UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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FEDERAL COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE LA VIDA MISSION 7 1/2-MINUTE QUADRANGLE, SAN JUAN AND McKINLEY 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 La Vida Mission 7½ minute quadrangle, San Juan and McKinley Counties, 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 Published and unpublished public information was used as data base for this study. No new drilling or field mapping was performed as part of this study, nor were any confidential data used.

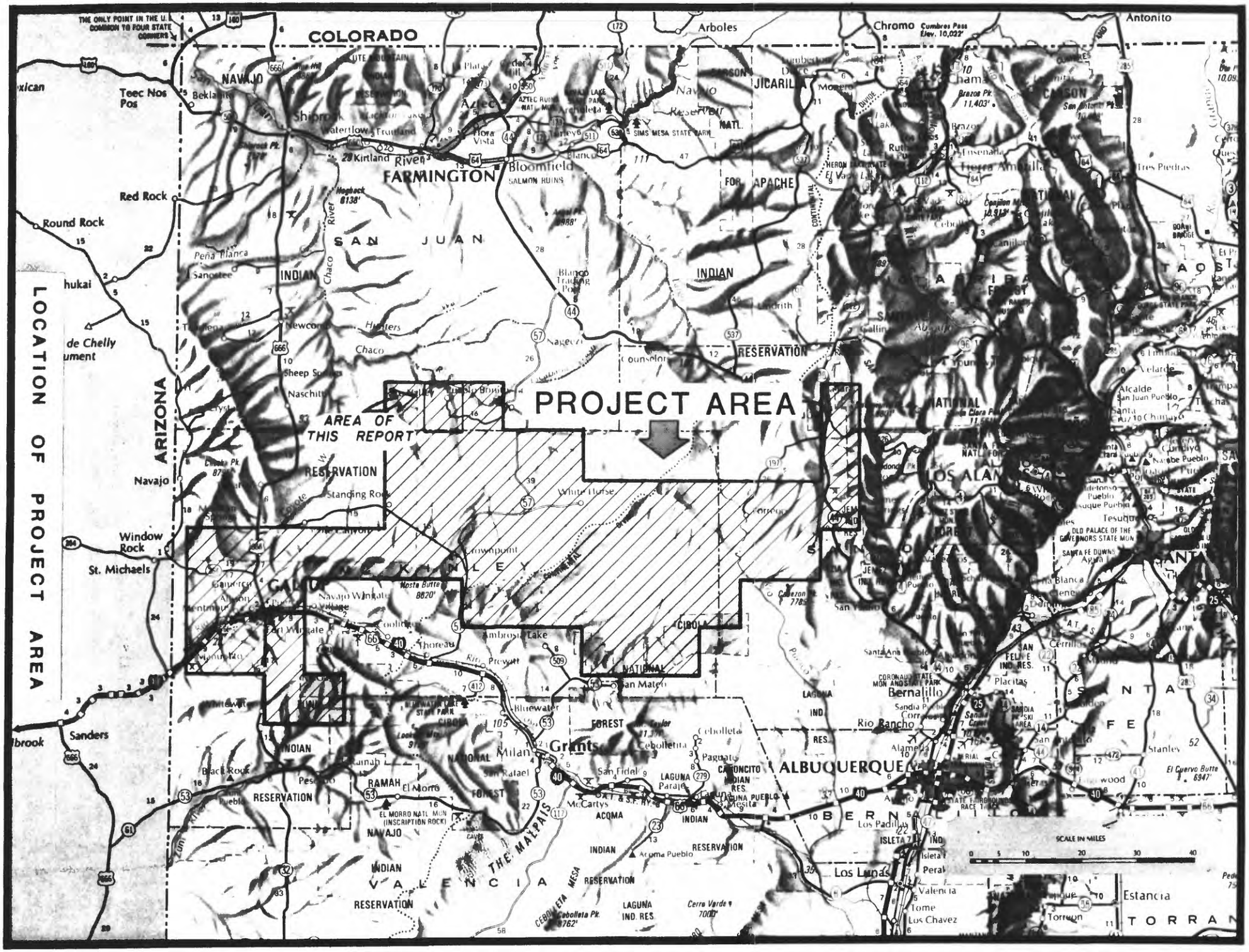
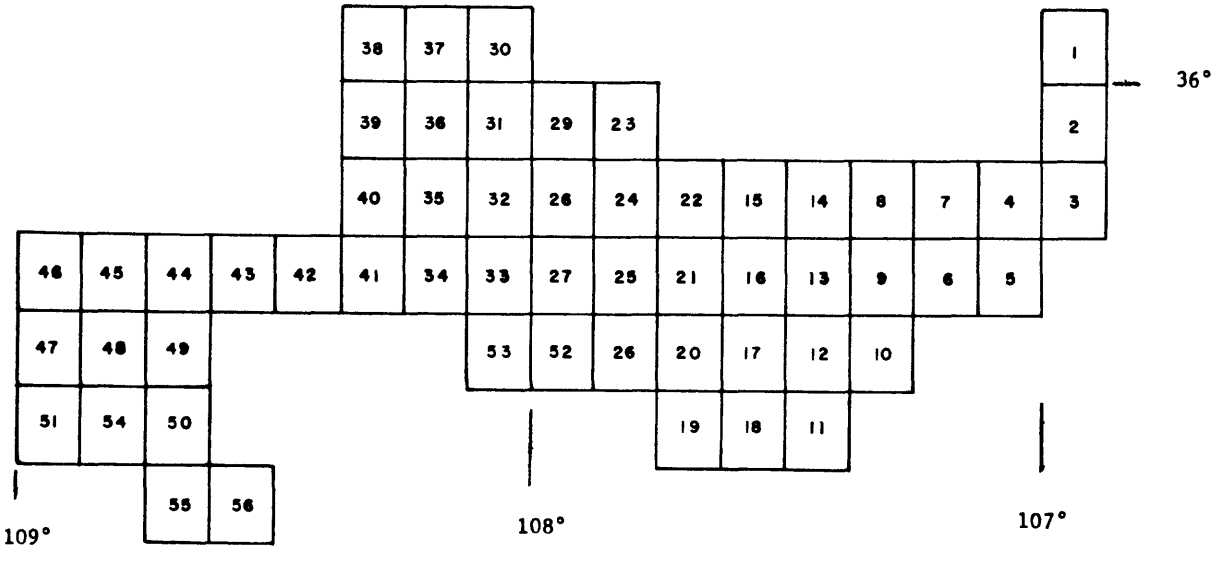

LOCATION OF PROJECT AREA
PROJECT AREA
AREA OF THIS REPORT
COLORADO
NEW MEXICO
ARIZONA
FARMINGTON
Bloomfield
Aztec
Shiprock
Kirtland
Waterflow
Teec Nos Pos
Red Rock
Round Rock
Sanostee
Newcomb
Sheep Spring
Naschitti
Chaco
Hogback
Navajo
Window Rock
St. Michaels
Sanders
Gallup
Grants
Milan
Bluewater
Thoreau
Prewitt
Ambrosia Lake
Crownpoint
Standing Rock
White Horse
Navajo Wingate
Nosta Butte
Cabezon
Arboles
Chromo
Antonito
Tres Piedras
Los Alamos
Bernalillo
Rio Rancho
Albuquerque
Placitas
Santa Ana
Cochiti
Jemez
Los Lunas
Valencia
Tome
Los Chavez
Estancia
Torrance
Isleta
Laguna
Acoma
Cebolleta
Pagüate
San Fidel
San Rafael
McCartys
El Morro
Ramah
Black Rock
Pescado
Lukachukai
Round Rock
Peña Blanca
Sanostee
Beklabito
Teec Nos Pos
Navajo
Jicarilla
Apache
Carson
Brazos Pk. 11,403'
Cumbres Pass Elev. 10,022'
Hogback 6138'
Chaco River
Blanco Trading Post
Counselor
Torreon
Cabezon 7781'
Mesita
Laguna Pueblo
Acoma Pueblo
Cerro Verde 7000'
Cebolleta Pk. 9762'
Mesa Gigante 9719'
Dibeshe Pk. 8715'
Navajo Mtn. 10,388'
Carrizo Mts.
Chuska Mts.
Lukachukai Mts.
Defiance Plateau
Continental Divide
Navajo Reservoir
Heron Reservoir
Abiquiu Reservoir
Sims Mesa State Farm
Salmon Ruins
Aztec Ruins Nat. Mon.
Chaco Culture Nat. Hist. Park
Bluewater Lake State Park
El Morro Nat. Mon. (Inscription Rock)
Coronado State Mon. and Park
Old Palace of the Governors State Mon.
Santa Fe Downs
Cuervo Butte 6947'
Mesa Prieta 7359'
Taylor 7359'
Navajo Indian Reservation
Jicarilla Apache Reservation
Ramah Navajo Reservation
Canoncito Indian Res.
Laguna Ind. Res.
Isleta Ind. Res.
Sandia Ski Area
Sandia Peak Tramway
Cibola National Forest
Santa Fe National Forest
Carson National Forest
The Malpais
Cebolleta Mesa
Valencia
Bernalillo
Torrance
SCALE IN MILES
0 5 10 20 30 40

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 La Vida Mission 7½ minute quadrangle includes acreage in Tps. 20, 21, and 22 N., Rs. 12 and 13 W. of the New Mexico Principal Meridian, San Juan and McKinley counties, northwestern New Mexico (see figs. 1 and 2). The town of Lake Valley is in the northeast part of the quadrangle. Part of the Chaco Canyon National Monument is in the southeast corner of the area.

Accessibility

State Highway 371 passes through the quadrangle and provides access to the towns of Crownpoint, 24 mi (39 km) south, White Rock, 2.1 mi (3.4 km) west, and Farmington, about 48 mi (77 m) north of the quadrangle. Light-duty maintained and unimproved dirt roads traverse most parts of the area. The Atchison, Topeka, and Santa Fe Railroad line passes about 40.5 mi (65.2 km) south of the quadrangle (see fig. 1).

Physiography

The La Vida Mission 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 area is characterized by rugged badlands, eroded mesas, and alluvial valley floors.

No perennial streams are present in the quadrangle. Local drainage

is provided by the Chaco River and several intermittent arroyos. Juans Lake is a relatively large lake near the town of Lake Valley. Elevations within the quadrangle range from less than 5,820 ft (1,774 m) along the Chaco River near the northern quadrangle boundary to over 6,360 ft (1,939 m) on Red Hill at the western edge of the area.

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 Chaco Canyon National Monument Station. The La Vida Mission quadrangle is about 9 mi (14 km) W. of the Chaco Canyon National Monument Station. Average total annual precipitation for thirteen of the previous fifteen years is 8.75 in. (22.23 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 48.4°F (9.1°C). The average daily temperatures in January and July are 26.3°F (-3.2°C) and 72.5°F (22.5°C), respectively.

Land status

The Federal Government holds the coal mineral rights to approximately 66 percent of the La Vida Mission 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 5,350 acres (2,165 ha) in the southern and western portions of the quadrangle is within the Tsaya

Known Recoverable Coal Resource Area. As of October 26, 1978, there were no Federal coal leases, coal preference right lease applications of coal exploration licenses within the La Vida Mission quadrangle.

GENERAL GEOLOGY

Previous work

Early reports on the area include that of Bauer and Reeside (1921) who mapped and measured Menefee and Fruitland Formation coals in the area. Dobbin (1932) mapped Allison Member coal outcrops in the northern part of the quadrangle, although he reported no coal measurements. Shomaker, Beaumont, and Kottlowski (1971) examined the area and reported two relatively thick Allison Member coal beds of good quality in T. 22 N., R. 13 W. They traced these beds and noted "On the mesa immediately south of the La Vida Mission School, the lower coal is 5.0 to 6.5 ft (1.5 to 2.0 m) thick and heavily burned along the outcrop (sec. 25, T. 22 N., R. 13 W., and sec. 30, T. 22 N., R. 12 W.). Coal reserve calculations give the mesa 1.0 to 1.9 million short tons (0.91 to 1.72 million t) of strippable coal." They also estimate about 30 million short tons (27.2 million t) of strippable Menefee Formation coal for T. 22 N., R. 13 W. O'Sullivan, et.al., (1972) discuss the stratigraphic relationships of the Cretaceous rock units in the area. Beaumont, Shomaker, Stone and tohers (1976) discuss coals and environments of deposition in the Tsaya Canyon area of thier road log.

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° W. - S. 60° E. (Sears, Hunt, and Hendricks, 1941). The transgressive and regressive shoreline migrations are evidenced by 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 La Vida Mission quadrangle include some of the sedimentary units of Upper Cretaceous age. There is Quaternary alluvium and terrace gravels along drainages in the area. The Menefee Formation is exposed at the surface over most of the quadrangle and the Point Lookout Sandstone is present only in the subsurface in this 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). The Point Lookout Sandstone is composed of light gray to reddish-brown, fine to medium grained sandstone with interbedded shales and averages 130 ft (40 m) thick locally. The continental sediments deposited inland from the beach area during the 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 averages 400 ft (112 m) thick locally. The Allison Member represents continued continental sedimentation. Erosion has reduced the Allison Member to about 1,000 ft (305 m) thick in some areas, although the full thickness of the member approaches 1,600 ft (488 m). Intertonguing of the Allison Member with the overlying Cliff House Sandstone indicates the instability of the Cretaceous shorelines during transition from regressive to transgressive depositional conditions in this area.

The Cliff House Sandstone formed in a nearshore marine environment as the Cretaceous seaways advanced southwestward during the final transgression in the San Juan Basin. The Cliff House Sandstone crops out in the northern part of the quadrangle and consists of light gray, medium grained, locally calcareous sandstone with interbedded shales, and local coal beds. Erosion has reduced the unit to about 50 ft (15 m) thick locally.

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 is represented by 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 La Vida Mission quadrangle is in the Central Basin and Chaco Slope structural divisions in the southern portion of the structural depression known as the San Juan Basin (Kelley, 1950). No major structural

features are present in the quadrangle. The rock units dip from 1^{o} to 2^{o} N to NE. Dobbin (1932) did not map any faults in the area.

COAL GEOLOGY

In this quadrangle, the authors identified two coal beds and two coal zones from oil and gas well logs and Dobbin's (1932) reconnaissance mapping. These beds and zones are here informally called the Menefee Cleary No. 1 and No. 2 coal beds, Menefee Cleary coal zone, and the Menefee Allison coal zone.

The Menefee Cleary No. 1 bed is the first persistent coal bed above the Point Lookout Sandstone. It occurs 0 to 3 ft (0 to 0.9 m) above the Point Lookout Sandstone in this quadrangle, although in nearby areas it is up to 15 ft (5 m) above the Point Lookout Sandstone. The bed is inferred to be continuous, although it may be several individual beds that are stratigraphically equivalent. The Menefee Cleary No. 2 coal bed is 17 ft (5 m) above the Point Lookout Sandstone in this quadrangle.

The Menefee Cleary coal zone contains two beds which occur from 23 to 33 ft (7 to 10 m) above the Point Lookout Sandstone. These beds lack sufficient continuity with poorly defined stratigraphic position and cannot be designated as persistent coal beds. Dobbin (1932) mapped the trace of a coal zone which the author's identified as the Menefee Allison coal zone. No coal measurements are available for the zone, which occurs about 50 ft (15 m) below the Cliff House Sandstone. These coals occur in the approximate stratigraphic position of Shomaker, Beaumont, and Kottlowski's (1971) upper coal in this area.

There is a coal quality analysis of upper Allison Member coals from the La Vida Mission quadrangle. This analysis (sample 3; table 1) was reported by the U. S. Bureau of Mines (1971) as well as another analysis (sample 4; table 1), which is in the northern adjacent Tanner Lake quadrangle. Bauer and Reeside (1921) report an analysis from the abandoned Blakes mine, about 1 mi (1.6 km) north of the La Vida Mission quadrangle. Shomaker, Beaumont, and Kottlowski (1971) report an analysis of a pit sample of Allison Member coal, about 1.7 mi (2.7 km) north of the quadrangle. The Allison Member coals analyzed are probably similar in quality to the Cleary Coal Member and Allison Member coals in this quadrangle. Rank of the Cleary Coal Member and Allison Member seams is probably subbituminous A to high volatile C bituminous in this area.

Menefee Cleary No. 1 coal bed

The Menefee Cleary No. 1 bed was identified in both oil and gas well logs in this quadrangle. Each well log indicates the bed to be 3.0 ft (0.9 m) thick. Based on Menefee Cleary No. 1 coal data from the western adjacent The Pillar 3 SE quadrangle, the bed is inferred to thicken to 5.0 ft (1.5 m) in the western part of the La Vida Mission quadrangle. Existence and character of the Menefee Cleary No. 1 coal bed are unknown in the northern and southeastern parts of the quadrangle because of insufficient data.

Table 1. - Analyses of coal samples from the Allison Member of the Menefee Formation.

[Form of analysis: A, as received; B, moisture free; C, moisture and ash free]

Sample 1 from Shomaker, Beaumont, and Kottlowski, 1971

Sample 2 from Bauer and Reeside, 1921

Sample 3 and 4 from U. S. Bureau of Mines, 1971

Sample	Type of sample	Location Sec. T. N. R. W.	Form of analysis	Proximate analysis (percent) Moisture	Volatile matter	Fixed carbon	Ash	Sulfur	Heating Value (Btu/lb)
1	pit sample	SW¼SW¼ 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
2	mine sample (Blakes mine)	13 22 13	A	19.0	32.4	43.2	5.4	0.92	10,190
			B	----	40.0	53.3	6.7	1.14	12,590
			C	----	42.9	57.1	---	1.22	13,490
3	mine sample (unnamed)	NE¼SE¼ 23 22 13	A	16.0	38.4	41.4	4.2	1.0	11,100
			B	----	45.7	49.3	5.0	1.1	13,210
			C	----	48.1	51.9	---	1.2	13,900
4	mine sample (unnamed)	SW¼NW¼ 24 22 13	A	9.5	38.9	48.0	3.6	1.1	11,300
			B	----	42.9	53.1	4.0	1.2	12,490
			C	----	44.7	55.3	---	1.3	13,010

Remarks:

A moist, mineral-matter-free (MMMF) calculation using the Parr formula (American Society for Testing and Materials, 1973) yields heating values of 11,103 Btu/lb (25,826 kJ/kg; sample 1), 10,830 Btu/lb (25,191 kJ/kg; sample 2), 11,642 Btu/lb (27,079 kJ/kg; sample 3), and 11,774 Btu/lb (27,386 kJ/kg; sample 4). Sample 1 is nonagglomerating, but no agglomerating characteristics are available for samples 2, 3 or 4.

COAL RESOURCES

The U. S. Geological Survey requested a resource evaluation of the Menefee Cleary No. 1 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 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 50 percent for coal beds 200 to 3,000 ft (61 to 914 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 the 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 bed 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.

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. High, moderate, and low development potential areas have respective overburden values of 200 to 1,000 ft (61 to 305 m), 1,000 to 2,000 ft (305 to 610 m), and 2,000 to 3,000 ft (610 to 914 m).

Boundaries of coal development potential areas coincide with the boundaries of the smallest legal land subdivision (40 acres or 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) for the Menefee Cleary No. 1 coal bed for subsurface mining methods is shown in table 2.

The coal development potential maps are 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

Based on coal development potential criteria, all Federal coal land has unknown development potential for surface mining methods in the La Vida Mission quadrangle.

Development potential for subsurface mining methods and in situ gasification

The coal development potential for subsurface mining methods in the La Vida Mission quadrangle is shown on plate 8. Based on coal development criteria, all Federal coal lands have moderate or unknown subsurface mining potentials. Refer to table 3 for reserves and planimetered acreage, by section, for Federal coal lands with subsurface mining potential.

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 subsurface mining methods for Federal coal lands in the La Vida Mission quadrangle, San Juan and McKinley Counties, New Mexico.

[Development potentials are based on thickness of overburden. To convert short tons to metric tonnes, multiply by 0.9072].

Coal Bed	High Development Potential (200'-1,000' overburden)	Moderate Development Potential (1,000'-2,000' overburden)	Low Development Potential (2,000'-3,000' overburden)	Total
Menefee Cleary No. 1	---------	13,260,000	---------	13,260,000
Total	---------	13,260,000	---------	13,260,000

Table 3. - Reserves and planimetered acreage, by section, for Federal coal lands in the La Vida Mission quadrangle with subsurface 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)
Moderate	Menefee Cleary No. 1	29	22	13	42.6	120,000
		33			95.8	280,000
		4	21	13	215.9	640,000
		5			447.0	1,810,000
		8			440.0	1,680,000
		9			124.7	360,000
		17			240.2	750,000
		18	21	12	48.7	130,000
		20			272.1	830,000

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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.