Tongue overlies the Gibson Coal Member and is composed of light gray to reddish-brown, fine-to medium-grained sandstone with interbedded shales, and averages 80 ft (24 m) thick locally.

As the transgression proceded and the Cretaceous seas deepened, the Satan Tongue of the Mancos Shale was deposited over the Hosta Tongue. The Satan Tongue formed from the marine sands, silts, and muds, and is composed of light to dark gray silty shales with interbedded tan to buff sandstone, and averages 70 ft (21 m) thick in the area. The Point Lookout Sandstone overlies the Satan Tongue, 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). Lithology of the Point Lookout Sandstone is identical to the Hosta Tongue. Thickness of the Point Lookout Sandstone ranges from 80 to 110 ft (24 to 33 m) 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 upper Allison Member. A massive channel sandstone sequence defines the boundary between the two members. The Cleary

Coal Member crops out along the northern quadrangle boundary where erosion has eliminated its upper strata. In this area, the incomplete thickness of the Cleary Coal Member is about 120 ft (36 m). The Allison Member absent in the Heart Rock quadrangle.

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 Heart Rock quadrangle is in the Chaco Slope structural division in the southern portion of the structural depression known as the San Juan Basin (Kelley, 1950). There are no major structural features in the area other than faults and localllized folding. The rock units dip 1^{o} to 2^{o} NE. to NW.

COAL GEOLOGY

In this quadrangle, the authors identified one coal bed and three coal zones from an oil and gas well and Dobbin's (1932) and Sear s'(1934) surface mapping. These coals are in the Dilco Coal Member and Gibson Coal Member of the Crevasse Canyon Formation, and Cleary Coal Member of the Menefee Formation. The coal zones and bed are here informally called the Crevasse Canyon Dilco coal zone, Crevasse Canyon Gibson coal zone, Menefee Cleary No. 3 coal bed, and Menefee Cleary coal zone. The individual beds within the coal zones may be correlated for limited distances in portions of the area, but they lack sufficient continuity with poorly defined stratigraphic position and cannot be designated as persistent coal beds.

The Crevasse Canyon Dilco zone was identified in the oil and gas well as one bed with 4.5 ft (1.4 m) of total coal. The zone bed occurs about 60 ft (18 m) above the Gallup Sandstone. Sears (1934) mapped the Crevasse Canyon Gibson zone in four measured sections as up to two zone beds with 1.2 to 4.2 ft (0.4 to 1.3 m) of total coal. These beds occur from 70 to 260 ft (21 to 79 m)

below the Hosta Tongue of the Point Lookout Sandstone.

The Menefee Cleary No. 3 bed was mapped at outcrop by Dobbin (1932), and is stratigraphically the highest coal bed identified in this quadrangle. Two measured sections indicate the bed to contain 0.5 to 2.2 ft (0.1 to 0.7 m) of total coal and to occur about 50 ft (15 m) above the Point Lookout Sandstone in this area. Clinker from the Menefee Cleary coal zone was mapped by Dobbin (1932) in two areas of isolated high relief in the northeastern part of the quadrangle. Due to the limited areal extent and inadequate thicknesses of the coals in this quadrangle, no further coal bed or coal zone evaluations were prescribed by the U. S. Geological Survey.

COAL RESOURCES

Because there are no identified correlative coal beds underlying Federal coal lands with thicknesses of 3.0 ft (0.9 m) or more, no reserve base or reserves have been calculated for the Heart Rock quadrangle. The U. S. Geological Survey specified that only coal beds 3.0 ft (0.9 m) or greater in thickness be included in reserve base and reserve data, rather than the 28 in. (71 cm) minimum prescribed in U. S. Geological Survey Bulletin 1450-B.

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 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 underlain by a potentially coal-bearing formation within 200 ft (61 m) of the surface which contain no correlative coal beds or a correlative coal bed less than 3.0 ft (0.9 m) thick have unknown surface mining potential.

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 boundaries for surface development potential (plate 4) are defined at the contact of the coal-bearing Menefee and Crevasse Canyon Formations with the noncoal-bearing Point Lookout Sandstone and Dalton Sandstone Member. These contacts are approximated due to the inaccuracies of adjusting old geological maps to modern topographic bases.

The coal development potential of this quadrangle is subject to revision. As further coal information becomes available, it is possible that correlative coal beds with sufficient thicknesses may be identified. These coal data will likely define areas of Federal coal lands with development potentials other than no or unknown.

Development potential for surface mining methods

The coal development potential for surface mining methods in the Heart Rock quadrangle is shown on plate 4. No correlative coal beds 3.0 ft (0.9 m) or more thick overlain by 200 ft (61 m) or less of overburden have been identified within the Crevasse Canyon or Menefee Formations in the Heart Rock quadrangle. Both formations are potentially coal-bearing in this area. All Federal coal lands in the Heart Rock quadrangle have either no or unknown development potential for surface mining methods.

Development potential for subsurface mining methods and in situ gasification

No correlative coal beds 3.0 ft (0.9 m) or more thick overlain by 200 to 3,000 ft (61 to 914 m) of overburden have been identified within the Crevasse Canyon or Menefee Formations in the quadrangle. All Federal coal lands in the Heart Rock quadrangle have unknown development potential for subsurface mining methods.

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.

SELECTED REFERENCES
(HEART ROCK QUADRANGLE)

American Society for Testing and Materials, 1973, Standard specification for classification of coals by rank, in American Society for Testing and Materials Standards for coal and coke: Designation D388-66, p. 54-57.

Baltz, E. H., 1967, Stratigraphy and regional tectonic implications of part of Upper Cretaceous and Tertiary rocks, east-central San Juan Basin, New Mexico: U.S. Geological Survey Professional Paper 552, 101 p.

Chapman, Wood, and Griswold, Inc., 1977, Geologic map of the Grants uranium region: New Mexico Bureau of Mines and Mineral Resources Geologic Map 31.

Dobbin, C. E., 1932, U.S. Geological Survey unpublished mapping.

Gardner, J. H., 1909, The coal field between Gallup and San Mateo, New Mexico, in Coal fields of Colorado, New Mexico, Utah, Oregon, and Virginia: U.S. Geological Survey Bulletin 341-C, p. 364-378.

Kelley, V. C., 1950, Regional structure of the San Juan Basin, in New Mexico Geological Society Guidebook of the San Juan Basin, New Mexico and Colorado, 1st Field Conference, 1950: p. 101-108.

Keroher, G. C., and others, 1966, Lexicon of geologic names of the United States for 1936-60: U.S. Geological Survey Bulletin 1200, 4341 p.

National Oceanic and Atmospheric Administration, 1964-78, Climatological data, New Mexico: National Climatic Center, Asheville, N. C., v. 68-82.

Petroleum Information Well Log Library: Denver, Colo.

Rocky Mountain Well Log Service, 1974, Catalog of electrical, radioactivity and hydrocarbon surveys: Electrical Log Services, 1974, 819 p.

Sears, J. D., 1934, The coal field from Gallup eastward toward Mount Taylor, part 1 of Geology and fuel resources of the southern part of the San Juan Basin, New Mexico: U.S. Geological Survey Bulletin 860-A, p. 1-30.

Sears, J. D., Hunt, C. B., and Hendricks, T. A., 1941, Transgressive and regressive Cretaceous deposits in southern San Juan Basin, New Mexico: U.S. Geological Survey Professional Paper 193-F, p. 101-121.

Shomaker, J. W., Beaumont, E. C., and Kottlowski, F. E., 1971, Strippable low-sulfur coal resources of the San Juan Basin in New Mexico and Colorado: New Mexico Bureau of Mines and Mineral Resources Memoir 25, 189 p.

Shomaker, J. W., and Whyte, M. R., 1977, Geologic appraisal of deep coals, San Juan Basin, New Mexico: New Mexico Bureau of Mines and Mineral Resources Circular 155, 39 p.

U.S. Bureau of Mines, 1936, Analyses of New Mexico coals: U.S. Bureau of Mines Technical Paper 569, 112 p.

U.S. Bureau of Mines and U.S. Geological Survey, 1976, Coal resource classification system of the U.S. Bureau of Mines and U.S. Geological Survey: U.S. Geological Survey Bulletin 1450-B, 7 p.

U.S. Geological Survey, 1965, Mineral and water resources of New Mexico: New Mexico Bureau of Mines and Mineral Resources Bulletin 87, 437 p.

GLOSSARY

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.