Preliminary Report on the Geology and Mineral Resource Potential of the northern Rio Puerco Resource Area in Sandoval and Bernalillo Counties and Adjacent parts of McKinley, Cibola and Santa Fe Counties, New Mexico

by

Virginia T. McLemore,
Gretchen H. Roybal,
Ronald F. Broadhead,
Richard Chamberlin,
Robert M. North,
JoAnne Cima Osburn,
Brian W. Arkell,
Robert M. Colpitts,
Mark R. Bowie,
Kent Anderson,
James M. Barker,
and
Frank Campbell

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EXECUTIVE SUMMARY

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PREFACE

During the Spring, 1984, the U.S. Bureau of Land Management (BLM) and the New Mexico Bureau of Mines and Mineral Resources (NMBM&MR) entered a cooperative agreement to prepare a preliminary mineral-resource inventory and assessment of the northern Rio Puerco Resource Area (RPRA) including all of Sandoval and Bernalillo Counties and adjacent parts of McKinley, Cibola, and Santa Fe Counties. A previous study was completed by the NMBM&MR for Torrance County (McLemore, 1984) and a future study will cover Valencia, Cibola, McKinley, San Juan, and western Rio Arriba Counties.

This report is based upon time consuming analyses of all available data, published and unpublished, by a group of geologists and technical support staff. Without their assistance and cooperation this project would be impossible. In addition to the coauthors of the final report, other people at the NMBM&MR and BLM provided assistance, especially in reviewing the rough draft (see Acknowledgments).

The executive summary is a concise statement presenting the highlights of the final report. Although it is written by the principle investigator, much of the information is derived from sections written by the coauthors. Additional information concerning the various commodities can be obtained from the final report. Furthermore, the executive summary is organized differently from the final report in order to present more important commodities first. Therefore, the figures and tables are not in sequential order, but correspond to the same figures and tables in the text. Not all of the figures and tables from the final report are pertinent to the executive summary and are included only in the final report. The figures are reductions of over-sized ones which are available at 1:500,000 scale separately. In addition, 52 maps at 1:100,000 scale showing mineral occurrences, prospects, deposits, and mines and mineral-resource potential are available separately.

INTRODUCTION

The northern Rio Puerco Resource Area (RPRA) of the U.S. Bureau of Land Management (BLM) is an area of complex and diverse geology and contains numerous economic materials. The eastern San Juan Basin (Colorado Plateau) forms the western extent of the area in western Sandoval and Bernalillo and eastern McKinley and Cibola Counties (Fig. 1). The Nacimiento uplift separates the San Juan Basin from the Jemez Mountains (Valles and Toledo calderas) and Española Basin in northern Sandoval County. The Albuquerque Basin lies in the center of the RPRA and is bordered on the east by the Sandia, Manzanita, and Manzano Mountains and the Hagan Basin in Bernalillo, southern Sandoval, and western Santa Fe Counties (Fig. 1). Albuquerque is the largest city in the state and lies in central Bernalillo County. Rocks of Precambrian through Recent age occur in the area and many contain economic commodities.

A preliminary assessment of the mineral-resource potential involves integration and analyses of all available published and unpublished geologic, geochemical, geophysical, and economic data and a brief field reconnaissance by a group of geologists and commodity specialists. From the available data bases, known mineral occurrences, prospects, deposits, and mines were located and mineral deposit types identified. Geologic, geochemical (NURE element distribution and geochemical anomaly maps), mineral occurrence, and geophysical (radiometric, magnetic, and gravity) maps were compiled and interpreted to delineate areas of potential mineralization.

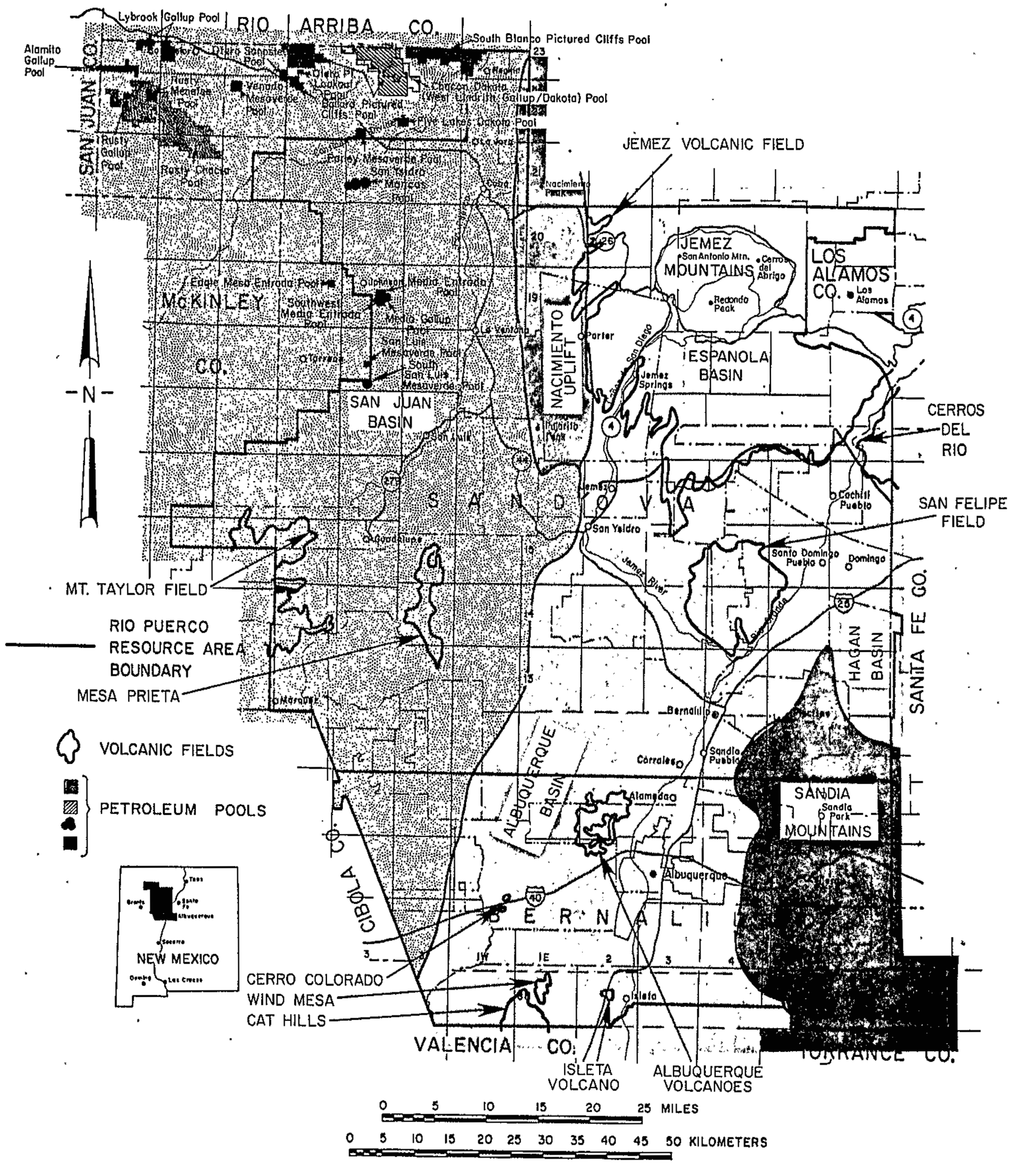

FIGURE 1 - PHYSIOGRAPHIC PROVINCES AND PETROLEUM POOLS IN THE NORTHERN RIO PUERCO RESOURCE AREA.

Mineral-resource potential is an assessment of the favorability or probability that a commodity will occur in substantial concentrations in a given area that can be exploited under current or future economic conditions. Mineral-resource potential is independent of the feasibility of extracting the minerals, accessibility of the minerals, or other factors that could preclude economic development of the minerals.

A simple and subjective classification of high, moderate, low, very low, or unknown is assigned. A high mineral-resource potential exists in areas of known mines or prospects where geologic and economic data indicate an excellent probability that economic mineral deposits occur there. Typically, a high classification is assigned to areas currently undergoing mining or active exploration in known mining districts or known areas of mineralization. A moderate mineral-resource potential exists in areas where geologic and economic data suggest a good possibility that undiscovered deposits occur in formations or geologic settings known to contain economic deposits in similar geologic settings elsewhere. Low mineral-resource potential exists in areas where available data imply the occurrence of mineralization, but indicates a low favorability. Very low mineral-resource potential is reserved for areas where sufficient information indicates that an area is unfavorable for economic deposits. A classification of unknown mineral-resource potential is assigned to areas where either necessary geologic, geochemical, geophysical, and economic data are inadequate to otherwise classify an area that may contain mineral deposits or where any other classification (high, moderate, low, very low) would be misleading. Some areas in the RPRA have not been evaluated for specific commodities because of lack of useable data. These areas are not classified as a very low mineral-resource potential because lack of data does not imply no minerals or other commodities in that region. Additional work is needed in these areas.

In addition to evaluation of the mineral-resource potential, the potential for development is classified simply as high, moderate, or low. High potential for development indicates that the area is currently producing a commodity or production is economically feasible in the near future. Moderate potential exists in areas where production would become feasible if certain geologic or economic conditions become favorable. Low potential occurs in areas where only a slight chance of production, if any, exists.

MINING HISTORY

Earliest mining in the northern RPRA occurred during prehisotric times by the Southwest Indians. Building stone, chert, pottery clay, mineral pigments, adobe, and gypsum are common in the area and were utilized by the Indians for centuries (Elston, 1967; Northrop, 1959). The Spanish introduced metals during the sixteenth century and early documents are filled with rumors of hidden Indian silver and gold mines throughout the mountain ranges in the RPRA (Kelley and Northrop, 1975; Elston, 1967; Northrop, 1959; D. Murray, unpublished manuscript, 1984).

Serious attempts of metal mining did not begin until the arrival of the Atchison, Topeka, and Santa Fe Railroad in 1880. The railroad not only provided transportation but required large amounts of crushed rock for ballast and road bed and tremendous amounts of coal for fuel. The metal mines could now be mined economically, but only during times of high metal prices.

Over $ 2 million worth of gold, silver, copper, lead, zinc, uranium, manganese, and molybdenum have been produced (Table 2) from a number of mining districts within the RPRA (Fig. 13). In addition, over $35 million worth of sand and gravel, coal, cement, gypsum, peat, uranium, pumice, clays, stone, copper, silver, manganese, and gemstones have been produced from 1952 to 1980 (Tables 3 and 4). Over 4 million barrels of oil and 24 billion cubic feet of gas also have been produced.

Currently hundreds of mining claims and leases cover portions of the northern RPRA (Figs. 14 and 15). Many of these claims are in the vicinity of known mining districts (Fig. 13).

Table 2 - Total value of known or estimated metal production in the northern Rio Puerco Resource Area.

Mining district	Years of production	Total value ($)	Commodities produced
Cuba Mn	1942-1959	250,000[1]	Mn
Gallina[2]	1956	230	U, V
Nacimiento[2,3]	1880-1964	800,000[1]	Cu, Ag
La Ventana-Collins	1954-1957	13,808	U, V
Jemez Springs	1928-1937	4,138	Cu, Ag, Au
Cochiti	1894-1963	1,321,920	Ag, Au, Cu, Pb
Placitas	1904-1961	2,329	Ag, Au, Cu, Pb, Zn
Tijeras Canyon-Coyote-Hells Canyon	1909-1952	4,179	Pb, Au, Ag, Cu
Marquez-Bernabe Montaño area (Grants district)	1979-1980	W	U, Mo
TOTAL (excluding W)	1894-1980	2,396,604	----

W - withheld due to proprietary information
1 - estimate from Elston (1967)
2 - Sandavol County only
3 - does not include production from 1971 to 1975

Table 3 - Total value of mineral production in Bernalillo County, New Mexico, 1952 to 1980. Compiled from U.S. Bureau of Mines (1952-1980).

Year	Value (dollars)[1]	Commodities
1952	355,751	----
1953	615,380	sand and gravel, pumice, coal
1954	1,361,136	sand and gravel, pumice, pumicite, clays, stone
1955	989,301	sand and gravel, stone, clays
1956	1,252,002	sand and gravel, stone, clays, gemstones
1957	833,300	sand and gravel, clays
1958	1,670,169	sand and gravel, stone, pumice, clays
1959	4,954,799	sand and gravel, cement, stone, pumice, clays
1960	6,364,524	sand and gravel, cement, stone, clays, gypsum, pumice, gemstones
1961	7,697,669	sand and gravel, cement, stone, clays, gypsum, pumice, gemstones
1962	7,489,578	sand and gravel, cement, stone, clays, gypsum, pumice
1963	10,219,570	cement, sand and gravel, stone, clays, pumice
1964	8,765,430	cement, sand and gravel, stone, clays, pumice
1965	8,614,631	cement, sand and gravel, stone, clays, pumice
1966	9,087,986	cement, sand and gravel, stone, clays, pumice
1967	7,390,000	cement, sand and gravel, stone, clays, pumice
1968	10,264,000	cement, sand and gravel, stone, clays, pumice
1969	8,675,000	cement, sand and gravel, stone, clays
1970	8,198,000	cement, sand and gravel, stone, clays
1971	11,802,000	cement, sand and gravel, stone, clays
1972	13,876,000	cement, sand and gravel, stone, clays
1973	15,973,000	cement, sand and gravel, stone, clays
1974	16,400,000	cement, sand and gravel, stone, clays
1975	W	cement, sand and gravel, stone, clays
1976	21,012,000	cement, sand and gravel, stone, clays
1977	28,506,000	cement, sand and gravel, stone, clays
1978	29,744,000	cement, sand and gravel, stone, clays
1979	26,660,000	cement, sand and gravel, stone, clays
1980	25,020,000	cement, sand and gravel, stone, clays
TOTAL 1952-1980	293,791,226	(does not include W value)

[1] W = withheld

Table 4 - Total value of mineral production in Sandoval County, New Mexico, 1952-1980. Compiled from U.S. Bureau of Mines (1952-1980).

Year	Value (dollars)[1]	Commodities
1952	W	----
1953	100,110	sand and gravel, pumice, coal
1954	71,173	sand and gravel, pumice and pumicite, coal
1955	101,942	sand and gravel, pumice and pumicite, copper, coal, stone, silver
1956	164,631	sand and gravel, pumice, copper, manganese ore, coal, stone, silver
1957	313,269	sand and gravel, copper, pumice, petroleum, manganese ore and concentrate, coal, silver, uranium ore, gemstones
1958	487,187	sand and gravel, pumice, petroleum, manganese ore and concentrate, coal, gemstones
1959	237,627	sand and gravel, pumice, petroleum, manganese ore and concentrate, coal, uranium ore, copper, gemstones, silver, lead
1960	261,311	sand and gravel, pumice, petroleum, gypsum, coal, copper, gemstones, silver, lead
1961	348,655	sand and gravel, gypsum, petroleum, pumice, coal, copper, lead, zinc, silver
1962	525,343	sand and gravel, gypsum, petroleum, pumice, coal
1963	1,461,329	sand and gravel, gypsum, pumice, petroleum, coal, silver
1964	1,027,809	sand and gravel, gypsum, pumice, petroleum, coal, silver, gold
1965	782,121	gypsum, sand and gravel, petroleum, pumice
1966	1,033,734	sand and gravel, gypsum, pumice, petroleum, stone, natural gas
1967	801,000	gypsum, pumice, sand and gravel, petroleum, stone, coal, natural gas, copper, silver
1968	976,000	sand and gravel, gypsum, petroleum, pumice, peat, natural gas
1969	715,000	gypsum, sand and gravel, petroleum, pumice, natural gas, peat, stone
1970	829,000	gypsum, sand and gravel, petroleum, pumice, natural gas, peat, stone
1971	2,836,000	copper, gypsum, petroleum, natural gas, sand and gravel, silver, peat, pumice, clay, stone, zinc
1972	8,544,000	copper, sand and gravel, petroleum, gypsum, natural gas, silver, peat, pumice, clays, zinc
1973	12,384,000	copper, sand and gravel, stone, gypsum, petroleum, natural gas, silver, peat, clays, pumice, gold, zinc
1974	11,005,000	copper, petroleum, natural gas, gypsum, silver, clays, peat, sand and gravel, pumice, gold, zinc
1975	3,677,000	petroleum, stone, natural gas, gypsum, sand and gravel, pumice
1976	5,043,000	petroleum, natural gas, sand and gravel, gypsum, copper, pumice, stone, silver, gold
1977	1,190,000	gypsum, peat, sand and gravel, pumice
1978	W	gypsum, sand and gravel, peat, pumice
1979	3,277,000	gypsum, sand and gravel, peat, pumice
1980	1,453,000	gypsum, sand and gravel, stone, peat, pumice
TOTAL 1952-1980	59,646,241 (does not include W values)	

[1] W = withheld

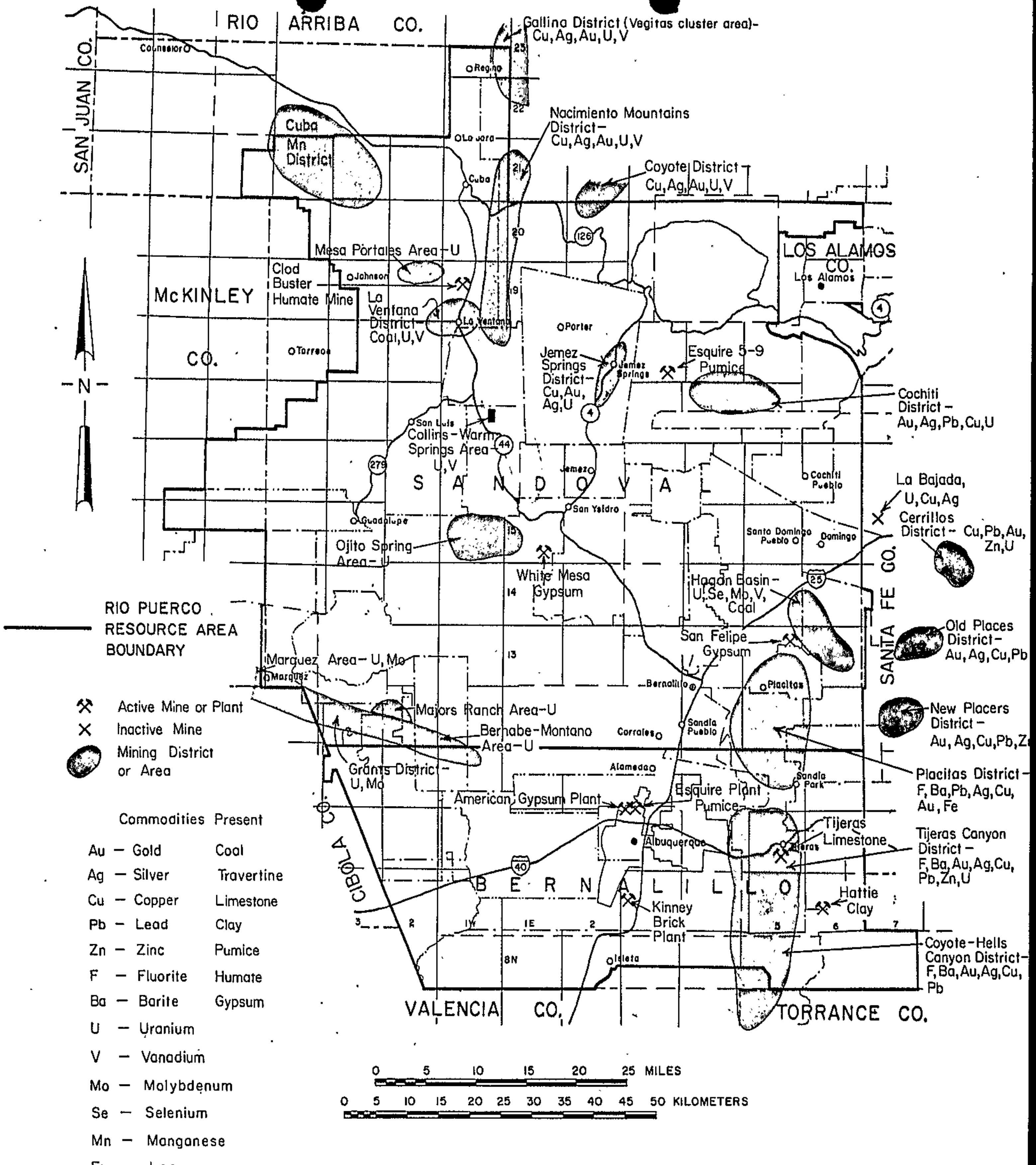

FIGURE 13 — MINING DISTRICTS IN THE NORTHERN RIO PUERCO RESOURCE AREA.

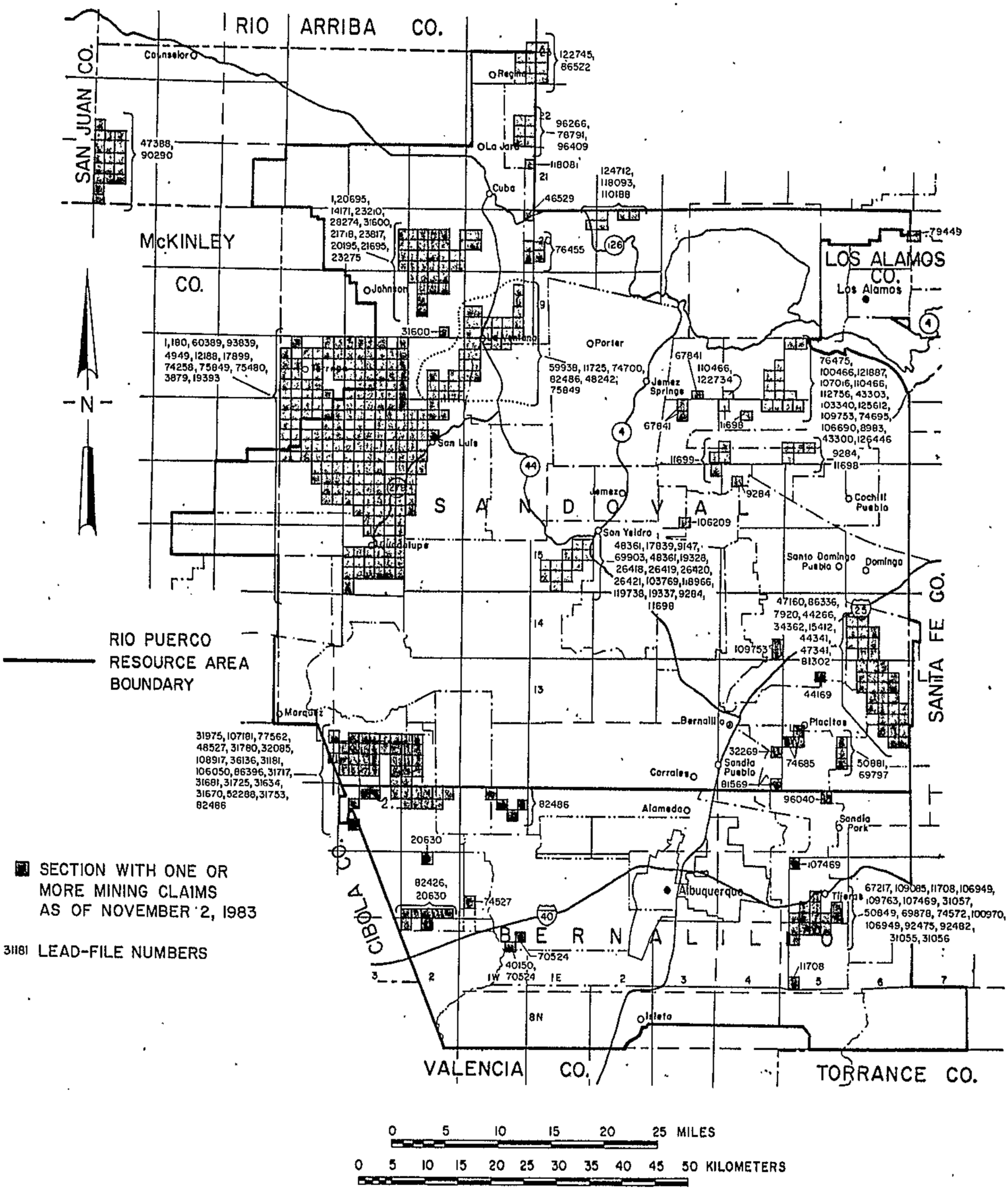

FIGURE 14 - SECTIONS WITH ACTIVE MINING CLAIMS IN THE NORTHERN RIO PUERCO RESOURCE AREA.

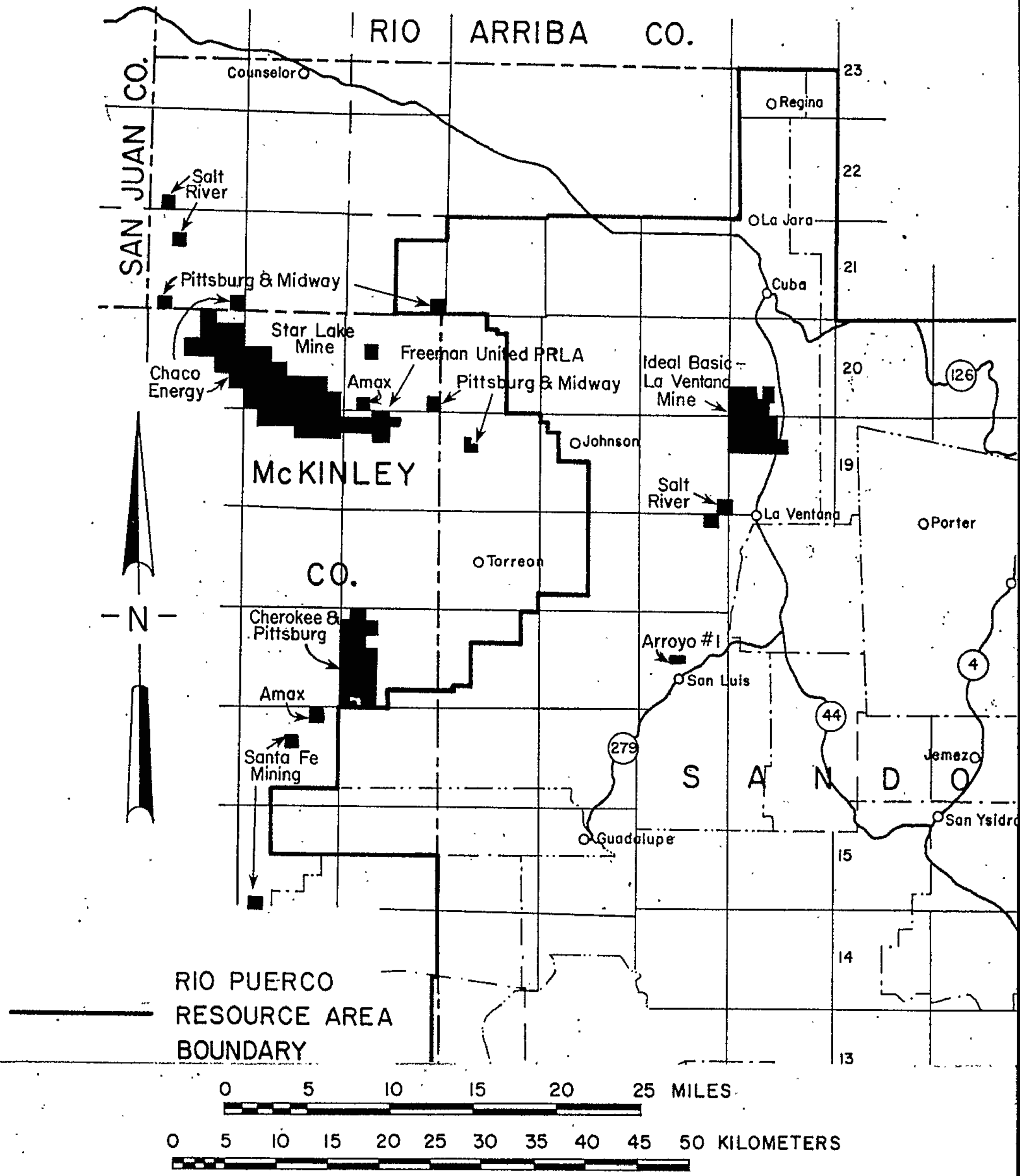

FIGURE 15 - PRESENT COAL MINES AND COAL LEASES (ADAPTED FROM BEAUMONT & COLLINS, 1982.)

Despite the large number of mining claims, no metal, coal, or uranium mines are currently producing. However, petroleum and industrial materials are being produced. Twenty-two sand and gravel operators are currently registered with the State Mine Inspector. Adobe manufacture continues in warm months in Sandoval and Bernalillo Counties. Ideal Cement Co. is currently operating at about 62% capacity. Three gypsum operations are active in the RPRA, but only one pumice mine is producing. Kinney Brick Co. continues producing bricks for the Albuquerque area and one humate mine is supplying humate as a soil conditioner. Most federal land open to petroleum leasing has probably been leased and exploration continues. Many oil and gas pools are currently producing and the future in petroleum discovery is promising.

MINERAL-RESOURCE POTENTIAL

The mineral-resource potential for various commodities in the northern RPRA are summarized in Table 42. Petroleum is the most important commodity in the RPRA, although high potential exists for sand and gravel, gypsum, humates, coal, uranium, geothermal, limestone and clay, and barite-fluorite-galena mineralization.

Petroleum

The most important commodity in the RPRA is petroleum in the San Juan Basin in northwestern Sandoval County where oil and gas are produced from Jurassic and Cretaceous rocks in 17 oil pools, 3 gas pools, and several additional wells (Fig. 27). Jurassic and Cretaceous rocks are probably the sources for oil and gas produced, but it is possible that some petroleum source rocks occur in marine limestones and shales of the Magdalena Group (Pennsylvanian). The greatest potential for undiscovered petroleum accumulations is in stratigraphic and/or hydrodynamic traps in the Entrada Sandstone and Upper Cretaceous sandstones.

The resource potential for petroleum is high northwest of the outcrop belt of the Point Lookout Sandstone (Fig. 28), because (1) four rock units are productive in this area (Entrada Sandstone, basal Niobrara sandstones, upper Mancos sandstones, and Pictured Cliffs Sandstones) and (2) petroleum shows in these units are common (Fig. 28). Southeast of the outcrop belt in the San Juan Basin, the resource potential is moderate, because (1) no production and only a few shows occur (Entrada Sandstone, Dakota Sandstone, and Magdalena Group), (2) potential reservoirs

Table 42 - Summary of mineral-resource potential in the northern Rio Puerco Resource Area. See Figures 21, 22, 23, 25, 26, and 28.

Commodity or type of deposit	Formation	Geographic location	Mineral-resource potential
Stratabound, sedimentary copper deposits (± Ag, Au, U, V, Pb, Zn)	Agua Zarca Sandstone Member (Chinle Formation)	Nacimiento Mountains	moderate
	Abo Formation (± Madera Group)	Nacimiento Mountains Jemez Springs, Gallinas, Coyote, Placitas, and Tijeras Canyon districts	low to moderate
Au-Ag veins	Bland Group	Cochiti district	high
		southern Jemez Mountains	unknown
with Te, Sb		Cochiti district	unknown
Ag-Pb veins	Precambrian	La Luz	moderate
Base-metal veins	Precambrian, Madera Group	Montezuma	low to moderate
		Tijeras Canyon district	low to moderate
Placer gold	Quaternary	northern Placitas district	unknown
	Quaternary	west drainages of Sandia, Manzanita, and Manzano Mountains	unknown
Au-Ag and massive sulfide deposits	Precambrian greenstones	Tijeras Canyon-Coyote Canyon district	moderate
		subsurface in northeast-belt in southern Bernalillo County	unknown
Barite-fluorite-galena (± silver)	Madera Group	Tunnel Springs, Landsend	high
	Madera Group	Montezuma	low to moderate
	contact between Precambrian and Madera Group	Sandia Mountains	unknown
Barite-fluorite-galena (± silver) and fluorite-galena veins	Precambrian and Madera Group	Tijeras Canyon-Coyote Canyon district	low to moderate
Manganese (± uranium)	San Jose Formation	west of Cuba	low
Adobe	Quaternary	streams and terraces	high
Building stone	Paleozoic, Precambrian	Sandia, Manzanita, Manzano, and Nacimiento Mountains	low to moderate
Bitumens	Pennsylvanian, Jurassic Cretaceous, Tertiary	entire Resource Area	very low
Carbon dioxide	---	San Juan Basin, Jemez Mountains	very low to low
Clays			
Portland Cement	Pennsylvanian	Tijeras Canyon	high
Bricks	Pennsylvanian	Southeast Bernalillo County	
	Cretaceous	Tongue area	moderate
Gypsum	Jurassic Todilto Formation	San Juan Basin, San Felipe Pueblo	high
		Cañoncito	low
Humate	Cretaceous	San Juan Basin	high
Limestone	Madera Group	Tijeras Canyon	high
	Pennsylvanian, Permian, Jurassic	---	high
Mica	Precambrian	Sandia, Nacimiento Mountains	low
Perlite	Bandelier Tuff	Jemez Mountains	low
Pumice	Bandelier Tuff	Jemez Mountains	low to high
Quartz	Precambrian	Sandia, Manzano Mountains	low to moderate
Sand and gravel	Quaternary	---	high
Scoria	Tertiary	Cat Hills	moderate
Semi-precious Stones	---	---	low to unknown
Silica sand	Glorieta Sandstone	Nacimiento Mountains, Hagan Basin	low to moderate
Sulfur	Tertiary-Quaternary	Jemez Mountains	moderate
Travertine	Quaternary	Nacimiento, Jemez Mountains	moderate

Table 42 (cont'd)

Commodity or type of deposit	Formation	Geographic location	Mineral-resource potential
Uranium	Morrison Formation	Marquez-Bernabe Montaño areas	high
		adjacent to Marquez-Bernabe Montano areas	moderate
		Nacimiento Mountains (Dennison Bunn, Collins-Warm Springs)	moderate
		Majors Ranch and Ojito Springs areas	low to moderate
		middle San Juan Basin	low
	Dakota and Menefee Formation	Butler Brothers mine	moderate
		La Ventana area	moderate
	Ojo Alamo Sandstone	Mesa Portales	low to moderate
	Galisteo Formation	Hagan Basin	moderate, low to moderate
	Precambrian	Manzano Mountains	unknown
Coal	Cretaceous	Tijeras field	low
	Mesaverde Group	Rio Puerco field	low
	Crevasse Canyon Formation	East Mt. Taylor field	low to moderate
	Menefee Formation	La Ventana field	high
	Menefee Formation	Chacra Mesa field	high
	Menefee Formation	San Mateo field	high
	Menefee Formation	Hagan and Placitas fields	low to moderate
	Fruitland Formation	Star Lake	high
Geothermal	---	Jemez Mountains	low to high
	---	Rio Grande rift	low to high
	---	San Juan Basin	low
Petroleum	Entrada, Dakota, Sanostee, Gallup, Mancos, Menefee, Mesaverde, Graneros	San Juan Basin	moderate to high
		Albuquerque and Hagan basins	moderate
		Española Basin	low
		Sandia Mountains	low to zero
		Nacimiento Uplift	low to zero, unknown
Oil shales	Jurassic, Cretaceous	---	very low

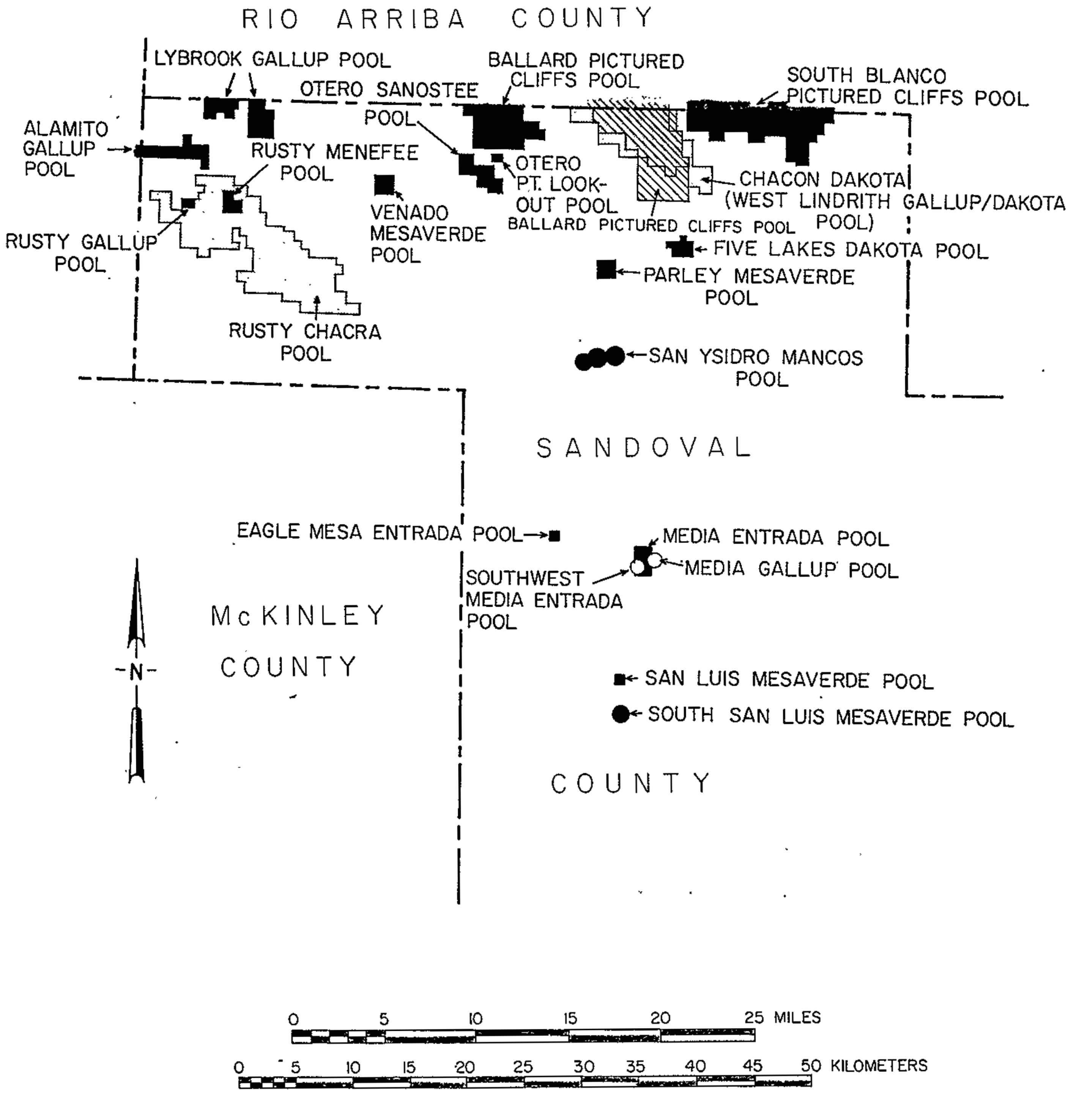

FIGURE 27 – PETROLEUM POOLS IN SANDOVAL COUNTY

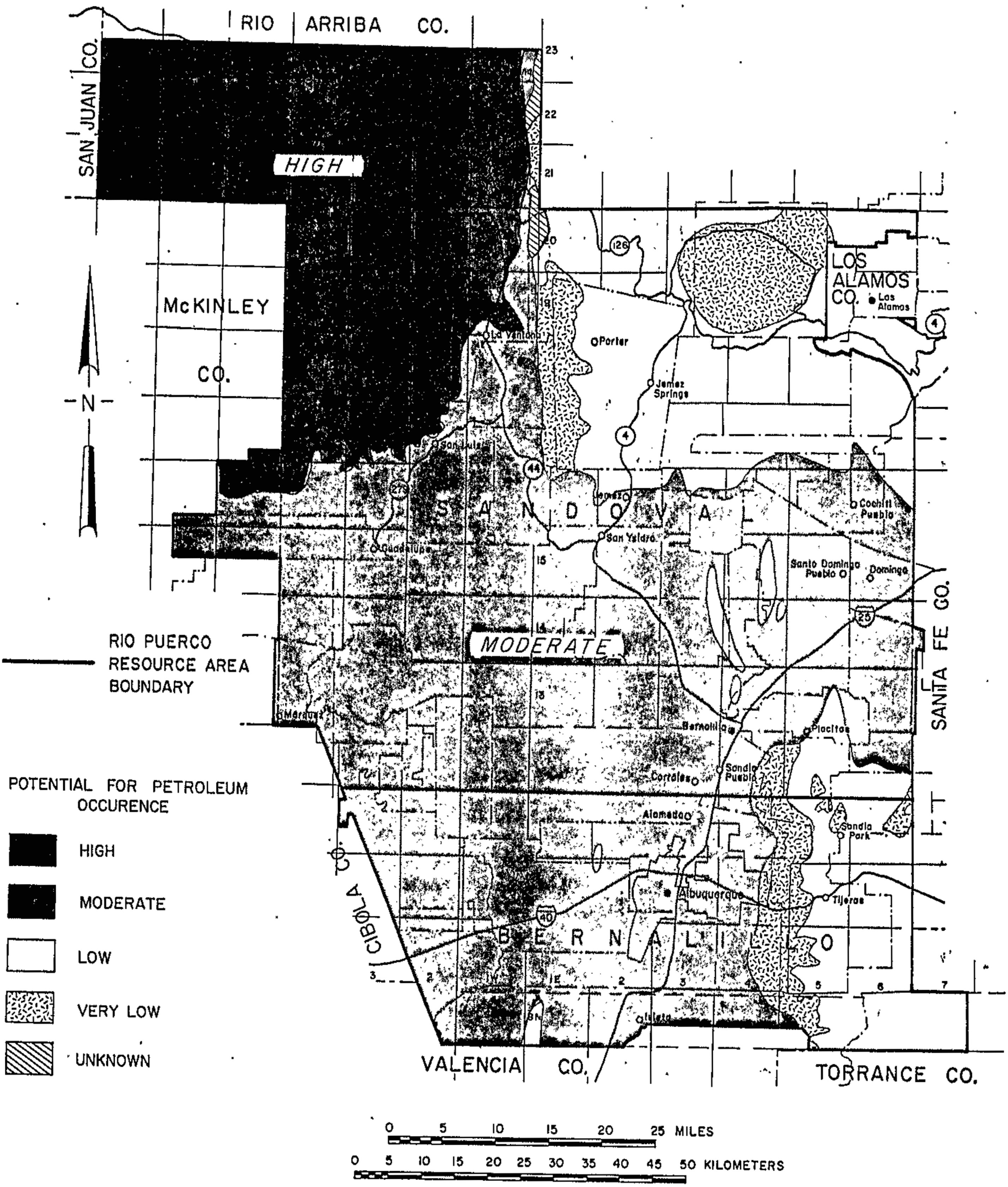

FIGURE 28 – PETROLEUM RESOURCE POTENTIAL IN THE NORTHERN RIO PUERCO RESOURCE AREA.

(Pictured Cliffs Sandstone, Point Lookout, Chacra, Hosta Sandstone, and basal Niobrara Sandstones) have been removed by erosion, (3) potential reservoirs crop out in the area allowing possible flushing by groundwater, and (4) the area lies structurally updip from known source rocks.

Oil and gas shows occur in several wells drilled in the Albuquerque and Hagan Basins, although petroleum has not been produced from the area. The best reservoirs in these basins are Upper Cretaceous marine and fluvial sandstones, whereas potential source rocks include bituminous shales of the Magdalena Group, limestones of the Todilto Formation, and Upper Cretaceous bituminous marine shales. The resource potential for petroleum is moderate (Fig. 28).

The resource potential for petroleum is very low where Precambrian basement rocks crop out or are close to the surface in the Sandia and Nacimiento Mountains (Fig. 28). However, the petroleum resource potential is unknown in two areas in the northwestern Nacimiento Mountains where magnetic data indicate anomalously nonmagnetic basement rocks. These magnetic anomalies suggest thin thrust sheets of Precambrian basement rock may overlie Paleozoic or Mesozoic rocks. There are good possibilities for structural traps to occur in these zones if overthrust relationships actually exist. Elsewhere in these mountains, the petroleum resource potential is low because of thin sedimentary cover.

Although the RPRA part of the Española Basin has not been drilled for petroleum, the resource potential is low (Fig. 28). It is likely that extensive Tertiary volcanism in the RPRA part of the basin has raised paleotemperatures above the preservation limits of oil, wet gas, and possibly dry gas.

Industrial Materials

Industrial materials are probably the second most important type of commodity in the RPRA. They are a highly diverse and specialized group of materials and a number of them are produced in the RPRA, in part due to the proximity to Albuquerque. Many types of industrial materials occur in the RPRA, however, they are not always a resource because of lack of a market, competitive prices elsewhere, or specifications cannot be met. These uneconomic commodities are discussed in the final report because some of them may become resources with a change in the economy, technological developments, or specific requirements desired by the consumer.

Construction materials are very important to the Albuquerque region. Sand and gravel and other types of aggregate (limestone, dolomite) are plentiful in the northern RPRA. Sand and gravel are produced from young terrace and pediment deposits of the Rio Grande floodplain. Limestone and dolomite are produced from Paleozoic rocks and the Todilto Formation (Jurassic). The resource potential for sand and gravel, limestone, and dolomite is high over large portions of the RPRA (Fig. 22). Cement has been manufactured by Ideal Cement Co. in the Tijeras Canyon area since 1959 and is the only cement plant in the state. Limestone and clay are mined from the Madera Group in Tijeras Canyon where the resource potential is high (Fig. 22).

Building materials such as wallboard, blocks, and bricks are

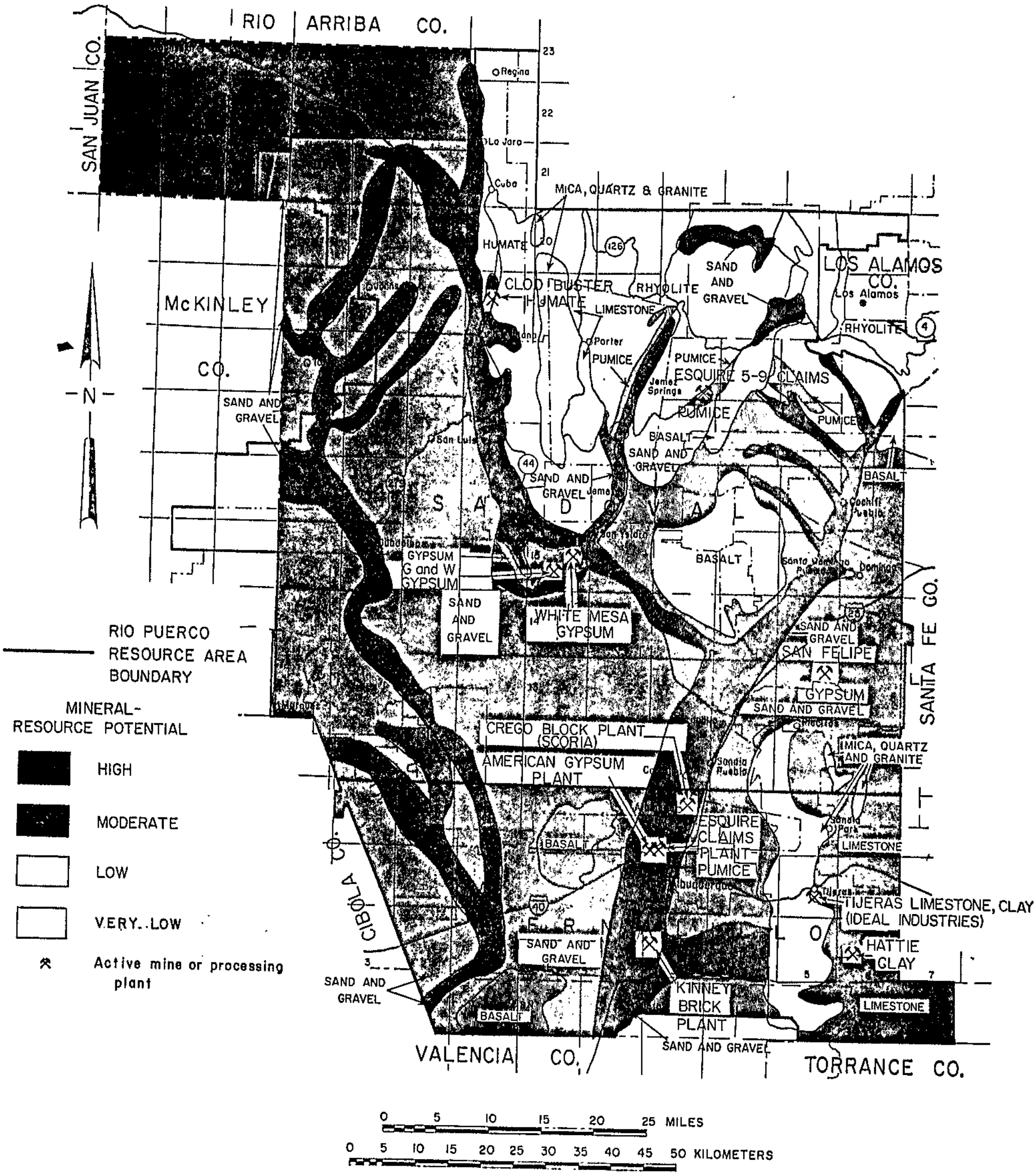

FIGURE 22-MINERAL-RESOURCE POTENTIAL FOR INDUSTRIAL MATERIALS IN NORTHERN RIO PUERCO RESOURCE AREA.

manufactured in the RPRA from available materials. Gypsum from the Todilto Formation is used in producing wallboard and other related materials. The resource potential is high in central Sandoval County, where much of the gypsum is produced (Fig. 22). Gypsum also occurs in the Todilto Formation in the Cañoncito area where the resource potential is low because of little outcrops and steep dip. Blocks are manufactured from pumice from the Bandelier Tuff in the Jemez Mountains. The resource potential is high in the immediate area but low to moderate elsewhere in the Jemez Mountains due to extensive overburden (Fig. 22). Although the Crego Block Co. in Albuquerque is producing blocks from scoria, no scoria is produced within the RPRA. Scoria does occur in the Cat Hills Volcanics in southern Bernalillo County, but the mineral-resource potential is moderate because no high-quality deposits have been delineated. Brick clay is mined from the Hattie mine in Bernalillo County by the Kinney Brick Co. Clay occurs in the Madera Group and the resource potential is high (Fig. 22). The resource potential for sediments and soils needed to produce adobe also is high in the RPRA. Several adobe operations produce adobes from Quaternary deposits of the Rio Grande.

The mineral-resource potential for building stone is low to moderate in the northern RPRA. Limestone, sandstone, granite, and other suitable Precambrian rocks, and the Bandelier Tuff are ideal for building materials; however, building stone is a labor intensive operation and with the availability of other building materials, stone is not in high demand.

Humates are produced in the RPRA for soil conditioners from coals and carbonaceous shale in the Menefee Formation in northern Sandoval County. The resource potential is high in that area (Fig. 22).

Barite and fluorite occur in vein deposits along faults and fractures in the Madera Group and along the unconformity between Precambrian basement rocks and Paleozoic rocks in the Sandia and Manzanita Mountains. The resource potential for barite is high in the Tunnel Springs and Landsend areas in the Placitas district, Sandia Mountains and unknown in the Placitas Basin (Fig. 21). Unfortunately, the potential for development is low because of wilderness designation and high, rugged topography.

Coal

Although coal is not currently produced in the RPRA, past production has amounted to over 452,000 tons. The RPRA contains many outcrops of Cretaceous coal-bearing sequences both in the San Juan Basin and the Hagan-Tijeras Basin (Fig. 24).

Most areas of the La Ventana field have a high mineral-resource potential (Fig. 25) where coal occurs in the Allison and Cleary Coal Members of the Menefee Formation (Cretaceous). Coal seams average 5.2 ft (1.6 m) thick, but may range in thickness up to 7.4 ft (2.3 m). Past production, low dip of beds, and drill hole data indicate a high potential.

A high coal resource potential occurs in the Chacra Mesa and San Mateo fields (Fig. 25) where coal occurs in the Cleary Coal Member. A few Allison Member coals occur in the Chacra Mesa field. Although very little mining has occurred in these areas, a high potential is indicated by outcrop and drill hole data.

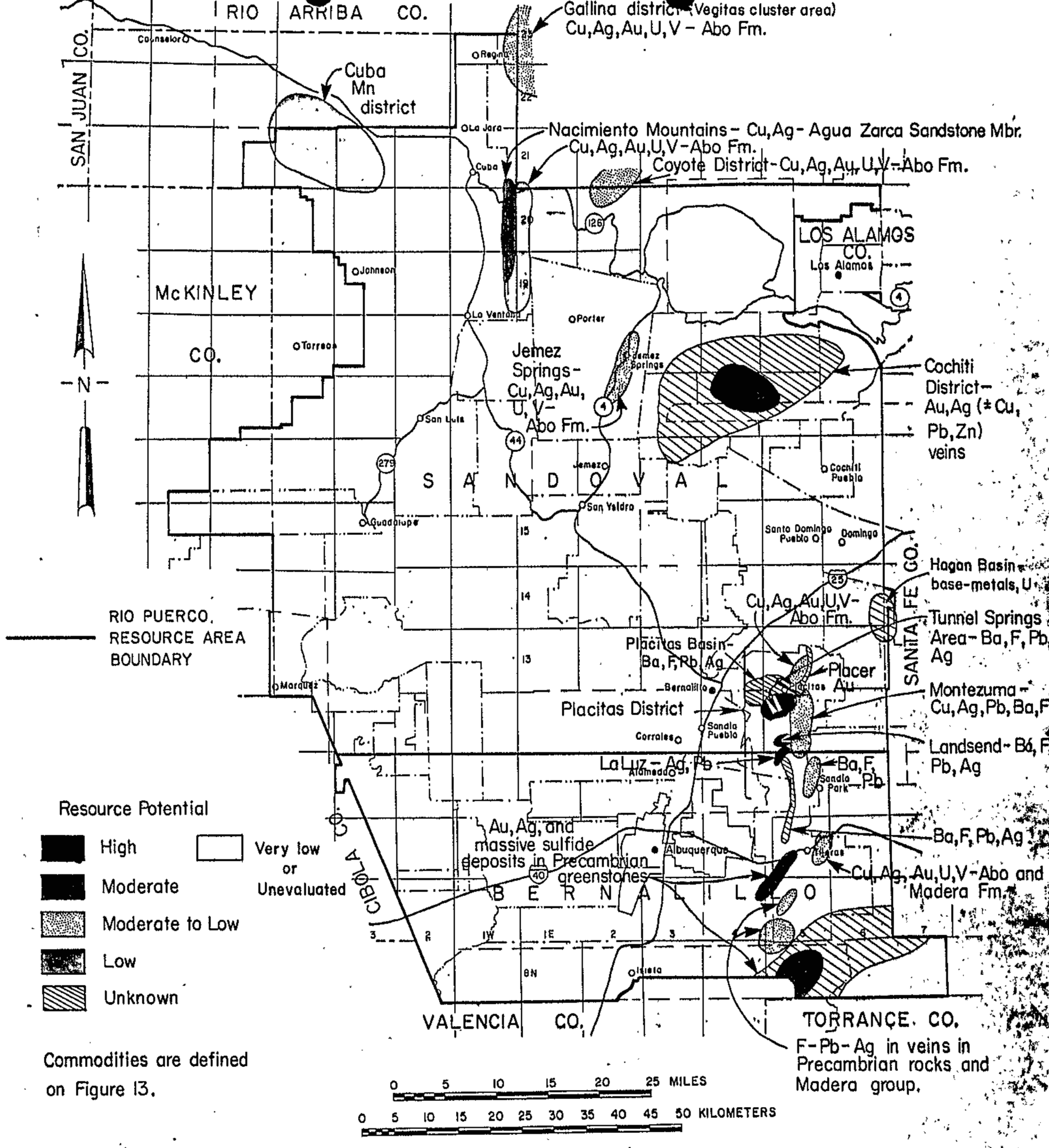

FIGURE 21 - MINERAL-RESOURCE POTENTIAL FOR METALS, BARITE, AND FLUORITE IN NORTHERN RIO PUERCO RESOURCE AREA.

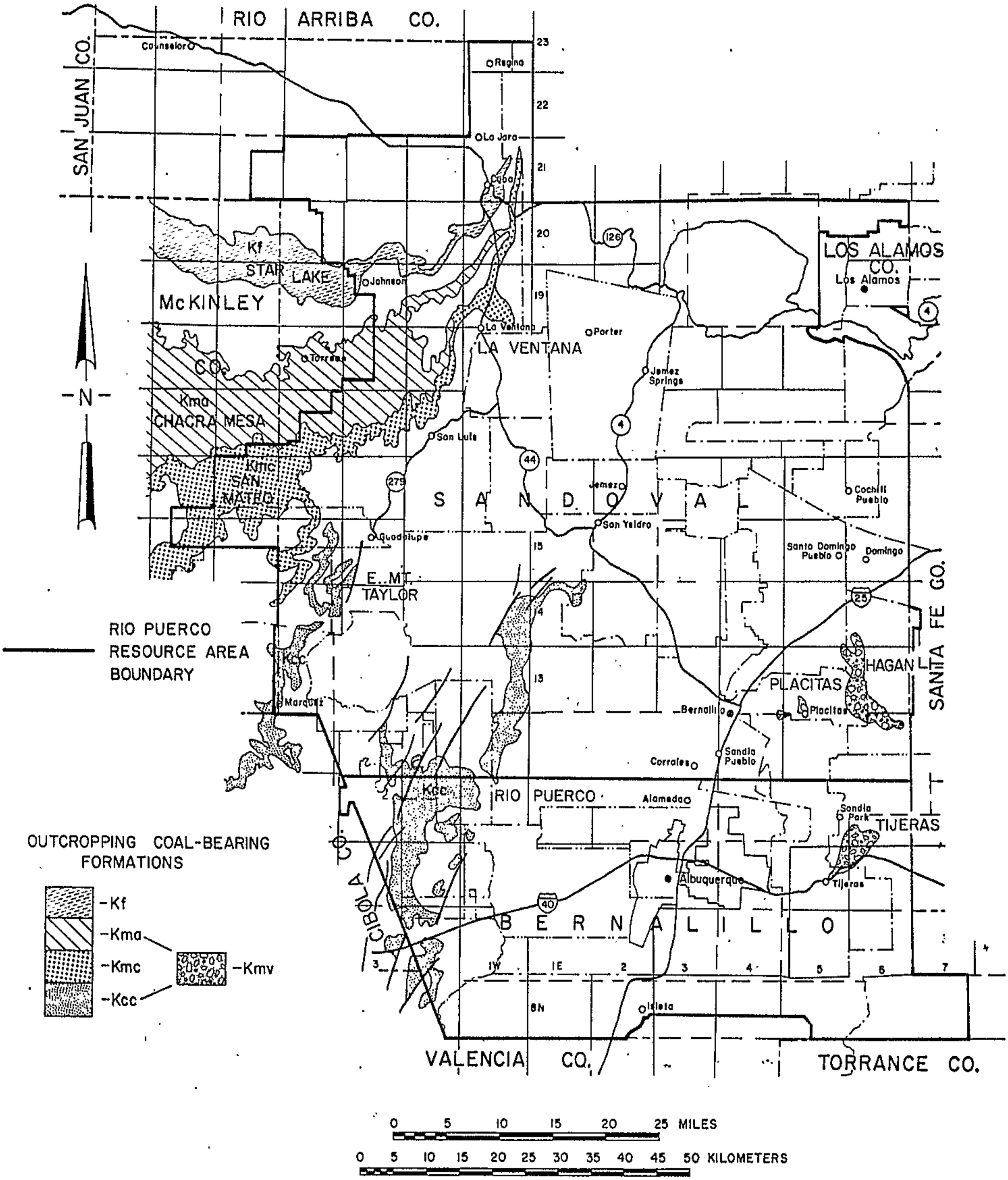

FIGURE 24 - OUTCROPPING COAL-BEARING FORMATIONS
(ADAPTED FROM SHOEMAKER, BEAUMONT, AND KOTTLOWSKI, 1971, AND KELLEY AND NORTHROP, 1975)

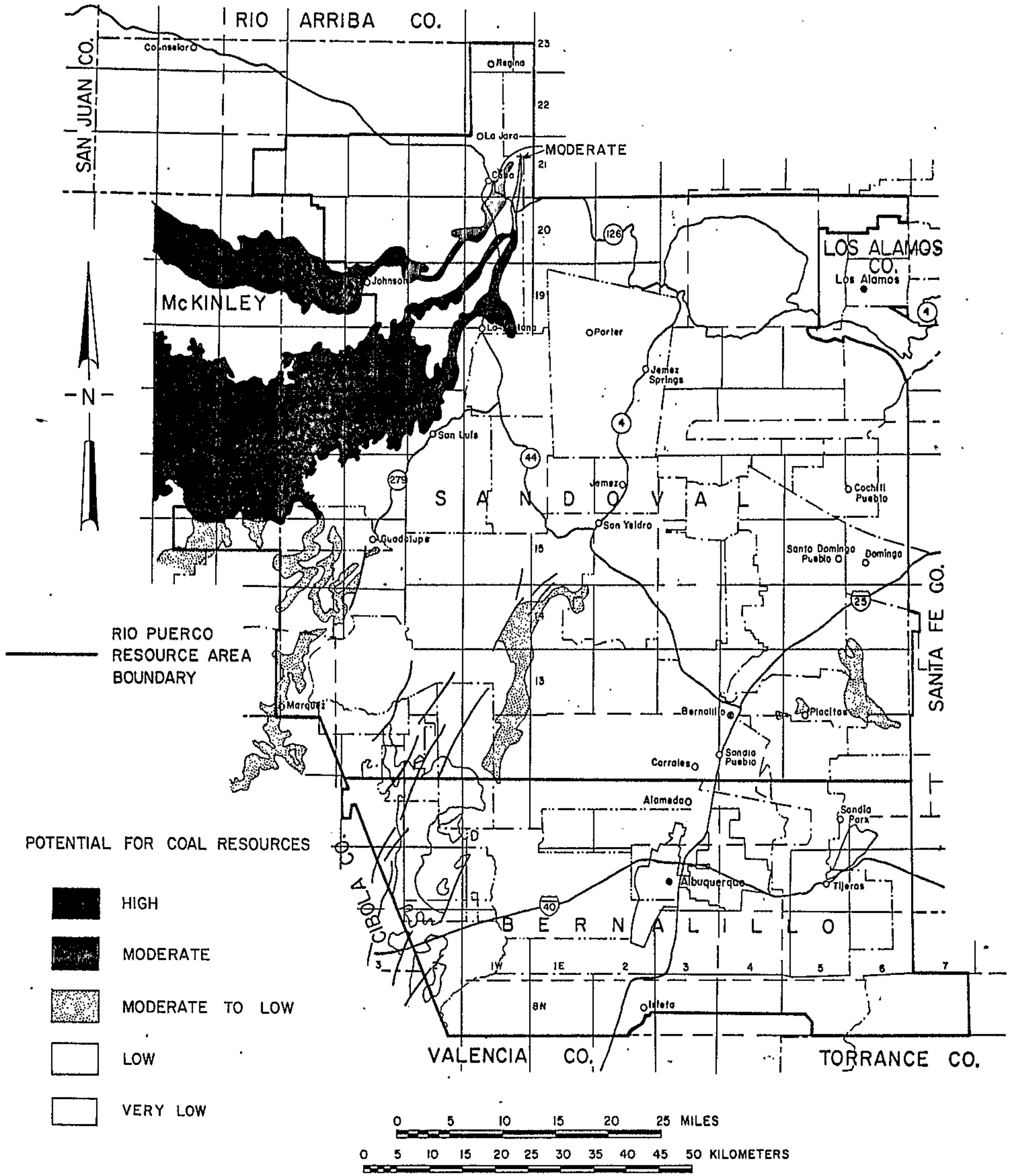

FIGURE 25 - COAL RESOURCE POTENTIAL
(FROM MEMOIR 25, KELLEY & NORTHROP, 1975; BEAUMONT, 1984)

The coals are approximately 3 ft (0.9 m) thick in the San Mateo field and 2.5-13.7 ft (0.8-4.2 m) thick in the Chacra Mesa field. Development of these fields depends upon construction of a railroad.

The coal resource potential in the Fruitland Formation (Cretaceous) in the Star Lake field is high (Fig. 25). Thickness of the coal seams average 8.5 ft (2.6 m) with maximum thickness of 22 ft (6.7 m) common. Unfortunately, the quality of these coals is poor compared to elsewhere in the San Juan Basin.

At the East Mount Taylor field, coal occurs in the Gibson Coal Member of the Crevasse Canyon Formation (Cretaceous). Coals average 1.7 ft (0.5 m) thick. Although very little drill hole data is available from this area, the resource potential is low to moderate because of (1) previous mining, (2) few faults, and (3) low dip of the beds.

The resource potential for coal in the Hagan field is also low to moderate. Low sulfur coal from the Menefee Formation (Cretaceous) averages 0.5-5 ft (0.2-1.5 m) in thickness. However, complex faulting and high dip of beds prevents a high rating.

The resource potential for coal in the Tijeras and Rio Puerco fields is low because of structural deformation, high-angle faulting, and steep dips of the beds. Coal averaging 3 ft (0.9 m) thick occurs in the Mesaverde Group (Cretaceous) in the Tijeras field, whereas coal in the Rio Puerco field is 2.5 ft (0.8 m) thick and occurs in the Dilco and Gibson Members of the Crevasse Canyon Formation.

Elsewhere in the RPRA, the coal potential is very low because (1) Cretaceous rocks are not present, (2) no coal-bearing rocks occur in the Cretaceous section, or (3) the coals are too deep to be considered at the present time.

Uranium

Over 96% of the uranium produced in New Mexico has come from sandstones of the Morrision Formation in the Grants uranium district in the southern San Juan Basin. However, only the eastern edge of the Grants district extends into the RPRA (Fig. 23) and only a minor amount of production has occurred.

Uranium occurs in the Westwater Canyon Member of the Morrison Formation in the Marquez and Bernabe Montaño areas (Fig. 23). Only one mine produced uranium and an unknown amount of molybdenum in the area, the Rio Puerco. The resource potential for uranium in these areas is high and moderate in the adjacent areas (Fig. 23). Molybdenum and possibly vanadium occur as byproducts. The Rio Puerco deposit contains about 3.2 million lbs (1.5 million kg) of U_3O_8 in reserves with an average grade of 0.16% U_3O_8. About 10-20 million lbs (4.5-9 million kg) of U_3O_8 with grades up to 1.0% U_3O_8 have been delineated in the Bernabe-Montaño area. Additional reserves occur in the Marquez area; however, a declining uranium market has prevented production of these reserves. The resource potential of uranium in the Majors Ranch area, north of the Marquez-Bernabe Montaño area is moderate to low because economic ore deposits have not been delineated.

Uranium also occurs in the Westwater Canyon and Brushy Basin Members and the Jackpile Sandstone in the Nacimiento Mountains where the resource potential is moderate. A minor amount of

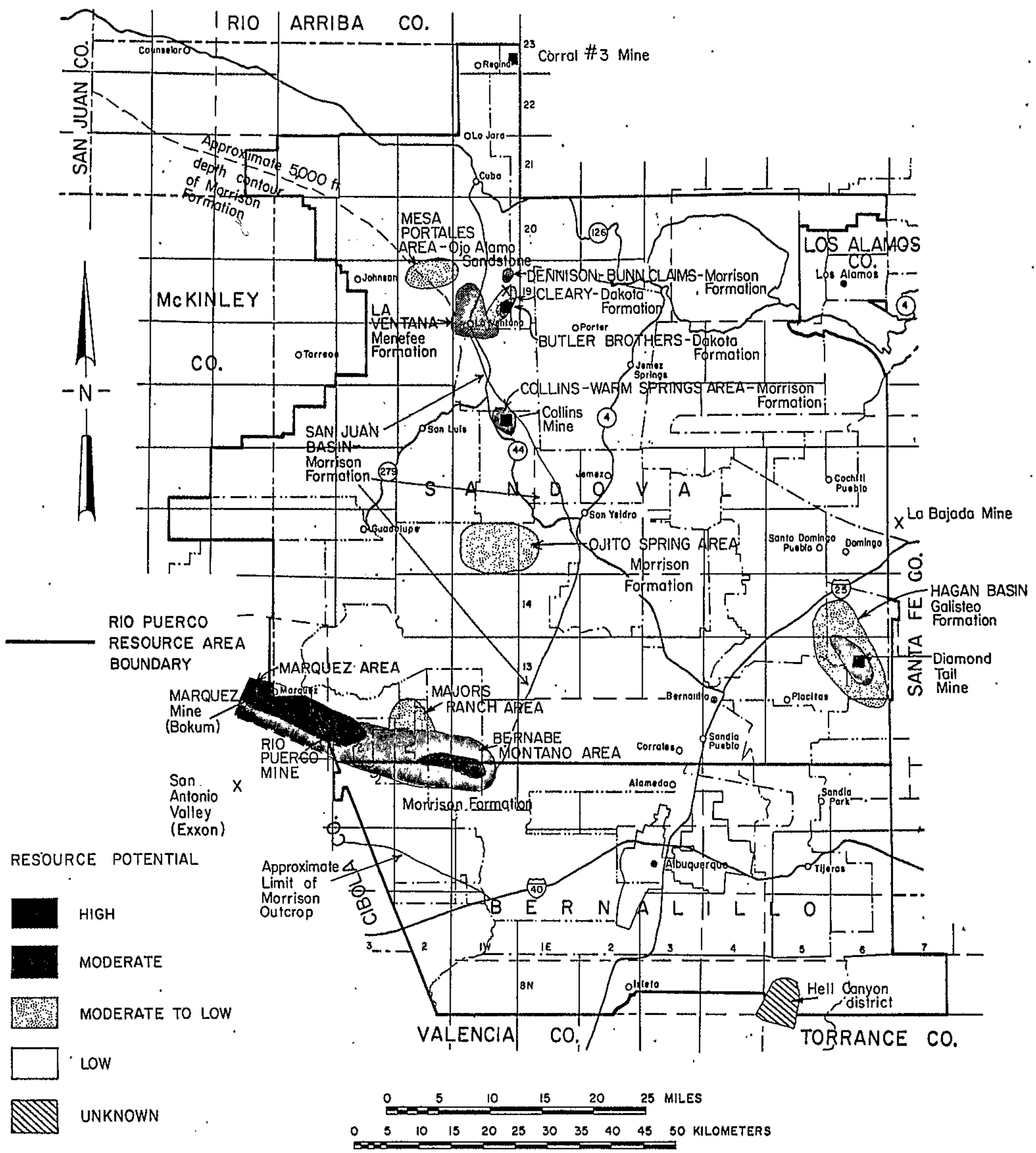

FIGURE 23 - URANIUM RESOURCE POTENTIAL IN THE NORTHERN RIO PUERCO RESOURCE AREA.

uranium and vanadium was produced from the Collins mine in the Collins-Warm Springs area (Fig. 23). Anomalous uranium values in the NURE geochemical data and radiometric anomalies occur in the area. Uranium also occurs in the Dennison-Bunn area, where the resource potential is moderate.

The resource potential for uranium in the Morrison Formation in the Ojito Spring area (Fig. 23) is low to moderate. Although uranium anomalies occur in the area, no large orebodies have yet been delineated.

Elsewhere in the San Juan Basin, the resource potential in the Morrison Formation is low because no ore deposits have been found despite favorable conditions for uranium mineralization. Elsewhere in the RPRA, the resource potential in the Morrison Formation is very low because of (1) nondeposition or erosion of the Morrison Formation, (2) excessive depths to the Morrison Formation, or (3) unfavorable lithologies.

Uranium mineralization also occurs in the Dakota, Menefee, and Galisteo Formations and the Ojo Alamo Sandstone (Fig. 23). At La Ventana, 132,000 tons of coal and shale contain an average of 0.10% U_3O_8 in the Menefee Formation where the resource potential is moderate. The Dakota Formation contains uranium mineralization in sandstones in the vicinity; the resource potential is also moderate. In the Hagan Basin, uranium occurs in high-energy, braided-stream sediments. About 0.9 million pounds of 0.09% U_3O_8 were delineated; however, high production costs and unfavorable market conditions forced Union Carbide Corp. to abandon the property. The resource potential is moderate. At Mesa Portales (Fig. 23), low-grade blanket-like horizons of uranium mineralization occurs in the Ojo Alamo Sandstone. However, no economic orebodies have been delineated and the resource potential is low to moderate.

Uranium anomalies occur in the NURE HSSR geochemical data in the Manzano Mountains (Fig. 23). This area is not known to contain uranium mineralization, although gold, silver, and copper mineralization occurs in Precambrian greenstones. The resource potential for uranium in the Precambrian greenstones or overlying Precambrian rocks is unknown and warrants additional investigation.

Geothermal

Two KGRA's (Known Geothermal Resource Area) and two KGRF's (Known Geothermal Resource Field) occur within the RPRA (Fig. 26). The geothermal resource potential is high in the Baca Location #1 KGRA for low-, intermediate-, and high-temperature geothermal reservoirs and for Hot Dry Rock projects (Fig. 26). The resource potential for low- to intermediate-temperature reservoirs is high in the Jemez Springs area, moderate in the San Ysidro KGRA, and low to moderate in the Pajarito Plateau area (KGRF #2, Fig. 26). The resource potential for low- to intermediate-temperature geothermal reservoirs is high in the Albuquerque area, low to moderate in the adjacent area, and low to moderate in KGRF #4 (Fig. 26).

Metals

Metallic mineralization occurs in numerous types of deposits throughout the RPRA, although production has not been significant

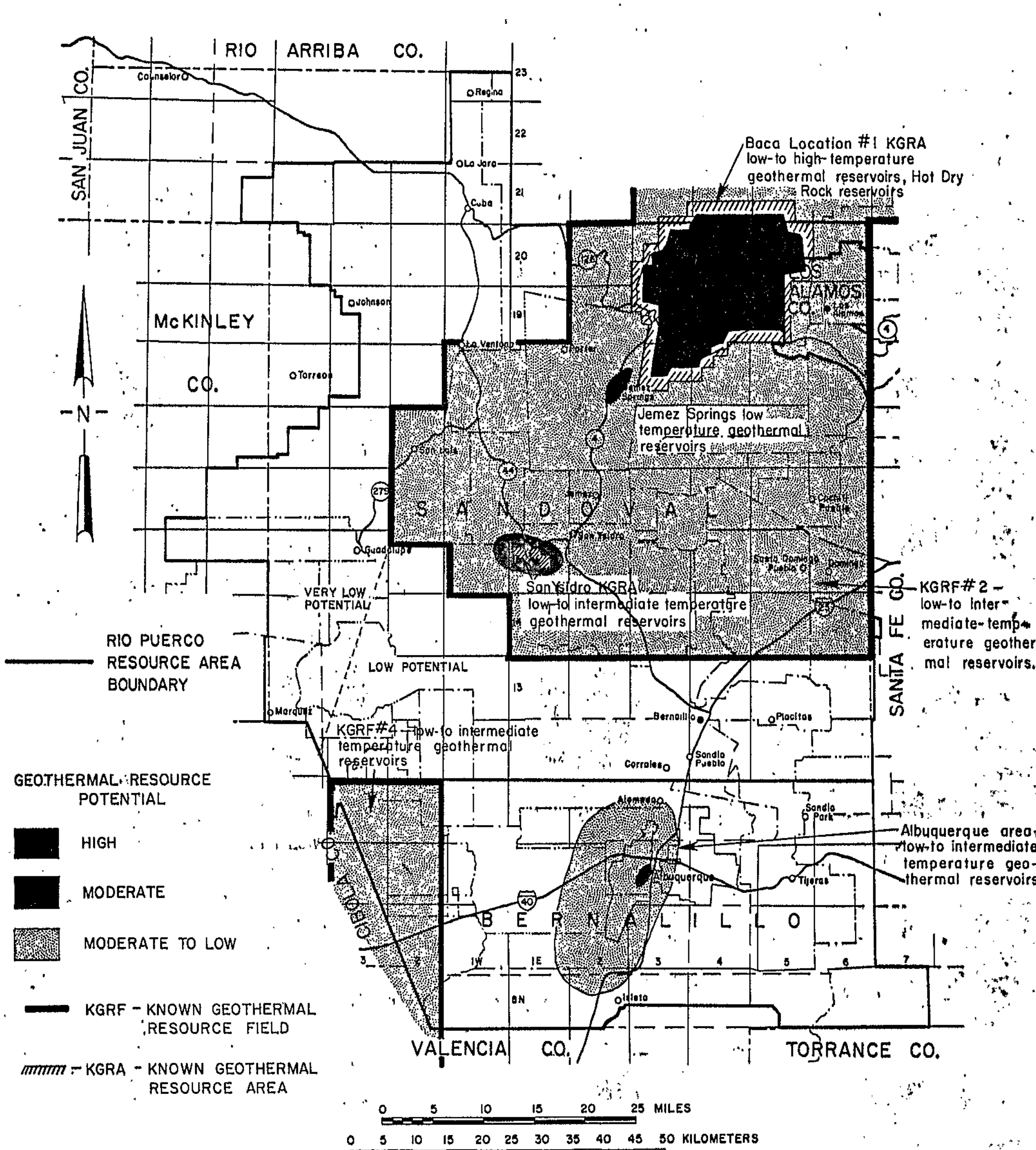

FIGURE 26 - GEOTHERMAL AREAS AND RESOURCE POTENTIAL IN NORTHERN RIO PUERCO RESOURCE AREA.

when compared to elsewhere in the state. One of the more important mining districts in the RPRA is the Cochiti district which produced over $1.3 million worth of gold, silver, copper, and lead. Precious- and base-metals occur in quartz veins filling pre-existing fractures and faults in the Tertiary Bland Group and Bearhead Rhyolite. These epithermal deposits are similar to mineral deposits associated with volcanic environments throughout the Southwest. The mineral-resource potential for precious-metlas in the Cochiti district is high (Fig. 21), although additional work may be needed to delineate additional reserves. The potential for associated base metals and antimony and tellurium is unknown.

Base- and precious-metals also are found in the Placitas district where numerous thin and discontinuous veins of barite, fluorite, galena, copper, and associated silver, gold, and zinc mineralization occurs. A small amount of placer gold was produced in 1904 and additional unrecorded production is likely. Most of the veins occur along or near faults in Pennsylvanian and Mississippian sediments and Precambrian Sandia Granite. The resource potential for barite-fluorite-galena with associated silver in the Tunnel Springs and Landsend areas is high (Fig. 21). The potential for silver-lead veins in the La Luz area is moderate. Elsewhere in the Sandia Mountains, the resource potential for barite-fluorite-galena mineralization is unknown. Unfortunately, the potential for development is low because of designation as a Wilderness Area or Wildlife Refuge and high, rugged topography.

Gold, silver, and copper mineralization occurs in quartz

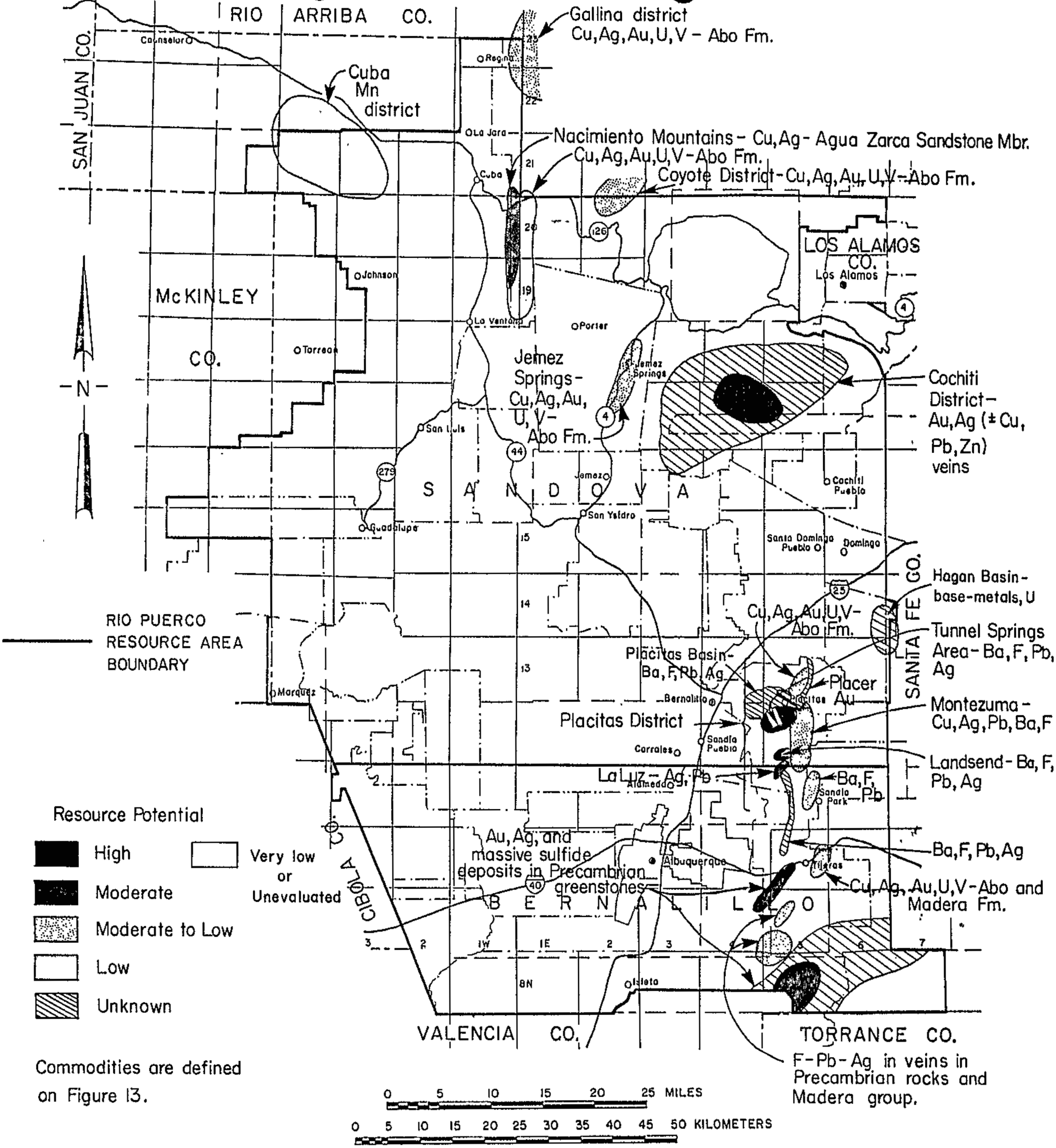

FIGURE 21 – MINERAL – RESOURCE POTENTIAL FOR METALS, BARITE, AND FLUORITE IN NORTHERN RIO PUERCO RESOURCE AREA.

veins along shear zones in Precambrian greenstones in the Tijeras Canyon-Coyote Canyon mining district. Over $4,000 of gold, silver, copper, and lead were produced from this area. Exhalative gold-silver and massive sulfide deposits occur in the greenstones of the Sandia, Manzanita, and Manzano Mountains and the resource potential for these deposits is moderate (Fig. 21). The resource potential for placer gold deposits is unknown. Furthermore, geophysical evidence suggests that the Precambrian greenstone terrain extends in the subsurface northeast of the Coyote Canyon-Hell Canyon district (Fig. 21), where the resource potential is unknown.

Stratabound, sedimentary copper deposits are widespread in the RPRA where copper and associated silver, gold, lead, zinc, uranium, and vanadium occur in Permian and Triassic sedimentary rocks (Fig. 21). The resource potential for copper and silver in the Agua Zarca Sandstone Member of the Triassic Chinle Formation in the Nacimiento Mountains is moderate. The resource potential in the Abo and Chinle Formations elsewhere in the Nacimiento Mountains, Jemez Springs, Gallinas, Coyote, Placitas, and Tijeras Canyon districts is low to moderate (Fig. 21).

Small manganese deposits occur in the San Jose Formation west of Cuba in Sandoval County (Fig. 21). Although over 3,600 tons of manganese concentrates were produced from 1942 to 1959, the mineral-resource potential is low because of low grade and low tonnage deposits.

RECOMMENDATIONS

The mineral-resource potential of the RPRA must be re-examined on a timely basis to update the assessments due to new information, both geologic and economic. Detailed geologic mapping, geophysical studies, and geochemical sampling are required in many areas to properly determine the mineral-resource potential. Mineralogy and chemistry of clay deposits are required. Chemical sampling of the Glorieta Sandstone Member is required to determine the potential for high-silica sand resources. Active claims need to be field checked. Geophysical studies and drilling are needed within the northeast-trending belt of gravity and magnetic highs interpreted to be greenstone terrain in southeastern Bernalillo County to determine the potential for gold and massive sulfide deposits. Additional recommendations are discussed in the final report. As new information is integrated with this study, better assessments will be possible.

Preliminary Report on the Geology and Mineral Resource Potential of the northern Rio Puerco Resource Area in Sandoval and Bernalillo Counties and Adjacent parts of McKinley, Cibola and Santa Fe Counties, New Mexico

by

Virginia T. McLemore,
Gretchen H. Roybal,
Ronald F. Broadhead,
Richard Chamberlin,
Robert M. North,
JoAnne Cima Osburn,
Brian W. Arkell,
Robert M. Colpitts,
Mark R. Bowie,
Kent Anderson,
James M. Barker,
and
Frank Campbell

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NOTE: 1:500,000 scale copies of Figures 1, 2, 4-10, 13-26, and 28 are included in pocket.

VOLUME 2 - Appendices

Maps (in pocket)

ABSTRACT

A preliminary mineral-resource potential assessment of Sandoval and Bernalillo Counties and adjacent parts of McKinley, Cibola, and Santa Fe Counties of the Rio Puerco Resource Area involves analyses of available published and unpublished geologic, geochemical, geophysical, and economic data and a brief field reconnaissance. Mineral-resource potential is an assessment of the favorability that a commodity will occur in substantial concentrations in a given area that can be exploited under current or future economic conditions. A classification of high, moderate, low, very low, or unknown is assigned. A high mineral-resource potential exists in areas where geologic and economic data indicate an excellent probability that economic mineral deposits occur there. Moderate or low mineral-resource potential exists in areas where the data indicate a lesser probability that economic mineral deposits occur. A classification of very low potential is reserved for areas where sufficient information indicates that an area is unfavorable for economic deposits. A classification of unknown mineral-resource potential is assigned to areas where either necessary geologic, geochemical, geophysical, and economic data are inadequate to otherwise classify an area or where any other classification (high, moderate, low, or very low) would be misleading. Some areas have not been evaluated for specific commodities because of lack of useable data.

Petroleum in the San Juan Basin in northern Sandoval County has a high mineral-resource potential. High potential also

exists for coal, humate, and uranium in portions of the San Juan Basin; geothermal resources in the Jemez Mountains; pumice and gold-silver veins in the Cochiti district of the Jemez Mountains; sand and gravel, adobe, and limestone throughout the Resource Area; gypsum and limestone in the San Juan Basin and Tijeras Canyon areas; and barite-fluorite-galena veins in the Sandia Mountains. Moderate mineral-resource potential is assigned to stratabound, sedimentary copper deposits in the Nacimiento Mountains, silver-lead veins in the Precambrian rocks at La Luz, silver-gold and massive sulfide deposits in Precambrian greenstones in the Tijeras Canyon-Coyote Canyon districts, scoria in Tertiary volcanics at Cat Hills, sulfur in the Jemez Mountains, travertines in the Nacimiento and Jemez Mountains, and uranium in the Dakota and Menefee Formations in the San Juan Basin and in the Galisteo Formation in the Hagan Basin.

Geologic, geochemical, and geophysical data indicate several areas which may have mineral-resource potential; but the available data are insufficient to adequately classify these areas. Unknown mineral-resource potential has been assigned to these areas. Gold-silver veins, similar to those of the Cochiti district, may occur elsewhere in the Jemez Mountains. Geochemical data suggest additional barite-fluorite-galena veins may occur along the Precambrian-Madera contact in the Sandia Mountains. Additional placer-gold deposits may occur in the Placitas and Tijeras Canyon-Coyote Canyon districts. Gravity and magnetic data suggest Precambrian greenstones may occur in a northeast-trending belt in southern Bernalillo County. Gold-silver and massive sulfide deposits are associated with greenstones and could occur within this postulated belt. Geochemical anomalies in the Manzano Mountains suggest presence of uranium mineralization in Precambrian rocks. Additional work is needed in these areas.

Additional geologic mapping and geochemical and geophysical studies are suggested in areas with active claims, in areas of unknown mineral-resource potential in the Cochiti and Placitas districts, and in western Bernalillo County and near Albuquerque to determine the geothermal-resource potential. Aggregate resources should be mapped and sampled prior to extraction. Mapping and chemical sampling of pumice deposits in the Jemez Mountains and the Glorieta Sandstone Member are needed to adequately assess these commodities.

INTRODUCTION

Purpose and scope

The Federal Land Policy and Management Act (FLPMA) of 1976 charges the U.S. Bureau of Land Management (BLM) with responsibility for preparing a mineral-resource inventory and assessment of mineral-resource potential for all of the public lands they manage. These studies are essential to land-use planning and management, and they are required prior to BLM actions such as disposal, withdrawal, exchange, or conveyance of land and wilderness designations. In order to meet this statutory requirement, the BLM and the New Mexico Bureau of Mines and Mineral Resources (NMBM&MR) entered a cooperative agreement to prepare a preliminary mineral-resource inventory and assessment for the northern Rio Puerco Resource Area (RPRA), including all of Sandoval and Bernalillo Counties and adjacent parts of McKinley, Cibola, and Santa Fe Counties (Fig. 1). NMBM&MR staff were already actively involved with compilations and geologic studies of various commodities on all lands within New Mexico, so the requirements of both agencies were satisfied. McLemore (1984) previously described the mineral-resource potential of Torrance County in the southern part of the RPRA.

This preliminary mineral-resource inventory and assessment is based on analysis of available published and unpublished geologic, geochemical, geophysical, and economic data and a brief (4-day) field reconnaissance study. A more rigorous and complete analysis of all available information and additional field work could expand the preliminary conclusions of this report.

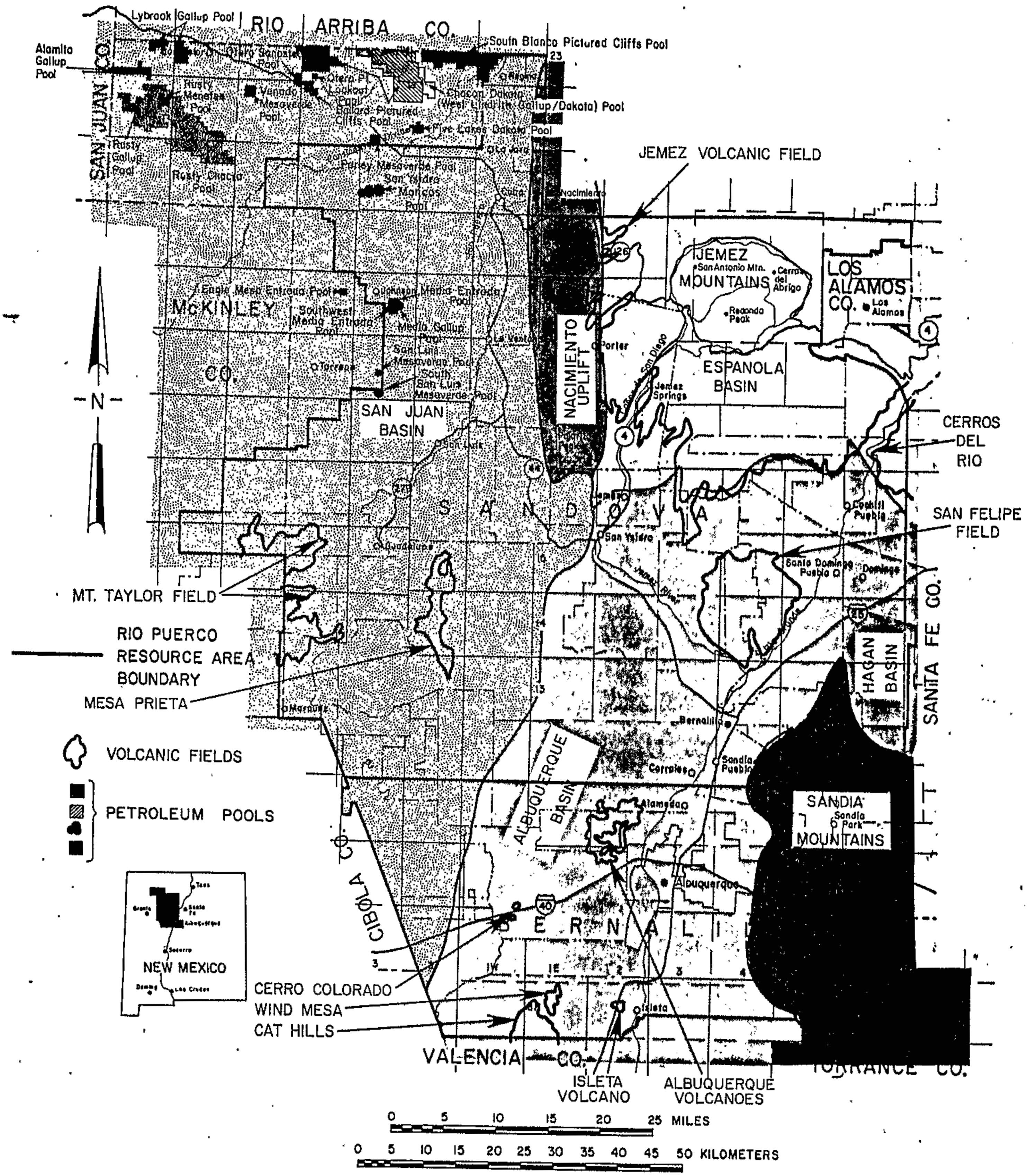


FIGURE 1 - PHYSIOGRAPHIC PROVINCES AND PETROLEUM POOLS IN THE NORTHERN RIO PUERCO RESOURCE AREA.

Methods of investigation and sources of information

This study involved a complex process of integration and analysis of various data sets that included: (1) published and unpublished reports; (2) CRIB (Computerized Resource Information Bank of the U.S. Geological Survey or USGS, prepared in part by NMBM&MR); (3) MILS (Mineral Industry Location Survey of the U.S. Bureau of Mines or USBM, prepared by NMBM&MR); (4) DMEA (Defense Minerals Exploration Administration) reports; (5) NURE (National Uranium Resource Evaluation of the U.S. Department of Energy or DOE), HSSR (Hydrogeochemical Stream-Sediment Reconnaissance) and ARMS (Aerial Radiometric and Magnetic Survey) data; (6) NCRDS (National Coal Resource Data System of the USGS, prepared in part by the NMBM&MR); and (7) various file data from numerous state and federal agenies (NMBM&MR, State Inspector of Mines, State Highway Department, BLM, USBM, DOE). From these data, known mineral occurrences (Appendix 1) were located and mineral deposit types were identified. Geologic, mineral occurrence, geochemical (element distribution and geochemical anomaly maps), and geophysical (radiometric, magnetic, and gravity) maps were compiled and correlated to delineate areas of potential mineralization. Finally, the mineral-resource potential of an area was assessed for each mineral or energy commodity.

Four days were spent in the field examining the Milagros gold mine (Valencia County), the vein deposits in the Placitas district, and igneous rocks in the Jemez Mountains. Samples were collected and chemical analyses were included in this report. Uranium occurrences in Sandoval, McKinley, and Bernalillo counties and copper-uranium deposits in the Nacimiento and Jemez Mountains were previously studied by McLemore (1982, 1983a) and these results were used in this study.

This report is organized into a text, eight appendices, and supporting figures, maps, and tables. Known mineral occurrences, prospects, deposits, and mines, including materials pits, are briefly described in Appendix 1 and generally described by deposit type in the text. Appendix 2 is a tabulation of coal resource data and Appendix 3 is a tabulation of coal quality analysis data. Appendix 4 contains statistical summaries of the HSSR geochemical data. A tabulation of geothermal wells and springs is in Appendix 5 and of oil and gas tests is in Appendix 6. A supplement to mineral-resource classification, relating the classification in this report to other classifications, is in Appendix 7. Appendix 8 is a list of acronyms and their meaning used in this report. Mineral and other commodity occurrences are plotted on 32 1:100,000-scale maps as requested by the BLM (Maps 1-7, 15-20, 28-46). An index to 1:100,000 scale maps used in this report is in Figure 2. Mineral-resource potential of various commodities is discussed in the text and shown on Maps 8-14, 19, 21-39, 47-54, and in Figures 21, 22, 23, 25, 26, and 28 (1:500,000 scale copies of these maps are also in the pocket).

Numbering system

The numbering system used in this report is based on the township, range, and section land-grid system (Fig. 3) that is used by the New Mexico State Engineer for numbering water wells

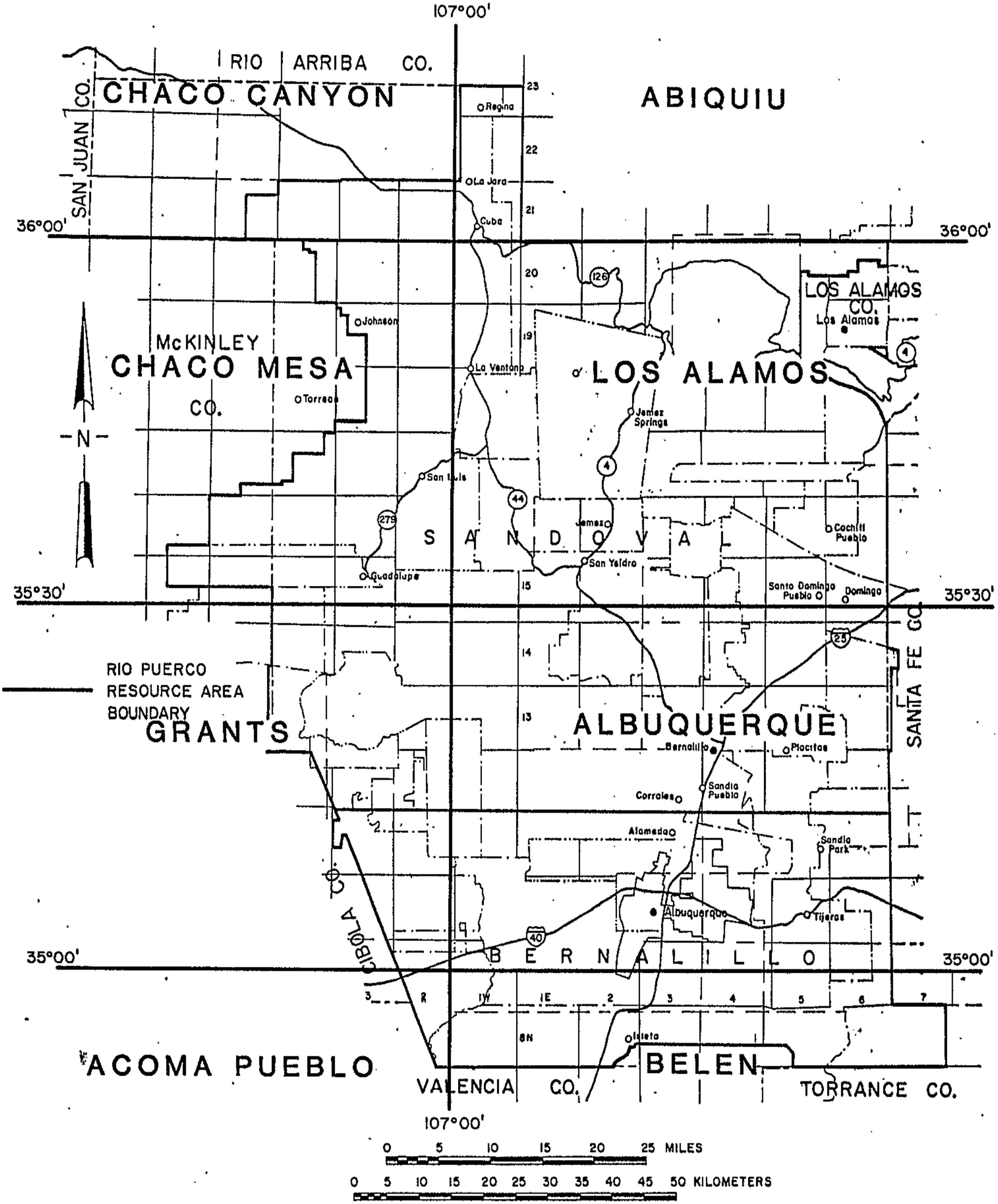
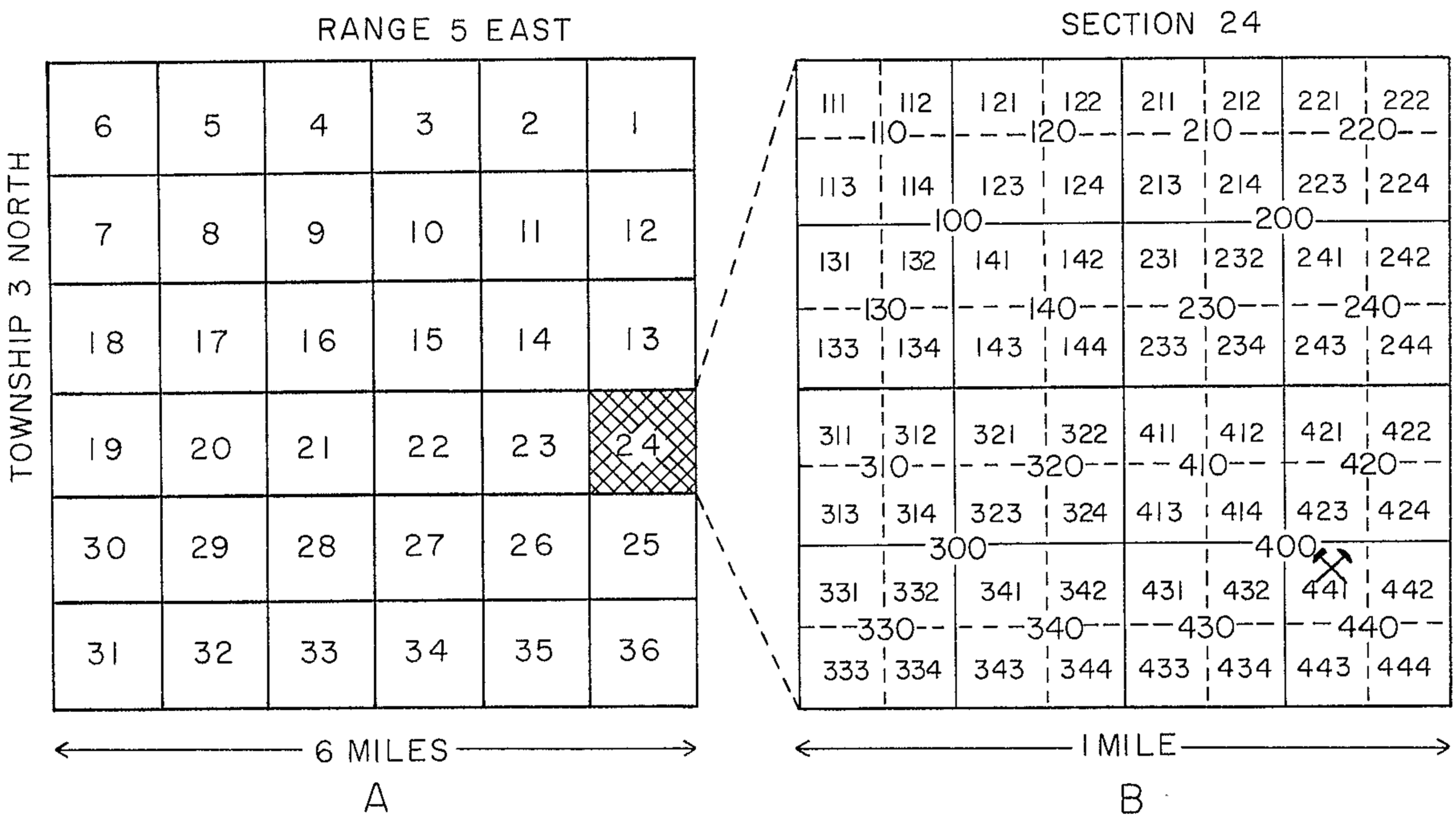


FIGURE 2 — INDEX TO 1:100,000 SCALE TOPOGRAPHIC MAPS COVERING THE NORTHERN RIO PUERCO RESOURCE AREA.

Figure 3— Numbering system used in this report.
A-Subdivision of a township into sections.
B-Subdivision of a section into quarter-quarter-quarter section blocks. Mine symbol indicates location of an occurrence numbered 3N.5E.24.441.



and springs. In this system, each occurrence or sample location has a unique location number consisting of four parts separated by periods (e.g., 3N.5E.24.441). The first part refers to the township, the second part to the range, and the third part to the section. The fourth part locates the occurrence to the nearest quarter-quarter-quarter section block, if possible, as indicated in Figure 3. An occurrence or sample number designated 3N.5E.24.441 is located in the NW 1/4 SE 1/4 SE 1/4 of section 24, T.3N, R.5E. Some occurrences are located only to the nearest section, quarter-section, or quarter-quarter section because the occurrence can not be located more accurately or it extends over the entire area given. In unsurveyed areas, the locations are approximated by projecting section lines.

Classification of mineral-resource potential

The mineral-resource potential of an area is the favorability or probability that a commodity will occur in large enough concentrations that economic extraction is currently or potentially feasible. The mineral-resource potential is not a measure or inventory of the quantities of the mineral resources, but it is a measure of the potential of occurrence of the commodities in substantial concentrations that can be exploited under current or future economic conditions (Taylor and Steven, 1983). Mineral-resource potential is independent of the feasibility of extracting the minerals, accessibility of minerals, or other factors that could preclude economic development of the minerls. The evaluation of the mineral-resource potential is based on analogous geologic situations or models of promising or favorable geologic environments or settings that contain known economic deposits. Such subjective appraisals or judgments depend not only on available information concerning the favorable area, but also on the current knowledge and understanding of known economic deposits. Mineral-resource potential is not a firm assessment, but a relative evaluation based on available information at a specific time.

Mineral-resource potential depends on a number of factors that include: (1) location, size, and grade of the mineral deposits; (2) past production; (3) depth of overburden to favorable host rock; (4) locations of mineral belts or trends; (5) specific geologic phenomena known to be associated with mineral deposits (silicic or alkalic igneous rocks, carbonatites, greenstones, or structural features); (6) reported exploration activity; (7) reported recent discoveries; and (8) geophysical and geochemical anomalies. The more information available, the greater the assurance or confidence of the resource potential.

Classification of mineral-resource potential differs from the classification of mineral resources. Mineral resources are the quantities of economic resources and are classified according to availability of geologic data and economic feasibility as identified (demonstrated or inferred) or undiscovered (hypothetical or speculative) and economic or subeconomic (Krishna and others, 1983; U.S. Geological Survey, 1976a; 1980). The mineral-resource potential is a qualitative judgment of the probability for discovery of a certain type of commodity and is classified according to availability of data, geologic assurance, and relative probability of occurrence. Classification of mineral-resource potential varies from a simple, subjective scheme (Krason and others, 1982) to complex, quantitative, and statistical methods (Taylor and Steven, 1983; Singer and Mosier, 1981). A simple classification is used in this report where the mineral-resource potential is classified as high, moderate, low, very low, and unknown. Definitions and comparisons of three simple classification schemes used by the USGS, BLM, and Oak Ridge National Laboratory (Voelker and others, 1979) are included in Appendix 7.

A high mineral-resource potential exists in areas of known mines or occurrences where the geologic, geochemical, or geophysical data indicate an excellent probability that mineral deposits occur in economic concentrations. All active and producing properties fall into this class as well as identified deposits in known mining districts or in known areas of mineralization. Hypothetical deposits, such as reasonable extensions of known mining districts and identified deposits or partially known deposits within geologic trends or areas of mineralization, are classified as high mineral-resource potential when sufficient data indicates a high probability of occurrence. Information, such as quantity, quality, grade, past and present production, depth to deposit, and reserves, is important although not always essential in evaluating an area suspected to have a high potential. Exploration is in progress or expected to occur within the next 10 years. This classification corresponds to the substantiated mineral-resource potential as described by the USGS (Brobst and Goudarzi, 1984) and the highest level of favorability and geologic assurance or certainty (4/C, D or 4/3, 4) as currently used by the BLM (written commun.) and Oak Ridge National Laboratory (Voelker and others, 1979; Appendix 7).

A moderate mineral-resource potential exists in areas where geologic, geochemical, or geophysical data suggest a good possibility that undiscovered deposits occur in formations or geologic settings known to contain economic deposits in similar geologic settings elsewhere. Hypothetical deposits in known mining districts or mineralized areas are assigned a moderate potential if evidence for a high potential of economic deposits is inconclusive. This assessment can be revised when new information, new genetic models, or changes in economic conditions develop. This classification corresponds to the probable mineral-resource potential as described by the USGS (Brobst and Goudarzi, 1984).

A classification of low to moderate is given to areas where the geologic evidence suggests the potential is intermediate between low and moderate. This classification is used to differentiate certain deposits which do not fall into the moderate classification, but have a higher potential than a low resource potential.

Low mineral-resource potential exists in areas where available data imply the occurrence of mineralization, but indicate a low favorability for the occurrence of an economic deposit. This includes speculative deposits in areas of geologic environments or settings not known to contain economic deposits, but which are similar to environments or settings of known economic deposits. Additional geologic data may be needed to better classify such areas.

Very low mineral-resource potential is reserved for areas where sufficient information indicates that an area is unfavorable for economic deposits. This evaluation may include areas with dispersed but uneconomic mineral occurrences as well as areas that have been depleted of their mineral resources. Use of the very low potential classification requires a high level of geologic assurance to support such an evaluation. Very low mineral-resource potential is assumed for potential deposits below depths at which the commodity can be extracted economically. These "economic" depths vary according to the commodity and of future economic conditions. This classification corresponds to the lowest favorability but highest certainty levels (1/D, 1/4) as currently used by the BLM and Oak Ridge (Appendix 7).

A classification of unknown mineral-resource potential is reserved for areas where necessary geologic, geochemical, and geophysical data are inadequate otherwise to classify an area. This assessment is assigned to areas where the degree of geologic assurance is low and any other classification (high, moderate, low, or very low) would be misleading. These areas should receive a high priority for additional study. This classification corresponds to the highest favorability but lowest certainty levels (3,4/A; 3,4/1) as currently used by the BLM and Oak Ridge (Appendix 7).

The mineral-resource potential of some areas could not be assessed because of a lack of useful data. Available geologic data does not indicate any mineralization or the presence of environments known to contain mineralization in these areas, however detailed geologic mapping at 1:24,000 is required before assessing the mineral-resource potential. The lack of data does not imply a very low mineral-resource potential.

This classification scheme is highly subjective and dependent on the evaluator's knowledge and experience. Advances in technology, extraction methods, economic conditions, and understanding of geologic processes that form economic deposits are likely to alter this assessment of mineral-resource potential. Political trends and public opinion could drastically alter the economic factors that influence mineral-resource potential classification of an area in a relatively short period of time. Therefore, assessments of mineral-resource potential must be periodically re-evaluated and updated.

In addition to evaluation of the mineral-resource potential, the potential for development can be assessed. The potential for development is classified simply as high, moderate, or low for the purposes of this report. High potential for development indicates that the area is currently producing a commodity or economic conditions suggest that production of the deposit is economically feasible presently or in the near future. Moderate potential for development exists in areas where production of the deposit would occur if certain geologic or economic conditions became favorable. Low potential for development indicates only a slight possibility, if any, for production of the deposit. The potential for development classification is also a highly subjective judgment and is dependent on the evaluator's experience and understanding of geologic and economic conditions during a specific time period. But it does offer an evaluation of the economic feasibility of a deposit that the mineral-resource potential classification (potential for occurrence) neglects.

Physiography

The northern RPRA is divided into several physiographic provinces (Fig. 1; Woodward, 1984; V. C. Kelley, 1977). The Colorado Plateau forms the western extent of Sandoval County and is bordered on the east by the north-trending Nacimiento Mountains. The Jemez Mountains and the Valles Caldera lie east of the Nacimiento Mountains. The Albuquerque Basin of the Rio Grande rift is south of the Nacimiento and Jemez Mountains and is bordered on the east by the 10,000 ft (3,048 km) high Sandia Mountains. The Hagan and Estancia basins lie east of the Sandia Mountains. Albuquerque is the largest city in the state and lies in central Bernalillo County.

The area is drained by numerous arroyos, tributaries, and rivers. The Rio Puerco is the major tributary of the Rio Grande in the western portion of the RPRA and the Rio Grande drains the eastern portion.

Previous geologic investigations

The geology of the northern RPRA is complex and diversified and many published and unpublished reports describe various

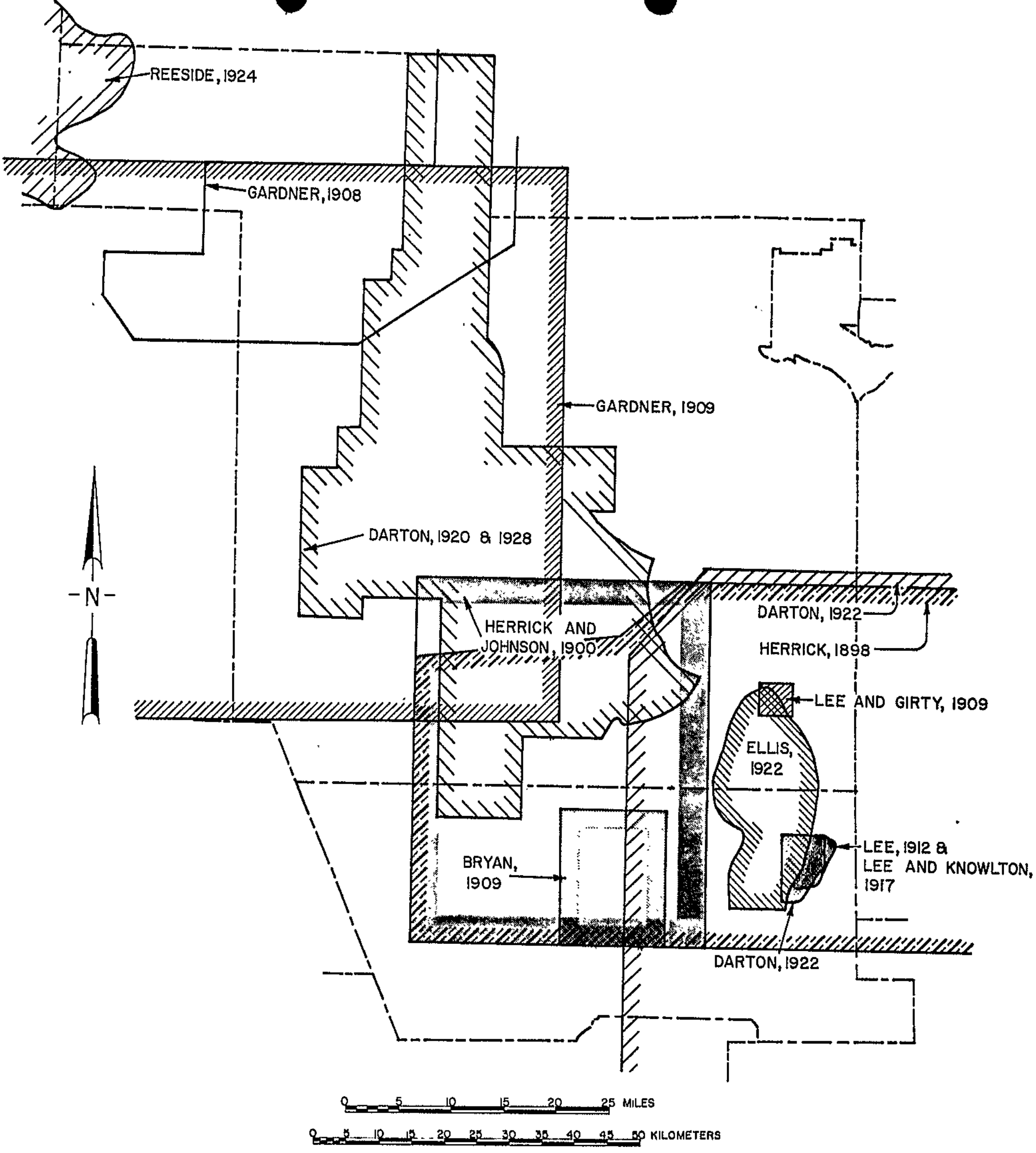


FIGURE 4 – INDEX OF GEOLOGIC MAPPING FROM 1890 TO 1929.

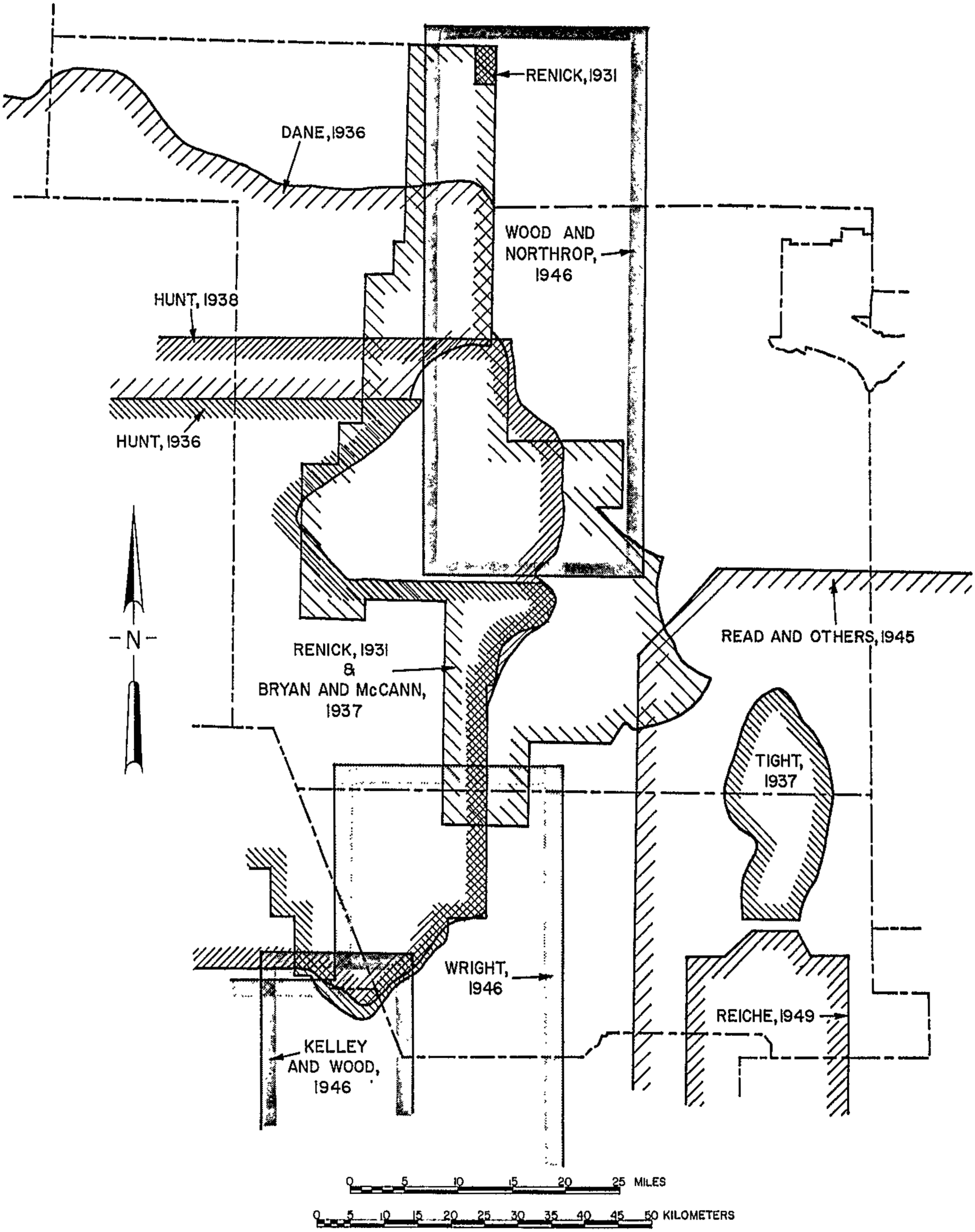


FIGURE 5 – INDEX OF GEOLOGIC MAPPING FROM 1930 TO 1949.

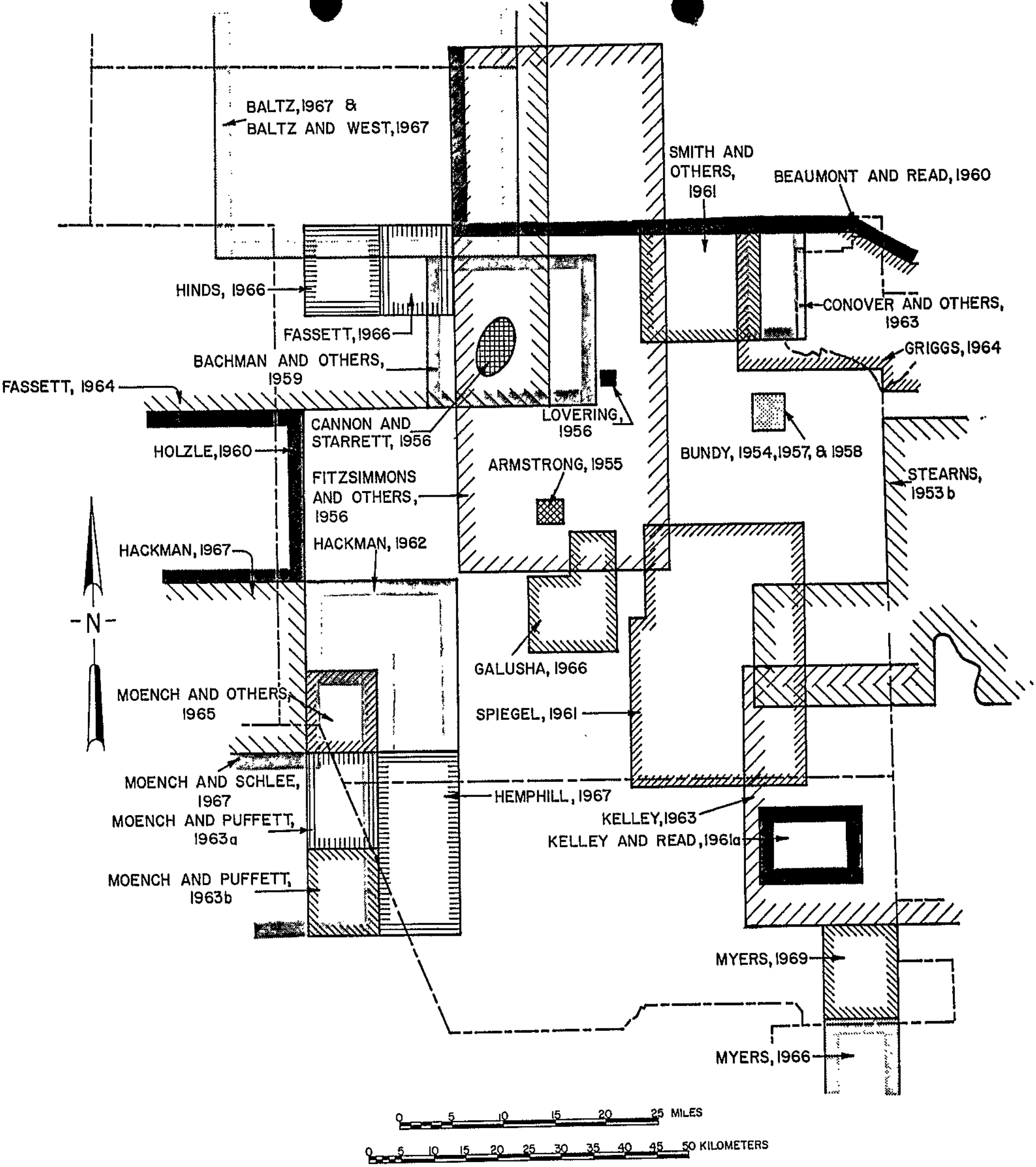


FIGURE 6 – INDEX OF GEOLOGIC MAPPING FROM 1950 TO 1969.

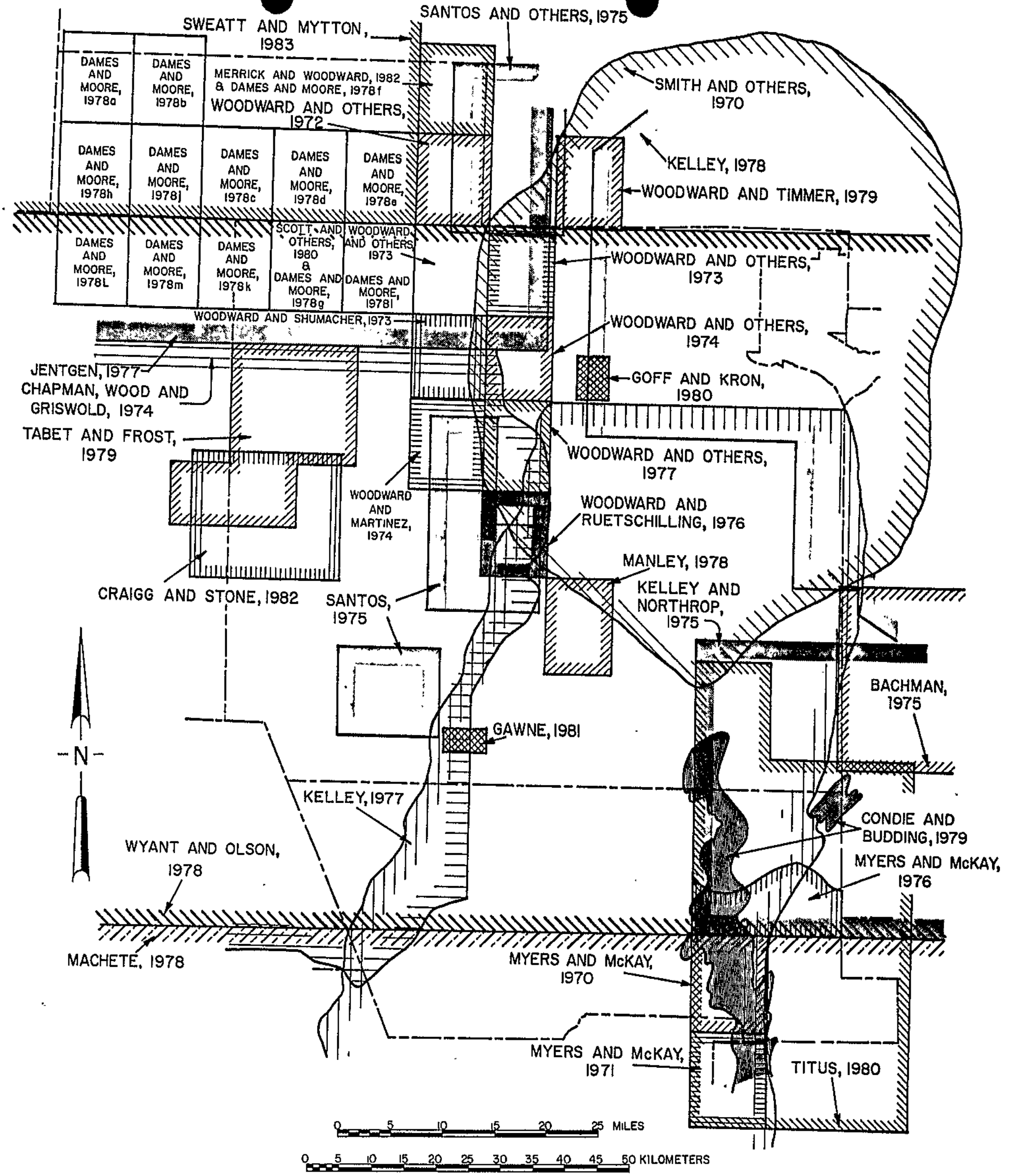


FIGURE 7 – INDEX OF GEOLOGIC MAPS FROM 1970 TO PRESENT.

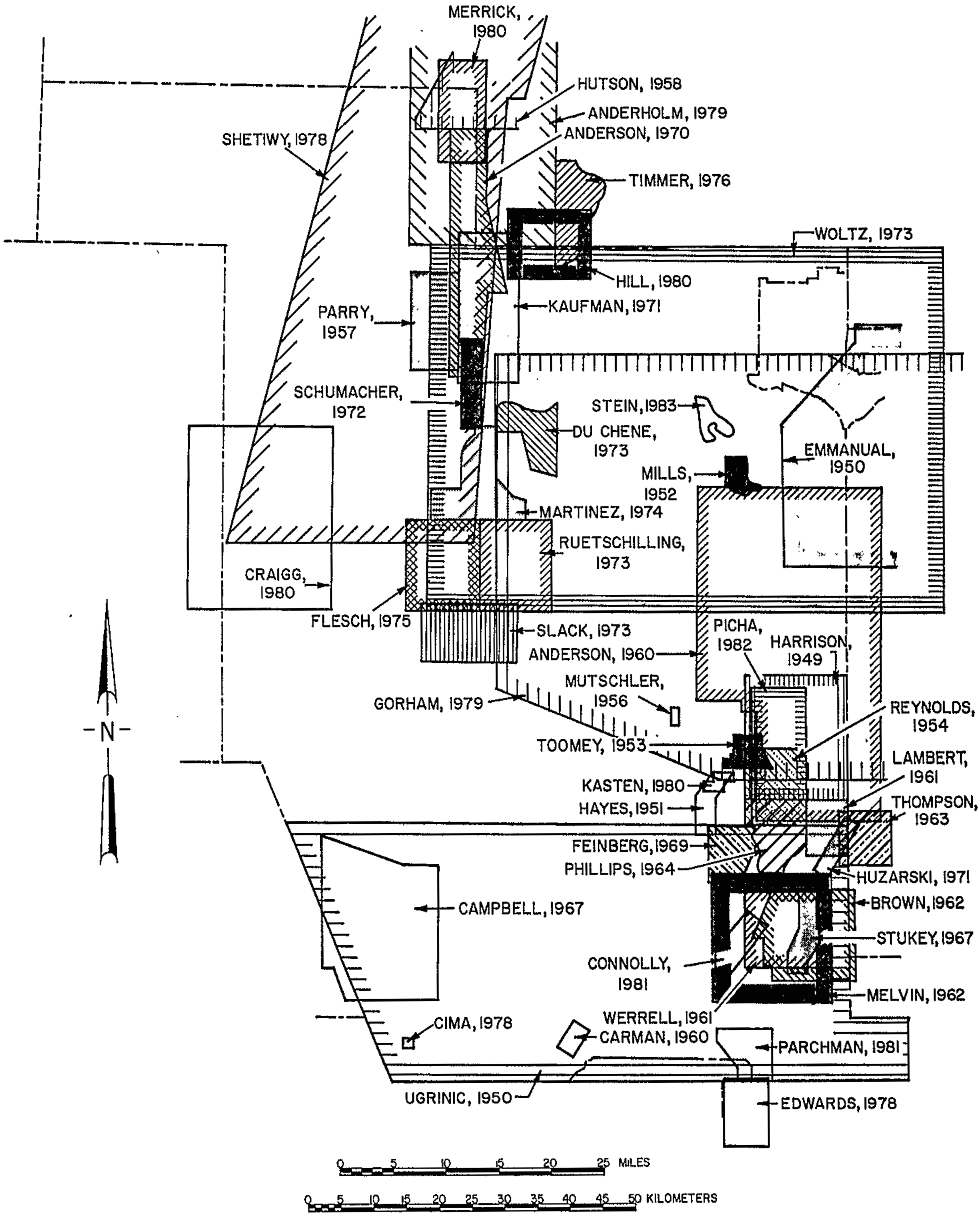


FIGURE 8 – INDEX OF THESIS AND DISSERTION MAPS FROM 1930 TO PRESENT.

aspects of the geology and mineral resources of the area. Most of the area has been covered by geologic maps of varying scales (Figs. 4-8). Two state geologic maps (Dane and Bachman, 1965; New Mexico Geological Society and NMBM&MR, 1983) also include the region.

Specific reports concerning the mineral resources in the northern RPRA are numerous. The most comprehensive sources describing mineral resources in this region are: (1) a compilation prepared by the U.S. Geological Survey (1965) in cooperation with numerous state agencies, (2) Elston (1967), (3) E. C. Anderson (1957), (4) Talmage and Wootton (1937), and (5) Lindgren and others (1910). Various energy and mineral-resource maps include Foster and Grant (1974), Bieberman and Weber (1969), W. T. Siemers and Austin (1979), Logsdon (1982a), Barker and others (1984), and U.S. Geological Survey and NMBM&MR (1981). Additional commodity reports are cited where appropriate. Leasable mineral land classification maps are by DeCicco and others (1978a, b; 1979). Reports describing the mineral-resource potential of various Wilderness Areas in the northern RPRA include the San Luis area by Roberts and Rizo (1982), the Sandia Mountains area by Hedlund and Kness (1984), the San Pedro Peaks by Santos and Weisner (1984), and the Dome Wilderness by Ryan (1983). The petroleum potential in Wilderness Areas in New Mexico is by Ryder (1983). The mineral-resource potential of the Caballo and Polvadera Roadless Areas in adjacent Los Alamos and Rio Arriba Counties is by Manley and Lane (1983).

Much of the northern RPRA was examined as part of 1- by 2-degree topographic quadrangle reports by the Department of

Energy's NURE program. This area lies in three 1- by 2-degree quadrangles: Albuquerque, Socorro, and Aztec (Fig. 9); specific reports concerning these quadrangles are listed in Table 1. A magnetic contour map (McLemore, 1984) and radiometric maps were compiled from the ARMS data and gravity and magnetic maps of the area were published by Cordell and others (1982), Cordell (1976, 1983), Keller and Cordell (1983), and U.S. Geological Survey (1976b).

Acknowledgments

This project was done under a cooperative agreement between the Bureau of Land Management (BLM) and the NMBM&MR. The coordinator for the BLM was James Turner who offered many suggestions and provided some of the basic data needed to compile this report. Many people on the NMBM&MR staff in addition to the coauthors assisted greatly in preparing this report. Lynn Brandvold and associates provided chemical analyses. David Menzie obtained theses concerning the Sandia, Nacimiento, and Jemez Mountains. Robert North, James Barker, and James Turner (BLM) assisted the author in the field. Kathy Parker, James Brannan, Robert M. Colpitts, Linda Wells-McCowan, and Kent Anderson drafted most of the figures and Lynne McNeil, Lisa Zangara, and Vicki Pollmann typed the manuscript. This manuscript benefited from critical reviews by George Austin, Gary Johnpeer, Robert North, Frank Kottlowski, Sam Thompson, James Barker, and James Turner.

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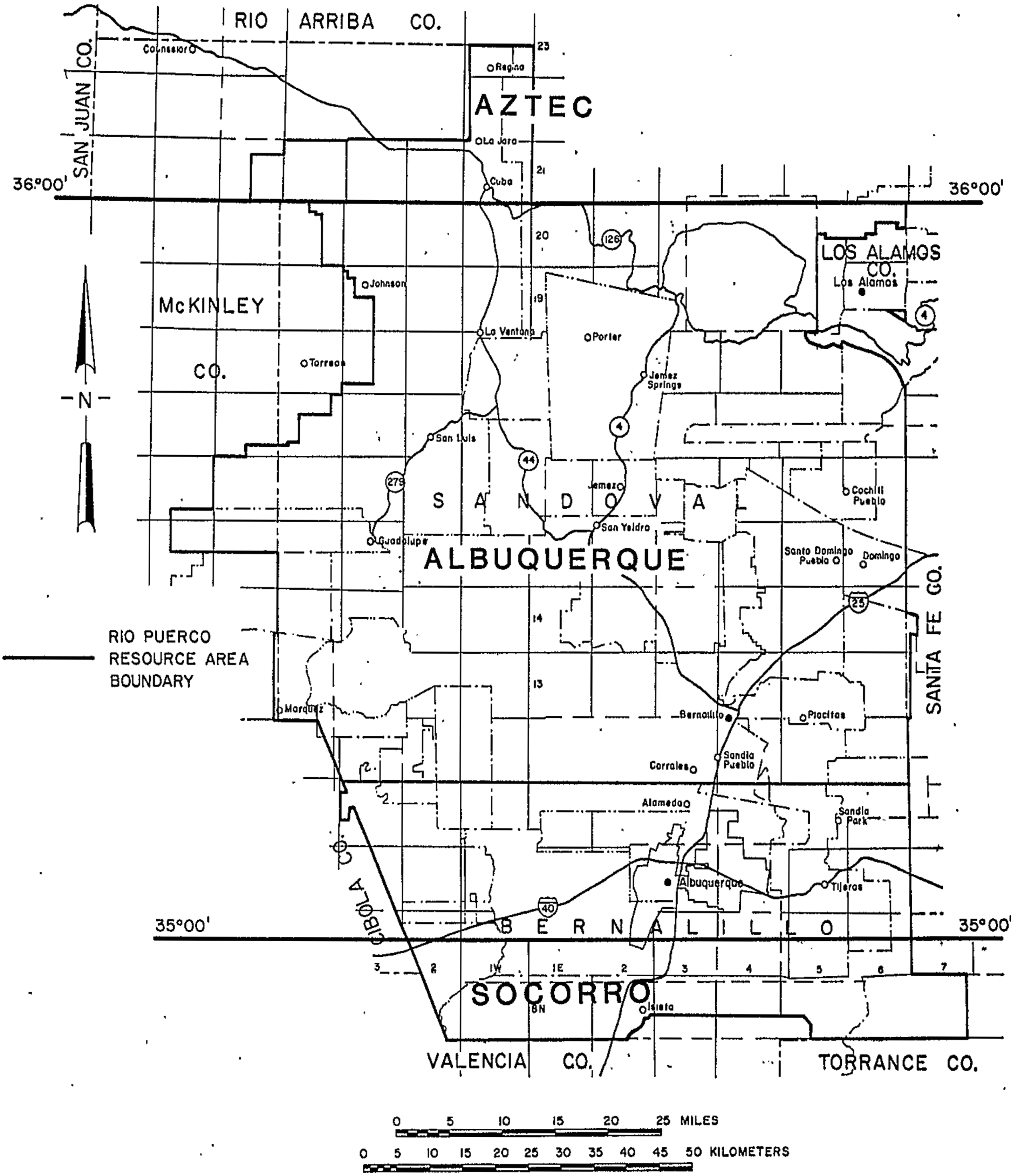

FIGURE 9 - INDEX TO 1:250,000 SCALE TOPOGRAPHIC MAPS COVERING THE NORTHERN RIO PUERCO RESOURCE AREA.

Table 1 - NURE reports pertaining to portions of the northern Rio Puerco Resource Area.

	Albuquerque	Socorro	Aztec
HSSR	Olsen (1977), Maason and Bolivar (1979)	Planner (1980)	Bolivar (1978), Union Carbide Corp., Inc (1981)
ARMS	Geometrics, Inc. (1979)	Geodata International, Inc. (1979)	Geodata International, Inc. (1980)
Magnetic Anomaly Maps	DOE open-file map GJM-401	DOE open-file map GJM-402	DOE open-file map GJM-400
Geologic Maps	(Wyant and Olson, 1978; USGS OF-78-467)	(Machette, 1978; USGS OF-78-607)	DOE map
Folio Reports	Green and others (1982b)	Pierson and others (1982)	Green and others (1982a)

NURE - National Uranium Resource Evaluation
HSSR - Hydrogeochemical and Stream-Sediment Reconnaissance
ARMS - Aerial-Radiometric and Magnetic Surveys
DOE - Department of Energy

suggestions for interpreting this data. Paul Garding of the Bureau of Indian Affairs accompanied the senior author onto the Isleta Pueblo to visit the Milagros gold mine. Finally, Kent Anderson, Robert Colpitts, John Hingtgen, Sandra Swartz, Mark Bowie, Antonio Lanzirotti, and Brian Christiansen (New Mexico Institute of Mining and Technology) assisted in copying, proofreading, compiling the bibliography, compiling the mineral occurrences, compiling the geochemical anomaly maps, and compiling the mapping indices.

GEOLOGIC FRAMEWORK

Lithologic units in the northern RPRA range in age from Precambrian to Holocene and many of the stratigraphic intervals contain mineral or other commodity deposits (Fig. 10; Dane and Bachman, 1965; New Mexico Geological Society and NMBM&MR, 1983). A brief synopsis of the lithologic units and geologic history is presented in this section, with emphasis on units containing deposits, in order to give a more complete understanding of the mineral resources.

Precambrian (by Virginia T. McLemore)

Precambrian rocks are exposed in the RPRA, but they contain few known mineral deposits compared to Precambrian terranes elsewhere in New Mexico. The known Precambrian geologic history is fragmentary throughout central New Mexico because these rocks are highly deformed and discontinuously exposed. One of the best Precambrian stratigraphic intervals in north-central New Mexico is exposed in the Sandia, Manzanita, and Manzano Mountains. Precambrian rocks are also exposed in the Nacimiento Mountains and Monte Largo Hills.

Stratigraphic correlations of Precambrian rocks are uncertain, even within a single mountain range and must be used with caution because of (1) complex structural histories, (2) multiple episodes of metamorphism, (3) poor and limited exposure, (4) pseudostratigraphic relationships produced by major tectonic events, and (5) disruption of stratigraphic sequences by burial, erosion, younger intrusives, and tectonic events. Further complicating interpretation of Precambrian history is the absence of detailed geologic mapping in some areas of Precambrian exposure.

The oldest Precambrian rocks in the Nacimiento Mountains are metasedimentary and metavolcanic rocks (Woodward, 1984). These rocks were subsequently intruded by mafic dikes and sills and ultramafic bodies. Gneisses, schists, and greenstones are common within these intervals, but stratigraphic relationships are poorly understood. Several granitic bodies were emplaced and subsequently metamorphosed. The Nacimiento and San Miguel plutons have chemistries typical of high-calcium granites whereas the Joaquin pluton has a chemistry typical of high-potassium, low-rare earth elements granite (Condie, 1978). Only a few mineral occurrences are found in these Precambrian rocks and most of these are in granitic plutons along faults, fractures, and shear zones (Appendix 1).

Small dikes and irregularly shaped bodies of distinctive brick-red syenite are found in the Gilman quadrangle in the southern portion of the mountains (Woodward, 1984; Woodward and others, 1977). The age of these rocks is uncertain, however, similar rocks in the Lobo and Pedernal Hills of Torrance County have yielded a minimum Rb-Sr age of 469 ± 7 m.y. (Loring and Armstrong, 1980).

The Precambrian rocks tend to decrease in age from the Los Pinos Mountains northward towards Tijeras Canyon in the Sandia Mountains (Cavin and others, 1982; Condie and Budding, 1979; Parchman, 1981; Condie, 1981). The oldest unit, the Hell Canyon greenstone, is exposed in southern Bernalillo, Valencia, and northern Torrance County where gold-silver and massive sulfide deposits are found (Woodward and others, 1978; Fulp and others, 1982). Metasedimentary rocks of the Bosque, Isleta, and Coyote Canyon sequences overlie the Hell Canyon greenstone. The Lacorocah metatuff unconformably overlies the Bosque metasediments (Parchman, 1981). The Coyote greenstone is the youngest of these rocks and may be correlative with the Tijeras Canyon greenstone (Cavin and others, 1982). The Tijeras Canyon greenstone is interpreted by Condie (1980) as a fragment of a basalt field erupted in a continental rift, although a submarine environment cannot be eliminated (Fulp and Woodward, 1981).

Granitic plutons intrude these sequences. The Ojita and Manzanita plutons are exposed in the Manzano and Manzanita Mountains and the Sandia pluton is exposed in the Sandia Mountains (Condie and Budding, 1979; V. C. Kelley and Northrop, 1975). The Ojita and Sandia plutons have chemistries typical of high-calcium granites (Condie, 1978), whereas the Manzanita pluton has a chemistry typical of high-potassium, low-rare earth elements granites (Condie, 1978). Mineralogic and chemical variations are common within granitic plutons (Brookins and Majumdar, 1982a) and only one intrusive event may have occurred.

Precambrian gold-silver and massive sulfide deposits occur in greenstone terranes (Fulp and Woodward, 1981; Fulp and others, 1982). Fluorite-galena-barite veins also are found in these rocks and extend into the Pennsylvanian limestones (Rothrock and others, 1946). Minor veins occur in the granitic rocks (Appendix 1).

Radiometric dating suggests older rocks occur within the northern part of the study area and younger rocks occur to the south (Condie, 1981; Condie and Budding, 1979; Muehlberger and others, 1966). Granitic rocks from a drill hole in the Jemez Mountains yielded a Rb-Sr age of 1.870 ± 0.13 b.y. and other age dates of granitic plutons from the Nacimiento Mountains range from 1.6 to 1.8 b.y. (Brookins, 1974a; Wobus and Hedge, 1980; Condie, 1981; Brookins and Laughlin, 1983; Woodward, 1984). The metasedimentary and metavolcanic rocks are still older.

The Juan Tabo series in the Sandia Mountains yielded an Rb-Sr age of 1.64 ± 0.04 b.y. (Brookins and Majumdar, 1983) and the Cibola gneiss yielded a Rb-Sr age of 1.61 ± 0.073 b.y. (Taggart and Brookins, 1975). Age dates of the Sandia granite range from 1.3 to 1.5 b.y. (Aldrich and others, 1958; Brookins, 1974b; Brookins and others, 1975; Brookins and Shafiqullah, 1975; Taggart and Brookins, 1975; Brookins and Majumdar, 1982b; Brookins, 1982). Granitic rocks in the Manzano and Manzanita Mountains range in age from 1.3 to 1.6 b.y. (White, 1978; Brookins and others, 1980).

Paleozoic

(by Ronald F. Broadhead)

The oldest known Paleozoic rocks in the RPRA belong to the Elbert Formation (Devonian). The Elbert is preserved only in the subsurface of the "panhandle" of northwest Sandoval County where it is as thick as 50 ft (15 m; Stevenson and Baars, 1977, fig. 7). The southeast extent of the Elbert is controlled by erosional truncation by Pennsylvanian rocks. Within the RPRA, the Elbert consists of green shale, thin-bedded limestone and dolostone, and white glauconitic sandstone (Stevenson and Baars, 1977, p. 104). Parts of the Elbert are thought to have been deposited on tidal flats.

The Ouray Formation (Devonian-Mississippian) conformably overlies the Elbert Formation. Within the RPRA, the Ouray also is preserved only in the subsurface of the "panhandle" of northwest Sandoval County where it is as thick as 30 ft (9 m; Stevenson and Baars, 1977, fig. 8). The southeast extent of the Ouray also is limited by erosional truncation by overlying Pennsylvanian rocks. The Ouray consists of dark-brown limestone and dolostone and was deposited in a low-energy marine environment (Stevenson and Baars, 1977, p. 104).

The next youngest Paleozoic unit in the RPRA is the Arroyo Peñasco Formation (Mississippian). The basal contact of the Arroyo Peñasco is an unconformity. The Arroyo Peñasco is present at the surface in the Sandia and Nacimiento Mountains (Armstrong and Mamet, 1977; V. C. Kelley and Northrop, 1975, p. 28-30) and possibly in the subsurface of the San Juan, Albuquerque, and

Española basins. It is as thick as 30 ft (9 m) in the Sandia Mountains (V. C. Kelley and Northrop, 1975, p. 30). The Arroyo Peñasco occurs as scattered erosional outliers of limited areal extent that are unconformably overlain by the Magdalena Group (Pennsylvanian). In the northern Sandia Mountains, it consists of 6 ft (2 m) of basal sandstone overlain by 32 ft (10 m) of stromatolitic dedolostones, lime mudstones, and dolostones (Armstrong and Mamet, 1974, p. 155) and unconformably overlies Precambrian basement. In the Nacimiento Mountains, the Arroyo Peñasco consists of 3 ft (1 m) of basal quartz conglomerate and sandstone overlain by approximately 131 ft (40 m) of carbonate rocks including dedolostones, crinoid wackestones, lime mudstones, and pelletoid-ooid wackestones and packstones (Armstrong and Mamet, 1974, p. 151). The Arroyo Peñasco consists of subtidal to supratidal carbonates (Armstrong and Mamet, 1977, p. 124).

The Magdalena Group (Pennsylvanian) unconformably overlies Mississippian, Devonian, and Precambrian rocks in the RPRA. Pre-Magdalena Paleozoic rocks are absent throughout most of the RPRA and the Magdalena rests unconformably on Precambrian basement in most places. The Magdalena is subdivided by most workers into a lower Sandia Formation and an upper Madera Formation, although Myers (1973, 1982) raised the Madera to group status and subdivided it into (in ascending order): Los Moyos Limestone, Wild Cow Formation, and Bursum Formation. Pennsylvanian rocks are as thick as 2,000 ft (610 m) in northwest Sandoval County (Jentgen, 1977, fig. 2). In the Sandia Mountains, the Sandia Formation ranges in thickness from 49 to 300 ft (15-91 m; V. C.

Kelley and Northrop, 1975, p. 32). The Madera Formation ranges in thickness from 1,300 to 1,400 ft (400-430 m) in the Sandia Mountains (V. C. Kelley and Northrop, 1975, p. 34). In the Sandia Mountains, the Sandia Formation consists of interbedded sandstone, shale, limestone, conglomerate, and siltstone; the Madera consists dominantly of gray marine limestone but also contains shale, sandstone, and conglomerate (V. C. Kelley and Northrop, 1975). In the San Juan Basin part of the RPRA, Magdalena lithology appears to be similar, consisting of marine shelf carbonates and arkosic clastic rocks (Peterson and others, 1965, p. 2,087-2,092). Detailed lithology of Pennsylvanian rocks in the San Juan, Albuquerque, and Española Basins is unknown. Limestone suitable for cement and barite-fluorite-galena veins are found in the Madera Group.

The Magdalena Group is conformably overlain by the Bursum Formation (Permian) in the Manzano Mountains. The Bursum grades laterally into the Abo Formation (Permian) in the northern Manzanita and Sandia Mountains; the Bursum is not a mappable rock unit in the RPRA (Myers, 1982, p. 236-237).

The Abo Formation (Permian) conformably overlies the Bursum Formation in the northern RPRA. Where the Bursum is not present or has not been mapped as a separate unit, the Abo overlies the Madera Formation. The Abo is 700-900 ft (213-274 m) thick in the Sandia Mountains (V. C. Kelley and Northrop, 1975, p. 50)and is as thick as 1,800 ft (550 m) in northwest Sandoval County (Baars and Stevenson, 1977, fig. 1). The Abo is a red-bed unit consisting of interbedded fluvial arkosic sandstones and shales.

The sandstones are locally conglomeratic. Stratabound, sedimentary copper deposits occur in the Abo Formation.

The Yeso Formation (Permian) overlies the Abo. The Yeso has been subdivided in ascending order into four members: Meseta Blanca Sandstone Member (Wood and Northrop, 1946), Torres Member (Wilpolt and others, 1946), Cañas Gypsum Member (Needham and Bates, 1943), and Joyita Sandstone Member (Needham and Bates, 1943). The Meseta Blanca Sandstone Member is correlative with the DeChelly Sandstone of the Four Corners area (Baars, 1962); it consists dominantly of nearshore-marine, orange-red, fine-grained sandstone and is 70-500 ft (20-150 m) thick in the RPRA, being thickest in the subsurface of western Sandoval County (Baars and Stevenson, 1977, fig. 2). The Torres Member consists of interbedded marine, orange-red, fine-grained sandstone, red shale, and thin limestones and dolostones, but it has not been mapped as a separate unit in the RPRA. The Cañas Gypsum Member consists of marine gypsum and has not been mapped as a separate unit in the RPRA. The Joyita Sandstone Member consists of pink to red marine sandstone and also has not been mapped as a separate unit in the RPRA. Most workers in north-central New Mexico have grouped the Torres, Cañas, and Joyita Members into the San Ysidro Member of Wood and Northrop (1946). The San Ysidro varies in thickness from 250 to 400 ft (76-120 m) in the Sandia Mountains (V. C. Kelley and Northrop, 1975, p. 51), is approximately 150 ft (46 m) in the Nacimiento Mountains (Wood and Northop, 1946), and 400 ft (120 m) in southwest Sandoval County (Baars and Stevenson, 1977, fig. 3).

The San Ysidro Formation thins and grades into the Abo

Formation near Regina in the extreme northern portion of the RPRA. At the point where the San Ysidro is indistinguishable from the Abo Formation, equivalent age rocks belong to the Cutler Formation. The Cutler Formation consists almost entirely of continental deposits.

The Glorieta Sandstone Member of the San Andres Formation (Permian) conformably overlies the Yeso in some places and disconformably in other places (V. C. Kelley and Northrop, 1975, p. 51). The Glorieta consists of clean, white, medium-grained, marine sandstone which is 65-125 ft (20-38 m) thick in the Sandia Mountains (V. C. Kelley and Northrop, 1975, p. 52) and 0-150 (0-46 m) thick in Sandoval County (Baars and Stevenson, 1977, fig. 4); it generally thins to the north in the RPRA. Portions of this unit may be suitable for glass sands.

The limestones of the San Andres Formation (Permian) conformably overlie and intertongue with the Glorieta Sandstone. It consists of gray to black, shallow-shelf marine limestones that are locally dolomitic. It is up to 200 ft (60 m) thick in the southern part of the RPRA and it pinches out in the northern part (Baars, 1962, fig. 18).

The Bernal Formation (Permian) unconformably overlies the San Andres Formation and is preserved only as isolated erosional remnants underneath Triassic rocks. It is composed of tan-brown, fine- to medium-grained sandstone and is 0-75 ft (0-23 m) thick in the Sandia Mountains (V. C. Kelley and Northrop, 1975, p. 52). The Bernal appears to be absent from most of the Resource Area.

Triassic

(by Kent Anderson)

The Santa Rosa Sandstone is the oldest Triassic unit in the RPRA. It was named for exposures at Santa Rosa in east-central New Mexico (Darton, 1922, p. 183). The thickness of the Santa Rosa is between 100 and 400 ft (30 and 122 m; V. C. Kelley and Northrop, 1975) and consists of white, light-gray, buff, and reddish-brown, thin- to thick-bedded, fine- to coarse-grained sandstone with conglomerate lenses that occur most commonly in the lower part of the unit. Reddish-brown mudstones are more prevalent up section (V. C. Kelley and Northrop, 1975).

The Santa Rosa, in some respects, is like a vast pediment sheet that bevels to the northwest (V. C. Kelley, 1972). The sandstones of this unit have been quarried, especially near Cañoncito, New Mexico (V. C. Kelley and Northrop, 1975).

In the Sandia area, the Santa Rosa rests unconformably on Permian San Andres and Bernal Formations. The contact with the overlying Chinle Formation is conformable. The Santa Rosa is only exposed in the Sandia Mountains in the RPRA.

The Chinle Formation, which is the most extensive Triassic unit in the area, was named for exposures in Chinle Valley, Arizona (Gregory, 1917). The Chinle is placed in the Upper Triassic by analyses of vertebrate remains (Reeside and others, 1957) and plant fossils (Daugherty, 1941). At the base of the Chinle is an angular unconformity with Permian strata. In the south-central Nacimiento Mountains, the Chinle overlies the Bernal Formation, and in the northern Nacimiento Mountains the unconformity cuts stratigraphically lower northward so that the upper two Permian formations (Bernal and Glorieta) are missing (Woodward, 1984). In the Sandia Mountains area, the Chinle is conformable with the Santa Rosa Sandstone (V. C. Kelley and Northrop, 1975).

In the northern part of the RPRA, the Chinle consists of the Agua Zarca Sandstone Member, the Salitral Shale Tongue, the Poleo Sandstone Lentil, and an informal upper shale member. In the southern part of the section, the Poleo Sandstone pinches out and the remaining shale members are combined as the Petrified Forest Member (Woodward, 1984).

The Agua Zarca Sandstone Member is the oldest member of the Chinle and was named by Wood and Northrop (1946) for exposures along Agua Zarca Creek, 75 mi (121 km) north of Albuquerque in Rio Arriba County, New Mexico. The thickness of the Agua Zarca ranges from zero in the Gallina and Jarosa quadrangles to 210 ft (64 m) in the La Ventana quadrangle (Woodward, 1984).

The lower part of the Agua Zarca consists of a discontinuous basal conglomerate (Kurtz and Anderson, 1980). This is overlain by a white to light-buff, medium- to coarse-grained, poorly cemented, quartzose sandstone containing lenticular channels of cross-bedded conglomerate consisting of light- to dark-gray metaquartzite cobbles up to 6 inches (15 cm) in diameter, fossil wood, and clay galls (Woodward, 1984). Moving up section, the grain sizes decrease to fine- to medium-grained sandstones and the beds become less lensoidal. Individual beds are normally graded throughout the section with gravelly zones existing at the base of some beds (Kurtz and Anderson, 1980). Towards the top of the section, interbedded shale and claystone units become more prominant creating a gradational contact with the Salitral Shale Tongue, where they become the dominant rock type. On a whole, the Agua Zarca fines upwards meaning an overall decrease in fluvial energy (Kurtz and Anderson, 1980).

A detailed paleotransport study by Kaufman (1971) confirmed the reported southwest direction of current flow in the Agua Zarca (Elston, 1967; Kurtz and Anderson, 1980). The southwest paleotransport direction and the high-energy deposits of the Aqua Zarca indicate an uplift to the northeast prior to the deposition of this unit (Kurtz and Anderson, 1980). Thus, the quartzite clasts found in the sandstones and conglomerates of this member were probably derived from the Precambrian Ortega Quartzite that crops out in the Brazos uplift 56 mi (90 km) to the northeast (Muehlberger, 1967). All members of the Chinle thin in that direction (Muehlberger and others, 1960).

The largest stratabound copper deposit in the region occurs in the Agua Zarca Sandstone Member, 5 mi (8 km) east of Cuba, New Mexico at the Nacimiento mine (Talbott, 1974). Uranium occurs with the carbonaceous plant debris in the sandstone at the top of the Agua Zarca, but only in trace amounts (Chenoweth, 1974).

The Salitral Shale Tongue, which overlies the Agua Zarca, was named by Wood and Northrop (1946) for exposures at Salitral Creek in Rio Arriba County, New Mexico. The thickness of the Salitral Shale ranges from a maximum of 335 ft (102 m) in the San Pablo quadrangle to where it pinches out to the north in the Gallina quadrangle (Woodward, 1984).

The base of the valley-forming Salitral Shale Tongue is claystones and shales with discontinuous, very fine-grained sandstones and siltstones (Kurtz and Anderson, 1980). The remaining Saltiral Shale consists of maroon and green bentonitic claystones (Kurtz and Anderson, 1980) and maroon and light-gray shale which contains abundant calcareous concretions up to 7 inches (18 cm) in diameter (Woodward, 1984). Very fine- to coarse-grained sandstone lenses appear locally (Stewart and others, 1972). The contact between the Salitral Shale and the Poleo Sandstone Lentil is a disconformity (Woodward, 1984).

The Poleo Sandstone Lentil was originally called the Poleo Top Sandstone by Huene (1911). Wood and Northrop (1946) then redefined the Poleo Sandstone as a lentil in the Chinle Formation. The thickness of the Poleo ranges from 135 ft (41 m) in the northern part of the San Pablo quadrangle near Señorito Canyon to where it pinches out at San Miguel Canyon in the southern part of the San Pablo quadrangle (Woodward, 1984).

The cliff-forming Poleo is a yellowish-gray to greenish, very fine- to coarse-grained, micaceous sandstone with lenticular, freshwater, clastic, limestone channel deposits consisting of light-gray to gray clasts averaging 0.5 in (1 cm) in diameter (Woodward, 1984). At the base of the Poleo Sandstone is a discontinuous coarse conglomeratic sandstone consisting of dark yellowish-orange to very pale orange granules and pebbles of quartz, quartzite and chert, with a few larger clasts of limestone and siltstone (Stewart and others, 1972). The upper zone of the Poleo consists of a thin- to thick-bedded, dark yellowish-brown to light olive-gray, medium- to fine-grained, micaceous, quartzose, cross-bedded sandstone (Woodward, 1984).

The Poleo Sandstone is described as a high-energy, fluvial deposit (G. G. Gibson, 1975) which, in combination with the upper shale member of the Chinle, comprise a second sedimentary cycle (Kurtz and Anderson, 1980). The contact between the upper shale member and the Poleo is gradational.

The conglomerates and sandstones of the Poleo together with paleotransport direction data showing a southwest trend, indicate an uplift similar to but of lower magnitude than the pre-Agua Zarca uplift. The decreased magnitude is evident in the smaller grained sandstones and the smaller sedimentary structures. Again, the uplift appears to be in the northeast (Kurtz and Anderson, 1980). In the upper portion of the Poleo, the paleotransport directions shifts to the northwest (Kurtz and Anderson, 1980). The sediments of this portion most likely came from Paleozoic sediments exposed on the Pedernal high (C. T. Smith, 1961).

Uranium occurs in the Poleo Sandstone Lentil at Poso Srings, north of Gallina, in association with carbonaceous plant debris and copper carbonates (Chenoweth, 1974).

The informal upper shale member was designated as the uppermost member of the Chinle Formation by Wood and Northrop (1946). This member is the thickest member of the Chinle, ranging from 400 to 600 ft (122 to 183 m) thick (Woodward, 1984).

This member consists mostly of reddish-brown shale with minor amounts of green and maroon shales (Woodward, 1984). Much of the shale is bentonitic and dominantly montmorillonitic and was derived from the alteration of volcanic debris (O'Sullivan, 1974). The upper shale member appears to have been deposited in swamps and sluggish streams in lowland areas (Kurtz and Anderson, 1980). The lower contact of the upper shale member is gradational with the Poleo and the upper contact is disconformable with the Jurassic Entrada Sandstone (Woodward, 1984).

The Petrified Forest Member of the Chinle was named for exposures in the Petrified Forest National Park in eastern Arizona (Gregory, 1950). In the southern part of the Nacimiento Mountains, the Poleo Sandstone Lentil pinches out bringing the Salitral Shale Tongue in contact with the upper shale member. Although there are slight color and lithologic differences between the two units, the contact between them is indistinguishable. Therefore, they are mapped as the same unit and called the Petrified Forest Member (Woodward, 1984).

Jurassic

(by Virginia T. McLemore)

The oldest Jurassic unit in the RPRA is the Upper Jurassic Entrada Sandstone which consists of an eolian massive-bedded sandstone. It is correlated with the Exter Sandstone in eastern New Mexico (V. C. Kelley and Northrop, 1975) and the Wingate Sandstone in western New Mexico and Arizona (Woodward, 1984). This unit ranges in thickness from about 60 ft (18 m) in parts of the Sandia Mountains (V. C. Kelley and Northrop, 1975) to about 300 ft (91 m) in the Nacimiento Mountains (Woodward, 1984) and consists of two informal members: a medial silty member and an upper sandy member (Harshbarger and others, 1957). A third member, a lower sandy member, is not present in the RPRA and the medial silty member is only present locally.

The Todilto Formation overlies the Entrada Sandstone and consists of two informal units, a basal limestone and an upper gypsum-anhydrite. The basal limestone is 4-30 ft (1-9 m) thick and present everwhere in the Todilto depositional basin. This unit typically consists of these zones: a basal platy or laminated zone, a crinkly or crenulated zone, and an upper massive zone. The overlying gypsum-anhydrite member reaches a maximum thickness of 170 ft (52 m) and is present in the center portions of the Todilto depositional basin. The gypsum-anhydrite member is locally mined for gypsum and this unit constitutes a large portion of the gypsum resources in New Mexico (Austin and others, 1982). The limestone member is locally minded for aggregate. Uranium mineralization locally occurs in the limestone member wherever the gypsum-anhydrite member is absent (McLemore, 1983a).

The actual depositional environment of the Todilto Limestone is controversial. The Todilto Limestone overlies the eolian Entrada Sandstone and the overlying Summerville Formation consists of eolian dune and fluvial sabkha sequences. It is uncertain as to a marine or a nonmarine origin of the Todilto Limestone. The presence of the gypsum-anhydrite member and correlation with marine limestones of the Curtis Formation suggest a marine origin, perhaps an embayment or lagoon (Hines, 1976; B. L. Perry, 1963). The lack of confirmed marine fossils (Hines, 1976), the lack of dolomitic sequences (Green, 1982), the presence of varved sequences of sediment (R. Y. Anderson and Kirkland, 1960, 1966), and the coastal-continental environments of the Entrada Sandstone and Summerville Formation favors a lacustrine origin, a coastal sabkha environment (Rawson, 1980a, b), an enclosed saline lake, or a brackish-water lake connected to the sea (R. Y. Anderson and Kirkland, 1960). Recent isotopic evidence favors a marine origin (Ridgley and Goldhaber, 1983).

The Summerville Formation overlies the Todilto Formation in most of the San Juan Basin and consists of a sequence of pale-brown thin-bedded sandstones and brownish-gray gypsiferous mudstones (Harshbarger and others, 1957). In most of the Nacimiento Mountains, these beds are indistinguishable from the lower member of the Morrison Formation and Woodward (1984) maps them as part of the lower member. In the Sandia Mountains, the Summerville Formation is not present due to nondeposition, erosion, or similarity with the Morrison Formation.

The youngest unit during Jurassic times is the Morrison Formation which consists of three members from oldest to youngest: the Recapture, Westwater Canyon, and Brushy Basin. A fourth member, the Salt Wash, is not present in the RPRA. The Morrison Formation is the major host for uranium mineralization in New Mexico.

The Recapture Member unconformably overlies the Summerville Formation in the eastern San Juan Basin and the Todilto Formation in the northern Nacimiento and Sandia Mountains. It typically consists of 50 to 200 ft (15-61 m) of alternating maroon and gray shales, siltstones, and fine-grained sandstones (Hilpert, 1963, 1969; Flesch, 1974, 1975). Low- to moderate-energy fluvial sandstones and interbedded overbank siltstones lie adjacent to dune sandstones and sabkha siltstones (Green, 1975). Near the top of the Recapture Member, a disconformity separates the eolian-sabkha sequence from the overlying fluvial-lacustrine sequence. This disconformity is locally marked by a thin, basal lag-conglomerate (Green, 1975, 1980). Many of the uranium occurrences in the Recapture Member in the Grants uranium district are found at or above this disconformity.

The Westwater Canyon Member overlies the Recapture Member and is the major uranium-bearing sequence in New Mexico. This member is 50 to 300 ft (15-91 m) thick and consists of reddish-brown or gray arkosic cliff-forming sandstones and interbedded gray shales (Hilpert, 1963, 1969; Flesch, 1974). The sandstones have features typical of braided-stream environments, whereas the siltstones and shales are typical of overbank and lacustrine deposits (Flesch, 1974; Turner-Peterson and others, 1980).

Shales of the Brushy Basin Member locally intertongue with the underlying Westwater Canyon Member. The Brushy Basin Member is 100 to over 500 ft (30-152 m) thick (Hilpert, 1963, 1969) and consists of light greenish-gray shales and mudstones and a few interbedded sandstones lenses. The basal sandstone present in the Ambrosia Lake-Poison Canyon area is the Poison Canyon sandstone (of economic usage); although it is unclear as to which sandstone in the RPRA would correlate with the Poison Canyon sandstone. The Brushy Basin Member was probably deposited by meandering streams with extensive floodplain and lacustrine environments.

The Jackpile sandstone (of economic usage) occurrs at the top of the Brushy Basin Member and is present only in the eastern San Juan Basin. A formal definition of the unit as the Jackpile Sandstone Member has been proposed by Owen and others (1984). The Jackpile sandstone is truncated by the Cretaceous unconformity and is overlain by the Cretaceous Dakota Sandstone. This unit consists of a thick arkosic sandstone with minor interbeds or lenses of shale. Features typical of a braided-stream environment are common within the Jackpile sandstone (Baird and others, 1980; Jacobsen, 1980; Moench and Schlee, 1967). This major uranium-bearing unit occurs in a northeast-trending zone as much as 13 mi (21 km) wide, 33 mi (53 km) long, and up to 200 ft (61 m) thick (Moench and Schlee, 1967).

Cretaceous

(by Gretchen H. Roybal)

Cretaceous stratigraphy in the southeast portion of the San Juan Basin ranges from Early Cenomanian to Late Campian age with five major transgressive-regressive cycles and some minor fluctuations during this time (Molenaar, 1983). Figure 11 is a diagram of the Cretaceous units to be discussed and represents a line from Cuba to the southwest portion of the study area northeast of San Fidel. Figure 12 is a diagram of the Cretaceous units in the Hagan, Placitas, and Tijeras areas.

The oldest Cretaceous unit in the southeast portion of the San Juan Basin is the Dakota Sandstone (Meek and Hayden, 1862) which unconformably overlies the Morrison Formation. The Dakota sands produce large quantities of gas northwest of the RPRA. The total thickness of the Dakota is 100 to 175 ft (30.5-53 m), made up of two to three sandstones separated by non-marine claystones, and mudstones, tongues of the marine Mancos Shale.

The basal part of the Dakota is a conglomeritic, coarse-grained, feldspathic arenite which contains a few coals. Uranium and associated selenium occur in a black peat near the base of the Dakota Sandstone east of La Ventana Mesa (Elston, 1967). Within the basal unit are carbonaceous shales with bentonite beds grading upward into silty sandstones and transgressive marine sandstones. This fine-grained, feldspathic arenite has a sharp upper contact with the overlying Clay Mesa Tongue of the Mancos Shale.

The Clay Mesa Tongue is a sandy marine shale, approximately

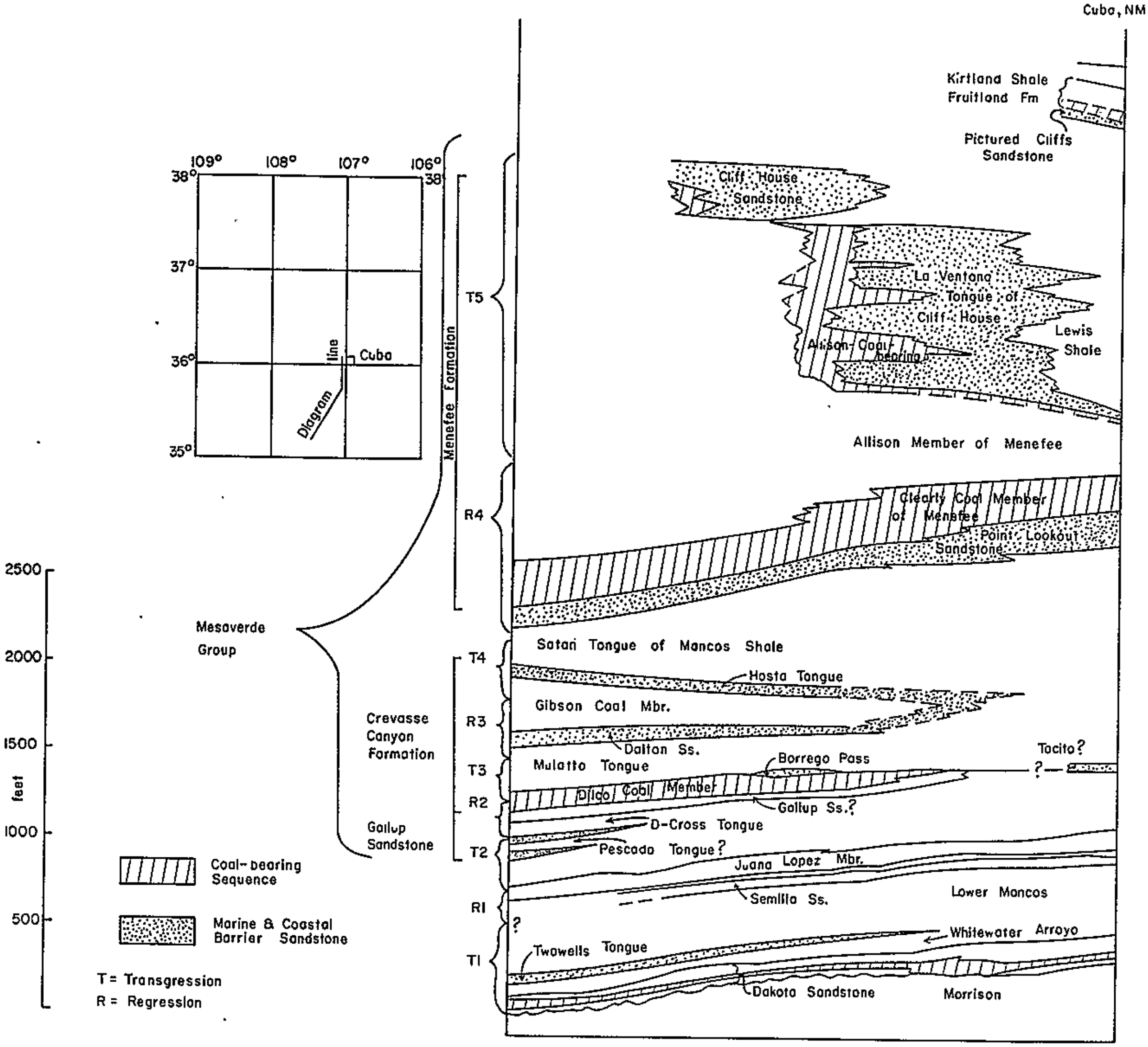

Figure 11 — Stratigraphic Diagram of Cretaceous Units on the Southeast side of the San Juan Basin (Modified from Fig. 7, Shomaker, Beaumont & Kottlowski, 1971, with additions from Dane, Landis and Cobban, 1972 and Molenaar, 1983b)

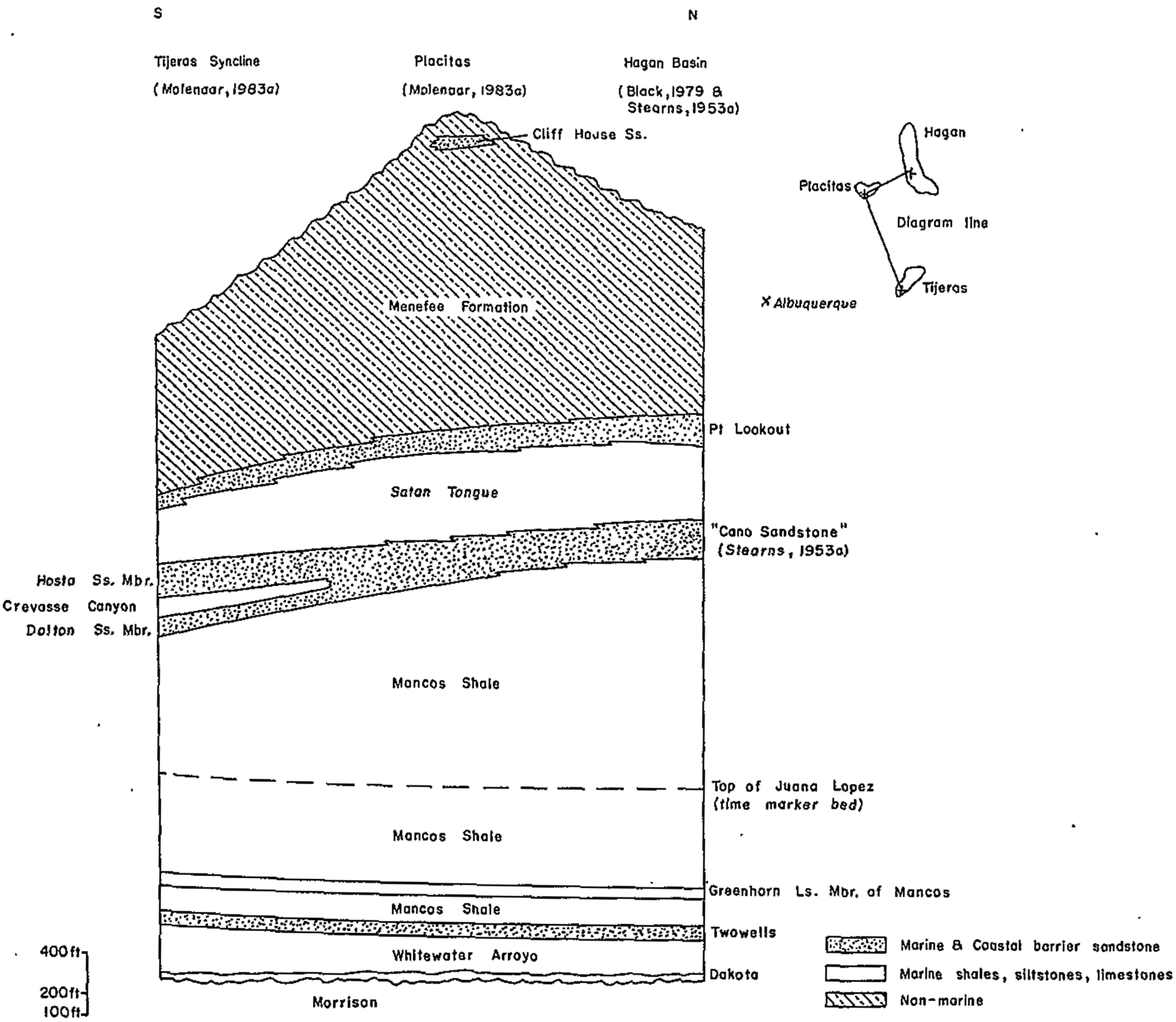

Figure 12 — Stratigraphic Diagram for Hagan, Placitas, and Tijeras areas. (adapted from Molenaar, 1983a)

60 ft (18 m) thick (Woodward, 1984). This unit grades into the Paguate Sandstone Tongue of the Dakota Sandstone a marine feldspathic arenite containing concretions, which is approximately 33 ft (10 m) thick. The Paguate has a sharp upper contact with the overlying Whitewater Arroyo Tongue of the Mancos Shale.

The Whitewater Arroyo Tongue of the Mancos Shale is a shallow water marine shale with a few thin limestones, sandstones, and bentonite beds (Landis and others, 1973). The Whitewater Arroyo Tongue varies from 30 to 100 ft (9-30 m) in the southwest portion of the study area (Fig. 11).

Overlying the Whitewater Arroyo Tongue is the Twowells Tongue of the Dakota Sandstone. The Twowells is a shallow water marine shelf sandstone (Landis and others, 1973) approximately 50 ft (15 m) to the northeast, the Twowells Tongue pinches out into the Lower Mancos Shale.

The Lower Mancos Shale represents a marine sequence approximately 380 ft (116 m) thick of dark gray shales with a few sandstone and limestone beds, and a few calcareous concretions. The Mancos shales are a source of clays (Elston, 1967).

Within a few feet of the top of the Lower Mancos Shale is the Semilla Sandstone (Dane and others, 1968). The Semilla Sandstone is a regressive fossiliferous sandstone of very well-sorted, fine to medium-grained sandstones with several zones of calcareous concretions, reaching a maximum thickness of 70 ft (21 m). Molenaar (1983a) suggests that the Semilla represents a time of maximum regression in this area during Late mid Turonian time. The Juana Lopez Member of the Mancos Shale rests conformably on the Lower Mancos Shale. This member is 50 to 100 ft (15-30.5 m) of fossiliferous calcarenite, containing broken shell fragments and sharks teeth (Molenaar, 1977) and represents a standstill during an overall transgressive sequence (Beaumont, 1971). The Juana Lopez Member is conformably overlain by the Middle Mancos Shale.

The overlying Middle Mancos Shale and tongues of the Gallup Sandstone of the Mesaverde Group to the lower D-Cross Tongue of the Mancos Shale were deposited during the second major transgressive cycle of the seas during Early Late Turonian time (Molenaar, 1983). The northeast portion of the study areas has 300-400 ft (91-122 m) of marine middle Mancos Shale and none of the intertonguing units seen to the southwest.

In the southwest portion of the study area two marine coastal barrier sandstone tongues (Beaumont, 1971) were deposited during a minor transgressive cycle. The lower tongue possibly correlates to a sandstone of the Tres Hermanos Formation to the west (Hook, Molenaar, and Cobban, 1983). The Pescado (?) Tongue of Mancos Shale overlies this sandstone and is approximately 40 ft (12 m) of marine shale. The other thin sandstone tongue in the southwest portion of the study area separates the Pescado (?) Tongue from the D-Cross Tongue of the Mancos Shale.

The upper portions of the Pescado Tongue and the D-Cross Tongue of the Mancos Shale are part of the second regressive cycle. The overlying Gallup Sandstone and the lower part of the coal-bearing Dilco Member of the Crevasse Canyon Formation were also deposited during this regressive cycle (Molenaar, 1983a) and are part of the Mesaverde Group (Holmes, 1877). The overlying

Point Lookout Sandstone, Menefee Formation, and Cliff House Sandstone are also units of the Mesaverde Group.

The Gallup Sandstone is a clean, massive coastal barrier sandstone with a maximum thickness of 60 ft (18 m) in the southwest portion of the RPRA deposited during earliest Conacian time (Molenaar, 1973) (Fig. 11). In this area the contact between the Gallup Sandstone and Dilco Coal Member of the Crevasse Canyon, a fluvial sandstone equivalent to the Torrivo Sandstone, the Hospah Sandstone, locally produces oil (Molenaar, 1977b). Near La Ventana, the Gallup Sandstone becomes less massive, more bedded and shaley grading into marine shales of the Mancos (Hunt, 1936).

The Dilco Coal Member of the Crevasse Canyon Formation is a paludal sequence conformably overlying the Gallup Sandstone. The Dilco Member is a series of claystones, mudstones, siltstones, sandstones, and coal beds with an average thickness of 70-100 ft (21-31 m). The upper Dilco represents the beginning of another transgressive phase which is overlain by the marine Mulatto Tongue of the Mancos Shale in most of the study area.

Two sandstone lenses overlie the Dilco Member in parts of the RPRA. The Borrego Pass Lentil, a coastal barrier sand, of the Crevasse Canyon is present in the middle of the study area. The Tocito Sandstone Lentil of the Mancos Shale seen in the northeast separates the middle and Upper Mancos Shale (Fig. 11).

The Mulatto Tongue of the Mancos conformably overlies the Dilco Member and is a transgressive marine deposit of sandy shales with a few interbedded sandstones ranging in thickness from 250 ft (76 m) in the southwest to 400 ft (122 m) in the northeast part of the study area. The Mulatto Tongue grades into dark gray shales to the northeast and is considered part of the main body of the upper Mancos Shale. In the northwest part of the RPRA, sandy lenses in the Upper Mancos produce oil and gas (Molenaar, 1977).

The upper part of the Mulatto Tongue, the Dalton Sandstone and the lower Gibson Coal Member of the Crevasse Canyon are deposits of the next regressive cycle beginning in Santonian time (Molenaar, 1983a). The Dalton Sandstone is a marine coastal barrier sandstone approximately 100 ft (30.5 m) thick. This unit is a friable, fine- to medium-grained, crossbedded sandstone. To the northeast this sandstone grades into marine shales of the upper Mancos.

The middle Mancos is approximately 400 ft (122 m) thick in the northeast and contains a regional unconformity recognized by use of microfossil zones and the local presence of the Tocito Lentil above the unconformity (Woodward, 1984). The Tocito Lentil consists of a number of elongate offshore sandstone bars which are oil producers in the northwest part of the RPRA (northwest and west-central Sandoval County). Molenaar (1983a) believes the Borrego Pass Lentil and Tocito Lentil to be time equivalent and represent a standstill and slight regression during the third regressive cycle. Many geologists have correlated the Tocito Lentil with the upper part of the Gallup, therefore, basal Niobrara sandstones (such as the Tocito) are often referred to as "Gallup" in the subsurface (Molenaar, 1977).

Overlying the Mulatto Tongue is the regressive marine coastal barrier Dalton Sandstone, a friable, fine- to medium-grained, crossbedded sandstone approximately 100 ft (30.5 m) thick. To the northeast this sandstone grades into marine shales of the Upper Mancos.

Overlying the Dalton Sandstone is the Gibson Coal Member of the Crevasse Canyon Formation. The Gibson Coal Member consists of a series of siltstones, mudstones, sandstones, and coals deposited in marginal swamps that vary in thickness from 160 to 300 ft (49-91 m).

The upper Gibson Coal Member is a landward deposit onlapped by the coastal barrier sandstones of the Hosta Tongue and marine shales of the Satan Tongue of the Mancos Shale during middle late Santonian time (Molenaar, 1983a). The Hosta Tongue of the Point Lookout Sandstone is a series of sandstones approximately 300 ft (91 m) thick (Hunt, 1936). To the northeast the Hosta Tongue grades into the upper Mancos Shale.

Overlying the Hosta Tongue is the Satan Tongue of the Mancos Shale, a dark gray marine shale, which becomes sandier to the southeast. This unit ranges in thickness from 210-630 ft (64-192 m) in the area of study. To the northeast, the Satan Tongue becomes part of the Upper Mancos Shale, which can be up to 1,200 ft (366 m) thick. The Upper Mancos is conformably overlain by Point Lookout Sandstone of the Mesaverde Group.

The Point Lookout Sandstone is a near shore sand which represents an extensive retreat of the seas (Molenaar, 1983a). The unit is a fine- to medium-grained, sandstone with thin interbedded carbonaceous gray to black shales (Woodward, 1984) averaging 140 to 200 ft (43-61 m) thick, thinning to 75 ft (23 m) north of Cuba (Beaumont, 1971). The Point Lookout Sandstone grades into the overlying Cleary Coal Member of the Menefee Formation.

The regressive Cleary Coal Member of the Menefee Formation consists of sandstones, mudstones, and coals 240-300 ft thick (73-91 m). The coals are lenticular and thin, generally less than 4 ft (1.2 m), locally up to 7 ft (2 m) thick. The Cleary Member is 240-300 ft (73-91 m) thick in the study area.

The overlying Allison Member is lithologically similar to the Cleary Coal Member of the Menefee Formation except for the general lack of coal in the unit. Some coals which have been mined, become predominant near the top of the Allison Member. Humate rich beds at the top of the Menefee also have been mined (Shomaker and Hiss, 1974). The Allison Member grades into the La Ventana Tongue of the Cliff House Sandstone.

The La Ventana Tongue of the Cliff House Sandstone is a thick buildup of sandstone deposited during a minor regression or static period during an overall transgressive time (Molenaar, 1983a). This unit consists of fine- to medium-grained, thin- to thick-bedded sandstones with interbedded shales. The La Ventana Tongue can reach a maximum thickness of 900 ft (74 m), and intertongues with the Lewis Shale to the northeast.

The Cliff House Sandstone outcrops further to the south and is equivalent to the La Ventana Tongue. This unit represents the final stages of the transgression along with the intertonguing Lewis Shale. Near Chacra Mesa, the Cliff House Sandstone is 290 to 360 ft (88-110 m) thick with carbonaceous and coal lenses within the sandstones.

The Lewis Shale (Cross, 1899) represents a marine deposit of light to dark gray shales with interbedded calcareous siltstones, sandstones, and bentonites (Woodward, 1984). The Lewis Shale is 1,500-2,000 ft (457-610 m) thick in the northeast part of the study area.

Intertonguing and overlying the Lewis Shale is the Pictured Cliffs Sandstone, a coastal barrier sandstone marking the final retreat of the Cretaceous seaway in Late Campanian time (Molenaar, 1983a). The Pictured Cliffs Sandstone is present only in the far northeast portion of the RPRA. This unit is 30 ft (9 m) of thin- to thick-bedded sandstones, siltstones, and shales. Several of the Pictured Cliffs sands are gas producers in northwest Sandoval County. The Pictured Cliffs Sandstone becomes a sandy shale further to the north and is indistinguishable from the Lewis Shale (Woodward, 1984).

The Fruitland Formation and Kirtland Shale overlies the Pictured Cliffs. These units have often been mapped together because of the problematic division based on the uppermost coal seam. These two units outcrop in the northern part of the study area. The lower part of the unit (Fruitland Formation) consists of carbonaceous shales, sandy to silty shales, and thin sandstones with a few thin coals. Outcrops of the Fruitland in the RPRA show an increase of coals to the west. The upper part of the unit (Kirtland Shale) is mostly shales with a few carbonaceous shales and concretions of calcite and siderite are common (Dane, 1936). The total thickness for both units in the study area is 85-200 ft (26-61 m). The Kirtland Shale is unconformably overlain by the Tertiary Ojo Alamo Sandstone on an erosional surface.

The Cretaceous sequence in the southeast corner of Sandoval County and northeast corner of Bernalillo County outside the San Juan Basin consist of three units: the Dakota Sandstone, Mancos Shale, and Mesaverde Group (Fig. 12). The Dakota Sandstone unconformably overlies the Morrision Formation on an erosional surface. The basal part of the Dakota is, in places, conglomeratic. The average thickness of the Dakota in this area is 20-25 ft (6-8 m) (Kelley and Northrop, 1975). This unit consists dominantly of white to buff, medium- to coarse-grained, sandstones with interbedded black shales, increasing upward.

The Mancos Shale intertongues with the adjacent Dakota Sandstone units. Molenaar (1983a) has identified the Whitewater Arroyo Tongue of the Mancos Shale overlying the basal Dakota in both the Tijeras Syncline and Hagan Basin. The Whitewater Arroyo is 180 ft (55 m) thick and overlain by the Twowells Tongue of the Dakota Sandstone. The Twowells in this area is approximately 55 ft (17 m) thick. The upper contact of the Dakota Sandstone is gradational with the overlying Mancos Shale.

A few members in the Mancos are recognized in the Hagan, Placitas, and Tijeras Canyon areas (Fig. 12). Approximately 125 ft above the base of the Mancos Shale is the Greenhorn Member of the Mancos made up of thin (2-6 ft; 0.6-2 m) gray, concretionary limestones. Molenaar (1983a) places the top of the Juana Lopez Member of the Mancos Shale 490 ft (149 m) above the top of the Twowells Tongue of the Dakota Sandstone. This fossiliferous, calcareous sandstone is 18-20 ft (5.5-6 m) thick in the Hagan Basin (Kelley and Northrop, 1975).

The Mancos Shale is predominantly a black to gray, sometimes brown, fossiliferous, very fissile shale and is locally calcareous, carbonaceous or siliceous (V. C. Kelley and Northrop, 1975). Exposures commonly are poor and faulted in this area, but the Mancos is estimated to be 1,400-1,800 ft (427-549 m) thick (Kelley and Northrop, 1975; Molenaar, 1983a).

The Mancos Shale grades into the overlying Mesaverde Group in both the Tijeras syncline and Hagan Basin, but more intertonguing is found in the Hagan Basin (Kelley and Northrop, 1975). The Mesaverde Group consists of alternating sandstones and shales. In the past the Mesaverde Group has been mapped as one unit in the Hagan Basin, Placitas, and Tijeras syncline. Black (1979) through the use of well log data and surface outcrops has correlated the units in the Hagan Basin with the Mesaverde Group in the San Juan Basin. Molenaar (1983a) measured sections in the Placitas and Tijeras areas in which these divisions were also recognized. Figure 12 is a diagram of the units recognized within the Mesaverde Group in these areas. Only the Hagan Basin is mapped with the same detail (Black, 1979).

The marine Cano Sandstone is the basal unit of the Mesaverde Group in the Hagan Basin (Stearns, 1953a). Black (1979) correlated this massive sandstone to the seaward pinchout of the regressive coastal barrier Dalton Sandstone of the Crevasse Canyon and the subsequent transgressive Hosta Tongue sandstones. The Dalton-Hosta sandstones are 220 ft (67 m) thick (Stearns,

1953) in the Hagan Basin which show no non-marine, paludal sequence separating them. These sandstones grade laterally into silty sandstones, siltstones, and marine shales to the north. In the Tijeras syncline, Molenaar (1983a) recognizes a non-marine sequence separating the Dalton and Hosta Sandstones of approximately 75 ft (23 m) thick. This non-marine sequence is equivalent to the Gibson Coal Member of the Crevasse Canyon Formation. The Dalton Sandstone Member of the Crevasse Canyon Formation is 98 ft (30 m) thick and the Hosta Sandstone is 153 ft (30 m) thick at Tijeras (Molenaar, 1983a).

The marine Satan Tongue of the Mancos Shale locally overlies and intertongues with the transgressive Hosta Sandstones. This gray black shale varies from 280 ft to 435 ft (85-133 m) from Tijeras to Placitas (Molenaar, 1983a). Stearns (1953) measured 350 ft (107 m) of a marine shaley sequence equivalent to the Satan Tongue in the Hagan Basin. The Satan Tongue of the Mancos is conformably overlain by the Point Lookout Sandstone.

The nearshore sands of the Point Lookout were deposited in an extensive retreat of the seas throughout the Hagan, Placitas, and Tijeras area and in the San Juan Basin. Molenaar (1983a) measured 50 ft (15 m) of Point Lookout in the Tijeras Syncline and 100 ft (30.5 m) at Placitas. Stearns (1953) measured 150 ft (46 m) of massive sandstone equivalent to the Point Lookout in the Hagan Basin. The Point Lookout is overlain by the non-marine sequence of the Menefee Formation (Fig. 12).

The Menefee Formation varies in thickness throughout this area due to the early Tertiary erosional surface. The total thickness of the Menefee Formation in the Tijeras is 800 ft (244

m) and at Placitas increases to 1,400 ft (427 m) (Fig. 12, Molenaar, 1983a). Stearns measured 900 ft (274 m) of Menefee in the Hagan Basin. Stearns (1953) also measured 300 ft (91 m) of "coal measures" above the Point Lookout Sandstone in the Hagan Basin which probably represents the equivalent of the Cleary Coal Member of the Menefee Formation in the San Juan Basin. The upper part of Stearns (1953a) section in the Menefee Formation is barren of coals. In both the Hagan and Tijeras areas the Menefee is unconformably overlain by the Tertiary Galisteo Formation.

At Placitas (Molenaar, 1983a) 50 ft (15 m) of overlying Cliff House Sandstone was measured above the Menefee Formation (Fig. 12). The presence of the Cliff House indicates the last major transgression seen in the San Juan Basin reached into the northern portion of this area. Approximately 100 ft (30 m) of non-marine sequence (Molenaar, 1983a) overlies the Cliff House at Placitas and represent the youngest Cretaceous sediments preserved in this area.

Tertiary

(by Robert M. North)

The Tertiary system in north-central New Mexico comprises continental sedimentary rocks interbedded with volcanic rocks and volcaniclastic sedimentary rocks. The Tertiary rocks of Bernalillo and eastern Sandoval Counties are sandstones and conglomerates of the Eocene Galisteo Formation overlain by Oligocene to Miocene volcanic and volcaniclastic sedimentary rocks of the Espinosa Formation which is overlain by sedimentary rocks of the Santa Fe Group, dominantly the Miocene Zia Sandstone. In the Jemez Mountains sedimentary rocks of the Albuquerque and Galisteo basins are overlain by a thick sequence of Miocene to Pleistocene volcanic rocks and associated volcaniclastic sedimentary rocks. Tertiary rocks of extreme northwestern Sandoval County include Paleocene to Eocene continental sandstones, siltstones, and shales of the San Juan Basin. The Mt. Taylor volcanic field extends into western Sandoval County and consists of basalts and basaltic andesites overlying Cretaceous sedimentary rocks. Sandstones, conglomerates, mudstones, and siltstones of the Santa Fe Group comprise the Tertiary and Quaternary rocks of western Bernalillo County and eastern Sandoval County.

San Juan Basin

The earliest Tertiary rocks preserved in Sandoval and Bernalillo Counties are the nonmarine clastic sedimentary rocks of the San Juan Basin. The oldest formation is the Paleocene Ojo Alamo Sandstone which is overlain by Paleocene Nacimiento Formation and Eocene San Jose Formation.

Ojo Alamo Sandstone--The Ojo Alamo Sandstone is a fine- to coarse-grained crossbedded sandstone, locally conglomeratic, with minor shale (Baltz, 1967). The type locality is in Ojo Alamo Arroyo, southeast of Ojo Alamo Spring, section 6, T.24N., R.11W. The Ojo Alamo unconformably overlies the Kirtland Shale and is conformably overlain and intertounges with the Paleocene Nacimento Formation (Baltz and others, 1966). Fossils include petrified logs up to 49 ft (15 m) in length. The Ojo Alamo Sandstone ranges in thickness from 82 to 164 ft (25 to 50 m) (Baltz, 1967). Uranium deposits occur in this formation.

Nacimiento Formation--The Nacimiento Formation is a thick sequence of shales, sandstones, siltstones, with minor arkosic conglomerate, lignite, and coal. The type locality is the Nacimiento Mountains, measured in large part by Gardner (1910) at the south end of the Mesa de Cuba, T.20N., R.2W. Baltz (1967, p. 88) measured a composite section in the same vicinity which is the best description of the Nacimiento Formation as the term is used today. The Nacimiento Formation conformably overlies the Ojo Alamo Sandstone and is in angular unconformity with the overlying San Jose Formation (Baltz, 1967). The Nacimiento Formation contains vertebrate fossils ranging in age from early (Puerco) and middle (Torrejon) Paleocene to possibly late (Tiffany) Paleocene (Baltz, 1967). Thickness varies from about 525 to 1,722 ft (160 to 525 m; Baltz, 1967, p. 11).

San Jose Formation--The Eocene San Jose Formation is a thick sequence of terrestial shales and sandstones. Baltz (1967) described four members of the San Jose Formation, from oldest to youngest they are the Cuba Mesa, the Regina, the Llaves, and the Tapicitos Members. Thickness of the San Jose Formation ranges from 197 to 1,804 ft (60 to 550 m). The following descriptions of the four members of the San Jose Formation are taken from Baltz (1967).

The Cuba Mesa Member is conglomeratic arkosic sandstone with interbedded lenses of green, reddish, and gray shale. The type section is Mesa de Cuba west of the Rio Puerco in sections 6, 7, 8, 17, 20, T.21N., R.1W., and sections 1 and 2, T.21N., R.2W. At the type section the Cuba Mesa Member is about 771 ft (235 m) thick, but elsewhere averages only about 213 ft (65 m) in the subsurface.

The Regina Member overlies and intertongues with the Cuba Mesa Member. The Regina Member is dominantly shale, siltstone, mudstone, shaly sandstone, and sandy shale with minor conglomerate. The type section of the Regina Member is near the town of Regina. The Regina Member is about 787 ft (240 m) thick at the type section, and ranges from 115 to 1,476 ft (35 to 450 m) in the San Juan Basin.

The Llaves Member conformably overlies the Regina Member and consists of very coarse-grained arkosic sandstone interbedded with some red sandstone and red and gray shale. The type section is near the Llaves Post Office. The Llaves Member is 295 to 689 ft (90-210 m) thick in the San Juan Basin.

The Tapicitos Member consists of up to about 460 ft (140 m) of maroon shales with interbedded lenses of brown to yellow sandstone. The type section is in Tapicitos Creek near Tapicitos Post Office.

Galisteo Basin

The Galisteo Basin formed during the Eocene between the Nacimiento and Sangre de Cristo uplifts in response to compressive tectonics of the Laramide orogeny (Baltz, 1978). The continental basin filled rapidly with sand, mud, and some coarser sediments, resulting in the red to white mudstone, sandstone, and conglomerate of the Galisteo Formation (Gorham and Ingersoll, 1979). The Galisteo Formation ranges in thickness from 856 ft (261 m) in the north to 4,250 ft (1,295 m) in the Hagan Basin section to the south. Vertebrate fossils show the Galisteo Formation to be Eocene and is in part a time equivalent of the San Jose Formation in the San Juan Basin (Lucas, 1982). The Galisteo unconformably overlies Cretaceous marine sediments and grades conformably into the volcaniclastic rocks of the Espinosa Formation.

The Espinosa Formation is dominately water-laid volcaniclastic sandstone and conglomerate interbedded with debris flows and local air-fall tuff, ash-flow tuff and lava flows (Kautz and others, 1981). The Espinosa Formation was formed as two coalescing fan deposits, probably derived from volcanic centers near Cerrillos in the north and the Ortiz Mountains in the south (Kautz and others, 1981, p. 982). Clasts of volcanic rocks in the Espinosa have been dated from 36.9 ± 1.2 m.y. (Weber, 1971, K-Ar on hornblende) to 26.9±0.6 m.y. (Kautz and others, 1981). The Espinosa is, therefore, thought to be the result of volcanic activity beginning around 38 m.y. and continuing until 26 m.y. (Kautz and others, 1981). The Espinosa Formation is unconformably overlain by Miocene and later sand and gravel deposits of the Santa Fe Group.

Albuquerque Basin

The Albuquerque Basin is an elongate, north-trending basin covering western Bernalillo and eastern Sandoval Counties. The basin began to form coincident with extensional tectonics in the late Oligocene or early Miocene (V. C. Kelley, 1977). The basin fill is dominately sandstone, mudstone, and conglomerate. The basin fill has been subdivided by various authors, but the general stratigraphy is Santa Fe Group, including the Miocene Zia Sandstone overlain by the middle red member and the Ceja Member. Overlying the Santa Fe Group is the Cochiti Formation and volcanic rocks, including basalt flows and silicic volcanic rocks of the Jemez Volcanic field.

Zia Sandstone--The Zia Sandstone is a Miocene eolian sand with minor clay layers and lacustrine limestone. The type section was measured on the Zia Indian Reservation by Galusha (1966) who recognized two members, the Piedra Parada and the Chamisa Mesa. Gawne (1981) describes a third member, the Canada Pilares Member.

The Piedra Parada Member is green to pinkish-gray crossbedded silty sandstone with a thin basal conglomerate and minor lacustrine limestone. The type section is in Piedra Parada

Arroyo in T. 14 N., R. 1 E., where the member is about 400 ft (122 m) thick (Gawne, 1981, fig. 2A). The Piedra Parada Member unconformably overlies the Galisteo Formation and is unconformably overlain by the Chamisa Mesa Member.

The Chamisa Mesa Member is red, green, pinkish gray to yellow, crossbedded, silty sandstone, with minor lacustrine limestone. The type section is on Chamisa Mesa in T. 16 N.4.2 and 3 E., where the member is about 656 ft (200 m) thick (Gawne, 1981, fig. 3). The Chamisa Mesa Member is conformably overlain by the Canada Pilares Member.

The Canada Pilares Member consists of red to green clay and pink siltstone and sandstone. The type section is Canada Pilares, T. 12 N., R. 1 W. and 1E where approximately 100 ft (30 m) is exposed (Gawne, 1981, fig. 5). The formation is in places in angular unconformity with overlying Pliocene sediments of the Santa Fe Group (Gawne, 1981) but also interfingers with overlying sediments (V. C. Kelley, 1977).

Middle and Upper Santa Fe Group--The Santa Fe Group was first divided by Bryan and McCann (1937) into the lower gray (equilivant to the Zia Sandstone of Galusha, 1966), middle red, and upper buff members. V. C. Kelley (1977) mapped the Zia Sandstone as a member of the Santa Fe Formation, retained the term middle red member (or "main body") in descriptions of the units, and mapped an upper member which he named the Ceja Member.

The middle red member contains reddish sandstones, mudstones, conglomerates, and fanglomerates with minor thin limestone beds. V. C. Kelley (1977) measured sections of the middle red ranging in thickness from 950 ft (290 m) to over 2,950 ft (900 m), but suggests that the formation is up to 4,265 ft (1,300 m) thick.

The Ceja Member was described and by V. C. Kelley (1977) in section 19, T. 10 N., R. 1 E. where the member consists of 213 ft (65 m) of conglomerate, sandstone, and mudstone. The Ceja Member, as mapped by V. C. Kelley (1977) is roughly equilivant to the Upper Buff of Bryan and McCann (1937). Fossil evidence indicates an early Pleistocene age for the Ceja Member (Lambert, 1968).

Cochiti Formation--The Cochiti Formation consists of alluvial fan deposits derived from Paleozoic sedimentary rocks and Miocene volcanic rocks of the Jemez field. The formation conformably and unconformably overlies the Zia Sandstone and consists of basal yellow silt and clay layers overlain in angular unconformity by a middle unit of pink to reddish-brown sand and gravel with an upper unit of red sand and gravel (Manley, 1978). The Cochiti Formation overlies the basalt of Chamisa Mesa which has a K-Ar date of 10.4 m.y. (Manley, 1978) and is overlain by the basalts of Santa Ana Mesa which have a date of 2.6 m.y. (Bachman and Mehnert, 1978), giving the Cochiti an age of late Miocene to early Pliocene (Manley, 1978).

Volcanic Rocks

Volcanic rocks of Tertiary and Quaternary age overlie sedimentary rocks of the Albuquerque basin. The volcanic rocks are part of a Miocene and younger event of bimodal volcanism. The largest area of volcanic rocks is the Jemez field near the northern end of the Albuquerque basin near where it joins the Espanola basin. Other Tertiary fields include the San Felipe field, the Canjilon Hill center, the Isleta volcano, and several additional isolated occurrences (Fig. 1). Scoria deposits occur in some of these areas.

The Isleta volcano is an alkali olivine basalt consisting of six flows and explosive maar deposits. The basalts are porphyritic with phenocrysts of olivine, augite, and labradorite in a groundmass of plagioclase, augite, olivine and opaques (V. C. Kelley and Kudo, 1978). Flow 2 has been dated as 2.78 ± 0.12 m.y. (Kudo and others, 1977; K-Ar whole rock).

Canjilon Hill, located just south of the large San Felipe field, is a well developed basaltic tuff breccia diatreme. The dominant rock is the Canijilon Tuff with lesser basalt flows, dikes, sills, and small plugs (V. C. Kelley and Kudo, 1978). One of the flows in the volcanic center has been dated at 2.61 ± 0.09 m.y. (Kudo and others, 1977, K-Ar whole rock).

The San Felipe field is a large area of olivine basalt flows forming the flat-topped Santa Ana Mesa. The earliest deposit in the San Felipe field is a basalt tuff which was covered by three successive basalt flows erupted along north-trending fissures (V. C. Kelley and Kudo, 1978). The flows are porphyritic with phenocrysts of olivine, labradorite and augite in a groundmass of plagioclase, pyroxene, olivine, and opaques (V. C. Kelley and Kudo, 1978). One of the flows has been dated at 2.5 ± 0.3 m.y. (Bachman and Mehnert, 1978). The San Felipe field has 66 cinder cones which were probably erupted through the lava. The final igneous event in the field was the emplacement of dikes and plugs in the cinder cone eruptions (V. C. Kelley and Kudo, 1978).

Quaternary basalt flows are found throughout the Albuquerque Basin and include the Cat Hills, the Albuquerque volcanoes, and the latest part of the Cerros del Rio (discussed above).

The Cat Hills are a series of eruptions along a north-trending fissure zone. The flows are porphyritic olivine basalts with olivine and plagioclase phenocrysts in a ground mass of titaniferous augite, plagioclase, olivine and opaques (V. C. Kelley and Kudo, 1978). The oldest flow of the Cat Hills event has been dated by K-Ar methods at 0.140 ± 0.038 m.y. (Kudo and others, 1977).

The Albuquerque volcanoes are a series of 5 large north-trending cones west of Albuquerque. V. C. Kelley and Kudo (1978, fig. 10) mapped 8 flows in the area. The flows are porphyritic with phenocrysts of olivine and plagioclase in a ground mass of plagioclase, olivine, augite, and opaques. Chemically, the basalts are related to olivine tholeiites (V. C. Kelley and Kudo, 1978). The basalts have been dated by K-Ar methods at 0.18 ± 0.04 m.y. (Bachman and Mehnert, 1978).

The Jemez volcanic field is a thick accumulation of Miocene to Pleistocene volcanic rocks of variable composition. The area has been extensively studied by the U.S. Geological Survey, in particular R. A. Bailey, R. L. Smith, and C. S. Ross. The following summary is based primarily on their work (Bailey and others, 1969; R. L. Smith and others, 1970; Bailey and Smith, 1978; C. S. Ross and others, 1961).

The Jemez volcanic field has a complex geologic history and a correspondingly complex stratigraphy. Volcanic activity began during the middle to late Miocene and continued through the Pleistocene. The volcanic stratigraphy consists of four groups which are from oldest to youngest 1) the Bland Group, informally proposed by Stein (1983), 2) the Keres Group, 3) the Polvadera Group and 4) the Tewa Group.

The Bland Group was informally proposed by Stein (1983) as the oldest igneous rocks in the Jemez volcanic field. The Bland Group includes about 980 ft (300 m) of intrusive, extrusive, and volcaniclastic sedimentary rocks exposed in Bland, Colle, and Medio Dia Canyons. The following discussion is summarized from the work of Stein (1983).

The oldest rocks of the Bland Group are gabbro, two volcanic breccia units and andesite. The relative ages of these units is not well understood. These rocks are intruded by a granular quartz monzodiorite and later quartz monzodiorite porphyry.

About 200 ft (60 m) of gabbro is exposed in upper Colle Canyon. The gabbro is intruded by quartz monzodiorite porphyry, Bearhead rhyolite, and an andesite dike. The gabbro is fine-grained and contains olivine, plagioclase, and augite with accessory biotite, iron oxides, and apatite.

Volcanic breccia 1 of Stein (1983), in the Washington Hill area and Bland and Colle Canyons, consists of interlayered volcanic breccia and volcaniclastic sandstone. The breccia clasts are as large as 12 in (30 cm), but are dominantly pebble size. Stein (1983) describes the unit as roof pendants and/or zenoliths in the quartz monzodiorite porphyry and granular quartz monzodiorite intrusions.

Volcanic breccia 2 of Stein (1983), near Bruce Place, in Medio Dia Canyon, and Reid Canyon, is a crudely stratified, purple breccia containing quartz, feldspar, and pebble-size rock fragments. The unit has been intruded by quartz monzodiorite porphyry. No contacts between breccia units 1 and 2 were observed by Stein (1983).

Andesite is the second most abundant rock unit in the Bland area and contains units petrographicly distinguishable as basaltic andesite, andesite, dacite, and basalt. These different subdivisions are indistinguishable in the field, hence the grouping as a mapping unit by Stein (1983). Basaltic andesite and andesite are the dominant rock types of the unit.

Quartz monzodiorite is the most abundant rock type in the Bland area. The quartz monzodiorite is a sequence of granular quartz monzodiorite intruded by a swarm of fine-grained quartz monzodiorite porphyry dikes. The sequence is exposed on Washington Hill and in Bland Canyon. The granular monzodiorite is medium-grained dark gray and contains andesine, augite, orthoclase, quartz, and iron oxides. The monzodiorite porphyry is dark gray and contains plagioclase phenocrysts up to 6 mm and augite phenocrysts up to 1.5 mm in a fine-grained groundmass of plagioclase, orthoclase, quartz, augite, chlorite, and iron oxides. A K-Ar date of 11.17 ± 0.3 m.y. was obtained by the University of Arizona laboratory on a separate of plagioclase phenocrysts from a relatively fresh sample of quartz monzodiorite porphyry. If correct, this would make the upper Bland Group time equilivant with the Lower Keres Group.

The Keres Group was proposed by Bailey and others (1969) for the basaltic, andesitic, dacitic, and rhyolitic rocks forming the southern Jemez Mountains. The Keres Group includes the Basalt of Chamisa Mesa, Canovas Canyon Rhyolite, Paliza Canyon Formation, and Bearhead Rhyolite-Peralta Tuff Member.

The Basalt of Chamisa Mesa is a series of thin multiple olivine basalt flows (Kudo, 1974). The flows were named for Chamisa Mesa in Sandoval County and have been dated by the K-Ar method at 10.4 m.y. (Bailey and Smith, 1978).

The Canovas Canyon Rhyolite was named by Bailey and others (1969) for a sequence of rhyolite flows, tuffs, domes and associated shallow intrusions exposed in the southwestern Jemez Mountains. The type section is Canovas Canyon, but the best exposures are on Bear Springs Peak. The Canovas Canyon Rhyolite consists of up to 902 ft (275 m) of bedded tuffs, massive pumice breccias, and lava flows locally intruded by small rhyolite bodies. The Canovas Canyon Rhyolite at Bear Springs overlies clastic sedimentary rocks of the Santa Fe Group and on Borrego Mesa conformably overlies the basalt of Chamisa Mesa, and interfingers with gravel deposits of the lower Cochiti Formation. The unit is conformably overlain by basalts of the Paliza Canyon Formation. K-Ar dates of 10.2-10.0 m.y. have been obtained on rocks of the Canovas Canyon Rhyolite (Bailey and Smith, 1978).

The Paliza Canyon Formation was named by Bailey and others (1969) for a complex of basalt, andesite, and dacite flows, tuffs, and breccias in the southern Jemez Mountains. Maximum thickness for the unit is about 2,950 ft (900 m). Bailey and others (1969) proposed a type area of Paliza Canyon, although the best exposures are in Cochiti Canyon and on the east side of St. Peters Dome. The Paliza Canyon Formation overlies rocks of Permian to late Tertiary age and is overlain and intruded by Bearhead Rhyolite. Rocks of the Paliza Canyon Formation have been dated from 8.1 to 8.5 m.y. (Bailey and others, 1969).

The Bearhead Rhyolite was named by Bailey and others (1969) for exposures on Bearhead Peak. The rhyolite consists of tuffs, flows, domes, and shallow intrusions in the southern Jemez Mountains. A tuffaceous member was formably designated by Bailey and others (1969) as the Peralta Tuff Member for exposures in Peralta Canyon. The tuff member is predominently air fall tuff with some tuffaceous sandstone which is interbedded with the volcanic gravels of the Cochiti Formation. The Bearhead Rhyolite has been dated between 7.1 and 6.5 m.y. (Bailey and Smith, 1978).

The Polvadera Group was named by Bailey and others (1969) for a sequence of basalts, andesites, dacites, and rhyolites in the central and northern Jemez Mountains. The Polvadera Group has three formations, the Lobato Basalt, Tschicoma Formation and El Rechuelos Rhyolite. Ages for the group range from 7.4 to 2.0 m.y. (Bailey and Smith, 1978).

The Lobato Basalt was named by Bailey and Smith (1969) for basaltic lavas capping Clara Peak, Lobato Mesa, Polvadera Mesa, Escoba Mesa, Cerro Pedernal and La Grulla Plateau in the northern Jemez Mountains. The formation was named for Lobato Mesa where a succession of individual flows ranging from 20 to 50 ft (6 m to 15 m) have a composite thickness of 460 ft (140 m). The flows are dominantly olivine-augite basalt with lesser hypersthene-, pigeonite-, and titaniferous augite-bearing varieties. Flows of Labato Basalt from Polvadera Mesa have been dated at 7.4 m.y. (Bailey and others, 1969).

The Tschicoma Formation was described by Griggs (1964) and consists of a series of latite, quartz latite, and andesite flows. The type section was designated on Tschicoma Peak north of Los Alamos. The Tschicoma Formation is as much as 2,625 ft (800 m) thick. K-Ar ages of 6.7 to 3.7 m.y. have been obtained on rocks of the formation (Bailey and others, 1969).

The El Rechuelos Rhyolite includes the small El Lagunito de Palo Quimudor pumice cone, two pumiceous rhyolite domes about 2 miles (3 km) northwest of Polvadera Peak, a small obsidian dome southwest of Polvadera Peak, and two lithic rhyolite masses at the head of Canoncito Seco. The formation was named for El Rechuelos draw on the west side of Polvadera Peak (Bailey and others, 1969).

The Puye Formation is a broad alluvial fan on the northeast side of the Jemez Mountains. Griggs (1964) divided the Puye into two members, the lower Totaui Lentil and an upper fanglomerate member. The Totaui Lentil member is a river gravel, consisting mainly of Precambrian rock clasts. The fanglomerate member is comprised of clasts of volcanic rock from the Jemez Mountains. The Puye Formation is penecontemporanous with the Tschicoma Formation of the Polvadera Group which has K-ar dates of 6.7 to 3.7 m.y. (Bailey and others, 1969).

The Tewa Group includes the large volumes of rhyolite tuffs erupted from the Toledo and Valles centers during the Pleistocene. The group consists of two formations, the Bandelier

Tuff and the Valles Rhyolite (Bailey and others, 1969; Bailey and Smith, 1978).

The Bandelier Tuff consists of two ash-flows, the Otowi and Tshriege members each with a basal pumice layer. The Cerro Toledo Rhyolite and Cerro Rubio Quartz Latite were extruded between the tuff eruptions.

The Otowi Member consists of the basal Guaje pumice bed (Guaje Member of Griggs, 1964) and overlying ash-flow units. The Guaje pumice bed is a bedded, pumice fall deposit formed as an early stage in the formation of the Toledo caldera. Pumice has been mined from this unit. The overlying ash flow units range from densely welded to non-welded (Kudo, 1974), and were also erupted from the Toledo caldera. The type section of the Guaje pumice bed is Guaje Canyon where about 26 ft (8 m) are exposed. The Otowi Member has been dated at 1.4 m.y. by K-Ar methods (Bailey and Smith, 1978).

The Cerro Toledo Rhyolite and Cerro Rubio Quartz Latite formed domes in the ring fracture zone of the collapsed Toledo caldera. The Cerro Rubio Quartz Latite intrudes the Cerro Toledo Rhyolite. Both of the dome-forming formations are unconformably overlain by the Tshirege Member of the Bandelier Tuff (Griggs, 1964).

The Tshirege Member was formed by the eruption of the Valles caldera about 1.1 m.y. ago. The Tshriege Member was named by Griggs (1964) for exposures near Tshriege ruins. Total thickness of the Tshirege Member is about 223 ft (68 m) (Griggs, 1964, p. 54-55). The basal unit of the Tshirege Member is the Tsankawi

Pumice Bed, named for exposures in the vicinity of Tsankawi ruins on the Pajarito Plateau (Bailey and others, 1969). The pumice bed ranges up to 11 ft (3.5 m). The overlying ash-flow tuff is welded and generally about 200 to 215 ft (60-65 m) thick.

The Valles Rhyolite was proposed by Griggs (1964) for rhyolite flows, domes, and tuffs erupted into the Valles Caldera after its collapse. The Valles Rhyolite is divided into six members, the Deer Canyon, Redondo Creek, Valle Grande, Battleship Rock, El Cajete, and Banco Bonito Members.

The Deer Canyon Member is a rhyolite dome-flow with associated tuffs in the central Valles Caldera. Maximum thickness is about 100 ft (30 m).

The Redondo Creek Member consists of rhyolite domes, dikes, flows, and perlitic flow breccias in the central and western Valles caldera. Maximum thickness is about 490 ft (150 m).

The Valle Grande Member is a series of young rhyolite domes formed in the moat of the Valles Caldera. The domes vary somewhat mineralogically, but are all considered petrologically related (Bailey and others, 1969). The domes have been dated from 1.1 to 0.4 m.y. (Bailey and Smith, 1978).

The Battleship Rock Member is relatively small rhyolite ash-flow tuff. The tuff reaches about 390 ft (120 m) in thickness. The tuff was apparently erupted into a canyon cut into the Permian Abo Formation and Pennsylvanian Magdalena Group. The Battleship Rock Member postdates the South Mountain dome flow which has been dated at 0.49 m.y. (Doell and others, 1968).

The El Cajete Member is a bedded air fall deposit of rhyolite pumice lapilli and blocks erupted from El Cajete crater.

The member contains rock fragments of Battleship Rock Member, demonstrating a younger age. The El Cajete Member is overlain by the Banco Bonito Member. The Battleship Rock, El Cajete, and Banco Bonito Members are all thought to be about 0.1 m.y. (Bailey and Smith, 1978).

The Banco Bonito Member is a porphyritic obsidian flow that fills the southwestern moat of the Valles Caldera. The vent of the flow is just west of El Cajete Crater. The flow is older than 42,000 years and younger than 0.43 m.y. (Bailey and others, 1969). Lack of erosion and preservation of concentric pressure ridges on the flow suggest it is closer to the younger age.

Quaternary Deposits

(by Brian W. Arkell)

Quaternary deposits in the RPRA consist of continental clastic sediments with local interbedded volcanics. Sediments were deposited in fluvial, alluvial fan, bajada and bolson environments, primarily in response to the rifting and uplift which characterized the Cenozoic. In addition, lacustrine and eolian deposits are present to a lesser extent.

The oldest Quaternary deposits are sandy gravels deposited upon the pediments or erosional surfaces at the base of mountains. The most extensive of these is the Ortiz gravel. It is present in the Albuquerque Basin, Hagan Basin and Sandia Mountains area. The Ortiz is composed of consolidated gravel and sand as much as 150 ft (46 m) thick in the Albuquerque Basin (V. C. Kelley, 1977). Correlative units occur in the southern Española Basin and Jemez Mountains where they are known as Ancha Beds and Mesita Alta gravel, respectively. Ortiz equivalents are also present in the low-lying regions of the Nacimiento Mountains and southern San Juan Basin. In addition to the Ortiz gravels, smaller pediment deposits are present locally in the RPRA. These have not been studied to a great extent and as such, they lack formal names or descriptions.

The youngest Quaternary deposits are those which comprise the alluvial fans, valley alluvium and river terraces of the RPRA. They are basically unconsolidated to poorly consolidated gravel and sand of predominantly alluvial or eolian origin.

Quaternary igneous deposits occur in some parts of the RPRA.

The most extensive are in the Jemez Mountains. These comprise the Pleistocene Bandelier Tuff of Valles Rhyolite Formations, collectively known as the Tewa Group (previously described). Quaternary igneous rocks also occur in the Albuquerque area. These are basaltic flows and cones of Cat Hills and Albuquerque volcanic fields (previously discussed).

MINING HISTORY

Earliest mining in the northern RPRA occurred during prehistoric times by the Southwest Indians. Building stone, chert, pottery clay, mineral pigments, adobe, and gypsum are common in the area and were utilized by the Indians for centuries (Elston, 1967; Northrop, 1959). The Spanish introduced metals during the sixteenth century and early documents are filled with rumors of hidden Indian silver and gold mines throughout the Nacimiento, Jemez, and Sandia Mountains (V. C. Kelley and Northrop, 1975; Elston, 1967; Northrop, 1959; D. Murray, unpublished manuscript, 1984). A group of mines along the Cuchilla de San Francisco in the Placitas district were mined for copper ores. Potsherds found in one of these mines were dated at 1500-1550 A.D. (Warren and Weber, 1979). Copper ore may have been mined from the Nacimiento mine by the Conquistadores during the same period (Talbott, 1974).

Mining methods employed by the Indians and Spanish were primitive by today's standards and more modern mining and milling methods were not available until after the U.S. occupation in 1846 (Elston, 1967). However, serious attempts of metal mining did not begin until the arrival of the Atchison, Topeka, and Santa Fe Railroad in 1880.

The railroad not only provided transportation but required large amounts of crushed rock for ballast and road bed and tremendous amounts of coal. Some coal was shipped to steel mills out of state. The metal deposits could now be mined economically and shipped to market, but only during times of high metal prices. Many mines operated in the various districts (Fig. 13) during the late 1800's, however, few mines operated continuously for more than 10 or 15 years. The Cochiti district produced gold and silver and increased the importance of northern Bernalillo County until 1903 when Sandoval County split from Bernalillo County (Northrop, 1959). During this period coal was the mainstay of mining until the 1929 Depression (Elston, 1967).

Manganese was produced during and shortly after World War II to build stockpiles of that strategic metal. Uranium exploration began during the 1940's, but production in the RPRA did not occur until 1954. Petroleum production began in 1953 and has provided the largest income from energy and mineral commodities since.

Industrial materials became increasingly important in the years following World War II. The high bulk but low unit value of industrial materials requires improved transportation methods and close proximity to urban centers. Dramatic growth, especially in the Albuquerque area, increased demand for industrial materials of all kinds, especially sand, gravel, and cement products. Exploration occurred by both government and private concerns for sources of clay, pumice, gypsum, limestone, and perlite. Kinney Brick Company began producing bricks and tile for the Albuquerque area in 1949. Cochiti Pumice Company began mining in 1948 and by 1949 six additional operators were mining pumice. Today, one pumice mine is active in the area. Scoria was mined commercially from the Cat Hills as early as 1950. Ideal Cement Company opened a 518,000 ton (470,000 metric tons) per year capacity cement plant in 1959. In 1960, American Gypsum began producing wallboard using gypsum from White Mesa.

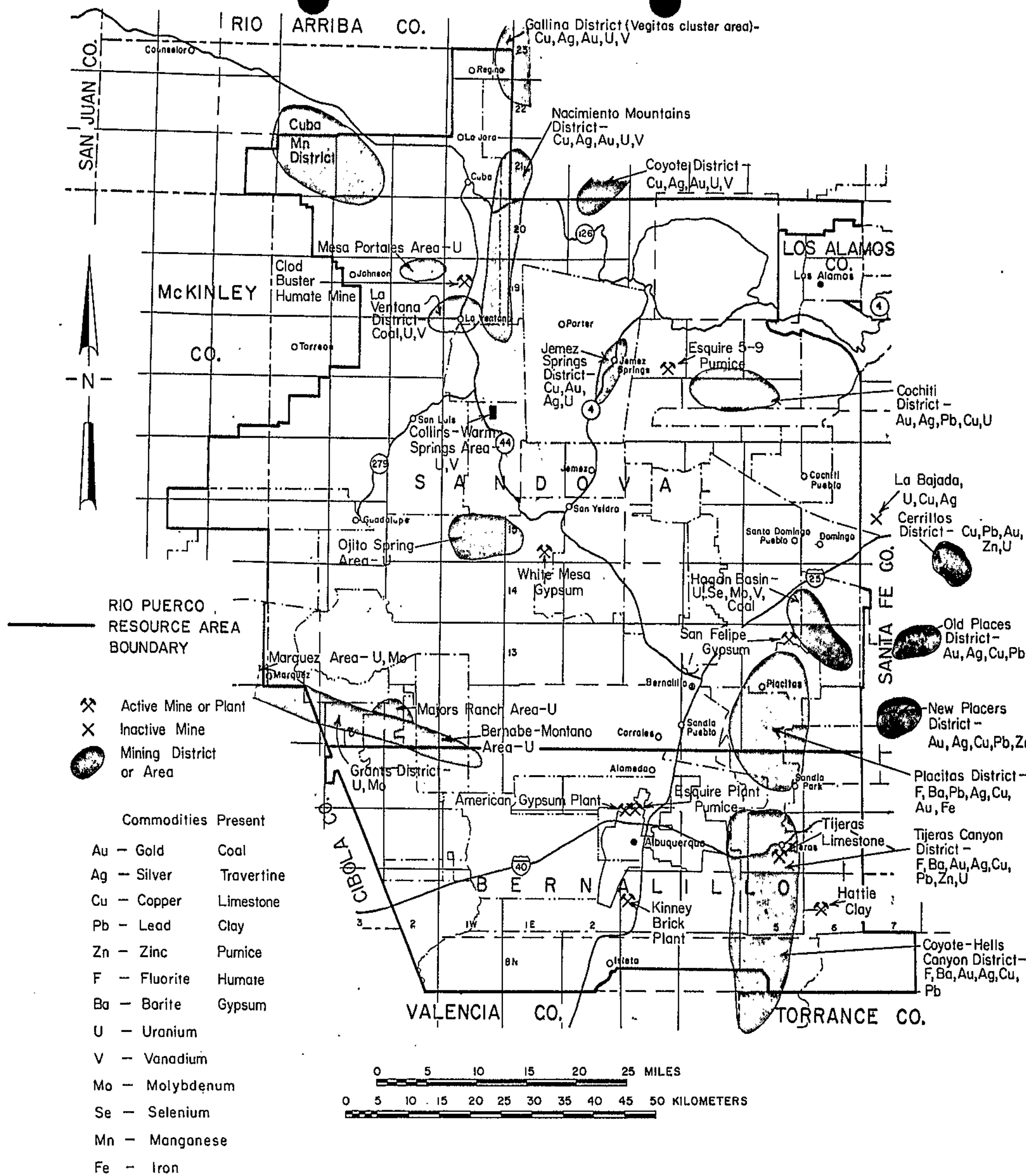

FIGURE 13 — MINING DISTRICTS IN THE NORTHERN RIO PUERCO RESOURCE AREA.

Kaiser Gypsum opened the Rosario pit and plant in 1962. Humate is commercially mined since 1967 by Farm Guard Products. In 1972, New Mexico Earth Company began offering adobe bricks for sale on a large scale, though the majority of commercial adobe brick operations did not open until the late 1970's when renewed interest in southwest architecture and alternatives to expensive building materials became popular.

Reliable production statistics were not available until the early 1900's for metals and even later for nonmetallic commodities. Metal production (including uranium) from mining districts within the RPRA (Fig. 13) has exceeded 2.5 million dollars since 1894 (Table 2). From 1952 to 1980, over 294 million dollars worth of sand and gravel, pumice, coal, clays, stone, gemstones, and cement was produced from Bernalillo County (Table 3). Value of mineral production from Sandoval County from 1952 to 1980 exceeded 59 million dollars (Table 4).

Present mining claims, leases, and exploration activity

Hundreds of mining claims and leases cover portions of the northern RPRA (Figs. 14 and 15). Many of these claims and leases are in the vicinity of known mining districts (Fig. 13). Dispite the large number of mining claims no metal or uranium mines are currently producing. The Rio Puerco uranium mine closed in 1980 because of a slump in the uranium market and the Nacimiento copper mine closed in 1975 after a tailings spill. There may be a few one- or two-man gold placer operations in the area, but these could not be confirmed.

Table 2 - Total value of known or estimated metal production in the northern Rio Puerco Resource Area.

Mining district	Years of production	Total value ($)	Commodities produced
Cuba Mn	1942-1959	250,000[1]	Mn
Gallina[2]	1956	230	U, V
Nacimiento[2,3]	1880-1964	800,000[1]	Cu, Ag
La Ventana-Collins	1954-1957	13,808	U, V
Jemez Springs	1928-1937	4,138	Cu, Ag, Au
Cochiti	1894-1963	1,321,920	Ag, Au, Cu, Pb
Placitas	1904-1961	2,329	Ag, Au, Cu, Pb, Zn
Tijeras Canyon-Coyote-Hells Canyon	1909-1952	4,179	Pb, Au, Ag, Cu
Marquez-Bernabe Montaño area (Grants district)	1979-1980	W	U, Mo
TOTAL (excluding W)	1894-1980	2,396,604	----

W - withheld due to proprietary information
1 - estimate from Elston (1967)
2 - Sandavol County only
3 - does not include production from 1971 to 1975

Table 3 - Total value of mineral production in Bernalillo County, New Mexico, 1952 to 1980. Compiled from U.S. Bureau of Mines (1952-1980).

Year	Value (dollars)[1]	Commodities
1952	355,751	----
1953	615,380	sand and gravel, pumice, coal
1954	1,361,136	sand and gravel, pumice, pumicite, clays, stone
1955	989,301	sand and gravel, stone, clays
1956	1,252,002	sand and gravel, stone, clays, gemstones
1957	833,300	sand and gravel, clays
1958	1,670,169	sand and gravel, stone, pumice, clays
1959	4,954,799	sand and gravel, cement, stone, pumice, clays
1960	6,364,524	sand and gravel, cement, stone, clays, gypsum, pumice, gemstones
1961	7,697,669	sand and gravel, cement, stone, clays, gypsum, pumice, gemstones
1962	7,489,578	sand and gravel, cement, stone, clays, gypsum, pumice
1963	10,219,570	cement, sand and gravel, stone, clays, pumice
1964	8,765,430	cement, sand and gravel, stone, clays, pumice
1965	8,614,631	cement, sand and gravel, stone, clays, pumice
1966	9,087,986	cement, sand and gravel, stone, clays, pumice
1967	7,390,000	cement, sand and gravel, stone, clays, pumice
1968	10,264,000	cement, sand and gravel, stone, clays, pumice
1969	8,675,000	cement, sand and gravel, stone, clays
1970	8,198,000	cement, sand and gravel, stone, clays
1971	11,802,000	cement, sand and gravel, stone, clays
1972	13,876,000	cement, sand and gravel, stone, clays
1973	15,973,000	cement, sand and gravel, stone, clays
1974	16,400,000	cement, sand and gravel, stone, clays
1975	W	cement, sand and gravel, stone, clays
1976	21,012,000	cement, sand and gravel, stone, clays
1977	28,506,000	cement, sand and gravel, stone, clays
1978	29,744,000	cement, sand and gravel, stone, clays
1979	26,660,000	cement, sand and gravel, stone, clays
1980	25,020,000	cement, sand and gravel, stone, clays
TOTAL 1952-1980	293,791,226 (does not include W value)	

[1] W = withheld

Table 4 - Total value of mineral production in Sandoval County, New Mexico, 1952-1980. Compiled from U.S. Bureau of Mines (1952-1980).

Year	Value (dollars)[1]	Commodities
1952	W	----
1953	100,110	sand and gravel, pumice, coal
1954	71,173	sand and gravel, pumice and pumicite, coal
1955	101,942	sand and gravel, pumice and pumicite, copper, coal, stone, silver
1956	164,631	sand and gravel, pumice, copper, manganese ore, coal, stone, silver
1957	313,269	sand and gravel, copper, pumice, petroleum, manganese ore and concentrate, coal, silver, uranium ore, gemstones
1958	487,187	sand and gravel, pumice, petroleum, manganese ore and concentrate, coal, gemstones
1959	237,627	sand and gravel, pumice, petroleum, manganese ore and concentrate, coal, uranium ore, copper, gemstones, silver, lead
1960	261,311	sand and gravel, pumice, petroleum, gypsum, coal, copper, gemstones, silver, lead
1961	348,655	sand and gravel, gypsum, petroleum, pumice, coal, copper, lead, zinc, silver
1962	525,343	sand and gravel, gypsum, petroleum, pumice, coal
1963	1,461,329	sand and gravel, gypsum, pumice, petroleum, coal, silver
1964	1,027,809	sand and gravel, gypsum, pumice, petroleum, coal, silver, gold
1965	782,121	gypsum, sand and gravel, petroleum, pumice
1966	1,033,734	sand and gravel, gypsum, pumice, petroleum, stone, natural gas
1967	801,000	gypsum, pumice, sand and gravel, petroleum, stone, coal, natural gas, copper, silver
1968	976,000	sand and gravel, gypsum, petroleum, pumice, peat, natural gas
1969	715,000	gypsum, sand and gravel, petroleum, pumice, natural gas, peat, stone
1970	829,000	gypsum, sand and gravel, petroleum, pumice, natural gas, peat, stone
1971	2,836,000	copper, gypsum, petroleum, natural gas, sand and gravel, silver, peat, pumice, clay, stone, zinc
1972	8,544,000	copper, sand and gravel, petroleum, gypsum, natural gas, silver, peat, pumice, clays, zinc
1973	12,384,000	copper, sand and gravel, stone, gypsum, petroleum, natural gas, silver, peat, clays, pumice, gold, zinc
1974	11,005,000	copper, petroleum, natural gas, gypsum, silver, clays, peat, sand and gravel, pumice, gold, zinc
1975	3,677,000	petroleum, stone, natural gas, gypsum, sand and gravel, pumice
1976	5,043,000	petroleum, natural gas, sand and gravel, gypsum, copper, pumice, stone, silver, gold
1977	1,190,000	gypsum, peat, sand and gravel, pumice
1978	W	gypsum, sand and gravel, peat, pumice
1979	3,277,000	gypsum, sand and gravel, peat, pumice
1980	1,453,000	gypsum, sand and gravel, stone, peat, pumice
TOTAL 1952-1980	59,646,241	(does not include W values)

[1] W = withheld

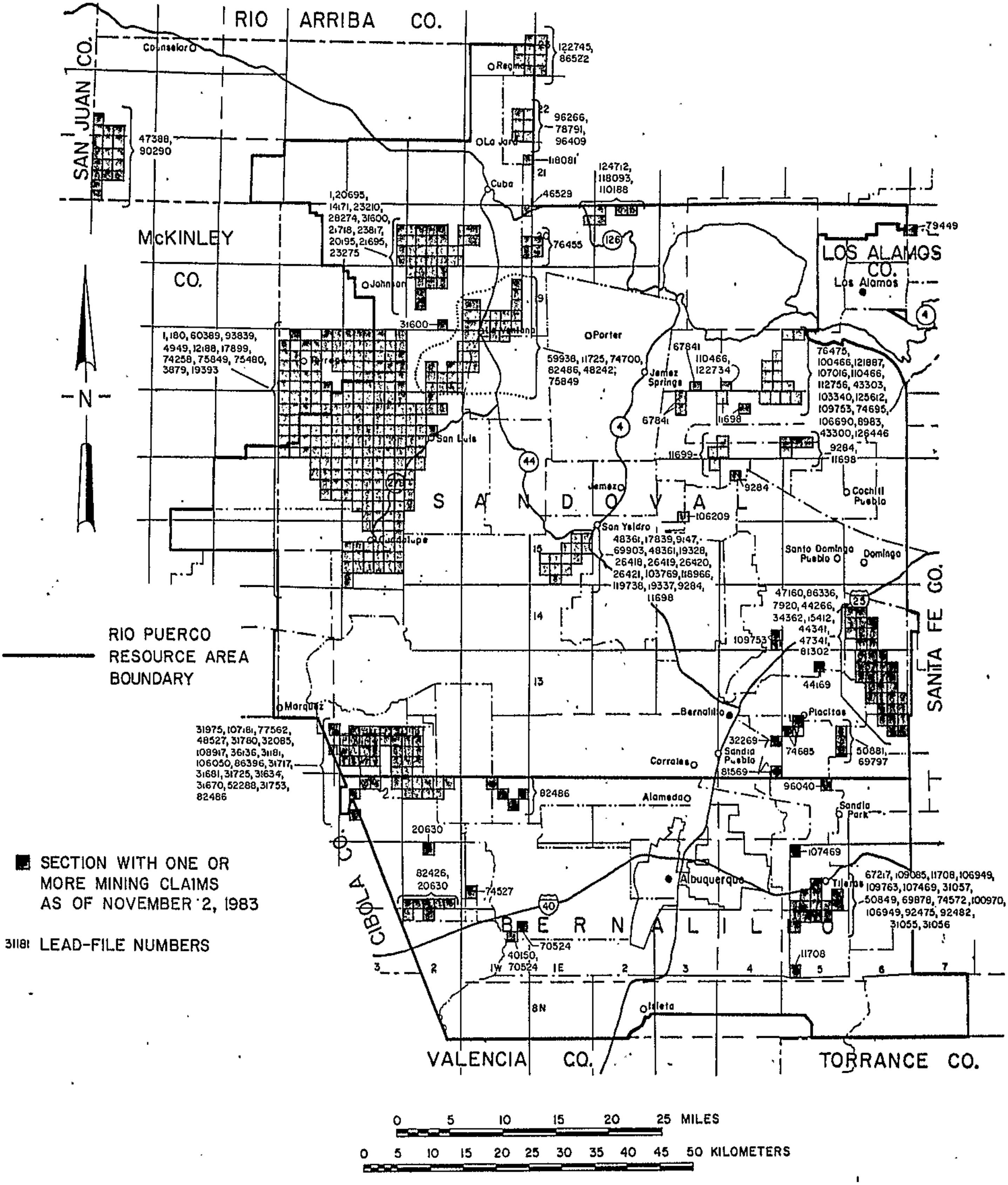

FIGURE 14 - SECTIONS WITH ACTIVE MINING CLAIMS IN THE NORTHERN RIO PUERCO RESOURCE AREA.

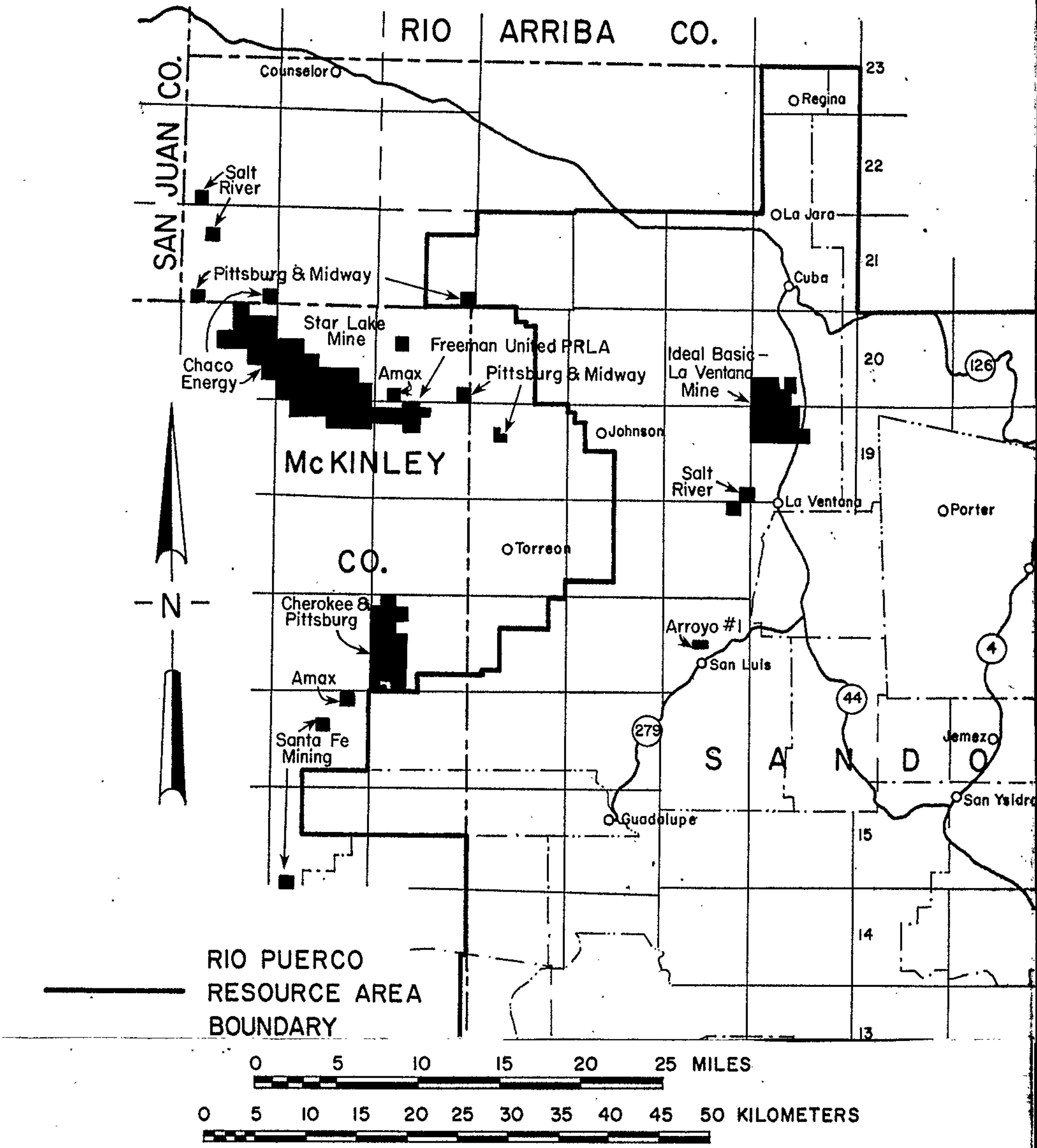

FIGURE 15 – PRESENT COAL MINES AND COAL LEASES (ADAPTED FROM BEAUMONT & COLLINS, 1982.)

Building materials, especially sand and gravel, continue to dominate the industrial minerals industry within the RPRA. Twenty-two operations are currently registered with the State Mine Inspector. Most of these operations are short-lived with portable crushers being quite common. Adobe manufacture continues at a strong rate with active operations in Sandoval and Bernalillo Counties. Ideal Cement Company is currently operating at about 62% capacity. Three gypsum operations are currently active in the RPRA: White Mesa, San Felipe, and G & W Mine. Only one pumice operation is currently active, the Esquire 5-9 in Sandoval County. Kinney Brick Company continues producing bricks for the Albuquerque area. Only one humate mine is operating presently, Farm Guard Products' Clod Buster mine.

The general upswing in the United States economy will most likely encourage continued growth in industrial materials markets. Building materials should increase in usage as the Albuquerque metropolitan area continues to grow. In the case of cement, gypsum, pumice, and scoria; a stronger economy may encourage reopening of idle pits and bring other mines up to capacity production.

Present coal mining and exploration activities in the RPRA are very limited. Most exploration in the resource area has been concentrated in the northwest corner extending west of the RPRA boundary in the coals of the Fruitland and Menefee Formations. Two coal mines are permitted by the state in the RPRA; the La Ventana underground mine operated by Ideal Basic Industries, and the Arroyo No. 1 surface mine operated by A. J. Firshau (Fig. 15). The La Ventana mine is on both state and federal coal leases and has not started production at the present. The Arroyo No. 1 mine is on a state lease and produced from 1979 to 1984. The production for this mine was 4,466 tons (4,051 metric tons) in 1979, 15,748 tons (14,286 metric tons) in 1980, in 1981 no production was reported, and 1982 production was 37,000 tons (33,600 metric tons). The Arroyo No. 1 was recently closed by the New Mexico Surface Mining Commission.

State leases are held by Salt River Project for section 36, T. 19 N., R. 2 W., and section 2, T. 18 N., R. 2 W. No other state coal leases are within the RPRA, although several leases exist to the west of the study area. A federal lease in the RPRA for Ametex Corp. is in T. 19 N., R. 2 W. PRLA's (Preference-Right Lease Application) west of the RPRA include Freeman United in T. 19 N., R. 5 W. and Peabody Coal in T. 20 N., R. 5 W. (Fig. 15).

Santa Fe Mining has a large block of holdings to the west of the RPRA and their Lee Ranch mine is in T. 15 - 16 N., R. 6,7,8 W. This mine is permitted and in development stage. The Star Lake mine of Chaco Energy which is in the permitting process is also to the west of the RPRA in T. 19 N., R. 6 W., and T. 20 N., R. 6,7 W. The Star Lake mine is dependent on the Star Lake Railroad being developed. Until this line of transportation is developed, the mine is essentially on hold.

Most federal land open to oil and gas leasing has probably been leased and exploration continues. Several oil pools are currently producing and the future in petroleum discovery is promising.

INTERPRETATION OF NURE GEOCHEMICAL AND GEOPHYSICAL DATA

(by Richard M. Chamberlin)

Recently published NURE geochemical and geophysical data (Table 1) have been examined and compiled to provide a source of new information pertinent to the mineral-resource potential of the northern RPRA. Specific objectives here are (1) to locate previously unrecognized areas of mineral potential, (2) to identify previously unrecognized types of mineral potential, and (3) to provide additional information that may be helpful in evaluating areas of known mineral potential (mining districts). Geochemical and geophysical anomalies identified from this analysis of NURE data have not been verified by additional field work; and they should not be considered as equivalent to known mineral occurrences.

The NURE data set (HSSR and ARMS) consists of (1) multi-element analyses of stream-sediment samples, (2) multi-element analyses of ground and surface waters, (3) gamma-ray spectrometer profiles that indicate concentrations of radioelements (U, Th, K) along flight lines, (4) residual magnetic intensity profiles that mostly indicate relative concentrations of magnetite along flight lines, and (5) residual magnetic intensity contour maps generated from flight line profiles. A new series of geothermal resource maps (Keller and Cordell, 1983; Cordell, 1983; Morgan and others, 1983; Callender and others, 1983), which includes gravity and aeromagnetic maps of New Mexico, has also been used in this analysis of NURE data. The highlights of this analysis are summarized in Figures 16, 17, 18, and 19, which (with the aid of a light table) may be used as overlays on the 1:500,000-scale state geologic map (Dane and Bachman, 1965) or on other resource maps of this report (Figures 13, 21, 22, 23, 26, and 28). Figure 20 summarizes the economic implications of this NURE data analysis.

Geochemical Anomalies

Geochemical anomalies in stream sediments and waters are respectively plotted in Figures 16 and 17. Anomaly thresholds for individual elements (Tables 5 and 6) were chosen from computer generated histograms and cumulative probability curves provided by Bendix Field Engineering Corp. (BFEC), Grand Junction, Colorado. Anomalous stream sediment samples have been identified from element distribution maps (also provided by BFEC) that use standard Canadian symbols to indicate element concentrations. These statistics and the element distribution maps were based on a quasi-log increment scheme that contains three intervals for each order of magnitude (1-2, 2-5, 5-10, ...). Although widely applicable, the quasi-log scheme often conceals subtle geochemical patterns related to mineral deposits.

Geochemical anomalies in waters were identified by time consuming visual inspection of tabulated data. Water anomalies were manually plotted on maps.

Different types of stream-sediment anomalies that can be recognized in Figure 16 are:

(1) detrital base-metal anomalies (Cu, ±Pb, ±Zn), which occur within a few miles of metal mining districts (Fig. 13; e.g. Tijeras, Placitas, New Placers,

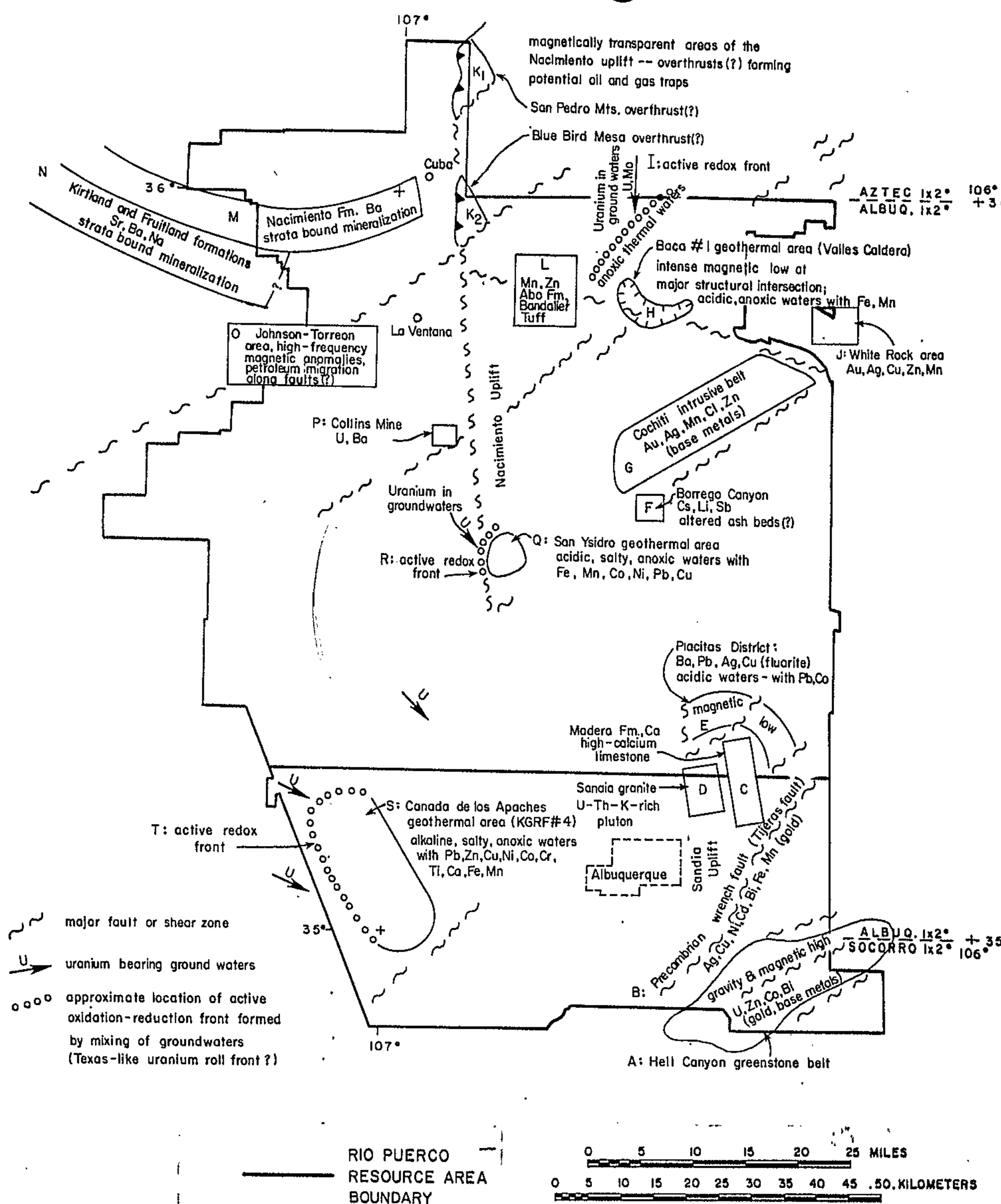

FIGURE 20 – Economically Interesting Geochemical and Geophysical Anomalies within the Northern Rio Puerco Resource Area (compiled from Figures 16-19). See text for discussion of anomalies; referred to by capital letters "A" to "T". Commodities spelled out in parentheses based on known mineral occurences.

Table 5. Summary of elemental mean values in stream sediments and anomaly thresholds for NURE quadrangle data (HSSR) in the northern Rio Puerco Resource Area. All values in parts per million (ppm). Anomalies plotted on Figure 16.

Symbol	Element	Albuquerque Mean[1]	Socorro Mean[1]	Aztec Mean[1]	Crustal Average[2]	Anomaly Threshold[3]
Ag	silver	2.59	2.60	1.05	0.07	5 (2)
Al	aluminum	51,148	54,241	51,200	81,300	100,000
Au	gold	0.03	0.00	--	0.004	0.05
B	boron	--	--	42.09	10	200
Ba	barium	599.15	619.0	664.04	425	1,000
Be	beryllium	1.86	2.33	1.37	2.8	10
Bi	bismuth	2.83	--	--	0.17	10
Ca	calcium	17,112	27,450	12,000	36,300	200,000
Cd	cadmium	2.56	--	--	0.2	10
Ce	cerium	67.14	58.91	64.40	60	200
Cl	chlorine	68.66	--	--	130	500
Co	cobalt	7.11	10.80	6.90	25	20
Cr	chromium	34.36	57.16	30.43	100	100
Cs	cesium	3.15	--	--	3	10
Cu	copper	22.65	23.17	16.22	55	50
Eu	eurupoum	0.95	--	--	1.2	2
Fe	iron	15,589	30,816	21,300	50,000	100,000 (50,000)
Hf	hafnium	13.51	13.11	7.82	3	50
K	potassium	16,271	16,537	12,600	25,900	20,000
La	lanthanum	36.00	31.33	31.71	30	100
Li	lithium	36.44	31.11	20.33	20	100
Lu	lutetium	0.48	--	--	0.5	2.0
Mg	magnesium	9,680	15,705	4,900	20,900	20,000
Mn	manganese	411.64	516.18	422.53	950	1,000 (850)
Mo	molybdenum	--	--	2.24	1.5	5 (2)
Na	sodium	9,655	11,252	7,800	28,300	20,000
Nb	niobium	10.47	10.40	10.95	20	50
Ni	nickel	11.23	14.35	13.84	75	50
P	phosphorus	--	--	430.30	1,050	1,000
Pb	lead	12.73	10.17	19.53	12.5	50
Rb	rubidium	40.55	--	--	90	100
Sb	antimony	1.00	--	--	0.2	5
Sc	scandium	5.93	7.74	5.87	16	20 (10)
Sm	samarium	4.65	--	--	6	10
Sn	tin	5.23	5.13	--	2	20
Sr	strontium	148.40	273.47	175.98	375	500
Ta	tantalum	0.81	--	--	2	5
Th	thorium	10.92	9.04	7.68	10	50
Ti	titanium	3,792	4,620	2,899	5,700	10,000
U	uranium	3.53	3.14	4.25	2.7	10
V	vanadium	59.82	87.24	60.79	135	200
W	tungsten	7.93	--	--	1.5	20
Y	yttrium	--	--	15.79	30	50
Zn	zinc	52.68	73.82	52.79	70	200 (100)
Zr	zirconium	--	--	71.09	165	200
U/Th	uranium/thorium	0.317	0.305	--	0.27	0.5

[1] Mean value for all samples in quadrangle; values below detection are assumed to be one half the elemental detection limit for purpose of calculating mean.
[2] From Levinson (1974, p. 43) and Mason (1966, p. 45).
[3] Anomaly thresholds based on histograms, cumulative probability plots, or element distribution maps provided by Michael E. Madson, Bendix Field Engineering Corp., 1984. Values in parentheses are lower intensity anomaly thresholds, applied to local geologic environments.

Table 6. Summary of elemental mean values in groundwaters and anomaly thresholds for NURE quadrangle data (HSSR) in the northern Rio Puerco Resource Area. All values in parts per billion (ppb). Anomalies plotted on Figure 17.

Symbol	Element	Albuquerque Mean[1]	Aztec Mean[1]	River water Average[2]	Anomaly Threshold[3]
Ag	silver	--	2.18	0.3	8
Al	aluminum	--	685.95	240	5,000
B	boron	--	252.56	10	1,000
Ba	barium	--	132.83	10	1,000 (500)
Be	beryllium	--	0.65	--	5
Ca	calcium	67,256	83,380	15,000	500,000
Ce	cerium	--	20.49	0.06	100
Co	cobalt	65.71	4.07	0.2	100
Cr	chromium	32.12	2.68	1	200
Cu	copper	11.66	30.08	7	50
Fe	iron	371.79	677.10	700	2,000
K	potassium	--	9,267	2,300	20,000
Li	lithium	--	119.18	3	500
Mg	mangnesium	24,006	37,280	4,100	200,000
Mn	manganese	92.56	250.98	7	1,000
Mo	molybdenum	18.42	8.15	1	20
Na	sodium	--	77,857	6,300	2,000,000
Ni	nickel	53.54	13.61	0.3	200
P	phosphorus	--	230.14	70 (sea water)	1,000
Pb	lead	1152.72	--	3	5,000
Sc	scandium	--	1.98	0.004	5
Si	silicon	--	7,049	13,100	40,000 (25,000)
Sr	strontium	--	1643.27	50	3,000
Ti	titanium	15.11	6.71	3	20
U	uranium[4]	2.86	3.43	0.4	5
V	vanadium	--	5.49	0.9	50
Y	yttrium	--	1.23	0.7	10
Zn	zinc	252.25	725.48	20	1,000
Zr	zirconium	--	4.51	--	20
Ct	conductivity	1964.3	1868.1	--	10,000
AC	acid (pH)	7.65	7.82	--	pH<6.9
AC	acid (pH)	7.65	7.82	--	pH<4.0
AK	alkaline (pH)	7.65	7.82	--	pH>9.0

[1] Mean value for all samples in quadrangle; values below detection limit are assumed to be one half the elemental detection limit for purpose of calculating mean.
[2] From Levinson (1974, p. 43) and Mason (1966, p. 198).
[3] Anomaly thresholds based on histograms and cumulative probability plots provided by Michael E. Madson, Bendix Field Engineering Corp., 1984. Anomalous samples identified from visual search of tabulated data. Values in parentheses are lower intensity anomaly thresholds, applied to local geologic environments.
[4] Mean value for uranium in groundwaters of the Socorro quadrangle is 4.97 ppb.

Cerrillos);

(2) heavy mineral concentrations characterized by multi-element anomalies (in boxes) that typically inclue Ti, Hf, Ce, La, Th, U, Cr, Nb, Fe, Ag;

(3) distinctive lithophile-element anomalies such as U, Be, Ta, Ce associated with the Bandalier Tuff and Hf, U, Th, Ce, La, Sc with the Sandia granite;

(4) relatively isolated, singular anomalies (i.e. not in clusters) of W, Sn, Au, Ag created by analytical methods that are relatively insensitive to these elements (only the highest values are detected);

(5) hydromorphic anomalies of relatively soluble elements (loosely held by clay minerals and hydrated Fe-Mn oxides), which include Cl in geothermal areas, Mo and U/Th (Fig. 17) down hydrologic gradient from uranium districts, and relatively low concentrations of Zn (100-200 ppm) and Co (10-20 ppm) down hydrologic gradient from base metal districts (Fig. 13; e.g. Hell Canyon , New Placers);

(6) belt-like (stratiform) anomalies, such as Ba and Sr associated with the Kirtland-Fruitland Formations and Ba with the Nacimiento Formation west of Cuba.

Obviously, not all of these stream-sediment anomalies represent economic mineral deposits (see Economic Implications). Also, in many instances the type of anomaly is unclear, because the anomalous sediments may represent mixtures derived from different geologic environments. Some anomalies associated with populated areas may be anthropogenic (man-made). Isolated anomalies of Cu and Au about 5 and 10 miles (8 and 16 km) west of Alameda (Fig. 16) are most likely man made. One of the most significant new observations from this map is an apparent base metal and precious metal anomaly downstream from the Los Alamos-White Rock area. The possible implications of this anomaly (Fig. 20, anomaly J) are discussed later.

Specific interpretations of groundwater geochemical anomalies shown in Figure 17 are not possible because critical parameters such as well depth, probable aquifer, hydraulic gradient (flow direction), dissolved oxygen (Eh), and anionic constituents are generally not known. As an aid to interpretation, regional groundwater flow directions (from Stone and others, 1983; Titus, 1980) have been plotted on Figure 17. In general, four categories of water anomalies can be recognized on Figure 17. They are:

(1) fresh (low conductivity), oxidizing groundwaters associated with U, Mo anomalies down gradient from uranium districts (e.g. Jackpile-Paguate area, Collins mine, Nacimiento copper district; Fig. 23);

(2) acidic, oxidizing groundwaters associated with Cu, Pb, Zn, Ni anomalies down gradient from base-metal sulfide districts (Placitas, Cerrillos, Tijeras, Fig. 13);

(3) oil-field brines that are anomalous in many elements, most notably Mg, Al, Fe, Pb, Ni, which occur in the southeastern San Juan Basin;

(4) salty, reducing geothermal waters associated with Fe, Mn, and Cl (latter in stream sediments) along the west

flank of the Rio Grande rift (Valles Caldera, San Ysidro; Fig. 26).

One of the most significant anomalies in Figure 17 is a broad plume of uraniferous waters emanating from the Hell Canyon base-metal district, which was not previously known to contain significant uranium mineralization. The base-metal content of these waters is unknown; only uranium analyses were completed on waters of the Socorro quadrangle.

Geophysical Anomalies

Portions of an aeromagnetic map (Cordell, 1983) and a gravity map (Keller and Cordell, 1983) of New Mexico are presented in Figures 18 and 19. These maps are useful in delineating the major structural features of the area. Symbols for linear magnetic and gravity gradients have been added to help define the structural grain of the area. Many of these linear elements represent concealed faults or high-angle contacts between contrasting rock units.

Aeromagnetic contour maps of the NURE program (Table 1) are generally similar to the state map of Cordell (1983). Cordell's map is preferred here because boundary discontinuities between survey areas have been eliminated, small anomalies are better defined, and the scale is more appropriate (1:500,000). A NURE compilation of the Socorro, Ft. Sumner, Albuquerque, and Santa Fe quadrangles which is presented in McLemore (1984; scale 1:500,000), exhibits a much lower level of resolution of magnetic features in comparison to the state aeromagnetic map by Cordell (1983).

Several large areas of different magnetic character are visible on Figure 18. These include:

(1) the deep San Juan and Albuquerque basins associated with long-wavelength, low-amplitude magnetic anomalies;

(2) basaltic lava flows northeast of Mount Taylor and near the Valles caldera, which are characterized by high frequency, high amplitude anomalies;

(3) areas of shallow Precambrian basement rocks in the Nacimiento, Lucero, and Sandia-Manzano uplifts, which are generally associated with intermediate wavelength, high amplitude anomalies.

Several smaller features are also defined by magnetic anomalies. Large amplitude magnetic highs at Ortiz Mountain and Cerrillos Hills probably represent metasomatic magnetite halos around small plutons (also defined by radiometric data). A large amplitude magnetic low, which defines the southern flank of the Valles caldera, may represent intense hydrothermal alteration or very high heat flow at depth (i.e., a shallow Curie point geotherm).

Shallow Precambrian basement rocks in the northern Manzano Mountains (Hell Canyon district, Fig. 13) have the high-frequency signature of mafic igneous rocks (compare with Mt. Taylor area). A northeast-trending gravity high coincident with this high frequency magnetic anomaly implies that the indicated mafic igneous rocks occur as a thick pile of high density rocks. The western portion of this coincident gravity-magnetic high is coincident with exposures of greenstones in the Coyote Canyon and

Hell Canyon areas (Myers and McKay, 1971). Therefore, this 5-by-25 mile (8 by 40 km) long gravity-magnetic high can be reasonably interpreted as a largely concealed greenstone belt.

Two triangular areas on the northwest flank of the Nacimiento uplift, are anomalously non-magnetic (magnetically transparent) in comparison to the rest of the uplift. In fact, if one draws the boundary between the Nacimiento uplift and adjacent San Juan Basin solely on the basis of the magnetic contours, then these triangular areas would be included with the basin. However, overlying the magnetic map on the gravity and geologic maps, clearly shows these magnetically transparent areas are part of the uplift. These transparent areas may be thin sheets of relatively magnetic basement rocks that have been thrusted over non-magnetic Cretaceous sedimentary rocks or, they may be thick prisms of relatively non-magnetic basement rocks in high-angle fault contact with the Cretaceous rocks. Surface observations near Bluebird Mesa and tectonic reconstructions of Woodward (1984) generally support the overthrust interpretation.

Two types of anomalies taken from NURE flight line profiles (ARMS) have been plotted in Figure 18: (1) aeroradiometric uranium anomalies and (2) high-frequency, low amplitude magnetic anomalies within sedimentary basins. The aeroradiometric uranium anomalies were previously identified in the individual quadrangle reports (Geometrics, Inc., 1979; and Geodata International, Inc., 1979, 1980). Felsic plutons, rich in all three radio-elements (U, Th, K) have also been delineated from the radiometric flight line data (Figure 18).

Aeroradiometric uranium anomalies in the RPRA are apparently associated with:

(1) relatively high background concentrations of uranium (5-15 ppm) in the Sandia granite, Mancos shale, Bandalier Tuff, and the tuffaceous Cochiti Formation;

(2) known uranium occurrences of Mesa Portales, Collins mine, San Ysidro (travertine), and Hagan basin (Galisteo Formation);

(3) probable uranium mineralization in Precambrian rocks southeast of Tijeras Canyon (supported by uranium anomalies in groundwaters emanating from this area).

High-frequency, low-amplitude magnetic anomalies have been observed on NURE magnetic profiles over oil and gas fields of southern California (James Bennett, BFEC, oral comm., 1984). Similar high-frequency low-amplitude magnetic anomalies are present on NURE magnetic profiles across some of the oil and gas fields of the northeastern San Juan Basin (compare U.S. Geological Survey and NMBM&MR, 1981; with Geodata International, Inc., 1980, 20 gamma/division magnetic profiles for tie lines 1, 2, 3, 4, and 5). These small peaks on the broadly undulating profiles may reflect local alteration of iron oxides to magnetite by migration of hydrocarbons or related brines along unmapped faults or fractures. However, similar high-frequency, low-amplitude anomalies are associated with basaltic dikes (Geodata International, Inc., 1980, north end of the tie line 5) and large structures made of steel, such as the petroleum plant at Lybrook (Geodata International, Inc., 1980, station 591 on tie line 3). Pipelines and powerlines apparently lack the mass necessary to produce aeromagnetic anomalies.

High-frequency magnetic anomalies shown on Figure 18 (west of La Ventana) are clearly not associated with dikes or large steel structures, but they do have a good correlation with mapped faults and a linear drainage. Several high-frequency anomalies have been observed in assocition with basaltic intrusions near Cabezon Peak and large man-made structures in the Albuquerque area. These are not shown on Figure 18.

The Bouguer gravity map of the RPRA (Fig. 19) shows the same major structural features as the aeromagnetic map, but with some significant differences. Deep basins of the Rio Grande rift (Albuquerque and Española basins) noticably transect the RPRA. A plot of late Cenozoic rhyolitic intrusions (approximately 1-5 m.y. old) shows a coincidence with northeast trending shear zones of probable Precambrian ancestry (Chapin and others, 1978). These deeply penetrating zones of weakness are locally well defined by short northeast-trending segments of north-trending rift faults. These anomalously oriented segments of rift faults delineate northeast-trending belts as much as 5 miles wide. The Cochiti gold district (Fig. 13) lies at the center of one of these intrusive belts within a transverse shear zone.

The southern flank of the Valles caldera appears to lie at a major three-way structural intersection between a prominent northeast-trending shear zone, a west-northwest-trending shear zone of probable Paleozoic ancestry (Stevenson and Baars, 1977), and the west flank of the Rio Grande rift. The gravity map indicates that the greatest structural relief (and therefore highest fracture density) should be on the southern flank of the caldera, which is also coincident with a large amplitude magnetic low (Fig. 18).

The gravity expression of the Nacimiento uplift is distinctly different from its magnetic expression. The gravity map indicates an incremental increase in structural relief from south to north along the west flank of the uplift. Abrupt increases in structural relief are apparently associated with northeast-trending faults. This relationship suggests that the north-trending Nacimiento fault and the subordinate (as expressed by gravity) northeast-trending faults acted as conjugate pairs of first and second order wrench faults during the Laramide orogeny (see Woodward, 1984). The presence of conjugate wrench faults along the west flank of the Nacimiento uplift would have allowed the local development of overthrust blocks in areas of greater crustal shortening. The interpretation of a coincident gravity and magnetic high in the Manzano Mountains was previously presented.

Economic Implications

Economically interesting geochemical and geophysical anomalies within the RPRA are shown in Figure 20. In brief, the economic implications of these anomalies are as follows (letters refer to Figure 20).

(A) A largely concealed northeast-trending greenstone belt has been outlined from the coincidence of a gravity high, a high-frequency magnetic anomaly, and mapped exposures of greenstones in the Hell Canyon and Coyote Canyon districts. The combination of hydromorphic uranium anomalies and aeroradiometric uranium anomalies in this area strongly suggests the presence of uranium mineralization in proximity to the greenstones or adjacent Precambrian metasedimentary rocks. Uranium occurrences are not presently known to exist in this area. Geologic studies (Fulp and others, 1982) indicate a high potential for gold-silver and massive sulfide deposits in the Hell Canyon greenstone. The concealed portion of the greenstone belt is everywhere less than 2,000 ft (610 m) below the surface and most of it is less than 1,000 ft (305 m) below the surface. The apparently large areal extent (5 by 25 mi) of this favorable greenstone belt greatly increases the chances for discovery of a concealed gold or massive sulfide deposit at relatively shallow depths. Magnetically-defined shear zones in the greenstone (Fig. 18) are a promising target for gold deposits. Detailed electromagnetic surveys could reveal large sulfide bodies below the Paleozoic sedimentary cover.

(B) The magnetically defined Tijeras shear zone lies significantly south of its surface geologic expression or gravity expression. This complex anastomosing structural zone almost certainly represents multiple periods of deformation (mostly Precambrian and Laramide). The magnetically defined fault zone is most likely to be of Precambrian ancestry, and represents a favorable target for Precambrian-age gold deposits (Fulp and others, 1982).

(C) Two stream-sediment samples in the Tecolote Peak-Palomas Peak area locally contain over 20% Ca (20.6-26.2% Ca) in association with low concentrations of Al (2.1-2.3%), Mg (0.4-0.5%), Fe (0.6-0.9%), K (0.7-0.8%), and Na (0.3-0.5%). Ratios of Ca/Mg exceed 50:1. This anomaly suggests the occurrence of high-calcium limestones in the Madera Group, which could be suitable for cement production. Additional field work is warranted here.

(D) Radiometric and stream-sediment anomalies indicate the northern portion of the Sandia granite is unusually rich in the radio-elements (U, Th, K). Stream sediments from this area contain 10-15 ppm U, 40-50 ppm Th and 1.5-2% K. When covered by a thick sedimentary blanket in late Paleozoic and Mesozoic time, the Sandia granite may have generated sufficient radiogenic heat to form low-temperature sedimentary hydrothermal (Mississippi Valley-type) lead-zinc-barite deposits in the overlying limestones (Fehn and others, 1978; Cathles, 1981).

(E) The Placitas district (Ba, Pb, Ag, Cu, F) could represent sedimentary hydrothermal Mississippi Valley-type mineralization on the north flank of the Sandia granite. The north boundary of the granite is probably defined by a bulbuous magnetic low which wraps around the north flank of the range (Fig. 18). The apparent northeastern boundary of the Sandia granite, which is concealed below Paleozoic limestones (about 5 mi [8 km] southeast of Placitas), may be a favorable target for concealed Placitas-type deposits.

(F) Stream sediments in the Borrego Canyon area contain distinctly anomalous concentrations of Cs, Li, and Sb, in association with high values of K, Na, and Al. Ca/Na ratios are approximately 2:1. These alkali-rich stream sediments were most likely derived from altered tuff beds in the lower Cochiti Formation (R. L. Smith and others, 1970). Altered ash-beds are commonly associated with bentonite clays and zeolites (Patterson and Murray, 1975; Sheppard, 1975). The area should be examined for possible Ca-rich bentonite or zeolite deposits. Na-rich bentonite and zeolites are more valuable than Ca-rich deposits (Eyde, 1982).

(G) The Cochiti gold district (Elston, 1967) occurs near the center of a northeast-trending intrusive belt of late Cenozoic age. The intrusions probably rose along a deeply penetrating shear zone of Precambrian ancestry (supported by linear gravity and magnetic gradients along this zone). Low level Zn, Mn, and Cl anomalies are common in stream sediments in this area and suggest widespread hydrothermal alteration. Cochiti-type gold deposits may be concealed below the Bandalier Tuff on a downdropped block just east of the district (R. L. Smith and others, 1970).

(H) Gravity and magnetic maps indicate that the southeast flank of the Valles caldera lies at a major three-way structural intersection (trends are northeast, west-northwest, and north-south). A large amplitude magnetic low is also centered on the south flank of the caldera. This coincidence suggests that the greatest fracture permeability and highest degree of hydrothermal alteration occur on the south flank of the caldera. In other words, the apparent heart of the geothermal system is on the south flank of the caldera. All deep geothermal test wells to date have been drilled in a graben block near the center of the caldera (Callender and others, 1983). Problems of insufficient steam capacity for a generating plant might be resolved by test holes on the south flank of the caldera.

(I) Geochemical anomalies in ground waters on the northwest flank of the Valles caldera (U, Mo) and geothermal waters within the caldera (Fe, Mn) indicate the presence of two geochemically distinct ground water regimes, respectively oxidizing and reducing. An inferred redox boundary between these solutions, in the zone of mixing (Trainer, 1975) could precipitate uranium and molybdenum in a manner similar to that interpreted for Texas Gulf coast uranium deposits. The inferred redox boundary has probably not existed long enough to form a significant uranium deposit. More work in this area could improve our understanding of uranium mobility in a hydrothermal system.

(J) Stream sediments emanating from the Los Alamos-White Rock area contain anomalous concentrations of Au, Ag, Cu, Pb, Zn, Mn, and Cl. There are no known metallic mineral occurrences in this area. This strong anomaly represents either a significant exposure of precious-metal and base-metal mineralization in this area, or significant contamination of the area by man. In either case, more work is warranted in this area.

(K) Magnetically transparent areas on the northwest flank of the Nacimiento uplift may represent small overthrust sheets. These triangular areas (K_1 and K_2) are adjacent to an area of high petroleum potential in the San Juan Basin (Fig. 28). The overhang of these possible thrust blocks above the favorable Cretaceous rocks could be as much as three miles (5 km). Structural traps of oil and natural gas would be possible. Additional work should be done to determine the magnetic character of Precambrian rocks in these transparent areas. If magnetic data support the overthrust interpretation, then seismic reflection profiling of the area would be appropriate.

(L) Numerous low to moderate intensity Mn, Zn, and Cl anomalies are present in stream sediments in the Fenton Lake area. These streams drain wide exposures of the Bandalier Tuff and the Abo Formation (Permian), the latter locally contains red-bed type copper occurrences. No copper anomalies are present here. More work is warranted to determine the source of the manganese and zinc anomalies.

(M) Ba anomalies in stream sediments west of Cuba define a stratiform zone of potential barium mineralization coincident with the Nacimiento Formation. Field work should be done in this area to evaluate the potential for stratiform barite deposits.

(N) Stream sediments emanating from the Fruitland-Kirtland Formations, about 20 mi (32 km) southwest of Cuba, contain distinctly anomalous concentrations of Sr, Ba, and Na. This stratiform anomaly may be truncated by an unconformity at the base of the overlying Ojo Alamo Formation somewhere near the RPRA boundary. This area should be examined for possible bedded barite-celestite deposits.

(O) A cluster of high-frequency magnetic anomalies in the Johnson-Torreon area (west of La Ventana) suggests significant petroleum accumulations in this area. The area lies athwart a subtle northeast-trending magnetic linear, which probably represents a major basement shear zone of Precambrian and Laramide ancestry. This basement structure may have controlled the formation of subtle stratigraphic or structural traps for oil and gas.

(P) Stream sediments near the Collins uranium mine contain anomalous concentrations of Ba (2,000-3,000 ppm) and groundwaters in the area contain anomalous uranium concentrations. The area is associated with a major northeast-trending gravity linear. Additional work should be done to determine the potential for barite deposits along this structure.

(Q) Geothermal waters in the San Ysidro area are defined by anomalous concentrations of Fe, Mn, Co, Ni, Pb, Cu, and

Cl (stream sediments). Base metal mineralization is possible in this area.

(R) Southeast flowing uranium-bearing waters are probably mixing with reducing geothermal waters west of San Ysidro. Secondary uranium deposits may be forming at a redox boundary in this zone of mixing.

(S) Saline well waters in the Cañada de los Apaches area carry anomalous amounts of Pb, Zn, Cu, Ni, Co, Cr, Ti, Ca, Fe, Mn. These anoxic thermal waters may represent a complex combination of oil-field brines and geothermal waters and could be an extension of KGRF #4 (Morgan and others, 1983).

(T) Highly uraniferous waters that flow southeast from the Grants uranium region probably intersect a broad redox boundary associated with thermal waters of the Canada de los Apaches area. Small secondary uranium deposits may have already formed in this hydrologic system, which has probably been active since middle Pliocene time (Mt. Taylor is presumed to have been a major recharge area to this system since its formation, 3-5 m.y. ago).

The most significant new information derived from this analysis of geochemical and geophysical data is the recognition of a possible large, mostly concealed, greenstone belt at shallow depths below the northern Manzano Mountains (Hell Canyon and Coyote districts). This greenstone belt is a favorable area for discovery of exhalative gold deposits or massive sulfide deposits of Precambrian age (Fulp and others, 1982). Hydromorphic uranium anomalies emanating from the general area of this greenstone belt indicate that previously unrecognized uranium mineralization here may ocur in proximity to the massive sulfide mineralization. This apparent spatial association of uranium and massive sulfide mineralization (not necessrily in the same body of rock) may be explained by the observations of Nash and others (1981, p. 73-76). Nash points out that after development of an oxidizing atmosphere (ca. 2.2 b.y. ago) and prior to development of land plants (ca. 0.4 b.y. ago), soluble (hexavalent) uranium was transported to marginal marine environments where algal bioherms created a reducing environment capable of precipitating uranium. Greenstones of the Hell Canyon district presumably represent metamorphosed submarine volcanic rocks in juxtaposition with metamorphosed marine sedimentary rocks that contain significant concentrations of uranium. Grauch (1978) has observed a close association of uraninite and massive sulfide mineralization.

DESCRIPTION OF MINERAL DEPOSITS AND MINERAL-RESOURCE POTENTIAL

Metals

(by Virginia T. McLemore)

Deposit types

Metallic mineralization occurs in numerous types of deposits in the Sandia, Manzano, Nacimiento, and Jemez Mountains and the Cuba area of the San Juan Basin (Fig. 13, 21). Stratabound, sedimentary copper deposits are common throughout parts of the RPRA and may contain economic concentrations of silver, uranium, lead, zinc, gold, and vanadium. Placer gold deposits were mined in the Placitas district and were probably derived from base- and precious-metal veins in the northern Sandia Mountains. Hydrothermal veins and breccia deposits of gold and silver with subordinate base metals occur in the Cochiti district. Barite-fluorite-galena veins with or without silver are present in Pennsylvanian limestones in the Sandia Mountains. Precambrian rocks in the Sandia, Manzano, and Nacimiento Mountains host veins of precious and base metals. Sediment-hosted manganese deposits occur in the Cuba area in the San Juan Basin.

Additional metallic occurrences are found in the northern RPRA which are probably uneconomic. Minor occurrences of hematite, suitable for local use as pigment, are found in the Sandia Mountains. Beach-placer sandstone deposits in the San Juan Basin contain subeconomic concentrations of titanium, iron, scandium, niobium, tantalum, uranium, thorium, zirconium, and rare-earth elements. A carbonatite dike containing anomalous amounts of niobium occurs in the Monte Largo Hills, east of the

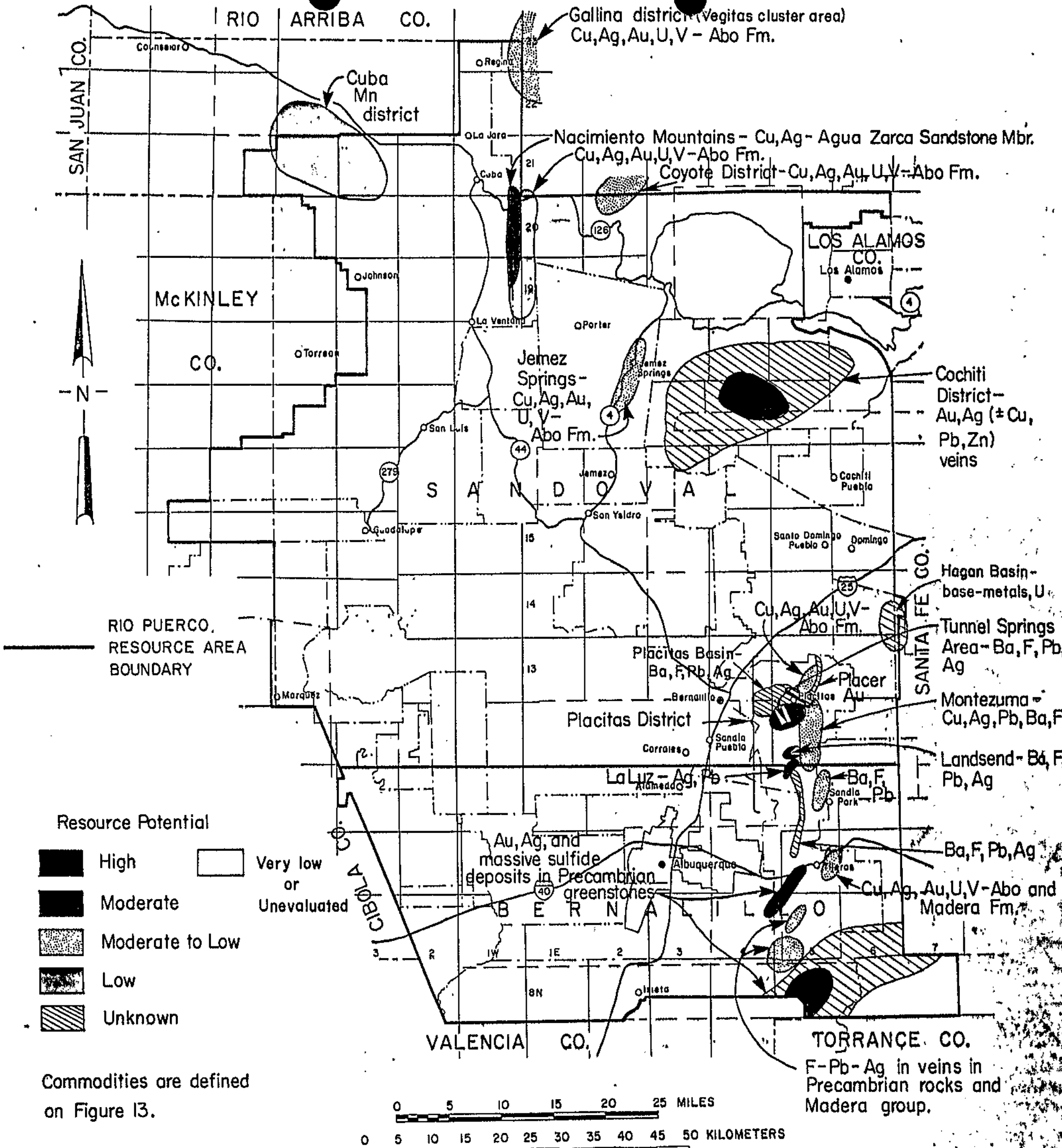

FIGURE 21 - MINERAL-RESOURCE POTENTIAL FOR METALS, BARITE, AND FLUORITE IN NORTHERN RIO PUERCO RESOURCE AREA.

Sandia Mountains.

Additional mining districts occur just east of the RPRA (Fig. 13, 21) which may indicate similar deposits in the Resource Area. Placer gold deposits occur in the New and Old Placers districts along with (1) hydrothermal gold-silver veins and breccia deposits, (2) base-metal vein deposits with associated gold or silver, and (3) replacement deposits in limestones. Base-metal veins with gold and silver also occur in the Cerrillos and La Bajada districts.

Stratabound, sedimentary copper deposits

Introduction--Stratabound, sedimentary copper deposits are numerous and widespread in western United States (R. Gibson, 1952; J. S. Phillips, 1960; Fischer and Stewart, 1961) and throughout the world (Gustafson and Williams, 1981) and may be locally associated with high concentrations of silver, gold, lead, zinc, uranium, and vanadium. These deposits are typically associated with red-bed sedimentary sequences and have been called "red-bed" copper deposits (Soule, 1956) even though mineralization occurs in gray or green beds within the red bed sequences. These deposits also have been called sandstone copper deposits, but they are not restricted to sandstones.

General description--Copper and associated mineralization typically occurs in bleached or gray to green sandstones, conglomerates, siltstones, shales, and limestones deposited in intracratonic basins with a lack of volcanism or magmatic activity (Gustafson and Williams, 1981). In the RPRA of New Mexico stratabound, sedimentary copper deposits occur in continental Permian and Triassic sediments in the Nacimiento Mountains, Jemez Springs, Coyote, Gallinas, Placitas, and Tijeras Canyon districts (Fig. 13, 21; Maps 2, 4, and 6; Appendix 1). Minor occurrences of copper mineralization are found in upper Pennsylvanian rocks.

Copper deposits in Permian rocks are associated with small, meandering stream channels and equivalent finer-grained facies; whereas deposits in Triassic rocks are associated with large braided stream complexes (LaPoint, 1979). Permian sandstones are typically more arkosic than Triassic sandstones. Sediments from both Permian and Triassic units were derived from major uplifts of exposed Precambrian rocks.

Copper and associated metals were probably transported in solution at low temperature through permeable sediments and along faults. Oxiding waters could leach metals from (1) Precambrian rocks enriched in these metals, (2) Precambrian base-metal deposits, and (3) clay minerals and detrital grains within the host rocks (LaPoint, 1974, 1979). Cuprous chloride (Rose, 1976) or cuprous carbonate (LaPoint, 1979) complexes are soluble in oxiding waters at low temperatures (77°F; 25°C) and can transport these metals easily. Low temperatures are indicated by the lack of hydrothermal activity. Sources for chlorides or carbonates occur in older evaporite and carbonate sequences. Precipitation occurred at favorable oxidation-reduction interfaces in the presence of organic material or H_2S-rich waters. Later groundwater and structural events may alter or destroy some deposits (LaPoint, 1979).

Mining and past production--The earliest mining of stratabound, sedimentary copper deposits in the RPRA was probably by the Indians and subsequently the Spanish. Potsherds found in the Cuchilla de San Francisco mines in the Placitas district were dated at 1500-1550 AD (Warren and Weber, 1979). Serious mining of these deposits did not occur until the 1880's through the early 1900's. With the exception of the Nacimiento copper mine, very little development of these deposits has occured since 1960. The Nacimiento mine produced an unknown amount of copper and silver from 1971 to 1974. Total known production from the stratabound, sedimentary copper deposits in the northern RPRA is over 7.5 million lbs (3.4 million kg) of copper and 75,227 oz (2.1 million g) of silver plus minor amounts of gold, lead, zinc, uranium, and vanadium (Table 7).

The largest copper deposits occur in the Agua Zarca Sandstone Member in the Nacimiento Mountains (Map 4). Although, these deposits were worked by Indians and the Spanish (Talbott, 1974); serious mining did not occur until the 1880's. Interest in the district faded after 1917 only to increase in the late 1960's. In 1971, Earth Resources Company began production at the Nacimiento copper mine after an extensive exploration program. A 3,000 ton/day (2,722 metic ton/day) flotation mill was built to handle estimated reserves of 9.6 million tons (8.7 million metric tons) of 0.71% copper (Woodward, Kaufman, and others, 1974). In 1973, a break in the tailings dam occurred and in 1974 the company ceased production.

Distribution--The copper deposits occur throughout the entire thickness of the Agua Zarca. Mineralization is associated with

Table 7 - Known production of stratabound, sedimentary copper deposits in the northern Rio Puerco Resource Area (Elston, 1967; Lindgren and others, 1910; U.S. Bureau of Mines, 1931-1980; U.S. Geological Survey, 1903-1930).

District	Years of production	Copper (lbs)	Silver (oz)	Gold (oz)	Lead (lbs)	Zinc (lbs)	U_3O_8 (lbs)	V_2O_5 (lbs)
Nacimiento Mountains[a]	1880-1964	7,561,567	75,068	0.41	1,783	463	--	--
Jemez Springs	1928-1937	19,200	159	1	--	--	--	--
Coyote	No production known							
Gallinas	1956	--	--	--	--	--	12	24
Placitas	No production known							
Tijeras Canyon	No production known							
	TOTAL	7,580,767	75,227	1.41	1,783	463	12	24

[a] Total production from 1971-1975 unknown and not included

organic debris and other carbonaceous material. Copper oxides and chalcocite are the dominant copper minerals. Silver is always present, ranging in concentration from 1 to 100 ppm (LaPoint, 1979) and occurs as native silver, silver sulfides, or in chalcocite. Sphalerite is common locally, especially at the San Miguel mine (Northrop, 1959) and has been produced (Table 7). Uranium is present locally, but only in trace amounts and gold is rare.

Copper mineralization is rare in the Poleo Sandstone Lentil, although uranium occurrences are present. Both copper and uranium mineralization is discontinuous, small, and low grade. The reason for lack of larger orebodies is not clear as the Poleo Sandstone is permeable and contains organic material. Perhaps copper-rich solutions were not present during deposition and diagenesis of the Poleo Sandstone.

Small copper orebodies occur in fluvial sandstones and adjacent units in the Abo and correlative Cutter Formations in the Nacimiento Mountains, Jemez Springs, Gallinas, Coyote, Placitas, and Tijeras Canyon districts (Maps 2, 4, and 6). The deposits in the Placitas and Tijeras Canyon districts are poorly known, but presumed to be similar to other Abo deposits. Small occurrences are present in the Madera Group, occasionally along faults. Silver, uranium, lead, zinc, and vanadium are present in varying amounts. Silver rarely is as abundant in Abo deposits as in Chinle deposits; however, a selected sample from the Spanish Queen West mine assayed 1.06 oz/ton (36 ppm) silver (Table 8). Uranium concentrations are higher in Abo deposits than Chinle deposits (Chenoweth, 1974). One sample from Deer Creek contained

Table 8 - Chemical analyses of selected samples from stratabound, sedimentary copper deposits in the northern Rio Puerco Resource Area. No gold was detected in any of the samples. Chemical analyses by Lynn Brandvold and associates, NMBMMR Chemical Laboratory. First three analyses from McLemore (1983a).

Sample number	Name	Location	Host rock	% Cu	% U_3O_8	Ag oz/ton
Nacimiento district						
3147	Deer Creek	18N.1E.35.144	Abo Fm.	5.92	0.144	0.88
Jemez Springs						
3144	Spanish Queen West	17N.2E.3.340	Abo Fm.	3.49	0.006	1.06
3150	Spanish Queen East	17N.2E.3.400	Abo Fm.	4.90	0.018	0.62
Tijeras Canyon						
	Shakespeare	10N.5E.26.144	Madera Group	16.0	0.005	0.00

0.144% U_3O_8 and 0.88 oz/ton (30 ppm) silver (Table 8).

Resource and development potential--The mineral-resource potential of copper and silver in the Agua Zarca Sandstone Member in the Nacimiento Mountains is moderate, but only in braided stream complexes (Map 11; Fig. 21). The mineral-resource potential of copper and associated metals in the Abo Formation in the Nacimiento Mountains, Jemez Springs, Gallinas, Coyote, Placitas, and Tijeras Canyon districts is low to moderate because of discontinuity, low grade, and small tonnage (Maps 9, 11, and 13; Fig. 21). The potential for development is low due to (1) low copper prices and (2) subeconomic tonnages compared to porphyry copper deposits.

Cochiti mining district

General description--Cochiti mining district is located in the southern Jemez Mountains in Sandoval County, originally part of Bernalillo County until 1903 (Fig. 13, 21). Only minor prospecting for precious and base metals occurred in the area until 1890 because of land disputes (Vieth, 1950). In 1897 the U.S. Supreme Court ruled the disputed land was public domain and opened the area to mineral prospecting (Dianne Murray, unpublished report, 1984). By 1899, 23 patented and 116 unpatented claims were located in the area.

Mining and past production--In 1896, the R. W. Woodbury mill near Bland began operations. A 300-ton (272 metric tons) capacity mill at the Albemarle mine was built in 1899 and closed in 1904. The Cossak Mining Co. built a mill in 1915, but it operated only a short period of time (Bundy, 1958). In 1943, another mill operated at the Iron King mine.

Total production in the district is unknown but estimated to exceed 1.2 million dollars (Table 9). Over one million dollars was produced prior to 1904 (Lindgren and others, 1910; Elston, 1967). Total estimated production from this district is 1,321,919 dollars worth of gold, silver, copper, and lead ore (Table 9).

Since 1963 only minor assessment work has been completed. Numerous problems have hampered mining in this district, including (1) rugged topography, (2) price of mining equipment, (3) freight cost, (4) low recovery rates of ore (less than 40%), (5) overselling of the district by speculators, (6) past litigation problems, and (7) an incomplete understanding of the genesis of the mineralization.

Only the major mines and claims are listed in Appendix 1 and plotted on Map 4. Additional prospects, claims, and small mines occur in the area, but available records are poor and accurate location maps are conflicting or unavailable.

Distribution and geology--Mineralization is similar to epithermal precious metal deposits associated with volcanic environments found throughout the Southwest (Buchanan, 1981). Gold and silver occur in quartz veins filling pre-existing fractures and faults in the Bland group and Bearhead Rhyolite. Most major quartz veins in the district occur near phaneritic quartz monzodiorite intrusives of the Bland group (Stein, 1983). Mineralization occurs as isolated pods or zones within the quartz veins.

At least thirteen vein systems have been mapped (Wronkiewicz

Table 9 – Metal production from the Cochiti mining district, Sandoval County, New Mexico, 1894 to 1963. From Elston (1967), U.S. Geological Survey (1904-1932), U.S. Bureau of Mines (1933-1963), Lindgren and others (1910), and New Mexico Bureau of Mines and Mineral Resources files.

Year	Tons	Au (oz)	Value ($)	Ag (oz)	Value ($)	Cu (lbs)	Value ($)	Pb (lbs)	Value ($)	Total Value
1894-1904	170,000[a]	33,200[a]	695,000	W	345,000					1,040,000
1914	4,373	824	17,036	24,460	11,964					29,000
1915	18,701	4,021	83,131	93,314	47,310			14,657	2,565	133,006
1916	9,300	2,070	42,800	56,404	37,100					79,900
1932	659	364	7,519	13,440	3,817					11,336
1933	465	158	3,273	7,940	2,779			W	W	6,052
1934	580	110	3,861	7,060	4,563	200	16			8,440
1935	159	20	707	1,575	1,132			7,800	312	2,151
1938	276	164	5,747	1,700	1,099					6,846
1939	514	66	2,310	2,310	1,446	100	10			3,766
1947	3	9	315	4	4	200	42			361
1948	9	9	315	451	408					723
1963	6	1	35	237	303					338
TOTAL	205,045[a]	41,016[a]	862,049	208,895[a]	456,925	500	68	22,457	2,877	1,321,919

[a] – estimated
W – withheld or not available

and others, 1984). The veins typically strike north-south and are up to 1,500 ft (457 m) long and 50 ft (15 m) wide. The deepest workings in the district are 725 ft (221 m) but are inaccessible (Bundy, 1958). The veins consist of dominantly quartz with small amounts of sulfides and calcite. Sulfide minerals include pyrite, argentite, sphalerite, chalcopyrite, galena, covellite, and proustite-pyrargyrite (Bundy, 1958; Wronkiewicz and others, 1984). Gold is typically associated with pyrite and argentite. Tellurium minerals are also reported to occur (Northrop, 1959). A chemical analyses by Barbour (1908) contained 0.00062% Au (0.18 oz/ton), 0.04200% Ag (12 oz/ton), 0.19% antimony, 0.242% tellurium, 0.61% S, 98.1% silica, and a trace of copper.

Fluid inclusion data indicate mineral deposition occurred at or above boiling at temperatures between 240° and 315°C (464° and 599°F) (Parkison and others, 1984; Wronkiewicz and others, 1984). Salinites ranged from 0 to 5 wt% equivalent NaCl (Wronkiewicz and others, 1984).

These epithermal deposits were probably formed by a hydrothermal convective system related to the various intrusives in the area. Metals were leached from underlying sedimentary and volcanic rocks as the heated waters circulated through fractures. Precipitation occurred at or near boiling when CO_2 and H_2S are lost as a vapor phase resulting in an increase in pH, oxygen fugacity, and cooling of the solution (Buchanan, 1981). Episodic boiling could result in two hydrothermal events suggested by field relationships, (1) a post-quartz monzodiorite and pre-Bearhead Rhyolite, and (2) a post-Bearhead Rhyolite and pre-Bandelier Tuff (Bundy, 1958). Gradual cooling of the intrusives resulted in cooling of the hydrothermal convective system.

Similar precious-metal epithermal deposits are underlain by base metal horizons (Buchanan, 1981), however, very little information is known about the Cochiti deposits at depth. It is possible that base metals may occur within relatively shallow depths but within several thousand feet.

Resource and development potential--The mineral-resource potential for precious metals in the Cochiti district is high, although additional exploration work may be needed to delineate potential ore deposits. The potential for antimony and tellurium is unknown; additional geochemical sampling is required. The potential for base metals also is unknown; drilling is required. Elsewhere in the Jemez Mountains the mineral-resource potential for precious metals in the vicinity of quartz-monzodiorite is unknown (Fig. 21; Map 11). The potential for development is moderate to high in the Cochiti district.

Interpretation of the geophysical data (Figs. 18 and 19) suggests that the Cochiti district is part of a northeast trending zone of felsic intrusives. Gold, silver, manganese, chloride, and zinc anomalies occur in the NURE geochemical data within this belt (Fig. 20; Area G). The potential for similar epithermal deposits of gold and silver exists along fractures and faults within this zone, especially near granitic or felsic intrusives. The depth to these undiscovered deposits is several hundred feet. The mineral-resource potential is unknown (Fig.

21; Map 11).

Placitas mining district

General description--The Placitas district is located in the northern Sandia Mountains in Sandoval and Bernalillo Counties (Fig. 13, 21) and consists of numerous thin and discontinuous veins and replacement bodies of barite, fluorite, galena, copper, and associated silver, gold, and zinc mineralization (Appendix 1; Map 6).

Mining and past production--In 1904 one shipment containing 49 oz (1,389 g) of placer gold was produced from the area (Wells and Wootton, 1932) and from 1920 to 1961, 48 oz (1,361 g) of silver, 2,441 lbs (1,107 kg) of copper, 10,357 lbs (4,698 kg) of lead, and 580 lbs (263 kg) of zinc were produced (Table 10). Most likely there was additional production from this area prior to 1904, but production figures are not available.

Little is known about the history and production of gold from placer deposits in the Placitas district. According to V. C. Kelley and Northrop (1975) and Wells and Wootton (1932), conglomeratic gravels from valley and terrace deposits near Placitas and Tecolote have been examined and worked for gold (Appendix 1; Map 6), but only the one small shipment is known. The origin of the gold from these placers is probably from the numerous veins in the northern Sandia Mountains.

Numerous small prospects, a few of which have been mined, occur throughout the district and consist of (1) base-metal veins in Pennsylvanian and Mississippian sediments, (2) base- and precious-metal veins in Precambrian rocks, and (3) barite-

Table 10 - Metal production from mines in the Placitas district in Sandoval and Bernalillo Counties, New Mexico, 1904-1961. From Elston (1967), U.S. Geological Survey (1904-1932), U.S. Bureau of Mines (1933-1968), Wells and Wootton (1932), and New Mexico Bureau of Mines and Mineral Resources files.

Year	Ore (tons)	Au (oz)	Value ($)	Ag (oz)	Value ($)	Cu (lbs)	Value ($)	Pb (lbs)	Value ($)	Zn (lbs)	Value ($)	TOTAL VALUE	MINE
1904[1]	---	49	1,013	---	---	---	---	---	---	---	---	1,013	Placer Au
1920	21	---	---	11	12	---	---	5,262	421	---	---	433	Montezuma
1926	14	---	---	37	23	2,400	336	700	56	---	---	415	Montezuma
1961[2]	4	---	---	---	---	41	17	4,395	443	580	8	468	Montezuma
TOTAL	39	49	1,013	48	35	2,441	353	10,357	920	580	8	2,329	

1 - Wells and Wootton (1932) reported this placer production as probably from Placitas.
2 - New Mexico Bureau of Mines and Mineral Resources files reported this production from a Montezuma mine presumably from Placitas district.

fluorite galena veins in Pennsylvanian and Mississipian limestones. Although historical accounts (Toomey, 1953, p. 5, 7; Northrop, 1959; V. C. Kelley and Northrop, 1975) imply a large amount of production from the area; only one mine, the Montezuma, is known to have produced in recent years. In 1920, 1921, and 1961, about $1,316 worth of silver, copper, lead, and zinc were produced (Table 10).

Distribution and geology--Most of the veins in the Placitas district occur along or near faults in Pennsylvanian and Mississippian sediments and Precambrian Sandia granite. Typically the base- and precious-metal veins, with or without accessory barite and fluorite, occur in the vicinity of the barite-fluorite-galena veins. Base-metal veins consist of copper, lead, and zinc minerals with minor silver whereas precious-metal veins consist of silver and gold with minor copper and lead minerals. The barite-fluorite-galena veins consist of primarily barite with accessory fluorite and argentiferous galena. The veins are two to three feet (0.6-0.9 m) wide and up to several thousand feet long. The depth of the veins is unknown. Chemical analyses from four deposits range from 0.10 to 0.46 oz/ton (3-16 ppm) silver, 0.19 to 4.99% lead, 0.001 to 0.65% zinc, and 0.001 to 0.12% copper (Table 11). Hedlund and Kness (1984) reported 0.43 oz/ton (14 ppm) silver from the La Luz mine and Hendzel and others (1983) reported 6 oz/ton (200 ppm) silver from a strip mine (12N.4E.1.414, Appendix 1) and >20,000 ppm Pb from the La Luz mine.

The lack of obvious magmatic activity in the Placitas district suggests these deposits were formed by sedimentary

Table 11 - Chemical analyses of selected samples from mineralized veins in the Placitas and Tijeras Canyon districts. Chemical analyses by Lynn Brandvold and associates, NMBMMR Chemical Laboratory, 1984.

Sample number	Name	Location	Ag oz/ton	% Pb	% Zn	% Cu	% $BaSO_4$	% $CaCO_3$	% CaF_2
PLACITAS DISTRICT									
4695	Victo Roco[1]	12N.5E.5.323	0.20	0.21	0.006	0.001	52.51	9.36	10.99
4597	Victo Roco[2]	12N.5E.5.323	0.00	0.02	0.0063	—	0.48	—	—
4598	Victo Roco[2]	12N.5E.5.323	0.00	0.01	0.0321	—	0.42	—	—
4699	Montezuma[1]	13N.5E.34	0.10	0.19	0.001	0.004	—	0.85	62.41
4697	Section 9[1]	12N.9E.9.133	0.46	4.99	0.65	0.0007	18.3	0.40	38.88
4596	Section 9[2]	12N.9E.9.133	0.00	4.14	0.006	—	38.07	—	—
4729	Section 9[2]	12N.9E.9.133	—	0.01	0.002	—	87.96	—	—
4732	Landsend	12N.5E.29.300	—	0.009	0.0006	0.004	83.37	—	—
4700	La Luz[3]	11N.5E.6	0.20	0.23	0.13	0.12	~0.70	5.24	58.90
TIJERAS CANYON DISTRICT									
4696	Shakespeare[4]	10N.5E.25.144	0.00	0.007	0.014	16.0	51.13	0.15	0.23
4727	Shakespeare[4]	10N.5E.25.144	—	0.039	0.010	6.4	63.08	—	—
4730	Shakespeare[4]	10N.5E.25.144	—	0.008	0.00009	0.026	82.91	—	—

1 - no gold detected
2 - trace of gold (<0.02 oz/ton)
3 - 0.02 oz/ton gold
4 - no gold detected, 0.005% U_3O_8 (same sample as given in Table 8)

hydrothermal processes. Sedimentary hydrothermal deposits are common throughout the Rio Grande rift (Putnam and others, 1983; Ewing, 1979; Beane, 1974; Allmendinger, 1975, 1974). Water is trapped within basin sediments during deposition and after burial by dehydration of minerals, chemical reactions, magmatism, and downward percolation of meteoric waters. These formation waters are heated by compression and compaction during burial and further warmed by convection from deeper sources, radiogenetic heat from the Sandia granite, and high heat flow associated with the Rio Grande rift (Reiter and others, 1979, 1978, 1975; C. L. Edwards and others, 1978). The heated formation waters leached metals and other ions from Precambrian rocks and Paleozoic sedimentary rocks. Precipitation occurred by cooling of hydrothermal waters, degassing, and/or mixing of waters.

The mineralization in the Precambrian rocks in the Placitas district is probably related to the base-metal and barite-fluorite-galena veins in Paleozoic sediments, although a Precambrian age is possible. Several periods of mineralization may have occurred, however, very little data exists concerning these deposits.

A magnetic low occurs north of the Placitas district, but its significance is not known. Barium, lead, silver, copper, and cobalt anomalies occur in the NURE geochemical data (Fig. 20; Area E) and are indicative of mineralization in the area. Silver, copper, lead, zinc, cadium, bismuth, manganese, and iron anomalies occur in the NURE geochemical data in the La Luz area (Fig. 20; Area DD).

Resource and development potential--The mineral-resource potential for barite-fluorite-galena with associated silver in the Tunnel Springs and Landsend areas is high (Fig. 21; Map 13; Hedlund and Kness, 1984). The mineral-resource potential for silver-lead veins in the La Luz area is moderate (Fig. 21; Map 13; Hedlund and Kness, 1984). The mineral-resource potential for copper, silver, and lead in the Montezuma area and for barite-fluorite-galena south of the Montezuma area is low to moderate (Fig. 21; Map 13). Elsewhere along faults near the Precambrian-Pennsylvanian contact in the Sandia Mountains and in the Placitas Basin north of the Placitas district the mineral-resource potential for barite fluorite-galena veins is unknown (Fig. 21; Map 13). The size and extent of most of these vein deposits are poorly known and additional exploratory investigation is required to properly assess the mineral potential. The mineral-resource potential for placer gold in terrace and valley deposits is unknown due to insufficient data (Fig. 21; Map 13).

The potential for development of the vein deposits in the Placitas district is low because (1) much of the land is classified a Wilderness Area or a Wildlife Refuge, (2) small size and low grade of individual deposits, and (3) high cost of development. However, the potential for development of placer and vein gold deposits outside the Wilderness Area and Wildlife Refuge is high should large quantities of gold exist.

Minor stratabound, sedimentary copper deposits are found in the northern part of the Placitas district, as previously discussed. The mineral-resource potential is moderate to low and the potential for development is low.

Tijeras Canyon-Coyote Canyon mining district

General description--Numerous mines and prospects are found in the southern Sandia, Manzanita, and Manzano Mountains (Fig. 13, 21; Maps 6, 7). Three mining districts are recognized in this area (from north to south): (1) Tijeras Canyon, (2) Coyote Canyon, and (3) Hell Canyon. The Hell Canyon is south of the study area, mostly in Valencia County and is only briefly described in this report. The Tijeras Canyon and Coyote Canyon districts are combined and discussed together for simplicity.

Mining and past production--Known production from the Tijeras Canyon-Coyote Canyon district from 1909 to 1952 includes 42.6 oz (1,208 g) of gold, 1,162 oz (32,942 g) of silver, 223 lbs (101 kg) of copper, and 42,738 lbs (19,386 kg) of lead amounting to $4,179 worth of production (Elston, 1967). Some production undoubtedly occurred prior to 1909, but the total figure is unknown.

Gold occurs in Precambrian greenstones in the Tijeras Canyon-Coyote Canyon district and in the Hell Canyon district (Fulp and Woodward, 1981). The largest deposit, the Milagros, is in the Hell Canyon district and production from the Milagros amounted to 2,348 oz (66,565 g) of gold and 9,333 oz (264,586 g) of silver that were recovered by heap leaching in 1975 and 1976 (Woodward and others, 1978).

Distribution and geology--Gold, silver, and copper occur in lenticular quartz veins emplaced along shear zones in the greenstones at the Great Combination, Mary M, and Milagros mines (Maps 6, 7; Appendix 1; V. C. Kelley and Northrop, 1975; Woodward and others, 1978; Fulp and Woodward, 1981). Mineralization partially replaced the greenstones and cemented brecciated, early-formed quartz. Additional deposits may occur in the area.

At least one polymetallic sulfide deposit, the York mine, occurs within greenstones in the Tijeras Canyon-Coyote Canyon district (Map 6; Appendix 1; V. C. Kelley and Northrop, 1975; Fulp and Woodard, 1981). Copper, lead, zinc, gold, and silver occurs within a marble lense in the greenstone. Ore minerals include pyrite, chalcopyrite, sphalerite, smithsonite, and quartz and appears to have been deposited after metamorphism (V. C. Kelley and Northrop, 1975; Bruns, 1959; Northrop 1959). Numerous copper occurrences are found in the district and may be indicative of additional deposits.

Many of world's primary gold deposits and massive sulfide deposits occur in Precambrian greenstone terranes, similar to the Tijeras Canyon and Hell Canyon greenstones (Anhaeusser and others, 1969). These greenstone terranes consist dominantly of metamorphosed, mafic volcanic sequences. The ore deposits may be syngenetic and formed by hot brines contemporaneously with submarine volcanism. Subsequent hydrothermal activity or metamorphism associated with younger granitic intrusives may have redistributed and concentrated gold and other metals from these primary hot-spring deposits or volcanic rocks enriched in precious and base metals to form deposits in stratabound horizons, veins, shear zones, or saddle reefs.

Northrop (1959) reports an early assay of ore from a mine which contained 72 lbs of nickel per ton (36 kg/metric ton), 80 lbs of tin per ton (40 kg per metric ton), and arsenic. Although it is likely that small occurrences occur elsewhere in the Precambrian terrane, however the mineral-resource potential for nickel, tin, and arsenic is very low.

The greenstones in the Manzano Mountains appear to be characterized by bouguer gravity and magnetic highs (Figs. 18, 19, 20). These geophysical features suggest that the greenstones exposed in the Manzano Mountains may be a part of a northeast-trending belt of greenstones. Petroleum test wells in southwestern Santa Fe County and northwestern Torrance County penetrate Precambrian rocks at depths ranging from 790 to 2,720 ft (241-829 m; McLemore, 1984, fig. 24; well data, NMBMMR). If the greenstones occur at similar shallow depths within the belt (Fig. 18), then these rocks may have potential for precious-metal and massive sulfide deposits. Additional geophysical studies and drilling are needed to adequately assess this region.

A few placer gold deposits have been reported from the western drainages of the Sandia, Manzanita, and Manzano Mountains (Map 6, 7; Appendix 1). Very little information concerning these small deposits is known.

Barite-fluorite-galena and fluorite-galena veins are relatively common along fractures and faults in Precambrian and Pennsylvanian rocks (Maps 6, 7; Appendix 1). Although barite is not common in the Tijeras Canyon-Coyote Canyon district as in the Placitas district, these veins are similar in emplacement, size, and mineralogy as the Placitas deposits. Minor base-metal veins may occur near some of these barite-fluorite-galena and fluorite-galena veins.

Fluorite-galena veins are the most common type of deposit in this district, although precious-metal and massive sulfide deposits are more important. The fluorite-galena veins are up to 5 ft (1.5 m) thick and several thousand feet long. Silver may be associated with galena in some of these veins. Copper oxides may be present. Gold has been reported to occur in veins (Northrop, 1959).

A barite-fluorite-galena vein occurs with or near a stratabound, sedimentary copper deposit at the Shakespeare mine (Map 6; Appendix 1). Copper oxides and associated uranium occurs along a fault within sandstones of the Madera Group. Barite-fluorite-galena veins occur along a parallel fault in limestones and sandstones. A chemical analysis of a selected sample contained 51.13% $BaSO_4$, 0.23% CaF_2, 16.0% Cu, and 0.005% U_3O_8 (Table 11).

These epithermal deposits were possibly formed by sedimentary-hydrothermal processes; although some primary Precambrian-age deposits related to granitic intrusives is possible. Heated formational waters leached ions from underlying rocks and deposited them along fractures and faults, similar to deposits in the Placitas district.

Resource potential and development--The mineral-resource potential for gold, silver, and massive sulfides in Precambrian greenstones in the Tijeras Canyon-Coyote Canyon district is moderate (Fig. 21; Maps 13, 14). Although mineralization is known to occur, economic orebodies in addition to small mines have yet to be delineated. The potential for development is moderate; however, most of the favorable greenstones lie on the

Isleta Indian and Sandia Military Reservations. The mineral-resource potential for nickel, tin, and arsenic is very low due to lack of favorable environment.

The mineral-resource potential for precious metals in the postulated greenstone belt in southeastern Bernalillo County (Fig. 21) and for placer gold deposits in Bernalillo County are unknown.

The mineral-resource potential for fluorite, galena, and silver in veins in the Tijeras Canyon-Coyote Canyon district is low to moderate (Fig. 21; Maps 13, 14). The potential for base-metal veins is also low to moderate. The potential for development is low because (1) discontinuous, low grade, and low tonnage deposits, (2) many deposits are on the Isleta Indian and Sandia Military Reservations, and (3) the Tijeras Canyon area is becoming a residential area.

Minor stratabound, sedimentary copper deposits are found in Tijeras Canyon district, as previously discussed. The mineral-resource potential is low to moderate and the potential for development is low.

Mining districts in western Santa Fe County

General description--Four mining districts; La Bajada, Cerrillos, Old Placers, and New Placers; are found in western Santa Fe County near the RPRA boundary (Fig. 13). The mineral deposits in these districts are briefly described because similar deposits or extension of known deposits may extend into the study area.

La Bajada district--La Bajada mine is found in western Santa Fe

County (sec. 9 T. 15 N., R. 7 E.; Fig. 13; Map 4) and is a unique low-temperature, base-metal vein deposit (Hilpert, 1969; Haji-Vassiliou and Kerr, 1972). Thin veins of sulfides and uranium occur along the footwall of a limburgite dike which was emplaced along a north-trending fault in the Espiñaso Formation (Oligocene). In 1928 and 1929, the American Smelting and Refining Co. produced 5,345 lbs (2,424 kg) of copper and 52 oz (1,474 g) of silver (McLemore and North, 1984). In 1950, uranium was discovered and from 1956 to 1966, 27,116 lbs (12,300 kg) of U_3O_8 was produced at an average grade of 0.14% U_3O_8. There is no indication of any similar deposits along La Bajada mesa and the mineral-resource potential for similar deposits in Sandoval County is presumed low.

Cerrillos district--The important deposits in the Cerrillos district are in fracture-controlled veins that cut Oligocene augite-biotite monzonite porphyry and hornblende monzonite porphyry. Less important veins cut Oligocene Espiñaso Volcanics and the underlying Oligocene Galisteo Formation (Disbrow and Stoll, 1957; Akright, 1979). The veins consist of three zones: oxide, mixed oxide-sulfide, and sulfide. Minerals in the oxide zone include neotocite, brochantite, and chrysocolla and humate. The mixed zone contains the minerals found in the oxide zone plus chalcopyrite, pyrite, bornite, covellite, and chalcocite. The sulfide zone contains chalcopyrite, pyrite, bornite, and molybdenite (Akright, 1979). Uranium is present locally (McLemore, 1983a) and lead-zinc veins also are common. The mineralization is probably related to the Oligocene intrusives.

The potential for deposits similar to the Cerrillos district is presumed low in the RPRA. However, there is a residual magnetic high southwest of the Cerrillos district in the Hagan Basin (Figs. 18, 21; Map 11), which may represent an intrusive similar to the Cerrillos intrusives in the subsurface. The resource potential for Cerrillos- and La Bajada-type deposits is unknown (Fig. 21). Additional geophysical studies are required to adequately test this interpretation.

Old and New Placers--The mineral deposits in Old and New Placers districts are perhaps the most important deposits in north-central New Mexico (McLemore and North, 1984). Over 3.6 million dollars worth of gold, silver, copper, lead, and zinc have been produced from the New Placers district and over $53,000 worth of gold, silver, copper, and lead have been produced from the Old Placers district (Elston, 1967). Six types of deposits are found in the New Placers district: (1) pyrometasomatic copper-gold-silver-tungsten deposits, (2) replacement deposits (sphalerite and argentiferous galena), (3) iron veins and bedded replacement deposits, (4) gold-pyrite-quartz veins, (5) gold-pyrite disseminations in tactite, and (6) gold placer deposits (Elston, 1967). Four types of deposits are found in the Old Placers district: (1) gold-quartz veins, (2) gold and scheelite disseminations, (3) contact pyrometasmatic deposits (gold, chalcopyrite, scheelite), and (4) gold placers (Elston, 1967).

Gold Fields Mining Corp. opened a 3,000 ton/day (2,722 metric ton/day) open-pit mine in the Old Placers district in 1980 (A. Wright, 1983). The ore averages 0.053 oz/ton (1.82 ppm) gold and occurs in quartz veins and breccia pipes. The veins intrude the nepheline-bearing augite monzonite Ortiz stock.

Unfortunately, no indications of extensions of these deposits into the RPRA are present with the possible exception of gold placers from the New and Old Placers districts. The mineral-resource potential is unknown.

Manganese Deposits

Small manganese deposits occur in the San Jose Formation (Tertiary) west of Cuba in Sandoval County (Appendix 1; Map 1; Dorr, 1965; Farnham, 1961). Manganese occurs as nodules or concretions in shales and sandstones and forms small, but discontinuous orebodies that average 35-44% Mn. Over 3,600 tons (3,266 metric tons) of manganese concentrates were produced from four properties during 1942 to 1959 under a government subsidized program (Table 12; Farnham, 1961). Most of the higher grade (35-44% Mn) deposits have been mined out, although lower grade (10-15% Mn) material may still be present. It is likely that additional small and discontinuous orebodies may occur at depth (Elston, 1967). There are no HSSR geochemical anomalies associated with these deposits. Presently the market for manganese is unfavorable to warrant exploration for these low-grade and small, discontinuous deposits; therefore the mineral-resource potential and the potential for development is low (Fig. 21; Map 8).

Miscellaneous metal deposits

Iron ore--Although iron ore has not been mined commercially in Sandoval or Bernalillo counties, a few occurrences are found in

Table 12 - Manganese production from Sandoval County, 1942-1959 (Farnham, 1961; U.S. Bureau of Mines, 1958-1959).

Year	Mine	Production (tons)	Average % Mn
1942	Landers No. 1 and 2	2,242	41
1944-1945	Taylor	896	38
1952-1955	Landers No. 1 and 2	68	38
1955-1957	Landers No. 1 and 2	271	41
1957-1958	Jicarilla Apache	309	36
1958	Landers No. 1 and 2	W	W
1959	Landers No. 1 and 2	W	W
	TOTAL 1942-1959 (excluding W)	3,786	

W = withheld

the Placitas and Tijeras Canyon districts in the Sandia Mountains (Map 6; Appendix 1). Brilliant red hematite, occasionally mistaken for cinnabar, occurs in fissures and fractures along the Las Huertas fault in the Placitas district. These deposits are small and may be associated with copper, fluorite, and silver (V. C. Kelley and Northrop, 1975; Harrer and Kelley, 1963; V. C. Kelley, 1949; R. W. Eveleth, written commun., 1980). Red and yellow limonite ocher occurs in spring deposits in the Tijeras Canyon district (Harrer and Kelley, 1963; Jones, 1904) and these deposits are also small. It is doubtful that any of these iron deposits have any potential except maybe for small local use for mineral pigments. The mineral-resource potential is low.

Beach-placer Sandstones--Beach-placer sandstone deposits are concentrations of heavy minerals that form on beaches or long-shore bars in a marginal-marine environment (Houston and Murphy, 1977). Anomalously high concentrations of titanium, iron, scandium, niobium, tantalum, uranium, thorium, zirconium and rare-earth elements are characteristic. Four deposits are found in the RPRA: (1) the B.P. Hovey Ranch (Torreon Wash) and (2) Herrera Ranch in Sandoval County, (3) Miguel Creek Dome in McKinley County, and (4) Herrera Ranch in Bernalillo County (Appendix 1; Maps 3 and 5).

These sandstone deposits are dark in color ranging from olive-gray, rust-brown, brownish-black, to maroon and occasionally are called "black-sandstones". Beach-placer deposits occur at the top of beach sandstones in upper Cretaceous rocks in the Gallup, Dalton, and Point Lookout Sandstones (Chenoweth, 1957; Houston and Murphy, 1977). One of the characteristic features of these deposits is radioactivity due to radioactive zircon, monazite, and columbium minerals. In addition, minerals such as ilmenite, anatase, leucoxene, magnetite, hematite, garnet, and tourmaline are common in these sandstones. A sample from the B. P. Hovey Ranch deposit contained 0.013% U_3O_8, 223 ppm Th, 7,852 ppm Zr, 244 ppm Y, and 277 ppm Nb (McLemore, 1983a).

Only one beach-placer sandstone has been mined in New Mexico; the Hogback #8 mine in San Juan County, where 8 tons (7 metric tons) of ore yielded 3 lbs (1.4 kg) of U_3O_8 in 1954 (McLemore, 1983a). Most of these deposits in New Mexico are low-tonnage and low-grade and remain undeveloped. It is estimated that collectively 4,751,200 tons (4,310,216 metric tons) of ore containing 12.82% TiO_2, 2.07% ZrO_2, 15.51% Fe, and less than 0.10% $eThO_2$ (radiometric equivalent ThO_2) are found in the entire San Juan Basin in New Mexico (Dow and Batty, 1961). The deposits in the RPRA represent only a fraction of this estimate.

Although additional deposits probably remain undiscovered in the area; the small size and low-grade of individual deposits prevents large-scale exploration and mining despite their economic potential. The mineral-resource potential and potential for development for beach-placer sandstone deposits in the San Juan Basin is low.

Carbonatites--A thin carbonatite dike (1 ft or 0.3 m wide) and associated veins are found in the Monte Largo Hills (Appendix 1; Map 6; McLemore, 1983b; Lambert, 1961). Carbonatites are known for economic concentrations of rare-earth elements, uranium, thorium, niobium, copper, iron, titanium, barite, fluorite, and phosphate. Chemical analyses of a sample are given in McLemore (1983b, Table 1). The carbonatite contains 4.21% P_2O_5, 42 ppm U, 30 ppm Th, 445 ppm Nb, 680 ppm Ba, and 1,114 ppm Sr. However, V. C. Kelley and Northrop (1975) report an analysis of 0.295% Nb_2O_5 from this carbonatite. The dike is small and economic concentrations are discontinuous and localized. The mineral-resource potential is probably low, although the subsurface potential is unknown.

Although carbonatites have not been found in the Nacimiento Mountains, brick-red syenite bodies are present (Woodward, 1984; Woodward and others, 1977). These syenites are similar to syenites found in the Lobo and Pedernal Hills in Torrance County (Woodward, 1984), where a carbonatite dike is associated with the Lobo Hill syenite (McLemore, 1984). Carbonatites are commonly associated with syenite bodies and it is possible that carbonatites may be associated with these rocks in the Nacimiento Mountains. Additional field work is necessary in this area, as uranium, thorium, niobium, barite, and other minerals could be associated with these rocks.

Miscellaneous metals--Miscellaneous and uneconomic occurrences of various metals are found throughout the RPRA. Rare-earth elements, lithium, zirconium, and berylillum are reported to occur in a few pegmatites in the Sandia Mountains (Appendix 1), however, not in large quantities. Nickel, chromium, and titanium occur in a mafic dike in the Tijeras Canyon district (Appendix 1; Northrop, 1959). Veins of molybdenum are found in the Hells Canyon district (King, 1965); but no other information is known.

Industrial Materials

Introduction (by James M. Barker)

Industrial materials are very difficult to classify (see, for example, Dunn, 1973; Fisher, 1969; Blair, 1981; L. A. Wright and Burnett, 1962; Bates, 1969; and Kline, 1970). They have traditionally been called "non-metallics" or "industrial minerals and rocks". Both terms are inadequate because these materials include solids, liquids (brine), and gases (carbon dioxide, nitrogen, etc.) along with minerals, rocks, manufactured products (lime), and some metals (boron, lithium, silicon) in a strict chemical sense. The end use of the material is the defining factor so that coal, lignite, bitumen, asphalt, uranium/thorium and others are, in certain instances, considered "industrial materials", the term used in this report.

About two dozen major end uses can be identified (Lefond, 1983) along with about 100 major materials and several hundred minor materials unevenly distributed throughout the major categories. A very simplified classification matrix is presented in Table 13a-c to highlight this diversity along with some possible resources for the RPRA. This matrix by no means covers all the possible material types; building or dimension stone, for example, has at least 56 types of stone used in this capacity. Many of these types of stone occur within the RPRA but only those with a favorable combination of quality, quantity, markets, and transportation can be distributed and sold.

Industrial materials are a highly-diverse group of products compared to such products as copper, gold and mercury, among

Table 13a - Classification of industrial materials by geology and industrial end use. See Tables 13b and 13c for lists of industrial materials and end uses.

Geology: Rock, Mineral, Material	Composition	End use	Natural Waters and Brines	Sedimentary Rocks: Clastic	Sedimentary Rocks: Chemical	Sedimentary Rocks: Organic	Metamorphic Rocks	Igneous Rocks: Plutonic Rocks (subsurface): Deep	Igneous Rocks: Plutonic Rocks (subsurface): Shallow	Igneous Rocks: Volcanic Rocks (surface): Flow	Igneous Rocks: Volcanic Rocks (surface): Pyro.	Weathering
Alunite	$K\,Al_3(SO_4)_2(OH)_6$	3,14			X		X		X			X
Amblygonite	$(Li,Na)Al(PO_4)(F,OH)$	3						X	X			
Andalusite	$Al_2\,SiO_5$	2,21		X			X	X	X			
Asbestos Minerals†	various silicates	15,16,22					X					
Barite*	$BaSO_4$	2,3,15,19,22		X	X				X			X
Bauxite Minerals	various	2,3,15,21,22										X
Beryl	$Be_3Al_2Si_6O_{18}$	2,3					X					
Borate Minerals	various	2,3,11,14,16,19	X		X		X		X			
Bromine	Br	3	X		X							
Brucite	$Mg(OH)_2$	14,21					X					
Carbon Materials†	C or C-compounds	2,15,16,19,21,22				X						
Celestite†	$SrCO_3$	3			X				X			
Chalcocite†	CuS_2	14							X			
Chalcopyrite†	$CuFeS_2$	14					X	X	X			
Chromite	$FeCr_2O_4$	2,3,17,19,21		X			X	X				
Clay Minerals*	layer silicates	1,2,5,15,16,17, 19,21,22		X	X		X		X			X
Cordierite	$Mg_2Al_4Si_5O_{18}$	2					X					
Corundum	Al_2O_3	1		X			X	X				
Cuprite†	Cu_2O	14							X			X
Diaspore	$AlO(OH)$	2,21										X
Diatomite†	$SiO_2 \cdot nH_2O$	15,21,22				X						
Dolomite†	$Ca,Mg(CO_3)_2$	2,4,9,11,14,15, 16,19,21,22			X		X	X				
Dumortierite	$(Al,Fe)_7BSi_3O_{18}$	2					X	X				
Epsomite	$MgSO_4 \cdot 7H_2O$	14			X							X
Feldspar Group†	silicate	1,2,8,11,15,16,19		X			X	X	X	X	X	
Fluorspar*	CaF_2	2,3,16,19			X				X	X		X
Galena*	PbS	22						X	X			
Garnet†	silicate	1		X			X	X	X	X		
Gases†	various	13,14,16		X		X			X			
Gems†	various	1,2		X		X	X	X	X	X	X	X
Glauconite†	silicate	14,15			X	X						
Graphite†	C	2,21					X					
Gypsum/Anhydrite*	$CaSO_4 \cdot nH_2O$	2,3,8,10,13,14, 15,19,22		X	X				X			X
Halite	NaCl	2,3,8,22	X		X							
Humate*	humic acid	14				X						
Ilmenite†	$FeOTiO_2$	22,16		X			X	X				
Iron Oxide Minerals*	$Fe_xO_y \cdot nH_2O$	1,2,16,20,22			X	X	X	X				X
Iodine Materials	I	3	X									
Kyanite	Al_2SiO_5	2,21		X			X	X	X			
Limestone*	$CaCO_3$	2,3,4,9,11,13- 16,19,21,22		X	X	X	X	X	X	X		X
Lithium Materials	various	2,3	X	X				X				
Magnesite†	$MgCO_3$	2,3,11,14,21		X			X		X			
Manganese*	various	8					X		X			X
Mica Minerals†	various	13,15,16,22		X			X	X	X	X	X	X
Molybdenite†	MoS_2	14					X	X	X			
Nepheline Syenite	rock	2,11,15,19						X				
Nitrate Materials	various	2,3,14			X	X						
Olivine†	$(Mg,Fe)_2SiO_4$	2,14,17							X			
Periclase	MgO	2,14					X	X				
Perlite*	volc. glass	5,11,15,21,22							X	X	X	
Phosphate Materials†	$Ca_5(PO_4)_3(OH,F,Cl)$	3,14		X	X		X	X	X			
Potash Minerals	KCl, etc.	2,3,14,16,19,22			X							
Psilomelane†	$(Ba,H_2O)_2Mn_5O_{10}$	14			X							X
Pyrite†	FeS_2	3,19,20		X	X	X	X		X			
Pyrolusite	MnO_2	3,14			X	X						X
Pyrophyllite	$Al_4(Si_8O_{20})(OH)_4$	2,15					X		X			
Pyrrhotite	Fe_xS	3						X				
Rare Earths & Thorium†	various	3,19		X		X		X	X			
Siderite†	$FeCO_3$	20,22		X					X			
Silica Materials†	SiO_2	1-4,9,11,13, 15-17,19,21,22		X	X	X	X		X	X	X	X
Sillimanite†	Al_2SiO_5	2,21					X	X	X			
Sodium Minerals	various	2,3,11,19,21,22	X	X								
Sphalerite†	$(Zn,Fe)S$	14					X	X	X			
Spodumene	$LiAlSi_2O_6$	2,3						X				
Staurolite	$(Fe,Mg,Zn)_2Al_9Si_4O_{23}(OH)$	17		X			X					
Stone*	various	1,2,4-9,12,14, 15,19,20		X	X	X	X	X	X	X	X	X
Strontianite†	$SrCO_3$	13			X				X			
Sulfur*	S	3,14				X				X		
Talc	$Mg_6(Si_8O_{20})(OH)_4$	2,15					X	X	X			
Titanium Minerals†	TiO_2	2,3,15,16		X				X				
Tourmaline†	complex silicate	2		X				X				
Trona	Na_2CO_3	3	X		X	X			X			X
Vermiculite	complex silicate	5,11,15,21						X			X	
Wollastonite	$Ca(SiO_3)$	2,15							X			
Witherite†	$BaCO_3$	3							X			
Zeolite†	complex silicates	15		X	X		X		X		X	X
Zirconium Minerals†	various	2,3,16,17,21		X			X	X				X

* Major commodity in northern Rio Puerco Resource Area
† Present in uneconomic amounts

Table 13b
List of industrial materials to accompany Table

Alunite
Amblygonite
Andalusite
Asbestos
  chrysotile crocidolite
  actinolite amosite
  anthophyllite tremolite
Barite
Bauxite (Gibbsite, Boehmite)
Beryl
Borate
  borax
  colemanite
  kernite
  probertite
  tincalconite
  ulexite
Bromine
Brucite
Carbon
  amorphous
  graphite
  coal (anthracite)
  lignite
  peat
  gilsonite, elaterite, wurtzilite
  bitumen, albertite, grahamite, impsonite
  asphalt
Celestite
Cerussite
Chalcocite

Chalcopyrite
Chromite
Clay Minerals
  kaolin, dickite, metahalloysite, halloysite, endellite
  illite
  smectite, montmorillonite, bentonite, hectorite
  attapulgite/seprolite/meerschaum
Cordierite
Corundum
  emery
Cuprite
Diaspore
Diatomite
Dolomite (see limestone)
Dumortierite

Epsomite
Feldspar
  potassium (orthoclase, microcline)
  sodium (albite)
  calcium (anorthite)
  perthite
Fluorspar
  cryolite
Galena
Garnet
Gases
  nitrogen sulfur dioxide
  helium hydrogen sulfide
  carbon dioxide noble

Gems (semi-precious & precious)
Glauconite
Graphite
  amorphous
  flake
Gypsum/Anhydrite
  calcined
  selenite
Halite
Humate
Ilmenite
Iron Oxide
  rouge goethite
  crocus lipidocrocite/epidocrocite
  ochre limonite

  sienna hematite
  umber magnetite
  micaceous
Iodine Materials
Kyanite
Limestone
  calcite vaughanite (lithographics)
  aragonite shell
  chalk (whiting) coquina
  dolomitic caliche
  argillaceous
Lithium Minerals
  brine amblygonite
  spodumene

Magnesite
Mica Minerals
  muscovite (sericite)
  phlogopite
  biotite
  lepidolite
Molybdenite
Nepheline Syenite
Nitrate Materials
  guano
  niter, nitre (KNO_3)
Olivine
Periclase
Perlite
Phosphate Materials
  apatite
  allophane (colloid)
Potash Minerals
  sylvite carnallite
  langbeinite polyhalite
  kieserite
  potassium sulphate
  potassium carbonate
    (pearl ash)

Psilomelane
Pyrite
Pyrolusite
Pyrophyllite
Pyrrhotite

Strontianite
Sulfur
Talc
Titanium Minerals
  rutile, anatase, brookite
  titania, titanite (sphene)
Tourmaline
Trona
Vermiculite
Wollastonite
Witherite
Zeolite
Zirconium (Hafnium) Minerals

Rare Earths & Accessory Minerals
  bastnoesite thorium
  monozite yttrium
  xenotime
Siderite
Silica
  opaline
  flint
  chert
  agate
  rottenstone
  tripoli
  ground
  novaculite
  colloidal
  quartzite
  pebbles (beach, river)
  sandstone
  gannister
  crystal
Sillimanite
Sodium
  sodium sulfate (salt cake)
  sodium carbonate (soda ash, trona)
  sodium nitrate (caliche)
  NaI
  NaBr
  sodium bicarbonate

Sphalerite
Spadumene
Staurolite
Stone
  limestone granite
  dolomite syenite
  dolomitic
    limestone anorthosite
  marble aplite
  calcareous marl andesite
  shell dacite (porphyry)
  coquina rhyolite
  coral trachyte
  travertine felsite
  onyx gabbro
  sandstone basalt
  graywacke diabase
  chert traprock
  shale norite
  argillite diorite
  quartzite peridotite
  gneiss tuff
  schist pumice, pumicite
  slate perlite

  amphibolite volcanic glass
  talc volcanic rock
  serpentine volcanic cinders
  greenstone volcanic breccia
  arkosic
    quartzite scoria

Table 13c - List of end use categories for industrial minerals as numbered on Table 13a.

END USE	NUMBER ON TABLE 13A
Abrasive	1
Ceramics/Art	2
Chemical	3
Crushed Stone	4
Lightweight Aggregate	5
Sand and Gravel	6
Slag	7
Cement	8
Dimension & Cut Stone	9
Gypsum and Anhydrite	10
Insulation	11
Roofing	12
Electronics & Optical	13
Fertilizer	14
Filler, Filter, Absorbent	15
Flux	16
Foundry Sand	17
Precious/Semi-Precious Gem	18
Glass	19
Mineral Pigment	20
Refractory	21
Well Drilling	22

Source: Lefond (1983)

many. Undifferentiated products are the same from each producer and have ready-made, highly-visible markets with set prices and standard, simple specifications. In contrast, industrial materials are highly diverse with no central market, no set price and complex specifications. This relationship is often seen in the extreme where each customer for an industrial material sets unique specifications that must be met by the producer. Such producers have dozens of "products" based on one material because of consumer preferences for slight differences in grain size, shape, purity, and others.

The relationships described above lead to the dominance of price, product specifications, customer location, transportation, and production costs over geology. Many industrial materials are potentially present in the RPRA (Table 13a, Fig. 22), but only in the broadest sense are they a resource because no markets exist or the details of specifications cannot be met. Only the industrial materials that have been or are potentially economic are discussed below.

Adobe (by JoAnne Cima Osburn)

General description--The use of mud in the arid southwest for building materials dates back to the time of the Pueblo Indians (E. W. Smith, 1982a, b). Traditionally, the sun-dried adobe bricks were made on the building site by the person desiring the bricks. Recent increases in housing prices, desire for houses that enhance natural surroundings, and rapid growth of population in the southwest have supported as many as 45 commercial adobe brick makers in New Mexico. New Mexico commercial producers made

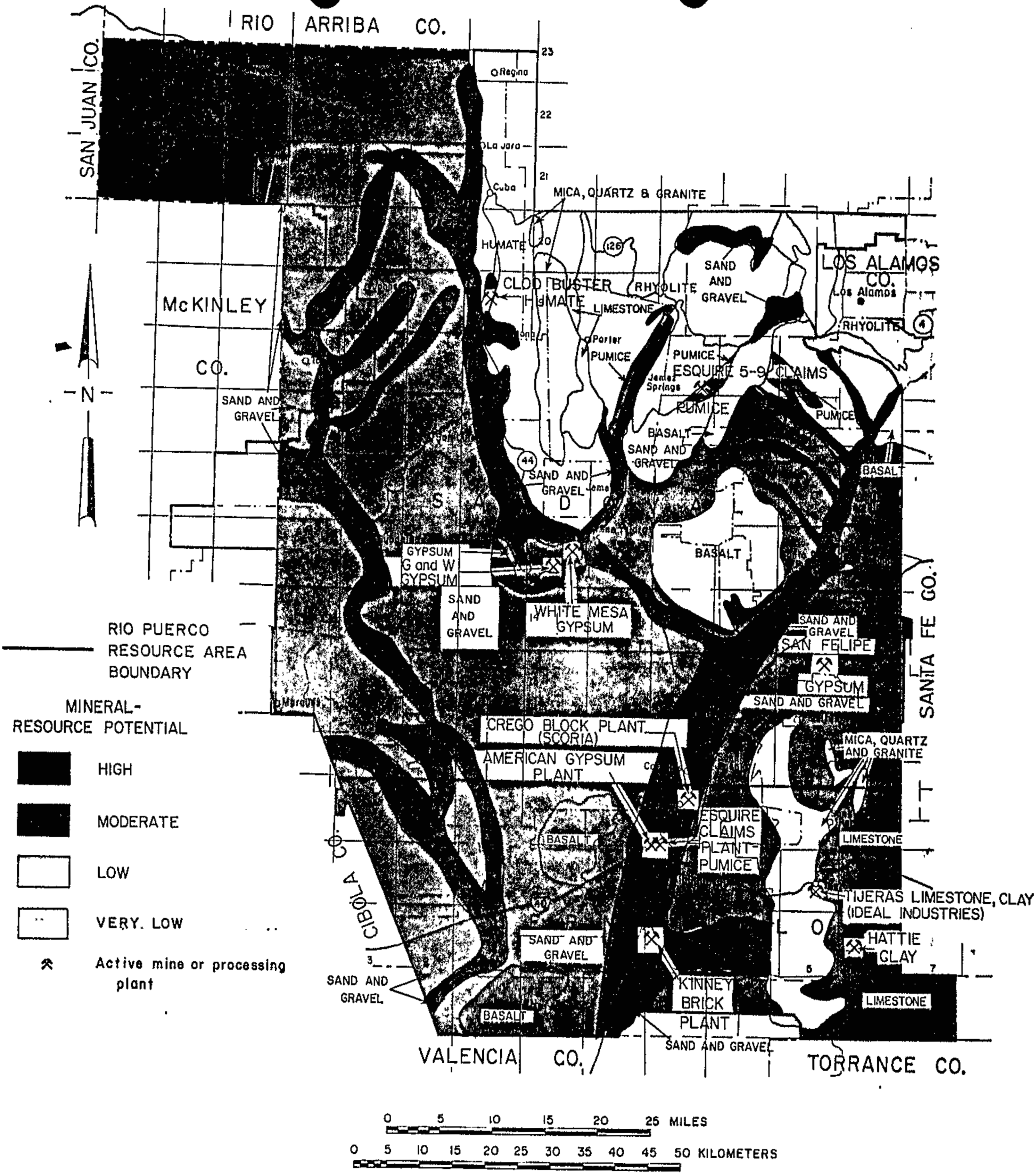

FIGURE 22-MINERAL-RESOURCE POTENTIAL FOR INDUSTRIAL MATERIALS IN NORTHERN RIO PUERCO RESOURCE AREA.

over four million bricks in 1980 valued at over one million dollars (Smith, 1982a). Both traditional adobes and adobes stabilized with asphaltic emulsions are currently available in New Mexico.

The soil used in adobe bricks is a mixture of sand, silt, and clay. Typical mixtures include 55-75% sand and the remainder is finer-grained material. The clay component in soils serves as the binding agent in adobe bricks. Smith (1982b) tested 49 samples and found that expansive and nonexpansive clay minerals were represented almost equally. In the expansive group, calcium- or sodium-rich smectites and mixed-layer illite-smectites occur and vary in expansive character. In the nonexpansive group, kaolinite and illite minerals were identified. Both the total amount of clay in a given soil and the ratio of expansive to nonexpansive clays affect the physical properties of the finished adobe brick. For example, soil with a large nonexpansive clay mineral component would produce a more brittle brick than a soil with a larger percentage of expansive clay minerals. Conversely, a soil with a large component of expansive clays may cause excessive cracks in the finished product. Both problems can be partially overcome by varying the sand or straw content of the brick. Most of the soils and sediment of the Albuquerque and Española Basins are suitable for adobe manufacture. Most of the valley flats and some of the pediment slopes adjacent to the Rio Grande are suitable for adobe making, unless they are very sandy or capped by basalt or caliche.

Mining and past production--Sandoval County has six adobe operations (Appendix 1) which in 1980 produced 261,000 bricks worth approximately $87,000 (Smith, 1982b). Four of the operations are located in Corrales and two additional adobe yards are located in Bernalillo and Peña Blanca. The raw material for adobes consists of Quaternary pediment deposits adjacent to the present Rio Grande valley.

Three adobe yards in Bernalillo County produced about 1.5 million adobe bricks in 1980. This output represents 35% of the total number of adobe bricks produced in New Mexico in 1980 (Smith, 1982b). Each adobe yard operates from spring through the fall when excavation and brick drying are not hampered by moisture and freezing.

Resource and development potential--Extensive fluvial deposits in Sandoval and Bernalillo counties provide an almost inexhaustive supply of sediment and soil suitable for adobe brick manufacture. Mineral-resource potential is therefore high. The practice of stabilizing adobes by adding small amounts of asphaltic emulsions makes the resultant brick quite competitive in price and utility with scoria and pumice cement blocks for dwellings and small commercial buildings.

The large potential market in Albuquerque plus very large local deposits of inexpensive raw materials insure the steady growth of the adobe industry in the RPRA. Recent favorable studies (Smith, 1982b) completed by the DOE in cooperation with various public and private agencies should encourage the use of adobe brick in federally-funded projects and thus greatly expand the potential market. Potential for development is high throughout the Rio Grande valley.

Barite and fluorite deposits (by Virginia T. McLemore)

General description--Barite and fluorite deposits with associated lead and silver are found along fault zones and the unconformity between limestones and sandstones of the Madera Group and Sandia Formation and Precambrian rocks in the Sandia Mountains. Fluorite deposits with associated base metals and silver, but little or no barite, are found in similar geologic settings in the Manzanita Mountains (Appendix 1; Maps 6 and 7).

Mining and past production--Although no barite has been produced from the RPRA, over 400 tons (363 metric tons) of fluorite has been produced from the Manzanita Mountains. In 1943, 300 tons (272 metric tons) of fluorite were shipped from the Blackbird mine and 100 tons (90 metric tons) were shipped from the Red Hill and Eight-five mines (F. E. Williams, 1966). In the early 1920's, one carload of fluorite was produced from the Galena King mine (Rothrock and others, 1946).

Distribution and geology--Numerous fissure veins of barite, fluorite, and silver-bearing galena occur in the Placitas district (Clippinger, 1949; F. E. Williams, 1965; T. J. Smith, 1982; Hedlund and others, 1984) and of fluorite and galena in the Tijeras Canyon-Coyote Canyon district (Rothrock and others, 1946; Van Alstine, 1965; Williams, 1966). This mineralization has been previously discussed under metals. Barite is the dominant mineral in the Placitas district; whereas fluorite is the dominant mineral in the Tijeras Canyon-Coyote Canyon district.

A belt of anomalous barium values are in NURE stream-sediment samples along the Kirtland-Fruitland contact and in the Nacimiento Formation in northern Sandoval County (Fig. 20, Areas M and N). Strontium and sodium anomalies are also present. Barite concretions have been reported to occur in the Kirtland and Nacimiento Formations (Talmage and Wootton, 1937; Donald Wolberg, NMBMMR, personal commun., June, 1984). These barium anomalies may have a similar origin to the concretions. The significance of these anomalies is unknown, but they may represent bedded barite and strontianite mineralization so additional work is suggested.

Anomalous concentrations of barium (2,000-3,000 ppm) are found in stream sediments in the vicinity of the Collins mine. The area is also associated with a major northeast-trending gravity linear and the area warrents further study to determine the source of the barium.

Resource and development potential--The mineral-resource potential for barite-fluorite-galena veins in the Tunnel Springs and Landsend areas of the Placitas district is high and in the Montezuma and Sandia Park areas is low to moderate (Fig. 21; Map 13). The potential for barite-fluorite-galena veins along faults and fractures elsewhere near the contact between the Precambrian rocks and the Madera Group in the Sandia Mountains and in the Placitas Basin north of the Placitas district is unknown. The mineral-resource potential for fluorite veins in the Manzanita Mountains is low to moderate. The potential for development is low in the Wilderness Areas, Wildlife Refuge, Sandia Military Reservation, and Isleta Indian Reservation; but moderate on forest and private lands. The rugged terrain and high elevation may also hamper development of some of these deposits.

Bitumens (by Robert M. Colpitts)

Deposits of bituminous material and oil shale occur within and adjacent to the northern RPRA. They occur in rocks of Pennsylvanian, Jurassic, Cretaceous, and Tertiary age and include localized deposits of oil and tar sands that have been locally quarried for road material (Winchester, 1933). Although these deposits occur in neighboring McKinley County (Gallup and Pinedale oil seep) and in eastern New Mexico (Santa Rosa tar sands) none are known to occur within the northern RPRA (Winchester, 1933; Foster, 1965a; Molenaar, 1977b) and the mineral resource potential of oil shales and tar sands is very low.

Building Stone (by JoAnne Cima Osburn)

General description--Small amounts of limestone and granite were quarried in the Sandia Mountains for use in foundations and sills in Albuquerque during the early part of the century (Talmadge and Wootton, 1937). Many houses in the vicinity of the Sandia Mountains have been completely or partially built from local stone. Rock types commonly used include: Precambrian granite, gneiss, and quartzite, Madera limestone and sandstone, and sandstone from the Mesaverde, Dakota, Entrada, Santa Rosa, Yeso, Abo, and Sandia Formations (V. C. Kelley and Northrop, 1975). The use of local rock is discouraged by the plentiful supply of raw materials for adobe as well as plentiful local and inexpensive cinder blocks (V. C. Kelley and Northrop, 1975). V. C. Kelley and Northrop (1975) report that Santa Rosa and Chinle sandstones have been used for flagstone and that Precambrian granite and quartzite, sandstone blocks from the Abo, and Todilto gypsum serve as road dividers throughout Bernalillo County. The Tshirege Member of the Bandelier Tuff has been used as building stone in northern Sandoval and Los Alamos Counties (Purtyman and Koopman, 1965).

Stone is used as riprap which is a protective veneer to stabilize arroyo channels, highway slopes, dikes, and culverts. Generally, angular blocks are interlocked to prevent the riprap from eroding during heavy water flows. Common rock types used for riprap are angular volcanic blocks from along the Rio Grande and Precambrian quartzite from the Manzanita Mountains.

Mining and past production--Currently, there are no stone quarries operating in the RPRA; however, large blocks and boulders are used extensively for decorative landscaping. These boulders are often gathered privately by small contractors and private citizens so production is not recorded.

Rocky Mountain Stone Co. sells veneer stone from a plant in Albuquerque. They quarry stone in Socorro and Valencia counties and import stone from Arizona and Texas. Another veneer stone company is located north of Santa Fe.

Resource and development potential--Although the mineral-resource potential for building stone is low to moderate (Maps 24, 26, 27), the development potential for growth of a strong building stone market anywhere within the RPRA is low. Quarrying stone is a labor-intensive operation that is typically carried out when there are no other alternatives or where cost is not a factor. The continued popularity of adobe bricks and scoria cement blocks as construction materials may limit markets for stone as riprap and decorative applications.

Carbon dioxide and inert gases (by Robert M. Colpitts)

Minor amounts of carbon dioxide occur in the northern RPRA associated with either oil and gas tests or hot springs in the Jemez Mountains (Pierce, 1965b). A showing of carbon dioxide was reported by Clark (1929) and Foster (1980) in an oil and gas test along the west side of the Nacimiento Mountains, where the gas was associated with hot water flowing from the well and accounted for one-third of the total flow of 5.5 cubic feet per second (155.7 liters per second; Clark, 1929). Black (1982) reported carbon dioxide in an oil and gas test on the north side of Albuquerque. Both wells are listed in Appendix 5 and 6 and located on Maps 35 and 37. One additional oil test in Rio Arriba County, just outside the RPRA (Map 41), contained a show of carbon dioxide with minor amounts of argon, nitrogen, and helium (Pierce, 1965a).

Carbon dioxide also occurs in gases emitted from hot springs in and around the Jemez and Nacimiento Mountains (Renick, 1931; Pierce, 1965b; Summers, 1976) and is associated with trace to minor amounts of nitrogen (Renick, 1931; Pierce, 1965a, b). The hot springs yield only small, non-commercial quantities of the gas.

No apparent commercial accumulations of carbon dioxide, helium, or other inert gases occur in the northern RPRA. Carbon dioxide in gases emitted from hot springs is the only significant source and cannot be extracted economically. The mineral-resource potential for carbon dioxide is low to very low. The mineral-resource potential for helium and other inert gases is very low.

Clays (by JoAnne Cima Osburn and Virginia T. McLemore)

General description--Clay deposits throughout the world are utilized in diverse industries such as drilling, ceramics, and industrial fillers. The ultimate use of a given deposit is highly dependent on the specific clay mineralogy and the size of the deposit. In the RPRA, several workers have collected and fired clay samples in an attempt to determine potential markets for the material (Russell, 1979; Hawks, 1970; Van Sandt, unpublished manuscript, 1963; Foster, 1966; Talmadge and Wootton, 1937; Clippenger, unpublished data, 1948).

Mining and past production--Kinney Brick Company is the largest clay consumer in New Mexico (Fig. 13, Map 18), but imports about half of their bricks from Texas and Nebraska. Kinney mines clay from the Hattie claims in southeast Bernalillo County (Fig. 13; Map 18; Appendix 1) and has been producing from these pits continuously since the early 1950's. Clay is trucked to the brick plant in southwest Albuquerque. Total production is unknown, but virtually all of the 18,000 tons/year (16,330 metric tons/year) produced is used in brick manufacture (W. T. Siemers and Austin, 1979).

The Albuquerque Brick and Tile Company manufactured bricks from 1930-1944 near the Tongue ruins in Sandoval County (Map 18) using Mancos shale (Hawks, 1970). The company also produced red brick and tile in 1946 using alluvial clay from the Rio Grande floodplain (Map 18, Appendix 1). Total production is unknown.

Pennsylvanian clay from the Wild Cow Formation also is mined in Tijeras Canyon by the Ideal Cement Company and is used in the manufacture of cement. Total production is unknown (see Limestone, this report).

Description and geology--Although clay is common in the RPRA, brick clay and other specialty clays are rare. Over twenty sites throughout the RPRA have been examined over the past 40 years by various state and federal agencies (Appendix 1). Clay occurs in Paleozoic through Recent deposits. Hawks (1970) tested shales from the Mesaverde Group, and Santa Rosa, Chinle, Morrison, and Abo Formations (Tables 14-15). Upper Cretaceous clays from the Mulatto Tongue of the Mancos Shale up through the Fruitland Formation in the San Juan Basin, western Sandoval County contain predominantly smectites, with subordinate amounts of kaolinite and illite (Krukowski, 1983). High quality kaolin clay occurs in the lower Dakota at Mesa Alta in nearby Rio Arriba County (Map 16), however, these deposits do not extend into Sandoval County (Reeves, 1963).

Kinney Brick Company mines claystone from the upper 40 ft (12 m) of the Madera Group, in the Pine Shadow Member of the Wild Cow Formation (V. C. Kelley and Northrop, 1975; Patterson and Holmes, 1965). Hawks (1970, p. 12) fired clay from the Hattie claims with the following results:

SAMPLE B64-1 (Madera Fm.)

Raw color	medium-gray		
Munsell designation	N 5.5		
Water of plasticity (%)	18.9		
Drying behavior	good		
Linear drying shrinkage (%)	6.0		
Dry modulus of rupture (psi)	1006		
Firing temperature (°F)	1800	1900	2000
Firing behavior	good	good	small cracks
Color	red-brown	red-brown	red-brown
Munsell designation	10R5/10	10R5/8	10R5/10
Firing shrinkage (%)	0.0	-0.4	-0.4
Total shrinkage (%)	6.0	5.6	5.6
Modulus of rupture (psi)	2750	2594	2165
Water absorption (%) (5 hrs)	12.4	12.1	10.8
Apparent spec. grav.	2.36	2.36	2.44
Bulk density (g/cm^3)	1.86	1.86	1.87
Ignition loss (%)	13.2	13.2	13.2
Pyrometric cone equiv.	cone 4-dark olive		

The clay deposit near the Tongue ruins, mined by the Albuquerque Brick and Tile Co. from 1930 to 1944, consists of dark-gray claystone and smaller amounts of shaly, fine-grained sandstone (V. C. Kelley and Northrop, 1975). Hawks (1970) sampled the clay pit and surrounding outcrops of Mancos shale up to 1.6 mi (2.6 km) away from the pit. Firing test data for these samples are presented in Table 16 (Hawks, 1970, p. 17). Clays tested by Hawks (1970) varied from being suitable for structural clay and pipe products to being useful for heavy clay products.

The clay deposit mined by the Albuquerque Brick and Tile Co. in 1946 is a bedded deposit of unknown thickness in alluvial floodplain deposits of the Rio Grande (Hawks, 1970). The clay pit measured 150 ft (46 m) long by 70 ft (21 m) wide with a 5.5 ft (1.7 m) working face. This pit is now located in a residential area and additional mining of clay in the area is

Table 14–Test Data for Hawks' Clay Samples from Coyote Area, Sandoval County

Geologic unit	MESAVERDE			MESAVERDE		
Sample number	SD65-5			SD65-6		
Raw color	yellowish brown			yellowish brown		
Munsell designation	10YR5/10			10YR7/2		
Water of plasticity (%)	27.5			26.2		
Drying behavior	warped & cracked			good		
Linear drying shrinkage (%)	10.0			11.0		
Dry modulus of rupture (psi)	690			1458		
Firing temperature (°F)	1800	1900	2000	1800	1900	2000
Firing behavior	severe bloating			cracked	good	
Color	moderate brown			moderate brown	moderate brown	
Munsell designation	5YR5/10			5YR5/8	5YR5/8	
Firing shrinkage (%)	1.8			1.0	2.5	
Total shrinkage (%)	11.8			12.0	13.5	
Modulus of rupture (psi)				4036	4210	
Water absorption (%) (5 hr)	2.5			8.9	6.1	
Apparent specific gravity	1.74			2.49	2.50	
Bulk density (g/cu cm)	1.66			2.04	2.16	
Ignition loss (%)	10.8			7.5	7.7	
Pyrometric cone equivalent						

Table 15–Test Data for Hawks' Clay Samples from Santa Ana-San Ysidro-Jemez Springs Area, Sandoval County

Geologic unit	ABO			CHINLE			MORRISON		
Sample number	SD65-15			SD65-12			SD64-12		
Raw color	moderate red			reddish brown			medium gray		
Munsell designation	10R5/4			10R4/6			10YR6/1		
Water of plasticity (%)	18.6			25.2			31.3		
Drying behavior	good			good			good		
Linear drying shrinkage (%)	6.5			9.2			9.5		
Dry modulus of rupture (psi)	1080			1455			224		
Firing temperature (°F)	1800	1900	2000	1800	1900	2000	1800	1900	2000
Firing behavior	lime pops	lime pops	few lime pops	few lime pops	few lime pops	bloated	cracked	cracked	cracked
Color	moderate brown	orange pink	grayish orange	reddish brown	reddish brown	dark brown	orange pink	orange pink	orange pink
Munsell designation	5YR6/6	5YR7/6	10YR7/4	10R5/6	10R4/4	5YR3/4	5YR8/2	5YR8/2	5YR8/2
Firing shrinkage (%)	1.1	1.3	1.2	2.6	1.6	0.8	2.0	2.5	4.7
Total shrinkage (%)	7.6	7.8	7.7	11.8	10.8	10.0	11.5	12.0	14.2
Modulus of rupture (psi)	3620	3780	4566	5300	4720	4035	735	810	1200
Water absorption (%) (5 hr)	7.7	10.5	4.7	0.7	8.2	1.5	16.4	15.7	10.4
Apparent specific gravity	2.34	2.52	2.20	2.23	2.37	1.74	2.69	2.73	2.65
Bulk density (g/cu cm)	2.02	1.99	2.00	2.20	1.89	1.69	1.87	1.91	2.07
Ignition loss (%)	13.8	13.7	13.6	7.1	7.1	6.8	11.0	11.2	11.2
Pyrometric cone equivalent	cone 4 - dark olive brown						cone 32 - light brown		

Table 16—Test Data for Hawks' Clay Samples from Tonque Area, Sandoval County

Geologic unit	MANCOS			MANCOS			MANCOS			MANCOS		
Sample number	SD64-3			SD66-3			SD66-2			SD66-1		
Raw color	yellowish brown			yellowish brown			olive gray			yellowish gray		
Munsell designation	10YR5/2			10YR7/2			5Y5/2			5Y7/2		
Water of plasticity (%)	17.2			12.5			21.3			21.9		
Drying behavior	good-slight scumming			good			slightly warped			good		
Linear drying shrinkage (%)	6.2			4.1			9.5			7.4		
Dry modulus of rupture (psi)	921			590			1270			1450		
Firing temperature (°F)	1800	1900	2000	1800	1900	2000	1800	1900	2000	1800	1900	2000
Firing behavior	good	good	good	lime pops	lime pops	good	good			good	good	good
Color	light brown	light brown	grayish orange	orange pink	pale orange	yellowish brown	reddish brown			light brown	light brown	moderate brown
Munsell designation	5YR5/8	5YR6/6	10YR7/4	5YR7/4	10YR8/2	10YR7/2	10R5/10			5YR6/6	5YR6/6	5YR5/4
Firing shrinkage (%)	-0.5	-0.2	0.2	-0.1	0.5	2.1	1.2			0.6	0.6	1.5
Total shrinkage (%)	5.7	6.0	6.4	4.0	4.6	6.2	10.7			8.0	8.0	8.9
Modulus of rupture (psi)	1918	2206	2302	637	658	1210	3254			2248	2238	3148
Water absorption (%) (5 hr)	18.4	18.8	16.3	20.3	20.9	19.6	5.8			14.2	11.9	11.9
Apparent specific gravity	2.70	2.70	2.62	2.30	2.58	2.40	1.71			2.39	2.51	2.51
Bulk density (g/cu cm)	1.80	1.79	1.80	1.56	1.68	1.63	1.60			1.78	1.68	1.93
Ignition loss (%)	11.3	11.4	11.5	11.2	11.3	11.0	6.6			8.95	9.20	8.95
Pyrometric cone equivalent												

Geologic unit	MANCOS			MANCOS			CHINLE			CHINLE		
Sample number	SD65-4			SD65-3			SD65-13			SD65-14		
Raw color	olive gray			yellowish gray			light brown			pale red		
Munsell designation	5Y6/2			5Y7/2			5YR6/4			10R5/4		
Water of plasticity (%)	24.8			21.8			18.5			23.2		
Drying behavior	good			good			good			good		
Linear drying shrinkage (%)	8.0			8.0			4.5			7.2		
Dry modulus of rupture (psi)	1175			720			378			920		
Firing temperature (°F)	1800	1900	2000	1800	1900	2000	1800	1900	2000	1800	1900	2000
Firing behavior	good	good	good	good	good	good	good	good	good	good	good	good
Color	light brown	light brown	light brown	light brown	light brown	light brown	light brown	light brown	grayish orange	reddish orange	pale red	moderate brown
Munsell designation	5YR6/8	5YR6/8	5YR6/6	5YR7/6	5YR7/6	5YR7/6	5YR7/6	5YR7/6	10R6/6	10YR8/4	10R5/4	5YR5/4
Firing shrinkage (%)	0.0	0.5	0.8	-0.5	-0.5	-0.5	-1.0	-1.0	0.5	0.8	1.0	3.5
Total shrinkage (%)	8.0	8.5	8.8	7.5	7.5	7.5	3.5	3.5	5.0	8.0	8.2	10.7
Modulus of rupture (psi)	3332	3452	2936	1327	1688	1722	642	680	1602	2770	2092	4122
Water absorption (%) (5 hr)	11.0	11.7	7.2	18.8	19.5	19.8	15.1	18.6	17.8	14.5	9.2	2.36
Apparent specific gravity	2.32	2.35	2.19	2.57	2.65	2.65	2.26	2.36	2.51	2.69	2.48	2.40
Bulk density (g/cu cm)	1.85	1.84	1.89	1.74	1.74	1.73	1.68	1.66	1.73	1.94	2.02	2.18
Ignition loss (%)	11.4	11.8	12.4	11.0	11.0	11.0	7.9	8.0	7.7	7.6	8.2	8.8
Pyrometric cone equivalent	cone 6 - dark brown			cone 8 - olive			cone 6 - light olive					

unlikely.

Hawks (1970) sampled and fired additional shales in the Sandia, Abo, and Mancos Formations along NM 44 from Sulphur Canyon to the Sandia Park area. One of five samples from the Abo fired well and would be suitable for structural clay products, the remaining four samples were not suitable for any clay products.

Two of the Cretaceous clay deposits near La Ventana were (Map 17) sampled and fired (Van Sandt, unpublished manuscript, 1963). The first of these deposits (19N.1W.31.220; Appendix 1; Map 17) is comprised of six ft (2 m) of gray to pale-yellowish brown shale with a conchoidal fracture. The clay is plastic and smooth but would have to be mixed with less plastic materials to obtain a satisfactory fired product. Van Sandt (unpublished manuscript, 1963) reports a pyrometric cone equivalent of 17 making the clay suitable for low-duty fire brick. The second clay deposit (19N.1W.31.240; Appendix 1; Map 17) is a nonrefractory, five ft (1.5 m) thick shale between two thin coal seams. Van Sandt suggests that this clay could be used for common brick when fired to 1,900°F (1,038°C).

Resource and development potential--Mineral-resource potential for clay is high in the Wild Cow Formation in Tijeras Canyon (for Portland cement) and southeast Bernalillo County (for bricks; Fig. 22, Map 26) and low to moderate for fire clay in Cretaceous and Paleozoic rocks elsewhere in the RPRA. It is moderate for bricks in the Tongue area. Development potential in Tijeras Canyon and southeast Bernalillo County (Hattie Claims) is high. Further development potential elsewhere in the RPRA is difficult to predict because the known deposits exceed the current demand.

Local deposits of speciality clays, such as for pottery, would have a high potential for small-scale and short-lived operations. Very little mineralogical studies are available on clays which are required for some speciality clays such as kaolin and bentonite.

Gypsum (by JoAnne Cima Osburn)

General description--Gypsum is a hydrous calcium sulfate present throughout much of New Mexico in both Paleozoic and Mesozoic rocks (Weber and Kottlowski, 1959). Most of the gypsum currently mined is used in the production of wallboard and related building materials. To make these construction products, the raw gypsum must be calcined to remove three-fourths of the chemically-bonded water. The calcined gypsum is later rehydrated and when dried produces a rocklike mass of interpenetrating needles comprising the final product (Bates, 1969). It is clear that the future of the gypsum industry is closely linked to the success of the construction industry.

Gypsum in Sandoval County is found exclusively in the Jurassic Todilto Formation. The Todilto crops out along the western and southern edges of the Nacimiento Mountains (Logsdon, 1982b) and ranges from 50 to 100 ft (15-30 m) in thickness (Kirkland, 1958).

Mining and past production--Three deposits in Sandoval County have been commercially active: the White Mesa, the San Felipe, and the G & W mines (Maps 17 and 18; Appendix 1). The White Mesa mine, the largest operation of the three, produced 180,000 tons

(163,293 metric tons) in 1979 compared to San Felipe's 25,000 tons (23,680 metric tons) during that year (W. T. Siemers and Austin, 1979). Value for gypsum mined in Sandoval County exceeded $500,000 in 1980 (U.S. Bureau of Mines, 1981).

The Ideal Cement Company mined the Cañoncito deposit near Cañoncito (Map 18) in the early 1960's for use in a cement operation located about 4-1/2 mi (7.2 km) to the south. The deposit was found to be inadequate and the Ideal Cement Company moved to a larger deposit on the San Felipe Pueblo (Map 18; V. C. Kelley and Northrop, 1975). Currently, gypsum is not mined in Bernalillo County.

Geology--Gypsum mined at White Mesa is used by the American Gypsum Company (Fig. 13). Markets for the wallboard include the Denver and Albuquerque areas and southern New Mexico (NMBM&MR files, 9/82). The quality of the gypsum at White Mesa is very good in the upper 100 ft (30 m) of the deposit but becomes progressively more anhydrite-rich deeper in the deposit. The current mining strategy is to quarry only the upper 100 ft (30 m) and leave the impure gypsum, rather than trying to separate the gypsum from the anhydrite (Logsdon, 1982b).

The San Felipe mine provides gypsum to the Ideal Cement plant in Tijeras Canyon for use as retarder in portland cement (Logsdon, 1982b). The Duke City prospect is reported to occur in the vicinity of the San Felipe mine and may have been mined at one time (V. C. Kelley and Northrop, 1975).

The G & W mine is a small mine located about five miles (8 km) southwest of San Ysidro (Map 18; Appendix 1). The mine opened in March 1982 and is producing 300-400 short tons (272-363 metric tons) annually for use in soil conditioning (Boyd Warner, owner G & W Mine, oral commun., 9/82).

Seven other gypsum prospects are in Sandoval County (Appendix 1; Maps 16, 17) and an active mine, the Rosario, is operated by Western Gypsum in western Santa Fe County. Two of these deposits were evaluated and used during WW II but were never operated on a large scale. Many of the other deposits are quite small, such as the second San Felipe pit that was used for a short time by Ideal Cement Company. It was abandoned when a larger and better quality gypsum source was located at the Duke City mine on the San Felipe Pueblo (V. C. Kelley and Northrop, 1975).

In Bernalillo County, the Todilto Formation crops out in a narrow, steeply-dipping band about 1/2 mi (0.8 km) east of the village of Cañoncito (Weber and Kottlowski, 1959). The Todilto Formation forms the western slope of a ridge that parallels NM 14 for 2 1/2 mi (4 km), then wraps around the nose of the San Pedro syncline for about 5 mi (8 km) more (V. C. Kelley and Northrop, 1975).

Resource and development potential--Gypsum-resource potential in Sandoval County is high (Maps 24 and 26) because of operating mines and a large outcrop area of Todilto Formation exposed in the county. Exploitation of this resource is tied directly to the state's construction industry.

The small amount of outcrop area and the steep dip of the Cañoncito gypsum in Bernalillo County deposit will probably preclude further development of this minor resource. The mineral-resource potential in this area is low (Map 24).

Humate (by JoAnne Cima Osburn)

General description--Humate is a general term describing salts and esters of humic acid and also carbonaceous mudrocks rich in humic acid (Shomaker and Hiss, 1974). C. T. Siemers and Wadell (1977) provided a complete summary of the characteristics of humate mined in New Mexico with respect to chemical composition, terminology, deposition environments represented, and individual mine characteristics. This section is largely a summary of C. T. Siemers and Wadell (1977) as it applies to humate resources of the RPRA, specifically Sandoval County. Humate is sold as a general soil conditioner that increases soil productivity by (1) increasing water-holding capacity, (2) improving the physical characteristics of the soil, (3) making the soil easier to till, (4) controlling aggregation of soil particles, and (5) carrying plant nutrients (Shomaker and Hiss, 1974).

Humate beds occur throughout the Menefee Formation within the RPRA but are concentrated in the lower 240-300 ft (73-91 m) and the upper 30-90 ft (9-27 m) where coal beds are abundant. Individual humate beds average 1-2 ft (0.3-0.6 m) thick, are laterally persistent, and are locally interbedded with coal. Humic acid content of New Mexico humate ranges from 5% to 60% NaOH soluble humic matter; commercial humate averages 15% humic acid.

Mining and past production--Humate is relatively new in the industrial minerals economy of New Mexico. The first commercial operations were recorded in the mid 1960's (New Mexico State

Mines Inspector 1960-1983). Two mines, the Clod Buster and Tenorio, seem to be the most successful of many humate mines operating sporadically on the eastern side of the San Juan Basin. The Clod Buster mine, between Cuba and La Ventana (Appendix 1; Map 17), has a peak capacity of about 100 tons per day (90 metric ton per day). Production varies and is largely dependent on spot sales. The mining process at the Clod Buster mine, operated by Farm Guard Products, Inc., consists of surface mining from beneath shallow overburden and crushing of the carbonaceous rock. The final product is guaranteed to contain at least 15% humic acid. Farm Guard Products in Albuquerque plans to blend the humate with various micro-nutrients and market the product in local garden and landscape centers (L. Taylor, Manager, Farm Guard Products, Inc., oral commun., 1983).

The Tenorio mine, about eight mi (13 km) southwest of San Ysidro (Map 18; Appendix 1), operated from 1966 until about 1980. The mine produced humate from the upper part of the Menefee Formation, but at a stratigraphically higher position than that of the Clod Buster mine. The humate-bearing beds range from 17 to 28 ft (5-9 m) in thickness.

Four other mines listed in New Mexico's Annual State Mine Inspector's Reports (Appendix 1), have closed with little or no production recorded. Production of humate from Sandoval County has steadily increased over the last 10 years. The market value of the material is moderately high for industrial minerals commodities. Current delivered prices are $120/ton in Albuquerque (L. Taylor, oral commun., 1983). Packaging for garden centers in small unit volumes raises the price equivalent several times.

Resource and development potential--Potential for occurrence is high and presumably humates are found throughout the region where the coal-bearing part of the Menefee crops out (see Coal Resources, this report, and Maps 24-32) Shomaker and Hiss (1974) suggest that coal-bearing Upper Cretaceous strata of northwestern New Mexico contain many millions and perhaps billions of tons of humate. Hence, humate resources in the RPRA are vast. Current humate supply greatly outstrips demand and will probably continue to do so in the foreseeable future.

Limestone (by JoAnne Cima Osburn)

General description--Limestone is a sedimentary rock comprised of 50% or more calcium carbonate by weight (Gary and others, 1972). In most commercial applications, limestone contains at least 90% calcium carbonate (Bates, 1960). Rocks containing less calcium carbonate are considered low-calcium limestone and they are used primarily for their physical properties as aggregate in a wide variety of applications, and as dimension stone (W. T. Siemers, 1982). Some of the typical coarse aggregate applications are crushed stone, concrete aggregate, road metal, landscaping, railroad ballast, and sewage filter beds. If the material is finely crushed, it is used for poultry grit, stucco, manufactured sand, coal mine dust, filler, and whiting (Bates, 1969).

High-calcium limestone (at least 95% $CaCO_3$) is used primarily for its chemical properties in the production of lime (CaO) by calcining limestone (Kottlowski, 1962). These limestones are important in the manufacture of cement, glass, paper, alkalies, calcium carbide, as a metallurgical flux, and in power-plant scrubber stacks (W. T. Siemers, 1982).

Mining and past production--The only cement plant in New Mexico is located in the RPRA at Tijeras Canyon (Map 18). The plant has operated continuously since 1959 and at full capacity produces 518,000 tons (470,000 metric tons) of cement annually (V. C. Kelley and Northrop, 1975). In 1983, the Tijeras Canyon plant produced about 325,000 tons (295,000 metric tons) of cement (J. MacMillan, Manager, Ideal Cement Co., oral commun., 12/83).

Geology--Ideal Cement Company quarries Pennsylvanian limestone from seven quarries in the Wild Cow Formation of the Madera Group as feedstock for the Tijeras Canyon plant (Maps 18 and 20; V. C. Kelley and Northrop, 1975). The limestone is mined adjacent to and near the plant in 30-35 ft (9-11 m) thick beds. The rock is drilled on about eight-foot (2-m) centers and blasted. About 3,000 tons (2,722 metric tons) of rock is mined daily by two shifts (J. Macmillan, oral commun., 12/83). The company estimates 75 years of reserves near the plant. NURE geochemical data suggests limestones of the Madera Group in the Sandia Mountains are high in calcium and also may have potential as high-calcium limestones (Area C, Fig. 20).

Production of Portland cement requires several constituents so a single formation seldom supplies all of them in the correct proportions and the Cow Springs Formation is no exception. In addition to the limestone; gypsum, iron oxide, and argillaceous materials are necessary for Portland cement (V. C. Kelley and

Northrop, 1975). Gypsum is trucked from the San Felipe mine (Appendix 1, Map 18). The small amount of iron ore needed is hauled from the Smokey Iron mine near Capitan, New Mexico. The argillaceous material comes from a variety of sources including shale beds within the Madera Group, especially the red clay bed, as well as residual clay, schist, slate, and fly ash (J. MacMillan, oral commun., 12/83). Cement manufacture requires that several ingredients be kept at a low relative concentration. Magnesium carbonate must be held to less than 5% for controllable curing, silica to less than 15% because of its abrasive properties, and alkalies to less than 1.5% because excess alkalies in the mixture will cause concrete eventually to expand and crack, especially when rhyolitic aggregate is used (Bates, 1969).

Aggregate for road metal, landscaping, and other uses are important for Albuquerque. At least 25 pits are located in the Sandia and Manzano Mountains, mostly in the Madera Group (Appendix 1; Map 18). Small amounts of limestone from the San Andres Formation are used as road metal (V. C. Kelley and Northop, 1975, map 1).

Limestones in Sandoval County occur within Mississippian and Pennsylvanian rocks of the northern Sandia and Nacimiento Mountains, and within the Todilto Formation (Kottlowski, 1962, 1965). The New Mexico State Highway Department developed two pits in the Madera Limestone near Placitas for road metal (Appendix 1; Map 18). No other commercial production is known either from Paleozoic or Mesozoic limestones in the county.

<u>Resource and development potential</u>--The mineral-resource

potential of limestone in the Albuquerque area is high (Maps 24, 26) to moderate (Map 27). The city is growing and will consume increasing amounts of aggregate and concrete for both residential and commercial projects. In addition, the manufacture of pre-stressed concrete forms will use more limestone following a recent decision by Underwriter's Laboratory to approve only products containing less than 7% free silica (Cloyce Harrison, Manager, Crego Block Co., oral commun., 1984). Increased urbanization in the Albuquerque area may force limestone operators to move farther from the city, especially for high-calcium limestone. If this happens, limestones in Sandoval County, especially in the Placitas and Tecolote Peak-Palomas Peak areas, may become economically important.

Mica (by Mark R. Bowie)

Mica is a group name for a variety of complex, hydrous, sheetlike aluminosilicates. The principal mica minerals are muscovite (white mica), biotite (black mica), and phlogopite (amber mica). Although micas are common minerals, only muscovite is currently mined in the United States.

Mica is used for a variety of industrial applications and is required to meet fairly strict specifications as to color, size, purity, and bulk specific density. Commercially muscovite mica is classified into two broad categories; sheet mica and scrap mica. Scrap (or ground) mica is the mainstay of the domestic mica industry. Generally, scrap mica is any mica that does not meet the specifications for sheet mica because of size, color, or quality. Principal industrial uses are as a filler and/or surface coating in joint cements, paints, roofing materials, rubber products, plastics, and drilling muds. The United States was the world's leading producer of scrap (and ground) mica in 1983, producing $22 million worth of this material (U.S. Bureau of Mines, 1984).

Most of the mica in New Mexico occurs in two areas outside the RPRA, in the north-central part of the state. They are the pegmatites of the Petaca district in Rio Arriba County and the quartz-muscovite (sericite) of the Rio Pueblo Schist in the Picuris Range of Taos County.

The only active mica operation in New Mexico is Mineral Industrial Commodities of America (M.I.C.A.) Tojo mine in the Picuris Range southeast of Taos. According to Beckman (1982), mica is mined from a quartz-muscovite (sericite) schist that occurs with a series of Precambrian metavolcanic rocks. Gresens and Stensrud (1974) state that the quartz-muscovite schist was derived from rhyolite by metasomatic recrystallization.

Northrop (1959) reports occurrences of micas in the RPRA. Muscovite is present at the Jemez Springs district and microscopic biotite and sericite occur in perlite in the Cochiti district of Sandoval County. Muscovite, biotite, and sericite also occur in the Juan Tabo area of the Placitas district and in the Tijeras Canyon district of Bernalillo County (Northrop, 1959). A notable occurrence of muscovite, locally with plates up to 4 inches (10 cm) across, is on the west side of the Sandia Mountains just north of Embudo Canyon (Map 18). However, these occurrences are considered to be of low mineral-resource potential (Maps 24, 26), because they are discontinuous with variable quality and small tonnage.

Annual production of New Mexico mica in the 1970's has ranged between 10,000 and 17,000 tons (9,100 and 15,400 metric tons). M.I.C.A. constructed a new mill near Velarde which is expected to double the company's present annual 13,000 ton (12,000 metric ton) capacity (Eveleth and others, 1982). A flotation circuit is under construction. Sheet mica resources in New Mexico are uncertain due to sparse available data, but resources of scrap mica are probably large. Lesure (1965) notes the discontinuous nature of most mica occurrences, the wide range of quality of material, the expense of mining, and the large amount of hand labor needed for preparation has historically limited sheet mica mining to periods of high prices. Mica sheet production continues to be essentially a manual operation with limited usage of mechanized equipment.

Perlite (by JoAnne Cima Osburn)

General description--Perlite was originally defined by Johannsen (1939) as a glassy rhyolite with a pearl-like luster and numerous concentric cracks resembling an onionskin. In commercial usage, however, perlite has come to describe any rhyolitic volcanic rock containing 2-5% water that will expand when rapidly heated to the softening point (Whitson, 1982). Uses of expanded perlite include: building plaster aggregate, filtrate, concrete aggregate, oil well cement, loose-fill insulation, and soil conditioner (Weber, 1965c).

Geology--Perlite is abundant in the volcanic rocks of the Jemez region (Elston, 1967). Three localities in the area have been prospected: Peralta Canyon (Mills, 1952), Bear Springs, and Bland Canyon (Appendix 1; Map 17). Elston (1967) reports that the Peralta Canyon deposit was the only producer with a few small shipments. The Peralta Canyon deposit consists of pale gray perlite to pumiceous perlite of commercial grade. A geologic map of the deposits is by Mills (1952). Large portions of the deposit consist of interbedded flow-banded rhyolite and perlite so it is unsuitable for commercial production (Jaster, 1956).

The Bear Springs deposit consists of highly vitreous, green-gray perlite that contains brecciated zones cemented with glass and lithoidal rhyolite. Some parts of the deposit are contaminated by hydrothermally devitrified glass and by abundant spherulitic nodules containing opal and chalcedony (Jaster, 1956). The deposit was intensely explored in 1950 (Weber, 1965c) but the remote location and the prevalence of impurities discouraged mining.

The Bland Canyon deposit is located in the Cochiti mining district downstream from the ghost town of Bland (Appendix 1; Map 17). The perlite here consists of pale-gray to black ribs and dike-like masses of vitreous to pitchy volcanic glass interspersed with rhyolitic breccia (Jaster, 1956). Weber (1965c) reports that expansion tests gave favorable results on some samples, but commercial production would be limited by variations in character, the small size of individual perlite masses and limited exposures below the thick, welded Bandelier Tuff.

Resource and development potential--Both mineral-resource potential and development potential of the perlite occurrences in the Jemez region are low. Though perlite is widely distributed throughout the Jemez area, nowhere is perlite found in sufficient quantity or purity to support a commercial operation. Four high quality perlite mines are active in Taos and Cibola Counties therefore development of these low quality, small deposits is low.

Pumice (by JoAnne Cima Osburn)

General description--Pumice is a light-colored, lightweight volcanic rock of rhyolitic composition. It occurs as fragments ranging from fine ash to blocks several feet in diameter. It is most useful as an industrial material when unwelded and thus easily mined.

Pumice is used primarily as lightweight-aggregate concrete which, in New Mexico, is used in manufacture of building blocks. Smaller amounts of pumice are used as cleaning agents, abrasives, soil conditioners and insecticide carriers (Clippinger and Gay, 1947; Weber, 1965b).

Mining and past production--Sandoval County provides the majority of New Mexico's annual pumice production (New Mexico State Mine Inspector, 1949-1982). At least 12 pumice mines are known in Sandoval County (Appendix 1; Map 17), however, only one mine, Esquire Claims 5-9 operated by Utility Block Company, is currently active with production of about 160 cubic yds/day (Fig. 13; W. T. Siemers and Austin, 1979). The pumice produced at this mine is used in building block manufacture. Pumice is also mined in the northern Jemez Mountains in Santa Fe County by Copar Pumice Inc. Pumice in the upper Tshirege Member of the Bandelier Tuff was used as a building and ornamental stone in northern Sandoval and Los Alamos Counties (Purtyman and Koopman, 1965).

Geology--Pumice is concentrated in the southern and eastern slopes of the Jemez Mountains (R. L. Smith and others, 1970). Most of the pumice suitable for industrial use is found in the lower member of the Bandelier Tuff where pumice occurs as friable beds of pumiceous lapilli tuff ranging from 8 to 20 ft (2-6 m) thick. Much of the Bandelier Tuff is pumiceous, but the pumice is pure and sorted to economic grades only in local areas. There are no pumice deposits in Bernalillo County.

Resource and development potential--The mineral-resource potential of pumice in the Sandoval County outcrop area of the Bandelier Tuff is high to moderate (Maps 22 and 24; Elston, 1967). Much of the pumice beds are overlain by the upper part of the Bandelier Tuff where the potential is moderate. The most desirable locations for pumice mining are in easily accessible canyons where the pure pumice beds are exposed at the surface and the potential is high. Additional detailed mapping is required to delineate these areas. Additional development of the pumice resources will depend on favorable market conditions.

Quartz Crystals (by JoAnne Cima Osburn)

General description--Quartz crystals have been used for art objects and decoration for centuries. Commercial uses of quartz crystal include optical prisms, radio circuits, radar, and ultrasonic equipment. None of the quartz in the RPRA is of suitable quality for these uses so it was probably mined for decorative aggregate.

Mining and past production--Three quartz mines in Bernalillo County operated intermittently from the late 1950's to the mid-1960's. Two of the mines, Quartz mine #1 and Quartz mine #2 (Appendix 1; Map 18), are in the foothills of Rincon Ridge. The third deposit, the Isleta Quartz mine is located in the Manzano Mountains. All of the mines are in Precambrian quartzite. New Mexico State Mine Inspector's Reports (1960-1966) list only minor production of 150-300 tons (136-270 metric tons) from 1960 through 1966. Value of the quartz varied from $10.00 to $16.50 per ton within this time period.

Resource and development potential--Resource potential for quartz crystal is low to moderate (Maps 24 and 25) and development potential is low.

Sand and Gravel (by JoAnne Cima Osburn)

General description--The use of sand and gravel as basic construction materials accurately monitors a region's economic developments because these materials are necessary in huge amounts for many types of urban improvements. Concrete consists of 80 to 85% aggregate by weight so vast tonnages of sand and gravel are necessary for construction.

Mining and past production--Bernalillo County provided over 15% of all sand and gravel mined in New Mexico in 1982 and was valued at 4.5 million dollars (New Mexico State Mines Inspector, 1982).

Most of the sand and gravel found in Bernalillo County is derived from young terrace deposits of the axial Rio Grande (Maps 19, 26, 27; Hunt, 1978). Elston (1967) reports that Quaternary terrace deposits in the county are generally well-sorted and make aggregate resources superior to older alluvial fan deposits.

Sand and gravel production on a commercial scale in Sandoval County has been reported since 1954 and measures a few hundred thousands of tons annually (New Mexico State Mine Inspector, 1954-1983). The New Mexico State Highway Department (1975) has several pits scattered in a variety of young deposits ranging in age from upper Tertiary to Holocene. These deposits are in the Upper Santa Fe Group, San Jose Formation, Quaternary pediment gravels, and Quaternary alluvium. Woodward (1984) reports terrace and pediment deposits made up of boulders and cobbles derived from Precambrian crystalline rocks near the base of the Nacimiento Mountains are a good source of gravel.

<u>Resource and development potential</u>--Resource and development potential for sand and gravel in Bernalillo County is high (Maps 19, 26, and 27). Increased urbanization, especially in Albuquerque will make pit location more difficult and likely progressively more expensive in the future. The sand and gravel producers have offset this trend by acquiring rights to very large local reserves. Potential gold placer deposits could be utilized for sand and gravel resources.

Sand and gravel resources in Sandoval County also are extensive (Maps 21-24; Hunt, 1978). Resource potential is therefore high, while actual development potential is only moderate because of limited population within the county and adequate developed resources in adjacent populated counties.

Scoria (by JoAnne Cima Osburn)

General description--Scoria, or volcanic cinder, is a dark colored, vesicular, light-weight rock formed when gases, especially water vapor, expand in molten or plastic rock during a volcanic eruption. Scoria tends to pile up around the volcanic vent producing a scoria cone. The color of the material ranges from dark reddish brown at the vent to very dark gray to black at the perimeter of a given cone. Chemical analyses and heating tests have shown that color variation reflects a progressive decrease in ferric iron with respect to total iron content away from the vent (Osburn, 1982). Other physical properties such as grain size and sorting also show systematic change relative to the position of the vent (Cima, 1978). Scoria is used as lightweight aggregate in the manufacture of cement blocks and forms, as road-surfacing aggregate and in landscaping and roofing applications where the color of volcanic aggregate is becoming very important.

Mining and past production--Although the Crego Block Co. operates a cinder block plant in Albuquerque, scoria is not produced in the study area. Crego Block Co. obtains scoria from pits at La Cienega in western Santa Fe County. Commercial quantities of scoria are present only in the extreme southern part of the RPRA in the northern part of the Cat Hills volcanoes (Map 25), where production has been recorded since 1950 though quarrying has probably been going on much longer. The most recent production data show annual output exceeding 20,000 cubic yds valued at over $20,000. The principal recent use of scoria from the Cat Hills is landscaping.

Geology--Twenty-three scoria cones are aligned apparently along a northeast-trending fissure in the Cat Hills area (Kelley and Kudo, 1978), and at least four quarries are present (Appendix 1; Map 18). Not all the Cat Hills cones are of high-quality scoria, and careful site-specific testing is necessary.

Resource and development potential--The mineral-resource potential of scoria in the Cat Hills area is moderate (Map 27) because high-quality deposits have not been delineated. The development potential is high, should economic deposits occur. Elsewhere in the RPRA the resource potential is very low.

Semi-precious Stones/ Mineral Collecting (by JoAnne Cima Osburn)

Northrop (1959) has identified a number of semi-precious stones and mineral collecting localities in Sandoval County. The Cochiti district is known for wood opals, occasional precious opals, orthoclase, and moonstone. The opals occur in a two- by eight-mi (3- by 13-km) band from the north bank of the Colla to Bear Canyon. They are in a matrix of hydrated quartz and in volcanic tuffs near Battleship Rock. Orthoclase and moonstone in the Cochiti district are confined to volcanic rocks. Moonstone also has been described throughout the Jemez region. Orthoclase crystals are fairly common in the Placitas and Tijeras Canyon districts. Tourmaline has been reported from the Placitas, Tijeras Canyon, and Cochiti districts (Northrop, 1959).

The gathering of semi-precious stones and collecting materials is not done commercially so it has not been accurately tallied. These commodities are of hobby or scientific interest rather than a commercial mining venture. Therefore, resource potential is low to unknown.

Silica sand (by Mark R. Bowie)

Silica sand generally refers to sand composed almost as quartz grains. Siliceous raw materials are often marketed directly as finished products, shipped without elimination of natural contaminants, for industrial use principally in glass manufacture, ferrous and nonferrous foundry operations, certain chemical and metallurgical processes, and in many manufactured products as fillers or extenders (U.S. Bureau of Mines, 1984). Most industrial sands must meet rigid specifications with respect to purity and silica (SiO_2). Grain size and shape are also important physical properties monitored for many commercial applications.

Numerous sandstone units in northwest and central New Mexico, partly within the RPRA, are possible sources of silica sand. These include the Zuni Sandstone and equivalent units in the Entrada, Todilto, Summerville, Bluff, and Morrison beds (Carter, 1965) along with the Chuska, Dakota, Sarten, and Glorieta Sandstones. However, the potential for silica sand is unknown in all of these units except the Glorieta Sandstone.

The Permian Glorieta Sandstone Member of the San Andres Formation crops out in central and northern New Mexico (Milner, 1978) and was once quarried at the New Mexico Silica mine, located in the San Pedro Mountains on the southeast side of Oro Quay Peak, SE 1/4 sec. 23, T. 12 N., R. 7 E. near the RPRA (Map 18). The material mined included subangular grains from silt to coarse sand. Mine samples contain minor magnetite-hematite and secondary plagioclase along fracture surfaces (R. Foster, unpublished report, 1977). The mineral-resource potential of the Glorieta around the mine is considered high (Map 26). Future exploration should be directed at the Glorieta-Yeso contact to the southeast of the mine (J. T. Taggard, unpublished report, 1977). The Glorieta in Sandoval County has a low to moderate mineral-resource potential (Maps 24, 26).

Sulfur (by Virginia T. McLemore)

General description--Sulfur occurs around some of the hot springs deposits in the Jemez River area in Sandoval County (Map 17; Broderick, 1965; Wideman, 1957; Mansfield, 1918), where sulfur was first reported to occur in 1598 by Don Juan de Onate (Northrop, 1959). Small pits and one adit have exposed the deposits at Sulfur Springs and San Diego (Appendix 1). About 100 tons (91 metric tons) of 60% sulfur was produced from 1902 to 1904 from the Sulfur Springs deposit and sold locally (F. J. Kelley, 1962; P. S. Smith, 1918).

Geology--Sulfur at Sulfur Springs occurs along fractures in rhyolite (P. S. Smith, 1918; R. L. Smith and others, 1970). About 9 acres (3.6 hectares) of sulfur is found at Sulfur Springs; however, the deposit is only a few inches thick (Mansfield, 1918).

The San Diego deposit is about 700 ft (213 m) long, 150 ft

(46 m) wide, and 2-4 inches (5-10 cm) thick and contains about 15-39% free sulfur. This irregular deposit occurs in carboniferous or Permian limestone (Mansfield, 1918).

Resource and development potential--Neither of these deposits is large enough to be considered economic. The majority of the sulfur deposits in the United States are associated with salt domes in Texas and Louisiana. Sulfur is also produced as a byproduct in many sulfide ore deposits (Broderick, 1965). Therefore the mineral-resource potential for sulfur in the Jemez Springs area is moderate, but the potential for development is low.

Travertine (by JoAnne Cima Osburn)

General description--Travertine is a hard, dense, finely crystalline, compact or massive limestone formed by rapid chemical precipitation from calcium carbonate in surface and ground water (Gary and others, 1972). Analyses of New Mexico travertines range from 85% to over 99% calcium carbonate (W. T. Siemers, 1982). The relative amount of calcium carbonate in a given deposit strongly influences the potential market (Bates, 1969).

Mining and past production--Kottlowski (1962) reports that New Mexico travertines have been used as soil conditioners and as crushed stone in concrete aggregate. Woodward (1984) described travertine in the RPRA that is suitable for building stone. Although travertine is not mined in the RPRA, it is currently mined as dimension stone in Valencia County.

Distribution--Cenozoic travertine deposits in the RPRA are located in the San Ysidro quadrangle and adjacent quadrangles to the northwest (Map 17; Woodward and Ruetschilling, 1976; Woodward and others, 1977). These deposits range from 10 to 50 ft (3-15 m) in thickness near the common corner of the Holy Ghost, Gilman, and San Ysidro quadrangles on Zia Pueblo land covering nearly 2 mi^2 (5 km^2) and readily accessible from NM 44 (Woodward, 1984). Woodward (1984) describes another large travertine exposure in sec. 16 and 21, T. 15 N., R. 1 E., but access to this deposit is poor. Several smaller travertine exposures are present in the northwestern part of the San Ysidro quadrangle but access is very poor (Woodward and Ruetschilling, 1976).

Resource and development potential--Resource potential varies greatly in these travertine deposits with respect to size of the deposit, access and distance from NM 44, and the calcium-carbonate content of the deposit. No published chemical analyses are available for any of these travertine deposits. Analyses are needed to determine if any of these deposits are in the high-calcium limestone (at or above 95% calcium carbonate) category. High-calcium limestones are used in basic manufacturing industries and generally command higher prices than limestones used in the agricultural or construction industries (W. T. Siemers, 1982). Use as a dimension stone or in art work is dependent more on color banding and hue than on carbonate content. Most travertine is too plain for widespread decorative or art use but local accumulations vary so detailed sampling is necessary. Resource potential for this end use is moderate. Development potential is moderate.

Miscellaneous Deposits

Several small and subeconomical industrial materials deposits are scattered throughout the northern RPRA. These include graphite, alum, nitrate, roofing granules, and ocher. The mineral-resource potential is very low and these occurrences are only briefly described for completeness.

Graphite--Ellis (1922) described thin (1-3 ft; 0.3-1 m) impure amorphous graphite in a vein in Pennsylvanian Madera Group in the eastern part of Tijeras Canyon near Whitcomb's Spring. Herrick (1900) thought that the band was prospected under the supposition that it was coal. A second graphite occurrence was reported near Alameda on an unpublished map, but no other information is known.

Nitrate--Hayes (1967) shows a nitrate occurrence just west of the Rio Grande in northeastern Sandoval County on a nitrate and guano index map of New Mexico. The deposit is not discussed in his accompanying paper and no other information is available.

Alum--Alum minerals occur in the northwestern part of Sandoval County (Talmadge and Wootten, 1937). The host rock is sandstone but neither a specific formation nor a location is discussed. Northrop (1959) reports alum in a 15-20 ft (4.5-6 m) thick bed.

Sand--Elston (1967) reports that an occurrence of aeolian sand along the Jemez River was used as roofing granules in the 1960's (Appendix 1; Map 18). The deposit is apparently no longer worked and the mineral-resource potential is low (New Mexico State Mine Inspector, 1983).

Ocher--V. C. Kelley and Northrop (1975) mention the occurrence of red and yellow ocher in the Tijeras district. Kelley (in Elston,

1967) suggested that the deposit was a local spring deposit.

Additional mineral occurrences in Bernalillo and Sandoval Counties are noted by Northrop (1959) and presented in Table 13a. However, most of these occurrences are small and have a very low resource and development potential.

DESCRIPTION OF ENERGY RESOURCES AND ENERGY-RESOURCE POTENTIAL

Uranium (by Virginia T. McLemore)

Introduction

Over 96% of the uranium produced in New Mexico has come from sandstones of the Morrison Formation in the Grants uranium district in the southern San Juan Basin. Although the eastern edge of the Grants district extends into the RPRA, only a minor amount of uranium has been produced from the Morrison Formation in this area (Table 17). As of January 1, 1982, uranium reserves for the combined Laguna (Cibola County), Chama Basin (Rio Arriba County), and Nacimiento areas amounted to 4,000 tons (3,600 metric tons) of U_3O_8 at $30/lb, only 3.6% of the total uranium reserves in New Mexico (McLemore, 1983a, Table 8).

Uranium has also been produced from Cretaceous sediments in the La Ventana area and Abo sandstones in the Nacimiento area (Table 17) and undeveloped deposits have been found in the Galisteo Formation in the Hagan Basin and the Ojo Alamo Sandstone in the Mesa Portales area. Minor uranium occurrences also are found in rocks of various ages and lithologies, including Precambrian rocks, Triassic, Permian, and Pennsylvanian sandstones, Jurassic limestones, Tertiary volcanics and intrusives, Precambrian to Ordovician carbonatites, Cretaceous beach-placer sandstones, and Recent travertines (Appendix 1).

Uranium in the Morrison Formation

General description--Two types of ore occur in the Morrison

Table 17 - Uranium production from mines in Sandoval County, New Mexico, 1954-1980, from U.S. Atomic Energy Commission production records. Note that the dollar value is an estimate of value for uranium only. The shippers received payment for V_2O_5 and $CaCO_3$; however, these figures are not known.

Year	Mine	Host	Tons ore	Pounds U_3O_8	Pounds V_2O_5	Pounds $CaCO_3$	Value of U_3O_8 ($)
1954	Butler Brothers	Dakota	14	224	22	1,400	2,751
1957		Dakota	9	66	34	990	692
	SUBTOTAL	--	23	290	56	2,390	3,443
1957	Collins	Brushy Basin	395	989	116	4,298	10,365
1956	Corral #3	Abo	20	12	24	6,920	230
	TOTAL 1954-1956	--	438	1,291	196	13,608	14,038
1979-1980	Rio Puerco	Westwater Canyon	W	<20,000	W	--	W

Formation in the Grants uranium district; primary tabular and redistributed ore (Granger and others, 1961; Squyres, 1972). Primary-tabular orebodies are also known as trend or prefault ore, whereas redistributed orebodies are known as stack or post-fault ore. In addition, redistributed orebodies can be differentiated as (1) fracture-controlled (stack), (2) geochemical cell-controlled (roll-type), and (3) relict or remnant ore (D. A. Smith and Peterson, 1980).

Primary-tabular orebodies occur as (1) flat-lying pods, (2) lenses, and (3) blankets which may be locally subparallel to bedding structures. Local distribution of ore may be controlled by sedimentary features such as minor disconformities, bedding planes, cross-stratification, channels, or sandstone-shale interfaces. Bleached sandstones and altered feldspars and magnetite are associated with mineralization. These orebodies tend to be dark gray to black in color and are characterized by a sharp boundary with unmineralized sandstone. They are irregular in shape and consist of thin, high-grade (0.20% U_3O_8), multiple lenses or ore pods. They are offset by Laramide faulting (hence prefault) and are considered the first stage of mineralization. Orebodies tend to rise stratigraphically in the Westwater Canyon Member towards the center of the San Juan Basin in the Ambrosia Lake area (Granger, 1968). Uranium is directly associated with organic material, referred to as humates (Leventhal, 1980) and may be enriched in vanadium, molybdenum, and selenium (Spirakis and others, 1981). Halos of molybdenum and selenium may surround uranium mineralization (Squyres, 1972). Vanadium is generally less than uranium in concentration, whereas molybdenum occurs in sufficient quantities to hamper milling operations. Quivera Corp. (formerly Kerr McGee Nuclear Corp.) added a circuit to recover molybdenum as a byproduct in order to reduce molybdenum in their milling and tailings pile. Homestake recovers vanadium from their ores.

Redistributed orebodies occur as discordant, asymmetrical, or irregular bodies that are controlled by fractures and faults or are controlled by a geochemical cell. These orebodies vary in color from brownish-gray to light-gray and are characterized by a gradational boundary with unmineralized sandstones. They cut across sedimentary structures and stratification and occur in (1) thick, low-grade (less than 0.20% U_3O_8), multiple stacked horizons along some Laramide faults and (2) at the interface between oxidized red and reduced gray sandstones (roll-type). These orebodies may be low in organic material (humates) and molybdenum. Selenium may be enriched throughout the ore deposit, but more commonly occurs along the interface between mineralized and barren sandstone (Fishman and Reynolds, 1983; Spirakis and others, 1981). Roll-type deposits may be difficult to distinguish from primary-tabular orebodies that have been oxidized (Adams and Saucier, 1981) or otherwise partially redistributed early in the history of the mineralization. Mobilization of uranium by geochemical solutions occurred periodically throughout time and produced redistributed orebodies of different ages.

Relict or remnant ore pods in reduced sandstones surrounded by oxidized sandstones locally occurs updip from roll-type deposits (D. A. Smith and Peterson, 1980; Ristorcelli, 1980; Adams and Saucier, 1981). Occasionally, relict orebodies may be partially or almost completely destroyed by subsequent oxidizing fluids leaving ghost orebodies (Holen, 1982; Adams and Saucier, 1981). These orebodies have yet to be identified in the northern RPRA, although the Dennison Bunn claims may be a relict orebody.

Numerous sources exist for the uranium and associated elements. L. T. Silver (1977) found zircons in granitic basement rocks to be anomalously high in uranium and suggested these rocks as a potential source. The alteration of silicic volcanic detrital fragments within the host sandstones (Fitch, 1980; Falkowski, 1980a, b) could release uranium into the ground water system. Alteration of volcanic ash units in the source terrain also could release uranium (Adams and Saucier, 1981). Despite the source of uranium, a regional uraniferous source terrain appears to be likely. The ore-controlling humates may be derived from (a) buried organic material and logs within the host sandstones (Squyres, 1980; Granger, 1968), (b) adjacent lacustrine mudstones and shales rich in organic material (F. Peterson, and Turner-Peterson, 1980), (c) detrital material (Jacobsen, 1980), (d) overlying Dakota Sandstone (Green, 1980; Granger, 1968; Granger and others, 1961), or (e) organic-rich layers deposited on top of the Morrison Formation prior to deposition of the Dakota Sandstone and subsequently were eroded (Green, 1980; Granger, 1968).

Preservation of the uranium deposits can be attributed to (a) protective overlying cover of impermeable rocks, (b) many deposits occur below the water table, (c) the resistance of the humate-uranium mineralization complex to oxidation and mobilization, and (d) calcite and clay cementation.

Marquez-Bernabe Montaño area--The Marquez-Bernabe Montaño area of the Grants uranium district lies north of the Laguna subdistrict in the RPRA (Figs. 13, 23) and is an eastern extension of the Ambrosia Lake trend. Only one mine has produced from this area, although several large deposits are found in the Westwater Canyon Member. Kerr McGee (now Quivera Corp.) produced less than 20,000 tons (18,000 metric tons) of U_3O_8 from the Rio Puerco mine from 1979 to 1980 (Table 17), but economic conditions, distance from the Ambrosia Lake mill, and milling difficulties forced closure of the mine.

The Rio Puerco deposit (Appendix 1; Fig. 13; Map 5) contains about 3.2 million lbs (1.5 million kg) of U_3O_8 in reserves in the Westwater Canyon Member. Several zones of mineralization extend over an area roughly 6,000 ft (1,800 m) long and 1,000 ft (300 m) wide with an expected average grade of 0.16% U_3O_8 (Perkins, 1979). Depth to the ore zone is approximately 800 ft (244 m).

Exxon Minerals Co. USA located several shallow, low-grade orebodies in the San Antonio Valley area in Cibola County, just west of the RPRA (Fig. 13; Map 5; S. C. Moore and Lavery, 1980). These deposits are flat-lying primary-tabular bodies in the Westwater Canyon Member and averages 6-12 ft (2-4 m) thick. The dominant uranium mineral is coffinite and chemical assays range up to 0.385% U_3O_8. Depth to the ore is about 800-1,000 ft (244-305 m). Declining economic conditions prohibited Exxon from developing this property.

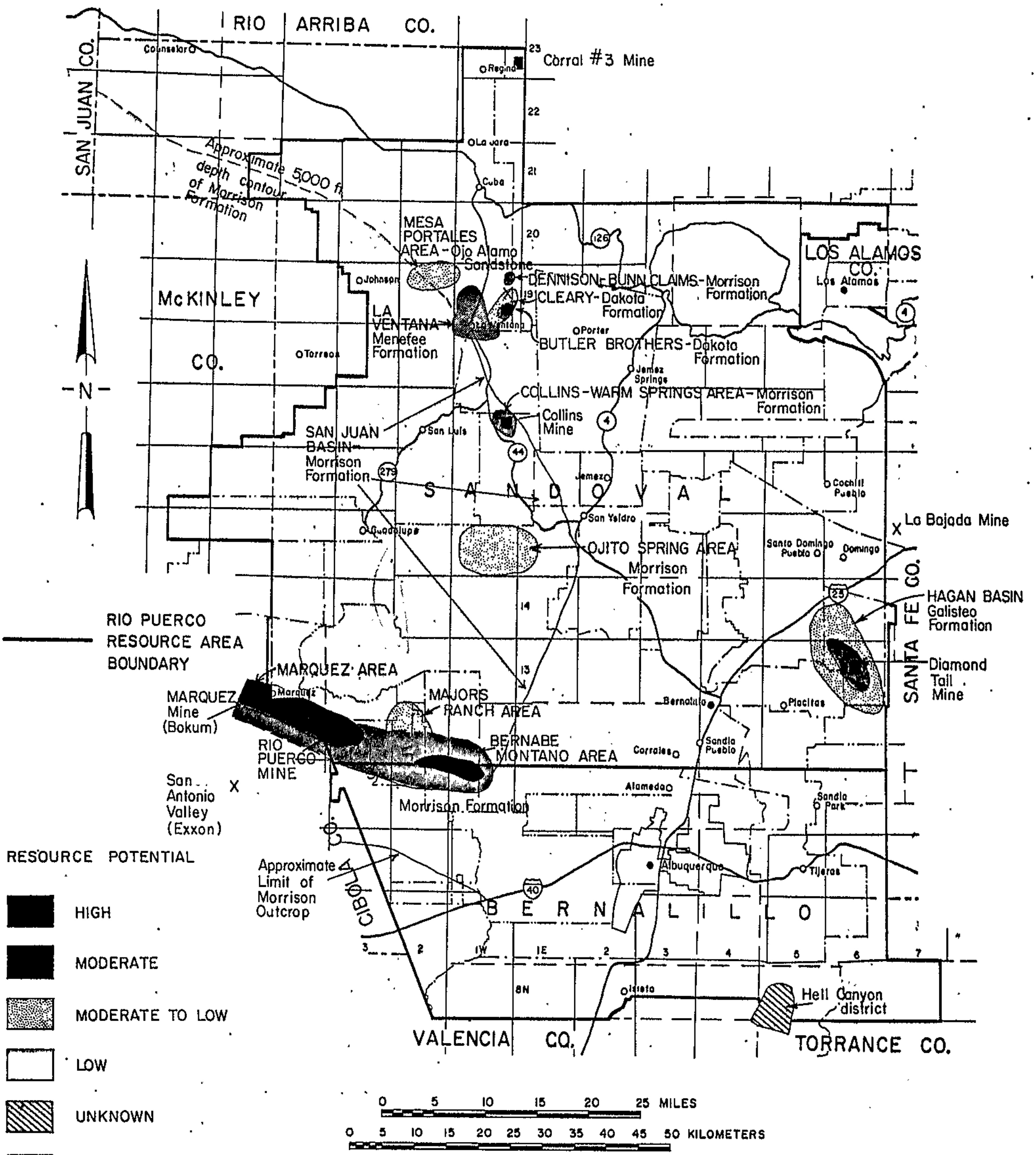

FIGURE 23 – URANIUM RESOURCE POTENTIAL IN THE NORTHERN RIO PUERCO RESOURCE AREA.

Ore deposits were found in the Marquez area by Kerr McGee Corp. (now Quivera Corp.) and Bokum Resources Corp. (Fig. 13; Map 5; Appendix 1). Bokum suspended shaft sinking and construction of a mill due to financial difficulties and economic conditions; Kerr McGee is maintaining assessment work. Three distinct ore horizons occur in the Westwater Canyon Member at depths of about 2,100 ft (640 m; Livingston, 1980). Remobilization of the primary-tabular ore is minor.

Ore at Marquez is controlled by shale breaks, high permeability, and recurrence of meandering streams. Where the shale beds are absent, uranium mineralization is dispersed throughout the sandstone and is subeconomic. Mineralized sandstones tend to be permeable; however, excessively permeable sandstones allow mineralization to be redistributed elsewhere. Mudstone pebbles restrict the permeability and concentrate uranium mineralization. Uranium mineralization appears to be restricted to meandering channels within the dominantly braided-stream complex (Livingston, 1980). Actual development and mining of these deposits will add to our knowledge of mineralization in this area.

Conoco Minerals Co. discovered primary-tabular ore in the Bernabe Montaño grant in 1971 and delineated ore reserves of 10-20 million lbs (4.5-9 million kg) of U_3O_8 in the Westwater Canyon Member (Fig. 13; Map 5; Appendix 1; Kozusko and Saucier, 1980). This orebody occurs in the Rio Puerco fault zone and ranges in grade up to an excess of 1.0% eU_3O_8 (radiometric equivalent U_3O_8; Kozusko and Saucier, 1980). Depth to the ore zones is about 1,000-2,500 ft (305-760 m). The U.S. Department of Energy (1980) estimates that 32 tons (29 metric tons) of 0.36% U_3O_8 at $30/lb possible-potential uranium resources occur in this area. Conoco has since divested itself of all uranium properties and the ownership reverted back to the Laguna Indian Reservation.

Nacimiento Mountains--Uranium occurrences are found in the Collins-Warm Springs area in the Nacimiento Mountains, where the Collins mine produced 989 lbs (449 kg) of U_3O_8 that averaged 0.12% U_3O_8 (Table 17; Figs. 13, 23; Map 4). Uranium mineralization occurs in at least four horizons in the upper Westwater Canyon Member, the lower unit of the Brushy Basin Member, and lower Jackpile sandstone. Uranium occurs (1) at the contacts between sandstone and green claystone, (2) along bedding planes and fractures in sandstone and underlying siltstone, and (3) as disseminations within homogeneous sandstone (Kittleman and Chenoweth, 1957). Anomalous uranium values occur in NURE HSSR data in the area (Fig. 13) and a radiometric anomaly is present (Fig. 18). Estimated possible-potential uranium resources are about 231 tons (210 metric tons) of U_3O_8 at $30 per pound at an average grade of 0.29% U_3O_8 (U.S. Department of Energy, 1980). The potential for discovering additional uranium deposits in the Brushy Basin Member in this area is good.

Uranium mineralization also occurs in the Westwater Canyon Member at the Dennison-Bunn claim south of Cuba in the Nacimiento Mountains in Sandoval County (Fig. 13; Map 4). The Westwater Canyon Member is about 200 ft (61 m) thick and consists of medium- to fine-grained sandstones, siltstones, and shales. The host sandstones are characteristic of low- to moderately low-energy fluvial environments and the channels trend west-southwest (Ridgley, 1980). Uranium occurs throughout the Westwater Canyon Member in this area and occurs at the irregular boundary between oxidized and reduced sandstones. A selected sample assayed 0.082% U_3O_8 (Table 18), where uranium is associated with iron-stained zones and carbonaceous material. This deposit may be a roll-type deposit (Ridgley, 1980) or a remnant or relict orebody and may be indicative of additional ore deposits in the area. Geochemical and petrologic studies are needed to adequately classify this ore deposit. Possible potential resources in the Westwater Canyon Member in this area are estimated as 434 tons (394 metric tons) of U_3O_8 at $30 per pound at an average grade of 0.27% U_3O_8 (U.S. Department of Energy, 1980).

Miscellaneous occurrences--Minor uranium occurrences are found throughout the Morrison Formation in the Majors Ranch and Ojito Spring areas in Sandoval County (Appendix 1; Figs. 13, 23; Maps 4 and 6). Many drill holes in these areas have penetrated mineralization and high groundwater anomalies are found in the HSSR data (Figs. 16, 17). However, some of these areas are remote and isolated and only reconnaissance studies, if any, have been completed (Santos, 1975; Light, 1982; Chenoweth, 1974; Kittleman, 1957). Additional work in these areas is warranted.

Resource and development potential--The mineral-resource potential of uranium mineralization in the Westwater Canyon Member of the Morrison Formation in the Marquez and Bernabe Montaño areas is high and is moderate in the area surrounding the

Table 18 - Chemical analyses of selected samples from uranium occurrences and deposits in the northern Rio Puerco Resource Area (McLemore, 1983a).

Sample number	Name	Location	Host Rock	% U_3O_8	Other analyses
3152	Dennison-Bunn #2	19N.1W.11.440	Westwater Canyon Mbr.	0.082	---
3161	Dennison-Bunn #3	19N.1W.11.440	Westwater Canyon Mbr.	0.044	---
3146	Cleary	19N.1W.14.233	Dakota Fm.	0.038	---
2131	B. P. Hovey Ranch	17N.4W.34.332	Point Lookout Sandstone	0.013	223 ppm Th 277 ppm Nb
3160	Soda Dam	18N.2E.13.400	Travertine	0.001	35.9% Ca
2124	Diamond Tail	13N.6E.16.124	Galisteo Fm.	0.064	trace Se
2134	Mimi #4	12N.6E.3.413	Intrusives	0.018	171 ppm Th
2135	Monte Largo carbonatite	11N.6E.16.300	Carbonatite	0.005	29 ppm Th 445 ppm Nb
2130	Cerro Colorado	9N.1W.1.300	Volcanics	0.007	14 ppm Th

Marquez-Bernabe Montaño area and in the Dennison Bunn area in the Nacimiento Mountains (Fig. 23; Maps 11, 12, and 13). The uranium-resource potential in the upper Westwater Canyon and lower Brushy Basin Members and the Jackpile Sandstone in the Collins-Warm Springs area is also moderate (Map 11). In the Majors Ranch and Ojito Spring areas, the uranium-resource potential in the Morrison Formation is low to moderate since no large, high-grade deposits have been discovered (Map 11 and 13). Elsewhere in the San Juan Basin, the uranium-resource potential is low because no uranium mineralization has been found even though the Morrison Formation contains favorable lithologies (Maps 8, 10, 11, and 12; Green and others, 1982a, b). In the remaining portion of the RPRA the uranium-resource potential in the Morrison Formation is very low because of nondeposition, unfavorable lithologies, or at excessive depth (greater than 5,000 ft or 1,500 m) to mine economically. The potential for development is dependent upon an increase in demand and improved economic conditions for uranium.

Uranium in the Dakota and Menefee Formation

General description and distribution--Uranium mineralization occurs in carbonaceous shale and lignite lenses in the Dakota Sandstone in La Ventana area and production from the one mine, the Butler Brothers, amounted to 290 lbs (132 kg) of U_3O_8 (Table 17; Figs. 13, 23; Map 4). At the Cleary prospect, uranium occurs within carbonaceous shale and peat layers at the base of the Dakota Sandstone (Appendix 1). A selected sample from the Cleary prospect contained 0.038% U_3O_8 (Table 18). Although small deposits of economic grade (greater than 0.10% U_3O_8) may occur in the La Ventana area, the potential for large, economic deposits in the Dakota Sandstone is poor due to the low grade and thinness of the mineralized zones.

Uranium mineralization occurs in coal, carbonaceous shale, and carbonaceous sandstone in the Menefee Formation of the Mesaverde Group in La Ventana area (Fig. 13; Map 4; Appendix 1; Gabelman, 1956; Bachman and others, 1959; Green and others, 1982b). At least three mineralized horizons are present at the top of the Menefee Formation and into the basal sandstone of La Ventana Tongue of the Cliff House Sandstone.

Concentrations of U_3O_8 as high as 0.62% may be found in coal; whereas, the coal ash has uranium concentrations as high as 1.34% (Bachman and others, 1959; Vine and others, 1953). Mineralized zones are thin and range in thickness from a few inches to 1-1/2 ft (0.5 m). The deposits are in or adjacent to beds of carbonaceous sediments or porous sandstone and near the axis of La Ventana syncline. It is thought that uranium was transported by groundwaters through the overlying sandstones and was precipitated by organic material in the Menefee Formation (Green and others, 1982b).

Resource and development potential--The mineral-resource potential is moderate at the Butlers Brothers mine and low to moderate surrounding the mine (Fig. 23; Map 11). Bachman and others (1959) estimate that 132,000 tons (120,000 metric tons) of coal and carbonaceous shale at an average grade of 0.10% uranium are found at La Ventana mesa. In contrast, the U.S. Department of Energy (1980) estimates the probable-potential uranium resources at $50 per pound to be 16 tons (15 metric tons) of U_3O_8 at an average grade of 0.11% U_3O_8. The reliability of either of these estimates is unknown. The mineral-resource potential is moderate (Fig. 23; Map 11). The development potential is low at both deposits.

Uranium in the Ojo Alamo Sandstone

General description--Drilling during the 1970's at Mesa Portales indicates that low-grade uranium occurs in several blanket-like horizons in the Ojo Alamo Sandstone. In addition to a few uranium occurrences at Mesa Portales (Appendix 1; Map 3), geochemical and radiometric anomalies are detected by water and stream-sediment geochemical surveys and by the aerial-radiometric studies (Green and others, 1982a, b).

Geology--Uranium mineralization occurs in sandstones and is associated with iron-staining, clay galls, and carbonaceous material. The sandstones are composed of quartz and feldspar and were deposited by braided to meandering streams on an alluvial fan. Mudstones are associated with the orebodies and probably provided permeability barriers. However, sandstone-to-shale ratios and permeability are too high in most places to be favorable (Vizcaino and O'Neill, 1977). The lack of a clear mineralization pattern may suggest that these deposits are modified roll-type or remnant orebodies (Green and others, 1982a, b).

Resource and development potential--The U.S. Department of Energy (1980) estimates that speculative-potential uranium resources in the Ojo Alamo Sandstone in the Mesa Portales area are 45 tons (41 metric tons) of U_3O_8 at \$30 per pound at an average grade of 0.25% U_3O_8, despite the absence of proven economic orebodies. The mineral-resource potential is low to moderate (Fig. 23; Maps 10 and 11). The potential for development is low until the market for uranium improves substantially.

Uranium in the Galisteo Formation

General description and distribution--Uranium mineralization occurs in high-energy, braided-stream sediments of a complex alluvial-fan sequence in the Galisteo Formation in the Hagan Basin (Appendix 1; Figs. 13, 23; Map 6). Uraninite and coffinite occur as sand coatings in roll-type orebodies (J. C. Moore, 1979). Selenium and molybdenum are common. Radiometric anomalies occur in the area (Fig. 18). One of these orebodies is estimated to contain 0.9 million lbs (410,000 kg) of U_3O_8 at an average grade of 0.09% U_3O_8 at depths of 10-400 ft (3-120 m; J. C. Moore, 1979). One sample from the ore pile at the Diamond Tail decline in this area assayed 0.064% U_3O_8 and a trace of Se (Table 18; McLemore, 1983a). Uranium-bearing latite dikes and sills probably related to the Espinaso Volcanics, intrude this sequence and may be a potential source for these roll-type uranium orebodies.

Resource and development potential--High production costs, low-grade ore, environmental costs, and a declining uranium market forced Union Carbide to abandon uranium mining in this area. Probable-potential uranium resources in the area are estimated to be 185 tons (168 metric tons) of U_3O_8 at an average grade of 0.25% U_3O_8 at $30/lb (U.S. Department of Energy, 1980). The mineral-resource potential is moderate in the vicinity of the Diamond Tail mine and low to moderate surrounding the mine area (Fig. 23; Map 13). Production may occur if economic conditions substantially improve. Additional deposits may occur in the Galisteo Formation northwest of the Diamond Tail, but there is insufficient data to adequately assess this area.

Miscellaneous uranium occurrences

Limestone deposits--Minor occurrences of uranium are found in limestones and adjacent sandstones of the Entrada, Todilto, and Summerville Formations. These occurrences are small and low grade (Appendix 1). Although uranium has been produced from these formations in the Ambrosia Lake subdistrict, it is unlikely that any economic orebodies occur in the RPRA, except at depth. Uranium mineralization typically is found in these units only where the gypsum member of the Todilto Formation is absent (Hilpert, 1969; McLemore, 1983a); however, the gypsum member is extensive in the RPRA. In addition, uranium mineralization in the Todilto Formation is controlled by intraformational folds and the largest orebodies tend to occur where the intraformational folds are clustered and have a similar trend (Hilpert, 1969). Trends of intraformational folds are not observed in the Todilto Formation in this area. Only a few drill holes have penetrated to the Todilto Formation in the western part of the RPRA and the uranium potential there is presumed low because of (1) excessive depth, (2) presence of gypsum member, and (3) lack of intraformational folds.

Stratabound, sedimentary copper deposits--Uranium occurs in the stratabound, sedimentary copper deposits in the Abo Formation and Madera Group in the Gallinas, Coyote, Nacimiento, and Tijeras Canyon districts (Appendix 1; Fig. 13; Maps 4 and 6), however, only one mine in the RPRA yielded any ore from these sandstone deposits. Only 12 lbs (5 kg) of U_3O_8 were produced from the Corral #3 mine in the Gallinas district in the northern Nacimiento Mountains (Table 17). Other mines in Rio Arriba County have also produced small quantities of uranium from these rocks (McLemore, 1983a; Vizcaino and others, 1978). Uranium mineralization typically occurs with copper mineralization and both are associated with organic material in fluvial sandstones, siltstones, and conglomerates. Uranium contents rarely exceed 0.10% except at Deer Creek where uranium concentration in a sample was 0.14% U_3O_8 (Table 18). High radiometric anomalies and high geochemical anomalies in the NURE data occur near some of these deposits (Figs. 16-18). In most places, uranium and copper mineralization is sporatic and discontinuous and the uranium potential is probably low.

The largest stratabound copper deposits in the Nacimiento Mountains occur in the Chinle Formation (Woodward, Kaufman, and others, 1974); however, only trace amounts of uranium mineralization are associated with these stratabound deposits (Appendix 1; Map 4; Chenoweth, 1974). Locally, copper may be absent at uranium occurrences found in the Poleo Sandstone Lentil. However, organic material which controls uranium mineralization is rare in the Poleo Sandstone Lentil (Vizcaino and others, 1978). It is doubtful that any economic uranium ore deposits occur in the Chinle Formation and the mineral-resource potential for uranium is very low.

Beach-placer sandstones--Uranium is also found in beach-placer sandstone deposits in the San Juan Basin (previously discussed under Metal Deposits). These deposits are low grade and small tonnage and probably do not represent any economic potential. A sample from one prospect, B. P. Hovey Ranch, assayed 0.013% U_3O_8 (Table 18). Numerous radiometric anomalies are present in the Cretaceous rocks and probably represents additional deposits (Fig. 18). The mineral-resource potential and the potential for development is very low.

Other sandstone deposits--Minor occurrences of uranium and radiometric anomalies (Fig. 18) also are found in the San Jose Formation where uranium is associated with carbonaceous material in fluvial sandstones (Appendix 1). However, despite favorable lithologies in this unit (Green and others, 1982b; Vizcaino and O'Neill, 1977), no economic orebodies have yet to be found. The resource and development potential is low.

Travertines--Several travertine deposits in the San Ysidro and Jemez Springs area are radioactive (Appendix 1; Map 4). One sample from Soda Dam, near Jemez Springs, contains 0.001% U_3O_8 and 35.9% Ca (Table 18). Several radiometric anomalies occur in the vicinity of these travertines (Fig. 18). These travertine deposits probably do not have any economic potential for uranium, but they are significant because they indicate a source of uranium in the present environment.

Vein-type--Uranium occurs along fractures and shear zones in several areas (Appendix 1), but most of these occurrences probably do not have any economic potential because of their low grade and small tonnage. At the Mimi #4 claim in the Hagan Basin (Appendix 1; Map 6), 0.018% U_3O_8 and 171 ppm Th (Table 18) occurs in altered latite dikes and sills. This occurrence may suggest a potential source for the nearby roll-type deposits in the Galisteo Formation. Uranium concentration of a sample from Cerro Colorado in Bernalillo County is 0.007% U_3O_8 (Table 18) and is of no economic potential (Appendix 1; Map 6). The carbonatite dike in the Monte Largo Hills is also radioactive (Appendix 1; Map 6), but chemical analyses indicated only 42 ppm U and 30 ppm Th (Table 18; McLemore, 1983b). Other occurrences are reported from the Precambrian terrains in the Nacimiento and Sandia Mountains and probably are of little economic potential and low development potential.

La Bajada mine occurs in western Santa Fe County (9 T15N R7E; Fig. 13; Map 4) and is a unique low-temperature, base-metal and uranium vein deposit (briefly discussed under Metallic deposits). In 1950, uranium was discovered and from 1956 to 1966, 27,116 lbs (12,300 kg) of U_3O_8 was produced at an average grade of 0.14% U_3O_8. There is no indication of any similar deposits along La Bajada mesa and the mineral-resource potential in Sandoval County is presumed low, except in the Hagan Basin area where a magnetic high occurs (Fig. 18). The magnetic high may indicate an igneous intrusive and uranium mineralization could be associated. The resource potential is unknown (Fig.

21).

Manzano Mountains--Uranium anomalies occur in the NURE HSSR geochemical data in the Hell Canyon district (Figs. 16, 17). Uranium may occur in the Precambrian greenstones with precious metals or in the overlying Bosque metasediments or adjacent granitic rocks (Precambrian). One of the most likely traps for uranium in Proterozoic rocks would be at the transition from marine rocks, possibly containing algal bioherms, to nonmarine rocks without any organic material (Nash and others, 1981). Grauch (1978) briefly describes a deposit where uraninite is associated with massive sulfide mineralization near the contact between leucocratic and melanocratic metamorphic rocks. This area warrants additional study for uranium potential as the mineral-resource potential is unknown (Fig. 23: Map 14).

Coal Resources (by Gretchen H. Roybal)

Introduction

The RPRA contains many outcrops of Cretaceous coal-bearing sequences which have been delineated into recognized fields. Sandoval County encompasses a major part of the southeast portion of the San Juan Basin coal fields. The fields are delineated by the outcropping coal-bearing formations: Fruitland, Menefee, and Crevasse Canyon. These fields within Sandoval County are La Ventana, northeast East Mount Taylor, northeast Rio Puerco, east Chacra Mesa, east San Mateo, and east Star Lake. All of these coal fields except for La Ventana and Rio Puerco fields extend into McKinley and San Juan counties. The discussions that follow on these overlapping fields take into consideration at least one township into the adjacent counties. Two other coal fields delineated by outcropping Mesaverde Group coal-bearing sequence are the Hagan and Placitas fields in eastern Sandoval County. Coal areas in Bernalillo County are the Tijeras coal field and the south end of the Rio Puerco field. The Tijeras coal field on the east side of the Sandia Mountains is defined by coal outcrops of the Mesaverde Group. The southern portion of the Rio Puerco coal field is delineated by outcrops of the Crevasse Canyon Formation. Figure 24 shows these coal fields in Sandoval and Bernalillo counties and the coal-bearing sequence of the fields.

A general physiographic and geologic description of each field and the characteristics of the coals in the field are included in the discussion. Appendix 3 contains the raw data (except for confidential data) for the summarized coal quality

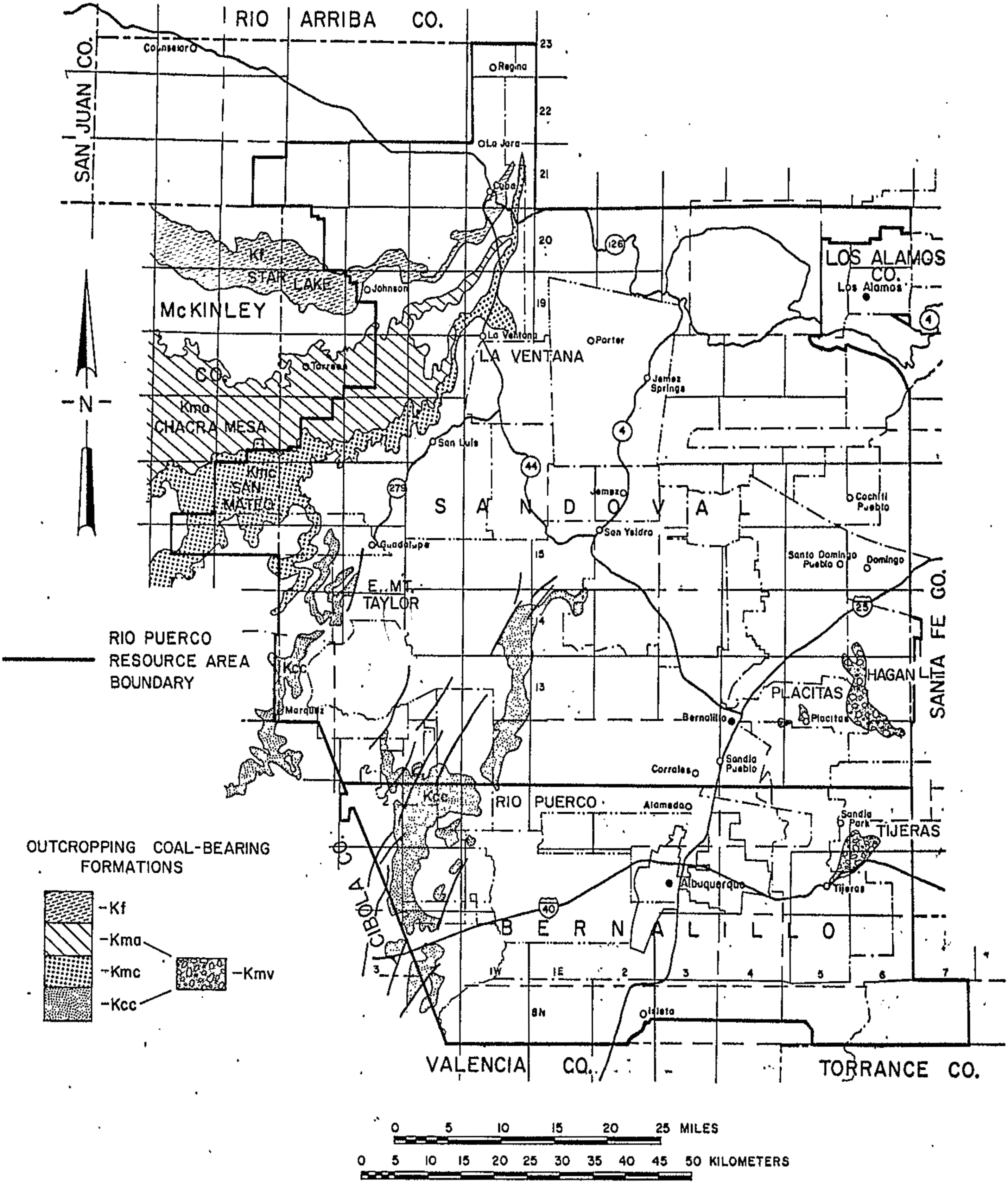

FIGURE 24 - OUTCROPPING COAL-BEARING FORMATIONS (ADAPTED FROM SHOEMAKER, BEAUMONT, AND KOTTLOWSKI, 1971, AND KELLEY AND NORTHROP, 1975)

data in Table 19. Coal mining and production and resource potential in both counties will be described on an individual basis. Production figures for each county and for individual mines within the counties are given in Tables 21 and 22. Further description of individual mines and prospects is given in Appendix 1. Resource (minimum of 1.2 ft (0.4 m) bed thickness) and reserve figures (minimum 2.5 ft (0.8 m) bed thickness) as defined by Wood and others (1983) are given in Tables 23 and 24 by township and range for these fields. Inferred resources and reserves were calculated only where the data are widely spaced and geologic information indicates a potential for coal. The data in these tables are derived from point source data from the data base (NCRDS data) at NMBM&MR which is continually being updated as new data are acquired (NCRDS). All data from this data base (except confidential data) used for both reserve/resource calculations and quality analyses are given in Appendices 1 and 3 respectively. Resource potential of each coal field is shown graphically in Figure 25 and on accompanying 1:100,000 maps (Maps 28-32). The resource potential represented is that for the area of the outcropping coal-bearing sequence.

Coal Quality (by Frank Campbell)

The rank of a coal is a systematic means of classifying coal based on its combustion characteristics for industrial use. Comparisons of coals from different areas can be made based on their heating values. Rank is based on several characteristics of coals which are determined by proximate, ultimate, and Btu

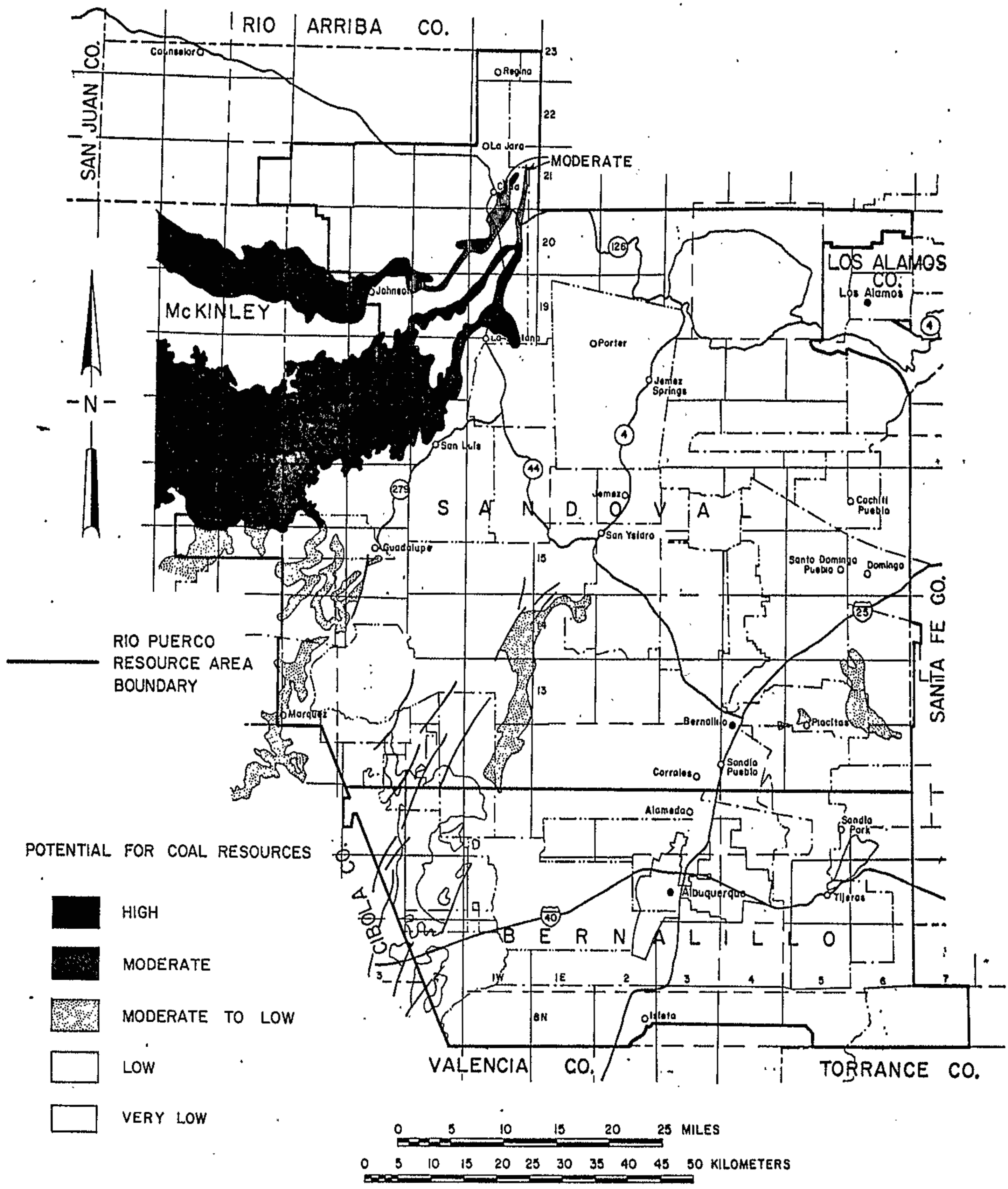

FIGURE 25 – COAL RESOURCE POTENTIAL
(FROM MEMOIR 25, KELLEY & NORTHROP, 1975;
BEAUMONT, 1984)

Tijeras

	No. of Samples	Avg.	Max.	Min.
Proximate Moisture	3	4.10	9.60	1.10
Proximate Ash	3	20.00	31.10	7.60
Volatile Matter	3	31.63	37.50	26.30
Fixed Carbon	3	44.23	51.20	36.20
Ultimate Moisture	1	6.47	*	*
Carbon	1	64.90	*	*
Hydrogen	1	4.60	*	*
Nitrogen	1	1.10	*	*
Sulfur	3	1.53	3.20	0.50
Organic Sulfur	0	*	*	*
Pyritic Sulfur	0	*	*	*
Sulfate Sulfur	0	*	*	*
Ultimate Ash	1	21.40	*	*
Oxygen	1	7.50	*	*
Btu	1	10293	*	*
MMF Btu	1	13480	*	*

East Mount Taylor

	No. of Samples	Avg.	Max.	Min.
Proximate Moisture	20	9.64	10.70	8.00
Proximate Ash	20	8.30	10.10	5.80
Volatile Matter	20	43.15	44.50	41.50
Fixed Carbon	20	48.57	51.70	46.90
Ultimate Moisture	0	*	*	*
Carbon	0	*	*	*
Hydrogen	0	*	*	*
Nitrogen	0	*	*	*
Sulfur	20	0.77	1.20	0.50
Organic Sulfur	0	*	*	*
Pyritic Sulfur	0	*	*	*
Sulfate Sulfur	0	*	*	*
Ultimate Ash	0	*	*	*
Oxygen	0	*	*	*
Btu	20	11738	12030	11320
MMF Btu	20	12910	13186	12610

Chacra Mesa

	No. of Samples	Avg.	Max.	Min.
Proximate Moisture	13	12.40	19.10	9.22
Proximate Ash	13	10.90	19.50	1.30
Volatile Matter	13	35.24	43.80	24.50
Fixed Carbon	13	42.41	56.17	32.60
Ultimate Moisture	5	13.08	16.30	11.00
Carbon	5	56.68	60.00	52.80
Hydrogen	5	5.50	5.90	5.20
Nitrogen	5	1.14	1.20	1.10
Sulfur	13	1.03	5.17	0.30
Organic Sulfur	0	*	*	*
Pyritic Sulfur	0	*	*	*
Sulfate Sulfur	0	*	*	*
Ultimate Ash	5	14.25	19.50	7.30
Oxygen	5	22.14	29.50	18.20
Btu	13	10364	11714	8910
MMF Btu	13	11794	13752	9966

Hagan

	No. of Samples	Avg.	Max.	Min.
Proximate Moisture	10	10.56	13.80	6.10
Proximate Ash	10	8.30	13.80	5.70
Volatile Matter	10	37.95	44.70	29.10
Fixed Carbon	10	43.23	51.00	38.90
Ultimate Moisture	4	9.39	11.00	6.10
Carbon	4	64.97	66.80	63.70
Hydrogen	4	5.60	5.90	5.10
Nitrogen	4	1.27	1.30	1.20
Sulfur	10	0.66	0.90	0.40
Organic Sulfur	0	*	*	*
Pyritic Sulfur	0	*	*	*
Sulfate Sulfur	0	*	*	*
Ultimate Ash	4	9.48	13.80	6.20
Oxygen	4	18.23	21.80	12.10
Btu	8	10508	11880	7740
MMF Btu	8	11625	13989	8572

Rio Puerco

	No. of Samples	Avg.	Max.	Min.
Proximate Moisture	4	16.41	23.20	9.40
Proximate Ash	4	8.00	10.00	6.10
Volatile Matter	4	35.43	37.92	31.60
Fixed Carbon	4	40.22	43.00	38.80
Ultimate Moisture	2	19.90	23.30	16.50
Carbon	2	55.05	55.90	54.20
Hydrogen	2	6.15	6.50	5.80
Nitrogen	2	1.00	1.00	1.00
Sulfur	4	.81	1.40	0.40
Organic Sulfur	0	*	*	*
Pyritic Sulfur	0	*	*	*
Sulfate Sulfur	0	*	*	*
Ultimate Ash	2	7.90	9.50	6.30
Oxygen	2	29.00	30.60	27.40
Btu	4	10278	12690	9200
MMF Btu	4	11243	13618	10289

La Ventana

	No. of Samples	Avg.	Max.	Min.
Proximate Moisture	33	15.54	22.10	10.60
Proximate Ash	33	9.50	34.00	4.50
Volatile Matter	33	34.54	40.00	26.06
Fixed Carbon	33	42.47	52.00	26.73
Ultimate Moisture	11	15.65	22.10	12.00
Carbon	11	58.84	62.50	52.80
Hydrogen	11	5.99	6.40	5.50
Nitrogen	11	1.14	1.20	1.00
Sulfur	33	1.12	2.80	0.50
Organic Sulfur	0	*	*	*
Pyritic Sulfur	0	*	*	*
Sulfate Sulfur	0	*	*	*
Ultimate Ash	11	10.90	44.80	4.50
Oxygen	11	25.55	34.70	21.20
Btu	33	10224	11300	7132
MMF Btu	33	11419	12454	9240

San Mateo

	No. of Samples	Avg.	Max.	Min.
Proximate Moisture	23	15.94	17.94	14.04
Proximate Ash	23	11.90	23.40	4.60
Volatile Matter	23	34.77	39.93	30.27
Fixed Carbon	23	37.36	44.86	30.31
Ultimate Moisture	23	15.94	17.94	14.04
Carbon	23	56.64	66.22	47.69
Hydrogen	23	4.25	5.13	3.73
Nitrogen	23	1.00	1.17	0.92
Sulfur	23	0.78	1.53	0.34
Organic Sulfur	23	0.53	1.02	0.31
Pyritic Sulfur	23	0.25	0.58	0.03
Sulfate Sulfur	23	0.01	0.02	0.01
Ultimate Ash	23	11.93	23.38	4.57
Oxygen	23	9.90	10.81	8.69
Btu	23	10021	11236	8476
MMF Btu	23	11511	11946	11145

Star Lake

	No. of Samples	Avg.	Max.	Min.
Proximate Moisture	19	12.50	14.66	10.79
Proximate Ash	19	23.10	42.30	9.50
Volatile Matter	19	31.78	36.34	23.57
Fixed Carbon	19	32.67	44.90	21.38
Ultimate Moisture	18	12.51	14.66	10.79
Carbon	18	49.58	62.00	32.76
Hydrogen	18	4.08	5.70	2.80
Nitrogen	18	1.01	2.02	0.08
Sulfur	19	0.61	1.00	0.41
Organic Sulfur	0	*	*	*
Pyritic Sulfur	0	*	*	*
Sulfate Sulfur	0	*	*	*
Ultimate Ash	18	22.98	42.33	9.50
Oxygen	18	10.83	22.90	1.25
Btu	19	8736	10950	5734
MMF Btu	19	11614	12221	10563

Btu - British thermal unit - a calorific value
MMF Btu - moist mineral matter free Btus - determines rank of coal

Table 20 Comparison of Quality of San Juan Basin Coals

	Fruitland			Menefee			Crevasse Canyon		
	No.	Avg.	S.D.	No.	Avg.	S.D.	No.	Avg.	S.D.
Prox. Moist.	400	11.60	5.1	185	12.66	5.87	162	11.62	3.87
Prox. Ash	400	21.80	9.4	185	11.10	5.90	162	9.20	5.00
Fixed Carbon	389	36.0	6.9	184	41.28	6.76	154	42.51	4.14
Vol. Matter	389	31.5	4.7	184	35.66	4.15	154	37.53	3.83
Ult. Ash	137	22.4	8.9	112	12.33	7.10	87	10.21	5.66
Ult. Moist.	137	12.8	3.4	112	14.87	4.41	87	11.12	4.76
Carbon	137	49.7	7.0	112	56.27	8.17	87	61.23	5.96
Hydrogen	137	4.2	0.8	112	4.76	0.93	87	5.43	0.69
Nitrogen	137	1.0	0.3	112	1.06	0.37	87	1.11	0.15
Oxygen	137	13.2	6.4	87	14.66	7.12	87	18.51	6.67
Total Sulfur	408	0.7	0.4	182	1.12	0.77	161	0.67	0.45
Organic Sulfur	31	0.4	0.1	71	0.58	0.22	45	0.48	0.17
Pyritic Sulfur	31	0.1	0.1	70	0.32	0.34	44	0.22	0.43
Sulfate Sulfur	21	0.0	0.0	40	0.05	0.10	24	0.11	0.33
Btu	399	9301	1694	182	10582	1478	154	10980	1007
MMMFBTU	399	12169	1499	182	12057	1442	154	12231	923

Table 21 – Coal production in Bernalillo and Sandoval Counties (for all years not combined with other counties).

Year	New Mexico State Mine Inspector (tons)	USBM Minerals Yearbook (tons)
BERNALILLO COUNTY		
June 1907-1908	350	
June 1908-1909	300	
June 1909-1910	160	
June 1910-1911	160	
Oct. 1938-1939	5,500	
1940	2,315	
1941	3,324	
1942	3,044	
1943	3,912	
1944	3,239	3,593
1945		3,119
1946		3,006
1949	1,442	
1950	1,088	
1951	1,551	1,255
1952	1,259	1,513
1953	930	1,030
1955	315	
TOTAL BERNALILLO COUNTY	28,889 tons	13,516 tons
SANDOVAL COUNTY		
June 1903-1904	970	
June 1904-1905	1,500	
June 1905-1906	1,000	
June 1906-1907	2,618	
June 1907-1908	5,000	
June 1908-1909	1,000	
Oct. 1918-1919	500	
Oct. 1924-1925	13,666	
Oct. 1925-1926	7,557	
Oct. 1926-1927	23,215	
Oct. 1927-1928	est. 2,000	
Oct. 1928-1929	16,349	
Oct. 1929-1930	16,000	
Oct. 1930-1931	15,000	
Oct. 1931-1932	10,000	
Oct. 1932-1933	2,456	
Oct. 1933-1934	2,898	
Oct. 1934-1935	7,257	
Oct. 1935-1936	7,702	
Oct. 1936-1937	3,711	
Oct. 1937-1938	3,191	
Oct. 1938-1939	5,137	
1940	3,189	
1941	2,100	
1942	1,694	
1943	7,966	5,488
1944	11,493	6,573
1945	10,438	6,573
1946		1,614
1947	3,118	
1948	9,280	
1949	5,854	
1950	6,744	
1951	3,315	6,348
1952	2,098	2,634
1953	2,579	2,415
1954	2,813	
1955	3,459	3,797
1956	2,645	2,537
1957	2,499	5,371
1958	1,306	1,306
1959	1,188	1,245
1960	2,069	1,457
1961	2,059	2,314
1962	1,903	
1963		2,052
TOTAL SANDOVAL COUNTY	238,536 tons	51,724 tons

Table 22 - Mine production in Bernalillo and Sandoval Counties.

Mine	Location	Field	Total production from Nickelson (tons)	Total production from NM State Mine Inspector (tons)
BERNALILLO COUNTY				
Canoncito Mine	SE1/4, sec. 8, T10N, R2W	Rio Puerco	13,748	
Ferro Mine	NE1/4, sec. 18 T10N, R2W	Rio Puerco	17,239	7,151
Tocco Mine	NE1/4, sec. 31, T11N, R6E	Tijeras	970	
		TOTAL BERNALILLO COUNTY	31,957 tons	7,151 tons
SANDOVAL COUNTY				
Heron Prospect	SE1/4, sec. 28, T12N, R1W	Rio Puerco	85	
Taraddei Prospect	SE1/4, sec. 31, T13N, R5E	Placitas	265	
Sloan Mine	NW1/4, sec. 17, T13N, R6E	Hagan	200	
Tejon Mine	SE1/4, sec. 17, T13N, R6E	Hagan	7,005	3,013
Hagan Mine(s)	NW1/4, sec. 33, T13N, R6E	Hagan	87,344	92,418
San Ysidro Sanders Mine, Sellers Prospect	SW1/4, sec. 8, T14N, R1E	Rio Puerco	2,954	
Marez Prospect	SW1/4, sec. 8, T14N, R1E	Rio Puerco	30	
Karavanus Prospect	NE1/4, sec. 19, T14N, R6E	Hagan	27	
Gallegos Yarbrough San Luis Mine	NE1/4, sec. 10, T17N, R2W	La Ventana	5,000	
Arroyo #1 Mine	NW1/4, sec. 16, T17N, R2W	La Ventana	19,944	
Tachias Prospect	SW1/4, sec. 34, T17N, R4W	Chacra Mesa	282	
Peacock No. 2	NE1/4, sec. 2, T18N, R2W	La Ventana	4,000	
Tonapah Mine	SE1/4, sec. 23, T18N, R2W	La Ventana	2,582	
Black Rose Mine	SW1/4, sec. 4, T19N, R1W	La Ventana	24,000	
Black Rose-Elena Mine	SW1/4, sec. 4, T19N, R1W	La Ventana	52	
McDonald & Hayes Mine	NW1/4, sec. 16, T19N, R1W	La Ventana	442	
Rio Puerco Mine	SE1/4, sec. 19, T19N, R1W	La Ventana	650	
Hoye Mine	NE1/4, sec. 19, T19N, R1W	La Ventana	650	
Carlisle Mine	NW1/4, sec. 20, T19N, R1W	La Ventana		17,857
Wilkins No. 1	SW1/4, sec. 26, T19N, R1W	La Ventana	551	
Cleary Mine	SW1/4, sec. 31, T19N, R1W	La Ventana	29,000	
Peacock No. 3	SW1/4, sec. 31, T19N, R1W	La Ventana	1,349	
Nance Mine White Ash Mine	NE1/4, sec. 32, T19N, R1W	La Ventana	16,128	
Sackett Mine	SW1/4, sec. 27, T19N, R2W	La Ventana	41,583	
Anderson Mine	SE1/4, sec. 35, T19N, R2W	La Ventana	85,225	
McDonald Prospect	SE1/4, sec. 36, T19N, R3W	La Ventana	8	
Padilla Mine	NE1/4, sec. 33, T20N, R1W	La Ventana	73,500	
Sunny Slope Mine	SE1/4, sec. 33, T20N, R1W	La Ventana	18,500	
		TOTAL SANDOVAL COUNTY	421,356 tons	113,288 tons

Table 23
Reserves for Sandoval County
(2.5 ft minimum bed thickness, in millions of tons)

Field	T.	R.	Depth 0 - 250 ft Meas.	Ind.	Inferred	Total	Depth 250 - 500 ft Meas.	Ind.	Total	Depth 500 - 1000 ft Meas.	Ind.	Total
San Mateo (Eastern)	15N	7W	32.813	118.81		151.623						
	16N	5W	2.037	16.283		18.32						
Chacra Mesa (Eastern)	17N	3W	2.037	16.286		18.323				4.525	36.191	40.716
	17N	4W	3.326	26.600		29.926						
	18N	3W	7.690	61.082		68.772	1.584	12.667	14.251	5.994	78.716	84.710
	18N	4W	1.245	8.950		10.195	4.775	20.589	25.364	1.856	14.839	16.695
	18N	5W	0.178	1.0329	11.68	12.891				0.792	6.333	7.125
La Ventana (Eastern)	18N	1W								1.426	5.392	6.818
	18N	2W	0.836	5.082		5.918	0.205	0.451	0.656			
	19N	1W	1.556	12.521		14.077	5.669		5.669	9.296	24.257	33.553
	19N	2W	0.205	1.679		1.884				1.652	9.835	11.487
	20N	1W	0.410		69.3	69.710						
Star Lake (Eastern)	19N	3W	3.063	8.689		11.752						
	19N	4W	6.330	41.553		47.883						
	19N	5W	23.146	126.786	828.60	978.612						
	20N	5W	4.073	22.657		26.730	4.412	35.286	36.698			
Rio Puerco	14N	1E	0.972	7.965	171.99	180.93						
	14N	2E	0.276	3.404		3.680						

Table 24
Resources for Sandoval County
(1.2 ft minimum bed thickness, in millions of tons)

			Depth 0 - 250 ft				Depth 250 - 500 ft			Depth 500 - 1000 ft		
Field	T.	R.	Meas.	Ind.	Inferred	Total	Meas.	Ind.	Total	Meas.	Ind.	Total
San Mateo (Eastern)	15N	6W	1.583	5.923		7.506						
	15N	7W	34.150	128.376		162.526						
	16N	5W	4.095	32.753	177.68	214.528						
Chacra Mesa (Eastern)	17N	3W	4.548	36.372	134.28	175.20				4.525	36.191	40.716
	17N	4W	4.978	39.810		44.788						
	18N	3W	12.952	102.510		115.462	2.715	21.714	24.429	7.194	57.543	67.737
	18N	4W	4.978	28.678		33.656	5.996	30.360	36.356	3.373	26.962	30.335
	18N	5W	0.435	4.199	11.68	16.31				0.792	6.333	7.125
La Ventana (Eastern)	18N	1W								2.376	8.986	11.362
	18N	2W	1.014	6.301		7.315	0.270	0.594	0.864			
	18N	3W	0.083	0.867		0.950						
	19N	1W	1.837	13.403	129.08	144.320	5.669		5.669	10.265	29.545	39.811
	19N	2W	0.328	2.687		3.015				1.652	9.835	11.487
	20N	1W	0.518	2.029	69.3	71.847						
Star Lake (Eastern)	19N	3W	3.063	8.689		11.752						
	19N	4W	7.643	51.460		59.103						
	19N	5W	24.459	131.561	869.24	1025.26						
	20N	5W	5.702	32.822		38.524	4.412	35.286	39.698			
Rio Puerco	14N	1E	1.761	13.975	262.09	277.826						
	14N	2E	0.426	4.846		5.274						

analyses.

The proximate analyses includes ash, moisture, volatile matter, and fixed carbon content on a percentage basis of a coal sample. A low ash content will increase the total heat value of a coal and make for a lighter coal, reducing transportation costs. A low ash coal tends to contain less abrasive materials and therefore decreases the amount of routine maintenance necessary on power plant boilers. A high moisture content in a coal can increase the weight of the coal and reduce the effective heating value, both undesirable factors. The volatile matter content is that portion of the coal which is driven off upon heating, without actually causing combustion of the coal. The fixed carbon content is obtained by subtraction of the moisture, ash, and volatile matter from 100. A high volatile matter and low fixed carbon content are indicative of coals suitable for steam coal purposes. These are the types of coals present in the study area.

Ultimate analyses of coal reports the total percentage of the organic elements; carbon, hydrogen, nitrogen, and oxygen. Total sulfur, moisture and ash are also included in the ultimate analyses. Historically sulfur has been of great concern in coal combustion, owing to the possible production of acid waters and acid rain and its effect on the environment. The sulfur content of New Mexico coals is low enough (average state wide 0.8%) to not be of great environmental concern to the degree it is in eastern coals. The information from the ultimate analyses is used both for design of steam boilers and in determining whether or not a coal is suitable for conversion processes.

The Btu value is a measure of the heating capacity of the coal determined by combustion. The Btu value along with the proximate ash and total sulfur content are used to determine the moist mineral matter free (mmmf) Btu value. This mmmf value is used to determine the rank of the coal; lignite, subbituminous, bituminous, or anthracite. Coals in the study area are generally in the bituminous rank.

Tijeras Field (by Gretchen H. Roybal)

General Description--The Tijeras field is located in Bernalillo County, covering portions of T. 10-11 N., R. 5-6 E. (Map 30). The total area encompassed by this field is 28 sq mi (72 sq km). The coals are of Mesaverde Group age, however, lack of detailed geologic study prohibits more precise stratigraphic correlation (Fig. 24). Structually the Tijeras field consists of two synclines, in which the coals dip as much as 30 degrees (V. C. Kelley and Northrop, 1975). Two coal zones are present, with the upper zone being of better quality. The single mmmf Btu value in Table 19 (Appendix 3) suggests that these coals are of a high volatile B bituminous rank. There are not enough samples available for determination of standard deviation; therefore a summarization of the available as-received values is given in Table 19.

Mining and Past Production--Coal was mined as early as 1898 (Herrick, 1900, p. 108) north of Gutierrez. The Tocco mine open in 1908 and shipped 350 tons (317 metric tons) in 1910, and 160 (145 metric tons) in 1911 (Table 22, Nickelson, 1979). Although the Section 1 mine and Holmes mine are known to exist in the Tijeras Basin, no production figures are available (Appendix 1).

Resource and Development Potential--Coal thicknesses may be as much as 3 ft (0.9 m) in the Tijeras field, and beds generally are structurally deformed (V. C. Kelley and Northrop, 1975). Read and others (1950) estimated coal resources to be 1.6 million tons (1.45 million metric tons) in the Tijeras field.

A large factor influencing the economic possibilities of the Tijeras field coals is the two synclines with beds dipping 30 degrees, which makes strip mining impractical. The thinness of the coal beds is another factor limiting the potential for any type of mining or in-situ use. The Tijeras field has a low resource potential, and therefore a low development potential (Fig. 25, Map 30).

Rio Puerco Field

General Description--The Rio Puerco field consists of Mesaverde Group sediments, present in the fault-controlled Rio Puerco Valley. This area extends from townships T. 8 to 14 N. and in ranges R. 1 E., and R. 1-3 W., covering approximately 90 sq mi (233 sq km) (Maps 29 and 30). The field is complicated by the Rio Puerco fault zone, which breaks the coal-bearing units into narrow, steeply dipping fault blocks over much of the field.

The coals outcropping in the Rio Puerco field are in the Dilco and Gibson Members of the Crevasse Canyon Formation (Fig. 24). The Gibson outcrops have several coal beds, some of which are of an economic thickness (Dane, 1936). These coals crop out in steeply dipping fault blocks and tend to be lenticular (Shomaker, 1971).

The average bed thickness is 2.5+/-1.4 ft (0.8+/-0.4 m), using a minimum thickness of 1.2 ft (0.4 m). In the northern portion of the Rio Puerco field, beds are as thick as 7.6 ft (2.3 m). The average as-received heating value for coals in this field is 10,278 Btu/lb, 2% lower than for the remaining Crevasse Canyon Formation coals. The average mmmf Btu indicates a rank of subbituminous A to high volatile C bituminous. The ash content is low (8.0+/-2.0%), when compared with the average for the remaining Crevasse Canyon Formation coals (Table 20). No data on forms of sulfur (pyritic, organic, sulfate) are available for this field, but the total sulfur content of these coals is nearly 21% higher than that found for the remaining Crevasse Canyon Formation coals in New Mexico. The average as-received analyses for the Rio Puerco is listed in Table 19.

Mining and Past Production--Mining in the Rio Puerco field began in the 1920's and extended to the early 1940's. There are six mines and prospects recorded in this field which are confined to two quadrangles in Sandoval County; Benavidez Ranch and Sky Village NE (Table 22, Appendix 1). Total production in the Sandoval County part of this field is 3,069 tons (2,784 metric tons) of coal (Nickelson, 1979). Some of the production, such as from the San Ysidro mine, might have been used to supply the railroad (Santa Fe Northwestern) going to Deer Camp. Two mines are on the Canoncito School quadrangle in Bernalillo County. The Canoncito and Ferro mines' total production was 30,987 tons

(28,111 metric tons) of coal (Table 22; Appendix 1, Nickelson, 1979). Generally, production in this area has not been of great commercial importance.

Resource and Development Potential--All data on bed characteristics and coal quantity for the Rio Puerco field are based on outcrop data, as no drilling data are available for this field. The total reserves for the Sandoval portion of this field, within 250 ft (76 m) of the surface is estimated at 184.6 million tons (168.0 million metric tons). Tables 24 and 23 show the point source resource and reserve calculations for the portion of the Rio Puerco coal field in Sandoval County. Appendix 2 lists point source data.

Resources for the southern portion of the Rio Puerco field are: (minimum 1.2 ft (0.4 m) thickness, in millions of tons)

Measured	Indicated	Inferred	Total
2.44	16.13	156.30	174.87

Due to the high number of faults and steep dips of beds, no reserves were calculated. Point source data for resource calculations are in Appendix 2.

From the small amount of data available on the Rio Puerco coals and the presence of high-angle faults, the coal resource potential in this field is considered to be low. Drilling in this area would help to clarify the true coal potential and the extent of the coal-bearing formation. The area of best potential within the Rio Puerco field is in the northern most portion where there is less faulting and good outcrops of coal. The resource potential for the southern portion of the Rio Puerco field is low due to the thinness of the coal beds and the high angle fault blocks that are prevalent (Fig. 25, Maps 29 and 30).

Development of the Rio Puerco coal fields is improbable due to the faulting and associated high-angle dip of the beds, which would complicate mining along with the lenticularity of the Crevasse Canyon coals. The lack of transportation in the area is a further detriment to coal mining in this area.

East Mount Taylor Field

General Description--The townships that include the East Mount Taylor field are T. 11-15 N., R. 3-6 W., a total area of 50 sq mi (130 sq km). Structurally this field is simple, with few faults present. Beds generally dip north-northwest and strike northeast. The angle of dip is generally less than 5 degrees. Topographic relief is highly variable, with steep-walled canyons being 500-1,000 ft (152-305 m) deep. The capping unit is a Tertiary age basalt, which attains a maximum thickness of 100 ft (30.5 m) (Hunt, 1936; Woodward and Martinez, 1974).

The coals in the East Mount Taylor field are in the Gibson Coal Member of the Crevasse Canyon Formation (Fig. 24), and tend to be lenticular, typical of this formation. Extensive and massive lava flows cover large areas of the field and overlie large portions of the Gibson Member.

Average as-received heating value for the East Mount Taylor field is higher (11,738 vs 10,983 Btu/lb) than what is found for the Crevasse Canyon Formation coals in general (Table 20). The mmmf Btu is also higher (12,910 vs 12,185 Btu/lb), and places these coals in the high volatile C bituminous range. Coals found in the East Mount Taylor field have a similar ash content (8.3%) to what is found in other Crevasse Canyon Formation coals (8.9%). total sulfur for this field averages 0.77%, nearly 18% higher than what is found for the remaining Crevasse Canyon Formation coals. The as-received statistical summary for twenty analyses for the East Mount Taylor field are given in Table 19.

Resource and Development Potential--Drill hole information is not available for the East Mount Taylor field. Resources are therefore based on outcrop data (Appendix 2), with no reserve estimates calculated, due to the high relief of the area and the thick basalt covering. Total resources within 250 ft (76 m) of the surface are estimated at 2.3 million tons (2.1 million metric tons). The average thickness of coals in this field is 1.7 +/- 0.5 ft (0.5+/-0.2 m).

The lenticularity and general thinness of the coal beds in the East Mount Taylor field, the lack of drill hole data, and very little previous mining, are reasons for considering this field to have a moderate to low resource potential (Fig. 25). Further drilling would help to delineate the true coal potential of this area.

The potential for coal development in the East Mount Taylor field is hindered by the presence of extensive and massive lava flows in the area, covering the coal-bearing sequence. The highly variable topography also limits the potential for surface mining in this field.

La Ventana Field

General Description--The La Ventana field lies on the southeastern corner of the San Juan Basin. This field covers portions of T. 16-21 N., R. 1-3 W., encompassing an area of approximately 165 sq mi (427 sq km). ; The western boundary of the La Ventana field follows the line between R. 2 W. and R. 3 W. southward to the line between T. 17 N. and T. 18 N. where it goes west to the boundary of R. 3 W. and R. 4 W. (Fig. 24, Maps 26, 27, and 28). The northern boundary is defined by the Menefee/Cliff House contact, and the southern and eastern boundaries are defined by the Menefee/Point Lookout contact.

In the northern part of the La Ventana field, the Menefee Formation is steeply dipping or overturned towards the east. This structure is caused by the Nacimiento uplift to the east. Beds vary from overturned dips of 22 degrees to the east in the northern portion of the field, to 2 degrees to the northeast in the southern portion of the field (Dane, 1936; Woodward and others, 1973; Woodward and Schumacher, 1973).

Coals in the La Ventana field are of the Allison and Cleary Coal Members of the Menefee Formation. Persistent Allison Member coal outcrops occur below the La Ventana Tongue of the Cliff House Formation. The Cleary Member coals crop out above the Point Lookout Sandstone along the southeast boundary of the La Ventana field. The La Ventana coals are subbituminous A to high volatile C bituminous in rank, with an average mmmf Btu of 11,416 Btu/lb. The as-received heating value does not vary significantly from that of the Menefee Formation coals throughout the San Juan Basin (Table 20). The mean as-received ash content is 16.8% lower than the 11.1% average for the remaining Menefee Formation coals. There is no difference between total sulfur content of all the Menefee coals taken together and coals from the La Ventana field. A compilation of the analyses for this field is given in Table 19. Individual analyses are listed in Appendix 3.

Mining and Past Production--The first coal mining period in the La Ventana field was in the 1880's to the early 1900's. These mines (Señorita, San Pablo, San Miguel; Appendix 1) supplied fuel to metal mines and smelters in the area, until their closing when coal was no longer needed. Subsequently, coal mining in the area became stagnant (Nickelson, 1979).

In the early 1920's interest in coal mining was aroused again with the development of railroads in the area, creating a market for coal and transporting coal to nearby towns for home use. The Cleary (San Juan), Wilkins, Sandoval, Anderson, Sackett, Kistler, and White Ash mines were developed during this period (Appendix 1). Spurs were built to some of these mines connecting to the main line from Bernalillo to Cuba. The Santa Fe Northwestern took several years to complete with several changes in ownership. Washouts along the route were a problem as well as financial difficulties. By 1931 most of the coal mines shut down due to the closure of the railroad (Nickelson, 1979). The Sunny Slope and Padilla mines endured the longest of the small operations with the closing of the Padilla in 1969. Many of these early mines were producing from what was called the Kaseman

Resource and Development Potential--Reserve estimates for the La Ventana field total 91.59 million tons (83.4 million metric tons), within 250 ft (76 m) of the surface. Beds that make up this reserve estimate have a maximum thickness of 7.4 ft (2.3 m) and average 5.2 ft (1.6 m). Resource and reserve dta from point source data (Appendix 2) are given in Tables 23 and 24 for the La Ventana field.

Most areas of the La Ventana field have a high coal resource potential (Fig. 25, Maps 27 and 28), based on the availability of both outcrop and drill hole data which shows a high frequency of coal beds, and the occurrence of past mining. In T. 17 N., R. 3 W., Shomaker (1971) indicates a potential for strip mining because of the low topographic relief and the low angle of dip of the coals and surrounding rock units. The Cleary Member coals in this area are within 150 ft (46 m) of the surface, making for a favorable overburden situation. Other areas to the north and east (T. 18, 19 N., R. 1, 2 W.) are more suitable for underground mining due to the increase in dip nearer to the Nacimiento uplift, and the massive overburden of the La Ventana Sandstone of the Cliff House Formation overlying the coal-bearing Allison Member of the Menefee Formation.

The development potential of coal resources in the La Ventana field is present as evidenced by the La Ventana and Arroyo #1 mines, but the lack of transportation out of the area is a hindrance. The added cost of a rail line to ship coal to market could be prohibitive to mining in the La Ventana area. Shipping coal by truck would be feasible if the market was within seam and what is now referred to as the Padilla coal seam (Ideal Basic La Ventana Mine Plan, 1979). This seam is generally thick and is in the uppermost part of the Allison Member of the Menefee Formation. The overlying unit is the La Ventana Tongue of the Cliff House Sandstone, a thick sandstone which is advantageous for mining of the Padilla Seam.

The most recent mining interest in the La Ventana area started in the 1960's. In 1964, Consolidated Coal Company applied for an exploration permit. In 1967, leases held by Consolidated Coal contained a mineable bed of coal (maximum thickness of 16 ft) for underground development, however, economics and lack of railroads hindered development. In 1976, this lease was sold to Ideal Basic Industries. Ideal Basic was permitted for mining by the State in 1982, but has not begun production (Appendix 1), as their permit has not been approved by the federal government.

Arroyo #1 mine, owned by A. J. Firchau was permitted in 1976. Production began in 1979 with 4,466 tons (4.051 metric tons) mined. In 1980, 15,748 ton (14,283 metric tons) of coal were produced (Table 22). No production figures are available for 1981 and Arroyo #1's 1982 production was 37,000 tons (33,566 metric tons) (Appendix 1). Early in 1984 Arroyo #1 was closed by the State of New Mexico due to noncompliance with state regulations.

Total recorded production for the La Ventana coal field is 297,418 tons (269,813 metric tons). This production has come from underground mining except for Arroyo #1, which is a surface operation.

close proximity to the mine.

Chacra Mesa Field

General Description--The Chacra Mesa field is defined by the outcrops of the Menefee Formation, in T. 17-19 N., R. 3-8 W., encompassing approximately 600 sq mi (1,555 sq km; Map 27). The northern boundary of the Chacra Mesa field is defined by the contact of the Cliff House Sandstone. The western border is the boundary between R. 9 W. and R. 8 W. The southern border is defined as the south line of T. 17 N. from R. 8 W. to R. 4 W. The structure of the Chacra Mesa field is not complicated. The beds dip to the north-northwest at 1 to 5 degrees. Normal faulting occurs throughout the field with a general downdropping of the beds to the north (Dane, 1936; Tabet and Frost, 1979).

Most of the coals in eastern Chacra Mesa field are in the Cleary Member of the Menefee Formation, although a few Allison Member coals crop out in this field (Fig. 24). The overlying unit is the La Ventana Tongue of the Cliff House Sandstone, which intertongues with the upper unnamed member of the Menefee Formation (Tabet and Frost, 1979).

Coals in the Chacra Mesa field are quite similar in quality to Menefee Formation coals in general (Table 20). The only major difference is found in the total sulfur content, which in the Chacra Mesa coals is approximately 12% lower than for the general Menefee Formation. Recent work (Tabet and Frost, 1979) in this field has resulted in the averages of as-received analyses in Table 19.

Mining and Past Production--Very little mining has taken place in the eastern portion of the Chacra Mesa field. Tabet and Frost (1979) indicate one prospect in the area which mined 88 tons (80 metric tons) between 1933 and 1935 on a U.S.G.S. lease. The same prospect was reopened as the Tachias prospect in 1939 and produced 190 tons (172 metric tons; Table 22, Appendix 1, Nickelson, 1979).

Resource and Development Potential--Reserve estimates for coals within 250 ft (76 m) for the eastern portion of the Chacra Mesa field are 140.12 million tons (127.51 million metric tons). The resource and reserve figures are given in Tables 23 and 24. Data (Appendix 2) available indicate that there are, in most places, three beds within 250 ft (76 m) of the surface. These beds range in thickness from 2.5 ft to 13.7 ft (0.8-4.2 m).

East Chacra Mesa field has a high coal resource potential (Fig. 25, Map 27). Although there is little if any significant past mining in the area, the outcrop data and drill hole data indicate this level of resource potential. Recent work by Tabet and Frost (1979) has helped to delineate the coal resources in this area.

Development of the eastern portion of the Chacra Mesa field looks favorable for strip mining. The low percentage of ash in the Menefee coals as compared to the Fruitland coals in the Star Lake field is an added incentive to mine (Table 20). The major problem with development in this area is the lack of rail transportation to market. If the proposed Star Lake railroad is built, the potential for development in the east Chacra Mesa field would be greatly increased.

San Mateo Field

General Desciption--This field extends from the boundary between T. 16 N. and T. 17 N., southward to the Point Lookout Sandstone outcrop, covering portions of townships T. 13-16 N., R. 3-8 W., for a total of 370 sq mi (958 sq km) (Map 27). The Point Lookout Sandstone outcrop separates the San Mateo field from the Crownpoint field to the west and the South Mount Taylor field to the east. The boundary between the San Mateo and La Ventana fields is the line between R. 2 W. and R. 3 W.

The eastern portion of the San Mateo field is simple in structure. To the west, north-south trending anticlines and synclines are present. A prominent structural feature, the San Mateo Dome, occurs seven miles north of San Mateo. The east flank of this dome is highly fractured, the north and east flanks show great vertical relief, and the north flank dips into a broad shallow syncline. A second major feature is the San Miguel Creek Dome (Hunt, 1936).

In the eastern portion of the San Mateo field, Cleary Member coals of the Menefee Formation outcrop extensively. There are very few Allison Member coals within the upper part of the outcropping Menefee Formation (Fig. 24).

Coals from the San Mateo field have an as-received heating value slightly lowr than that found for other Menefee Formation coals. The rank of coals in the San Mateo field is generally high volatile C bituminous. Ash content is very similar to that of the Menefee coals, being only 6.7% higher. The total sulfur content (.78+/-.33%) is much lower than that found for Menefee coals (Table 20). The pyritic/organic sulfur ratio indicates a reduction of pyritic sulfur in the San Mateo coals. Table 19 summarizes the quality analyses for this field.

Resource and Development Potential--Coals of the San Mateo field are in the Cleary Member of the Menefee Formation. In most places the coal beds are in the lower part of the Cleary Member. Reserve estimates for the east part of this field within 250 ft (76 m) of the surface, amount to 270 million tons (245 million metric tons). Generally, within 250 ft (76 m) of the surface there are three beds with thicknesses greater than 2.5 ft (0.8 m). The average thickness of these beds is 3 ft (0.9 m) (Appendix 2). Resource and reserve figures for east San Mateo are given in Tables 23 and 24.

East San Mateo field has a high resource potential (Fig. 25, Map 27). Although there is little previous mining in the area, drill hole and outcrop data from recent work (Tabet and Frost, 1979) and previous studies (Shomaker and others, 1971) indicate a high coal resource potential.

Development potential of the coal resources in east San Mateo is dependent on the proposed Star Lake Railroad coming into the San Juan Basin. The topography of the area, except east of San Miguel Creek Dome, is conducive to strip mining. The low ash, low sulfur and good Btu value of the coals along with the multiplicity of beds are all important positive factors for the development of this coal field.

Hagan Field

General Description--The Hagan field, also known as the Una del Gato field, is located in Sandoval County, covering portions of T. 12-13 N., R. 6 E. Coals in this field are correlated with the Menefee Formation. The Placitas field is a small outcrop in T. 12-13 N., R. 5 W., just east of the Hagan field and will be considered here instead of as a separate field (Fig. 24, Map 30).

The Hagan field is structurally a syncline with Menefee Formation coals exposed near the axis of this structure. The coal-bearing strata have a maximum dip of 20 degrees. There is also some faulting in the Hagan Basin. The Placitas coal outcrops occur in steeply dipping beds of the Menefee Formation. The beds can be dipping to the northeast from 45 to 70 degrees.

The average as-received Btu value for coals from the Hagan field is nearly equal to that found for the average of the rest of the Menefee Formation. The average ash content of the coals from this field is 8.3% lower than the 12.3% average for the remaining Menefee Formation coals. Sulfur is also notably lower than for other Menefee Formation coals (.66% vs 1.12%). The as-received analyses available for the Hagan field, are summarized in Table 19.

Coal Mining and Past Production--There were two periods of mining in the Hagan (Una del Gato) field, the first beginning in 1903 with the Hagan mine producing and the opening of the Pina Vititos mine. Both mines were operated by New Mexico Fuel and Iron (Appendix 1). Little tonnage is reported for the Pina Vititos mine but V. C. Kelley and Northrop (1975) estimate a total of

2,000 tons (1,814 metric tons) from this mine. The Sloan mine was also opened at this time. V. C. Kelley and Northrop (1975) estimate a total production from the Sloan mine to be 8,000 tons (7,257 metric tons). From 1903-1909 the Hagan produced 12,088 tons (10,966 metric tons) (V. C. Kelley and Northrop, 1975) from two slopes. The Hagan mine had a productive period from 1925-1931 (V. C. Kelley and Northrop, 1975) of 67,113 tons (60,833 metric tons). V. C. Kelley and Northrop estimate production for the Hagan mine to be:

1904-1909	12,100 tons (10,977 metric tons)
1910-1925	3,200 tons (2,903 metric tons)
1926-1931	67,700 tons (61,416 metric tons)

Total Hagan mine production is 83,000 tons (75,296 metric tons). The Tejon mine produced 557 tons (505 metric tons) in 1926. In 1937, 3,711 tons (3,367 metric tons) were produced and in 1939, 5,137 tons (4,660 metric tons; Table 22, Appendix 1) at the Tejon mine.

Total production for the Hagan coal field amounted to 115,465 tons (104,748 metric tons). Assuming all this was mined from less than 1,000 ft (305 m) and beds greater than 1.4 ft (0.4 m) almost 6,900,000 tons (6,259,574 metric tons) of coal remain as resources in the Hagan field. The largest problem with this resource is the fact that many of the beds in this field would not be considered of minable thickness (minimum 2.5 ft, or 0.76 m).

In the Placitas area three coal prospects were developed (Appendix 1). The Traddei prospect is the only one in this area with known production of 265 tons (240 metric tons; Table 21, Nickelson, 1979).

Resource and Development Potential--Read and others (1950) estimated resources for the Hagan field to be 17.3 million tons (15.7 million metric tons) of coal. The thickness of these coal beds range f rom 0.5 to 5 ft (0.2-1.5 m). No point source data is available for this field for resource and reserve calculations.

The Hagan coal field and Placitas area have a moderate to low resource potential (Fig. 25, Map 30) because there has been mining in the past, but there is little data for the field other than surface mapping (Kelley and Northrop, 1975). The large angle dips and faulting in the area require drill hole data to get an accurate estimate of the coal resource potential.

The development potential for the Hagan coal field for surface mining is low due to the structure of the field. The faulting is a negative factor for underground development especially considering the thinness of the coal beds.

Star Lake Field

General Description--The Star Lake field is defined by the outcrop of the Fruitland Formation from R. 9 W. to R. 1 W. in T. 19 N. to T. 21 N. (Map 27). The northern boundary is at the contact of the Ojo Alamo Formation. The southern boundary of the Star Lake field is the Fruitland-Pictured Cliffs contact. This field encompasses 185 sq mi (479 sq km), making this the smallest of the Fruitland Formation fields (Fig. 24). The Star Lake field extends from the Bisti field on the west eastward to Cuba. East of Cuba the Fruitland Formation becomes increasingly sandy and thins to disappearance.

The general dip of the Fruitland Formation within the Star Lake field is gentle, ranging from one to five degrees into the basin, swinging from NE in the western portion of the field to the NW in the eastern portion of the field. There is some normal faulting, mainly in the northeast-eastern portion of the field (Dane, 1936; Woodward and others, 1973; Fassett, 1966; Hinds, 1966).

The coals of the east Star Lake field are in the outcropping Fruitland Formation. Coal-bearing sequences in the Fruitland diminish east of R. 3 W., due to the increased sandiness of the formation.

Analyses of cores from this field show that Star Lake coals have an average Btu value of 8,736 Btu/lb, which is 7.7% lower than the average for the remaining Fruitland Formation coals (Table 20). On a mmmf Btu basis the Star Lake coals have a heating value of 11,614, 6% lower than the 12,347 Btu/lb average for the other three Fruitland Formation fields. This mmmf Btu average indicates a rank of high-volatile C bituminous. The 7% decrease in the as-received Btu value is reflected by a 7% increase in ash content (21.3% for Star Lake vs 21.6% for the remaining Fruitland Formation). The total sulfur (0.61%) is the lowest of the Fruitland Formation coals, which average 0.78%. Coals from the Star Lake field have the lowest variability of all the Fruitland Formation fields. Statistical breakdown of the available analyses (Appendix 3) is given in Table 19.

Resource and Development Potential--Conservative estimates of the strippable coal reserves for coal beneath 250 ft (76 m) of overburden, is 1,064.9 million tons (966 million metric tons). Tbles 23 and 24 show resources and reserves by township and range. The seams in this estimate have an average thickness of 8.5 ft (2.5 m) and a maximum thickness of 22 ft (6.7 m). Within 250 ft (76 m) of the surface there is an average of two seams (Appendix 2).

The eastern part of the Star Lake field, west of T. 19 N., R. 2 W., has a high resource potential (Fig. 25, Map 27). This is shown in outcrop and drill hole data along with recent interest in the area. The coal quality in this field is the poorest of all the Fruitland fields, but the Fruitland coals are generally thicker and less lenticular than coals in the other coal-bearing formations within the San Juan Basin.

The development potential for the coal resources of east Star Lake are dependent on the proposed Star Lake Railroad. The topography in the area and the low angle dip of the beds is conducive to strip mining.

Geothermal Resources

(by Virginia T. McLemore)

Introduction

Geothermal energy has been utilized for electricity at Larderello, Italy, since 1904 and as heat and hot water elsewhere in the world probably since prehistoric times (Mortensen, 1978). In 1983, geothermal power production in the United States amounted to 1,285 MW_e (million watts electrical) or about 0.2% of installed electrical capacity from all sources (Guffanti, 1984). In New Mexico geothermal energy is used for space heating and as hot water (Hatton and Peters, 1982) and several projects are underway to utilize geothermal resources for generating electricity.

Geothermal resources refer to the natural concentration of heat generated within the interior of the earth that can be extracted economically (Muffler, 1981). The major thermal areas of the world are associated with volcanism and calderas, typically of Late Tertiary to Quaternary age (Godwin and others, 1971) and the source of the geothermal energy in these areas is most likely to be of magmatic origin. Other geothermal systems are associated with active tectonic sedimentary basins where geothermal energy probably results from waters, heated by a moderate geothermal gradient, and ascended from great depth along major faults without any apparent magmatic activity. Both types occur in the northern RPRA (Callender, 1981).

The fluid in most geothermal reservoirs is water that is held in liquid form but above the boiling temperature by the confining pressures. Some geothermal systems contain dry steam without any water or a mixture of steam and hot water (Godwin and others, 1971). Hydrothermal reservoirs are classified as high-temperature (>300°F or 150°C), intermediate-temperature (194-300°F or 90-150°C), and low-temperature (68-194°F or 20-90°C). However, these convective hydrothermal systems have a restricted distribution where they can be economically tapped (depths less than 15,000 ft or 4.5 km) and are of limited potential (Laughlin and others, 1977).

For the past ten years, Los Alamos Scientific Laboratory has been experimenting with the concept of extracting energy from rock that is hot but of low natural permeability where water- and vapor-dominated systems are not available (M. C. Smith and others, 1975). The concept of the Hot Dry Rock (HDR) process is to drill into the impermeable rock and connect a pair of drill holes by a hydraulically induced fracture system (Laughlin and others, 1977; M. C. Smith and others, 1975). Water is injected into the fractures through an injection well and is heated by the hot rock. The heated water is recovered through a production well, used to generate electricity, and recycled through the injection well to complete the cycle. Experiments with HDR are underway at the Fenton Hill site in the Jemez Mountains in Sandoval County. It is hoped that HDR could be used to generate electricity in areas where water- and vapor-dominated systems are not available.

The Geothermal Steam Act of 1970 established criteria for the USGS to utilize in designating areas that are prospectively valuable for geothermal resources; these areas are termed KGRA

(Known Geothermal Resource Areas; Godwin and others, 1971; Renner and others, 1975). The New Mexico State Land Office also designates favorable areas within the state for potential geothermal resources; these areas are termed KGRF (Known Geothermal Resource Fields; Hatton and Peters, 1982; Hatton, 1981a, b, 1980, 1977). Favorable criteria include nearby discoveries, competitive interests, and favorable geologic, geochemical, and geophysical conditions.

KGRA's and KGRF's are generally found in tectonically active areas, typically with the presence of late Teritary or Quaternary volcanism and calderas. Geysers, fumaroles, mud volcanoes, or thermal springs are strong indications of geothermal energy. Subsurface reservoir temperatures are indicated by geothermometers such as SiO_2, Na, K, and Ca contents and Na/K ratios. Most geothermal reservoirs are in areas characterized by high heat flow. Heat flow is the dissipation of heat from within the earth by conduction or radiation at the surface and is measured in HFU (1 heat flow unit = 1 HFU = 1×10^{-2} Watts/m^2). The average heat flow in most areas is about 1.5 HFU.

Two KGRA's have been identified in the northern RPRA in the vicinity of the Valles caldera; (1) Baca Location #1 and (2) San Ysidro (Fig. 26; Map 35). The New Mexico State Land Office has also identified two KGRF's in the area. KGRF #2 is in the Jemez Mountains and includes the Baca Location #1 and the San Ysidro KGRA's and KGRF #4 is in the Rio Grande rift in western Bernalillo and Valencia and eastern Cibola Counties (Fig. 26; Map 35). Elsewhere along the Rio Grande rift, especially near Albuquerque, may have some geothermal potential even though these

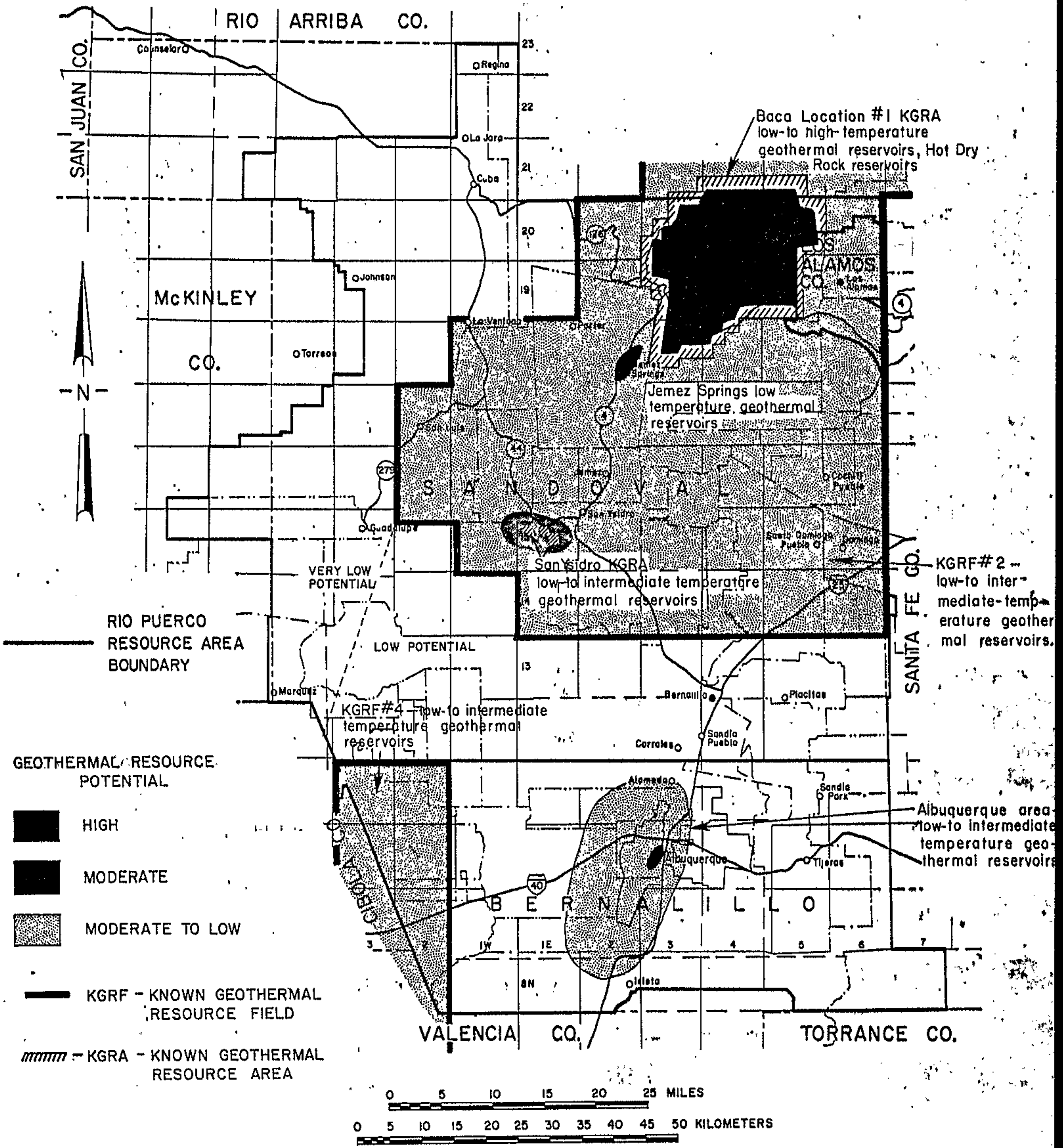

FIGURE 26 - GEOTHERMAL AREAS AND RESOURCE POTENTIAL IN NORTHERN RIO PUERCO RESOURCE AREA.

areas are not so designated.

Jemez Mountains

One of the more promising areas in New Mexico for geothermal resources is the Jemez Mountains which consists of two calderas, the Toledo and Valles. The Baca Location #1 and San Ysidro KGRA's are located in the Jemez Mountains near the youngest caldera, the Valles (Fig. 26; Map 35). Widespread recent alteration is prominent and suggestive of the interaction of hydrothermal fluids with the country rock. Heat flow values exceed 4.0 HFU near the Valles caldera (Reiter and others, 1979, 1978, 1975; C. L. Edwards and others, 1978) and further indicate geothermal potential.

Jemez Springs and San Ysidro--Numerous springs and wells surround the Valles caldera at Jemez Springs and San Ysidro (Map 33; Appendix 5). Temperatures range up to 385°F (196°C; Goff and Sayer, 1980; Bliss, 1983; Summers, 1979, 1976), although the mean reservoir temperature is only 109-167°F (43-75°C; Mariner and others, 1983). Geothermal reservoirs appear to be localized along faults and fractures, especially the Jemez fault zone and are a combination of heated meteoric waters and geothermal waters from the Valles caldera (Goff and others, 1981; Trainer, 1975; Goff and Sayer, 1980; Goff and Grigsby, 1982). The geothermal fluids dissolve Paleozoic limestones near Jemez Springs and form travertine deposits, such as Soda Dam. The waters at San Ysidro are also complex and probably derivatives of an intermediate-temperature system or a mixture of meteoric and geothermal waters (Goff and others, 1981; Callender, 1981).

The hot and warm waters in the Jemez Mountains have long been used for balneological purposes and recently are being used for a greenhouse and space heating for the village hall (Hatton and Peters, 1982; Goff and others, 1981; Laughlin, 1981). A 837 ft (255 m) well was drilled in 1979 at Jemez Springs and the 162°F (72°C) water is used for space heating (Goff and Grisby, 1982). Recent resistivity surveys in the area (Pearson and Goff, 1981) indicated that small reservoirs occur along the Jemez fault at depths of 150 ft (46 m) or less (Goff and Grisby, 1982).

Baca Location #1--The Baca demonstration project north of Jemez Springs (Map 33) was a joint venture between Union Oil Company of New Mexico, Department of Energy (DOE), and Public Service Company of New Mexico to develop a steam powered 50 MW_e generating plant (Bufe, 1983). The project was initiated in 1978 when Union Oil Company drilled four test wells which yielded 320,000 lbs (145,000 kg) of steam per hour. Geothermal fluids in ignimbrite at a temperature of 500°-600°F (260°-315°C) were brought to the surface where the fluids would instantly turn to steam because of the decrease in pressure and used to drive turbines to produce electricity. Initially Bodvarsson and others (1980) determined that a reservoir containing 2.2×10^{12} lbs (1.0×10^{12} kg) of hot fluid could generate a 50 MW_e power plant for 25 to 40 years. After drilling the four test wells, additional wells were drilled to provide the additional 900,000 lbs (408,000 kg) of steam per hour needed to generate 50 MW_e. By the end of 1981, only 268,000 lbs (122,000 kg) of steam per hour was being produced (Pay Dirt, 1983) and the project was abandoned because of the reservoir uncertainties and the high cost of drilling (Bufe, 1983).

Hot Dry Rock--Los Alamos Scientific Laboratory has successfully tested energy extraction from Hot Dry Rock (HDR), at the Fenton Hill site where two holes, GT-2 and EE-1 (Appendix 5; Map 35), were drilled into granite and granodiorite with temperatures ranging from 380° to 600°F (193-315°C) at depths less than 10,000 ft (3 km; Turner and Kues, 1978; Laughlin, 1981; Laughlin and others, 1983; Heiken and Goff, 1983). Circulation was established between the two holes by hydraulic fracturing and a 10 MW_e surface heat exchanger system was used to remove heat from the injected waters. The heat was simply released into the atmosphere during the initial test phase (Laughlin and others, 1983).

The second phase of the HDR project involves testing of a deeper, hotter, and larger reservoir. Once again two drill holes, EE-2 and EE-3, were drilled to depths of about 15,000 ft (4.6 km) where the bottom hole temperature is 613°F (323°C; Laughlin and others, 1983). Attempts to connect the two wells by hydraulic fracturing have not yet succeeded (Guffanti, 1984). The HDR project is a joint venture between Los Alamos and the governments of West Germany and Japan (M. C. Smith, 1982). Future tests are necessary to determine if sufficient energy exists for a plant to generate 10-20 MW_e for any length of time.

Pajarito Plateau--Los Alamos National Laboratory is currently investigating in the Pajarito Plateau for use of geothermal fluids for space heating (Goff and Grisby, 1982). A potable reservoir was found at depths of 1,970 ft (600 m) and temperatures of 86-95°F (30-35°C). Conservative estimates suggest that saline waters should occur at depths of 9,000-11,000 ft (2.7-3.4 km) and temperatures exceeding 194°F (90°C) which can be used for space heating. However, the first attempts to reach the reservoir failed due to lost circulation in fractured Bandelier Tuff and by caving of unconsolidated Tertiary sediments. A second test has not been planned (Goff and Grigsby, 1982).

Southern Valles Caldera--The Valles caldera is characterized by a bouguer gravity high (Fig. 19), however, only the southern portion of the Valles caldera is characterized by a magnetic low (Fig. 18). Furthermore, the gravity and magnetic data suggest that the southern portion of the Valles caldera forms the intersection of (1) a northwest trending shear zone, (2) a northeast trending shear zone, and (3) north-south trending Rio Grande rift. This three-way intersection suggests the southern Valles caldera may be a good site for fracture-controlled permeability for geothermal reservoirs. Drilling and/or detailed geophysical studies are needed in this region.

Resource and development potential--The geothermal-resource potential is high in the Baca Location #1 KGRA in the Jemez Mountains for low-, intermediate-, and high-temperature geothermal reservoirs and for HDR (Fig. 26; Map 35). The geothermal-resource potential for low- to intermediate-temperature geothermal reservoirs is high in the Jemez Springs area (Swanberg and others, 1980), moderate in the San Ysidro KGRA (Callender, 1981) and low to moderate in the Pajarito Plateau

(KGRF #2; Fig. 26; Map 35). The geothermal-resource potential for high-temperature geothermal reservoirs in these three areas is low. The geothermal-resource potential elsewhere in the Jemez Mountains KGRF is low to moderate because the geothermal fluids have not been proven (Fig. 26; Maps 35, 37). The potential for HDR elsewhere in the Jemez Mountains is unknown.

The potential for development of the geothermal resources is high in the Jemez Springs area, at Fenton Hill, and at Los Alamos (Pajarito Plateau). Elsewhere the potential for development ranges from low to moderate (Maps 35, 37; Fig. 26). Geothermal resources may not be economically competitive with other conventional forms of energy because (1) drill holes are extremely expensive, (2) the distance to potential customers (Albuquerque) is substantial enough to add significantly to the overall cost, and (3) reservoir uncertainties have not been resolved.

Rio Grande rift

Although no KGRA's have been delineated by the USGS in the Rio Grande rift, one KGRF (Canada de los Apaches, KGRF #4) has been identified by the New Mexico State Land Office in western Bernalillo and Valencia and eastern Cibola Counties (Fig. 26; Maps 37 and 38) on the basis of high heat flow, Late Tertiary to Quaternary volcanism, and presence of geothermal wells. The average heat flow along the Rio Grande rift is about 2.56 $\pm$ 0.63 HFU (Reiter and others, 1979, 1978, 1975; C. L. Edwards and others, 1978). Numerous volcanoes and lava-capped mesas occur along the western edge of the rift from Belen to north of

Bernalillo (Kudo, 1982; Grant, 1982; V. C. Kelley and Kudo, 1978). Some of these volcanoes are dated at 190,000 years old (Kudo, 1982; Bachman and Mehnert, 1978). Geothermal wells in the area range up to 90°F (32°C) at depths of 1,100-1,300 ft (340-400 m). Presently, geothermal waters are being used to space heat the Sandia Savings Building in downtown Albuquerque (Hatton and Peters, 1982).

Geophysical studies within the Rio Grande rift indicate that geothermal waters occur near buried magma bodies or along major faults within the subsurface. A gravity survey by Ander and Huesties (1978) suggests that a shallow magma body lies beneath the Lucero uplift partly on the Laguna Indian Reservation. The mean reservoir temperature is about 80°F (27°C; Mariner and others, 1983). Magnetic and resistivity surveys west of Albuquerque by Jiracek and others (1982) suggest that geothermal waters migrate upwards along a major fault. Additional detailed geophysical surveys may aid in delineating potential targets for local geothermal reservoirs.

Resource and development potential--The geothermal-resource potential in the Albuquerque area is high for low- to intermediate-temperature reservoirs where geothermal waters are being used for space heating (Fig. 26; Map 37). Elsewhere in the Albuqueruqe area and in KGRF #4, the geothermal-resource potential for low- to intermediate-temperature reservoirs is low to moderate near volcanics or buried magma bodies or along deep-seated faults. Elsewhere along the Rio Grande rift, the geothermal-resource potential is unknown due to insufficient data. The potential for development is highest in the Albuquerque area and decreases away from the city.

San Juan Basin

A number of wells drilled in the San Juan Basin have reported bottom hole temperatures in excess of 86°F (30°C) and have estimated geothermal gradients greater than 40°C/km (Swanberg and others, 1980; Mariner and others, 1983; Appendix 1; Maps 33 and 34). The majority of these wells probably represents basin waters heated by a normal to moderate thermal gradient or heated at great depth and migrated towards the surface along faults. These warm waters occur at depths ranging from 997 to 4,610 ft (303-1,405 m). The geothermal-resource potential is probably very low because of the low temperatures and great depth. The potential for development is low because of extreme distance to a potential market.

Petroleum

(by Ronald F. Broadhead)

Petroleum production history

Petroleum is produced from Jurassic and Cretaceous rocks in the RPRA. All production has been confined to Sandoval County in the San Juan Basin. Production began in 1953 when the Media Entrada pool was discovered. Production is presently from 17 designated oil pools, 3 designated gas pools, and from several wells that do not produce from designated pools (Appendix 6). Five oil pools have been either abandoned or shut in. Cumulative oil and gas production as of December 31, 1982, is summarized in Table 25.

Table 25--Oil and gas production from Sandoval County

OIL POOL	CUMULATIVE OIL PRODUCTION (BBLS)
Eagle Mesa Entrada	955,158
Media Entrada	1,050,735
Southwest Media Entrada	735,810
Chacon Dakota	1,002,458
Five Lakes Dakota (abandoned)	40,847
Otero Sanastee (abandoned)	29,882
Alamito Gallup	16,254
Lybrook Gallup	97,673
Media Gallup	29,576
Rusty Gallup (shut-in)	34,450
San Ysidro Mancos	15,452
Rusty Menefee (abandoned)	8,695
Otero Point Lookout Mesaverde (abandoned)	18,881
Parlay Mesaverde	85,766
San Luis Mesaverde	61,540
South San Luis Mesaverde	361
Venado Mesaverde	54,096
Undesignated Entrada	1,574
Undesignated Dakota	8,623
Undesignated Graneros	12,864
Undesignated Gallup	143,261

OIL POOL	CUMULATIVE OIL PRODUCTION (BBLS)
Undesignated Mancos	285
Undesignated Mesaverde	6,361
Undesignated Sandoval	6,238
Total production	4,416,840

GAS POOL	CUMULATIVE GAS PRODUCTION (MCF)
Rusty Chacra	814,204
Ballard Pictured Cliffs	18,146,463
South Blanco Pictured Cliffs	5,453,344
Total production	24,414,011

All petroleum production data presented in this report were obtained from the annual reports of the New Mexico Oil and Gas Engineering Committee. Information concerning individual test wells is presented in Appendix 6 and test wells are plotted on Maps 40-46.

Oil and Gas Pools

The 17 oil and three gas pools listed in Table 25 are located in the RPRA (Fig. 27). As of December 31, 1982, six pools had produced a total of 4,237,876 BO, 24,414,011 MCF nonassociated gas, and at least 7,863,282 MCF casinghead gas. 3,744,161 BO, or 88% of the oil produced, came from the Eagle Mesa Entrada, Media Entrada, Southwest Media Entrada, and Chacon Dakota pools.

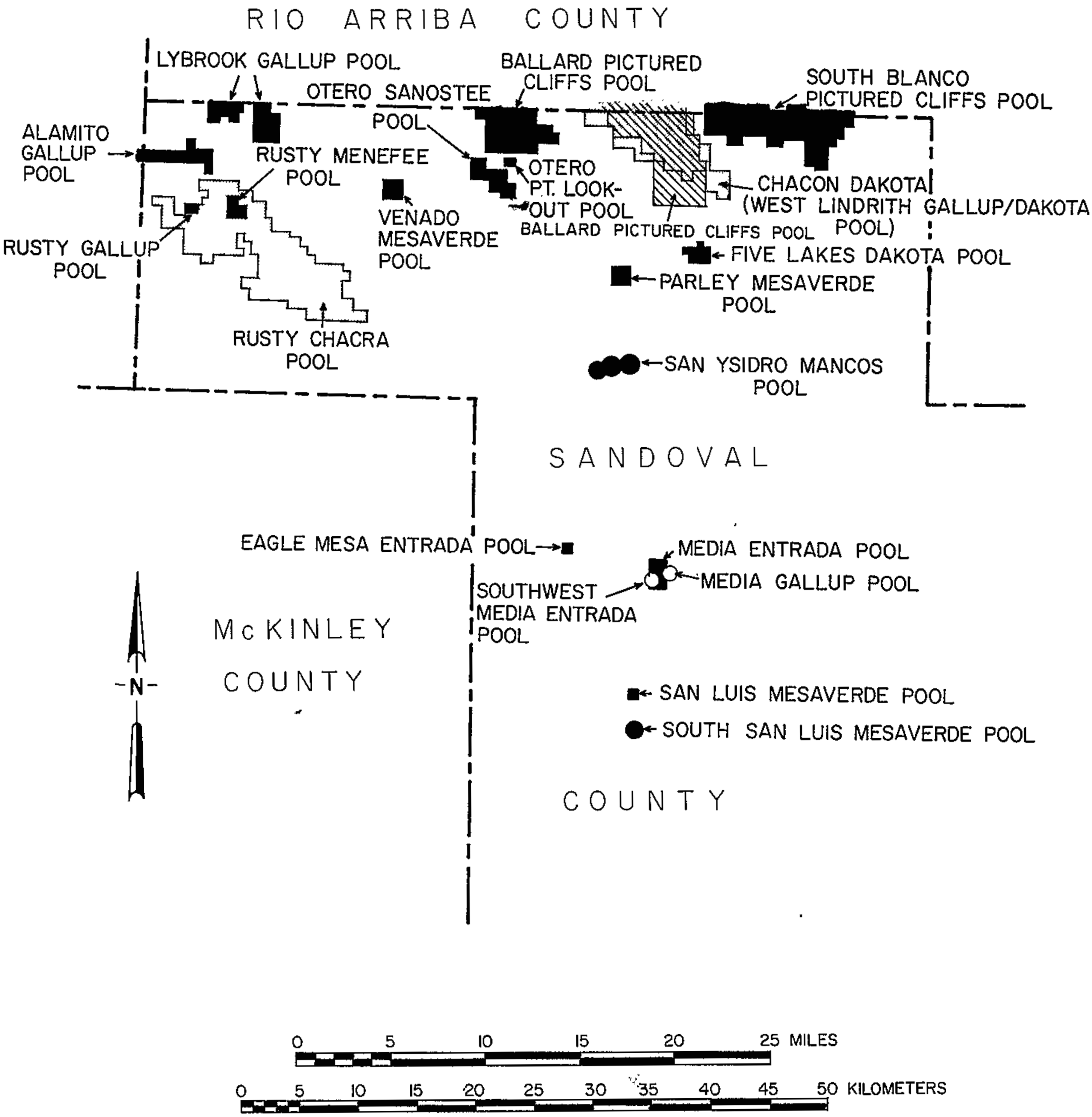

FIGURE 27 – PETROLEUM POOLS IN SANDOVAL COUNTY

Eagle Mesa Entrada Pool (oil)--The Eagle Mesa Entrada Pool is located in Sec. 11, T. 19N., R. 4 W., Sec. 12, T. 19 N., R. 4 W., Sec. 13, T. 19 N., R. 4 W., and Sec. 14, T. 19 N., R. 4 W., Sandoval County, New Mexico (Fig. 27; Map 42). The Eagle Mesa Entrada Pool produces oil from the Entrada Sandstone (Jurassic). It is located in the southeast part of the San Juan Basin.

The Eagle Mesa Entrada Pool was discovered in 1975 by the Filon Exploration No. 1 Federal "12", located in Sec. 12, T. 19 N., R. 4 W., Sandoval County. The No. 1 Federal "12" drilled to a total depth of 5,735 ft (1,748 m). It was completed on August 25, 1975 for an initial pumping production of 97 BOPD and 4,300 BWPD through perforations from 5,483 to 5,493 ft (1,671-1,674 m). As of December 31, 1982, the Eagle Mesa Entrada Pool had produced a cumulative total of 955,158 BO. A large volume of formation water is produced with the oil. Annual production data of oil and water are summarized in Table 26.

Table 26--Annual oil and water production from the Eagle Mesa Entrada pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1975	48,166	361,531	4
1976	109,947	1,288,105	1
1977	162,110	3,328,737	4
1978	163,068	4,819,910	4
1979	150,746	4,090,616	4
1980	132,049	4,403,468	3
1981	110,709	4,972,500	3
1982	78,363	4,832,300	3

The Eagle Mesa Entrada Pool produces oil from a stratigraphic trap in the Entrada Sandstone. The trapping mechanism is a closed structural high that was formed by burial of an Entrada-age aeolian sand dune (Vincelette and Chittum, 1981). Impermeable limestone and anhydrite of the overlying Todilto Formation (Jurassic) seal the Entrada reservoir. A north-plunging regional dip and hydrodynamic forces have modified the location of oil within the Entrada sand dune; ground-water flow has resulted in a southward tilt of the oil-water contact (Vincelette and Chittum, 1981, p. 2,560).

The Entrada is regionally 100-200 ft (30-60 m) thick. It is fine- to medium-grained, rounded to subrounded, well-sorted sandstone (Reese, 1978a, p. 410). Average thickness of net pay is 26 ft (8 m; J. P. Campbell, 1978, p 285). Porosity ranges from 22 to 26% and permeability ranges from 150 to 450 millidarcies. Eagle Mesa Entrada oil is paraffin based, has a pour point of 50°F (10°C) and has a gravity of 33°API (J. P. Campbell, 1978, p. 285).

The estimated ultimate recovery from the Eagle Mesa Entrada Pool is 1,615,000 BO, or 30% of the original oil in place (J. P. Campbell, 1978, p. 285). Because 955,158 BO had been recovered by the end of 1982, it is calculated that 659,842 BO, or 41% of the original recoverable oil, remains unproduced.

Media Entrada Pool (oil)--The Media Entrada Pool is located in Sec. 14, T. 19 N., R. 3 W., and Sec. 15, T. 19 N., R. 3 W., Sandoval County, New Mexico (Fig. 27; Map 42). The Media Entrada Pool produces oil from the Entrada Sandstone (Jurassic). It is located in the southeast part of the San Juan Basin.

The Media Entrada Pool was discovered in 1953 by the

Magnolia Petroleum Corporation No. 1 Hutchinson Federal, located in Sec. 14, T. 19 N., R. 3 W., Sandoval County. The Hutchinson Federal drilled to a total depth of 9,684 ft (2,952 m) and was plugged back to 5,231 ft (1,594 m) to test the Entrada. The well was completed on November 23, 1953, for an initial pumping production of 78 BOPD. As of December 31, 1982, the Media Entrada Pool had produced a cumulative total of 1,050,735 BO from nine wells, seven of which are currently active. A large volume of formation water is produced with the oil. Annual production data of oil and water are summarized in Table 27. Data from pool discovery in 1953 to 1958 are poorly documented, so production for those years is lumped.

Table 27--Annual oil and water production from the Media Entrada Entrada pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1953-1958	18,218	25,456	0
1959-1968	0	0	0
1969	33,996	34,931	3
1970	21,485	9,155	3
1971	61,037	224,110	3
1972	185,887	641,528	4
1973	168,111	1,430,342	4
1974	207,155	2,581,369	4
1975	117,478	1,761,703	4
1976	100,148	1,918,885	4
1977	50,964	1,652,556	4

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1978	16,631	964,913	4
1979	3,097	241,342	4
1980	5,074	280,336	2
1981	33,215	1,156,000	2
1982	28,239	896,000	2

The large volumes of water produced with the oil caused production to be uneconomic and the pool was abandoned in 1958. In 1969, Don C. Wiley and Fluid Power Pump Company drilled the No. 1 Federal Media in Sec. 14, T. 19 N., R. 4 W., and the use of high-volume down-hole pumps allowed the production of large quantities of reservoir fluid, including economic volumes of oil (Vincelette and Chittum, 1981, p. 2,547).

The Media Entrada Pool produces oil from a stratigraphic trap in the Entrada Sandstone. The trapping mechanism is a closed structural high that was formed by burial of an Entrada-age aeolian sand dune (Vincelette and Chittum, 1981). Impermeable limestone and anhydrite of the overlying Todilto Formation (Jurassic) seal the Entrada reservoir. A north-plunging structural nose and hydrodynamic forces have modified the location of oil within the Entrada sand dune; ground-water flow has resulted in a southwest tilt of the oil-water contact (Vincelette and Chittum, 1981, p. 2,546-2,549).

Over most of the RPRA, the Entrada is regionally 100-120 ft thick (30-37 m), but it is 215 ft (66 m) thick in the discovery well. The Entrada is a fine- to medium-grained, rounded to subrounded, well-sorted sandstone (Reese, 1978a, p. 410). Average thickness of net pay is 25 ft (8 m) in the Media Entrada Pool. Average porosity is 23% and average permeability is 290 millidarcies; both horizontal and vertical permeability are high. Media Entrada oil is black and has a gravity of 33.5° API; it has a high pour point (Reese, 1978a, p. 410). Associated formation water produced with the oil is brackish and contains less than 2,500 ppm dissolved salts.

The estimated ultimate recovery from the Media Entrada Pool is 2,198,000 BO (Reese, 1978a, p. 410). Because 1,050,735 BO had been recovered by the end of 1982, it is calculated that 1,147,625 BO, or 52% of the original recoverable oil, remains unproduced.

Southwest Media Entrada Pool (oil)--The Southwest Media Entrada Pool is located in Sec. 22, T. 19 N., R. 3 W., Sandoval County, New Mexico (Fig. 27; Map 42). The Southwest Media Entrada Pool produces oil from the Entrada Sandstone (Jurassic). It is located in the southeast part of the San Juan Basin. The Southwest Media Entrada Pool was discovered in 1972 by the Fluid Power Pump Company No. 5-22 Boling Federal, located in Sec. 22, T. 19 N., R. 3 W., Sandoval County. The Boling Federal drilled to a total depth of 5,450 ft (1,661 m) and was completed on June 15, 1972. Initial pumping production was 480 BOPD and 1,440 BWPD from the Entrada Sandstone through perforations from 5,346 ft to 5,376 ft (1,629-1,639 m). The Southwest Media Entrada Pool was not designated as a field separate from the Media Entrada Pool until 1974. As of December 31, 1982, the Southwest Media Entrada Pool had produced a cumulative total of 735,810 BO from three wells, all of which are currently active. A large volume of formation water is produced with the oil. Annual production data of oil and water are summarized in Table 28.

Table 28--Annual oil and water production from the Southwest Media Entrada pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1972	1,674	15,264	1
1973	1,847	13,220	1
1974	31,150	102,014	2
1975	64,455	207,015	2
1976	187,141	426,835	2
1977	209,618	1,734,886	2
1978	91,129	2,396,788	3
1979	70,285	3,446,865	3
1980	41,090	2,914,800	3
1981	22,950	2,793,800	3
1982	14,471	2,655,500	3

The Southwest Media Entrada Pool produces oil from a stratigraphic trap in the Entrada Sandstone. As with the Media Entrada Pool, the trapping mechanism is a closed structural high that was formed by burial of an Entrada-age aeolian sand dune (Vincelette and Chittum, 1981). Impermeable limestone and anhydrite of the Todilto Formation (Jurassic) seal the Entrada reservoir. A north-plunging structural nose and hydrodynamic forces have modified the location of oil within the Entrada sand dune; ground-water flow has resulted in a southwest tilt of the oil-water contact (Vincelette and Chittum, 1981, p. 2,546-2,549).

The Entrada is regionally 100-120 ft (30-37 m) thick and the discovery well drilled 108 ft of Entrada before reaching a total depth of 5,450 ft (1,661 m) in the Entrada. The Entrada is a fine- to medium-grained, rounded to subrounded, well-sorted sandstone (Reese, 1978b, p. 413). Average pay thickness is 18 ft (5 m) in the Southwest Media Entrada Field. Average porosity is 24% and average permeability is 360 millidarcies; both horizontal and vertical permeability are large. The oil is black and has a gravity of 33.5° API; it has a high pour point of 90°F (32°C; Reese, 1978b, p. 413). Associated formation water produced with the oil is brackish and contains less than 2,500 ppm dissolved salts.

The estimated ultimate recovery from the Southwest Media Entrada Pool is 1,800,000 BO (Reese, 1978b, p. 413). Because 735,810 BO had been produced by the end of 1982, it is calculated that 1,064,190 BO or 59% of the original recoverable oil, remains unproduced.

<u>Chacon Dakota Pool (West Lindrith Gallup/Dakota; oil)</u>--The Chacon Dakota Pool is located in Rio Arriba and Sandoval Counties, New Mexico. The pool name was changed to West Lindrith Gallup/Dakota in Aril, 1984 by order of the New Mexico Oil Conservation Division. The Sandoval County part of the pool is located in T. 22 N., R. 3 W., and T. 23 N., R. 3 W. (Fig. 27; Map 40). The Chacon Dakota Pool produces oil and associated gas from the upper

part of the Dakota Sandstone (Cretaceous). The pool is located in the southeast part of the San Juan Basin.

The Chacon Dakota Pool was discovered by the Keesee and Thomas No. 1 Chacon Jicarilla Apache D, located in Sec. 23, T. 23 N., R. 3 W., Sandoval County. The No. 1 Chacon Jicarilla Apache D drilled to a total depth of 7,863 ft (2,397 m) and was completed on September 7, 1974, for an initial flowing production of 95 BOPD and 55 MCFGPD through perforations from 7,315 to 7,345 ft (2,230-2,239 m). As of December 31, 1982, the Sandoval County part of the pool had produced a cumulative total of 1,002,458 BO, or 31% of the 3,205,913 BO produced by the entire pool. Annual production data for the Sandoval County part of the pool for years since pool designation in 1976 are summarized in Table 29.

Table 29--Annual oil, gas, and water production from the Southwest Media Entrada pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL GAS PRODUCTION (MCF)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1976	30,510	98,073	0	6
1977	83,975	592,525	0	11
1978	78,605	1,001,567	0	19
1979	100,580	1,248,861	0	28
1980	148,751	1,114,612	120	39
1981	316,982	1,755,116	1,605	52
1982	240,398	1,611,753	1,185	59

The Chacon Dakota Pool produces oil and gas from a stratigraphic trap in the Dakota Sandstone (Beach and Thomas, 1978). The trap is formed by a northwest-trending barrier bar in the upper part of the Dakota, as defined by Owen (1963). The reservoir is white to gray, very fine-grained sandstone; average net pay is 50 ft (15 m; Beach and Thomas, 1978, p. 263). Average porosity is 9.5% and permeability ranges from 0.01 to 0.1 millidarcy. Chacon Dakota oil has a gravity of 60°API and a pour point of 20°F (-7°C; Beach and Thomas, 1978, p. 263). Chacon Dakota gas has a specific gravity of 0.741 and a heating value of 1,270 BTU/ft^3; the gas has the following composition (Beach and Thomas, 1978, p. 263): 75.7% methane, 13.9% ethane, 5.9% propane, 4.5% other components.

Five Lakes Dakota Pool (oil, abandoned)--The Five Lakes Dakota Pool is located in Secs. 24, 25, and 26, T. 22 N., R. 3 W., Sandoval County, New Mexico (Fig. 27; Map 40). The Five Lakes Dakota Pool was abandoned in 1974 and produced oil from the Graneros Shale and Dakota Sandstone (Cretaceous). It is located in the southeast part of the San Juan Basin.

The Five Lakes Dakota Pool was discovered in 1970 by the Petroleum Refiners No. 1 Cuba-Union, located in Sec. 25, T. 22 N., R. 3 W., Sandoval County. The No. 1 Cuba-Union was drilled to a total depth of 7,189 ft (2,191 m). It was completed on October 8, 1970, for an initial production of 387 BOPD and 54 BWPD through perforations in the Graneros Shale from 6,878 to 6,914 ft (2,096-2,107m). The Five Lakes Dakota Pool produced a cumulative total of 40,847 BO prior to field abandonment in 1973. Annual production data are summarized below. Annual production data prior to official field designation in 1972 are not listed. The field was abandoned because it became uneconomical to produce the low volumes of oil obtained from the field (Reese, 1978d, p. 290).

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1972	9,416	831	4
1973	1,640	1,500	0

The Five Lakes Dakota Pool produced oil from a stratigraphic trap in the Graneros Shale and Dakota Sandstone (Reese, 1978d, p. 290). The reservoirs are very fine-grained shaly sandstones. Average porosity is 11.8% and average permeability is 7.23 millidarcies (Reese, 1978d, p. 290). Average net pay is 12.6 ft (4 m). Five Lakes Dakota oil is paraffin based and has a gravity of 40°API.

Otero Sanostee Pool (oil, abandoned)--The Otero Sanostee Pool is located in T. 22 N., R. 4 W., T. 22 N., R. 5 W., and T. 23 N., R. 5 W., Sandoval County, New Mexico (Fig. 27; Map 40). The pool was abandoned in 1960 and produced oil and associated gas from the Sanostee Member of the Mancos Shale (Cretaceous). The Sanostee is a synonym for the Juana Lopez Member of the Mancos Shale (Molenaar, 1977b, p. 162) and consists of thinly interbedded calcarenite, very fine-grained sandstone, and shale. The Otero Sanostee Pool is located in the southeast part of the San Juan Basin.

The Otero Sanostee Pool was discovered in 1955 by the Humble Oil and Refining Company No. 1 Jicarilla B, located in Sec. 1, T. 22 N., R. 5 W., Sandoval County. The No. 1 Jicarilla B drilled to a total depth of 6,368 ft (1,941 m) and was completed on May 14, 1955 for an initial potential of 50 BOPD through perforations from 5,820 to 5,840 ft (1,774-1,780 m). Between field discovery in 1955 and abandonment in 1960, the Otero Sanostee Pool produced a cumulative total of 29,882 BO. Annual production data are summarized in Table 30.

Table 30--Annual oil and gas production from the Otero Sandstone pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL GAS PRODUCTION (MCF)	NO. PRODUCING WELLS AT END OF YEAR
1955	5,162	-----	2
1956	6,586	5,372	2
1957	6,235	4,725	3
1958	5,032	3,854	3
1959	4,193	3,339	2
1960	1,378	1,120	2

Alamito Gallup Pool (oil)--The Alamito Gallup Pool is located in Sandoval and San Juan Counties, New Mexico. The Sandoval County part of the field is located in T. 22 N., R. 7 W., and T. 23 N., R. 7 W (Fig. 27; Map 40). The Alamito Gallup Pool produces oil and associated gas from basal Niobrara sandstones that are equivalent to the Tocito Sandstone Lentil of the Mancos Shale (Cretaceous). The pool is located in the southeast part of the San Juan Basin.

The Alamito Gallup Pool was discovered in 1971 by the BCO Inc. No. 1-C Federal, located in Sec. 31, T. 23 N., R. 7 W., Sandoval County. The No. 1-C Federal drilled to a total depth of 6,015 ft (1,833 m) and was completed on May 14, 1971, for an initial flowing production of 50 BOPD, 200 MCFGPD, and 2 BWPD through perforations from 4,706 to 4,958 ft (1,434-1,511 m). Oil gravity is 42° API. As of December 31, 1982, the Sandoval County part of the Alamito Gallup Pool had produced 16,254 BO, or 49% of the 33,321 BO produced from the entire pool. Annual production data are available from 1978 through 1982 for the Sandoval County part of the pool and are summarized in Table 31.

Table 31--Annual oil, gas, and water production from the Alamito Gallup pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL GAS PRODUCTION (MCF)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1978	1,470	7,264	0	2
1979	353	4,195	0	2
1980	1,202	7,903	0	2
1981	1,222	6,110	0	2
1982	1,141	5,705	9	2

Lybrook Gallup Pool (oil)--The Lybrook Gallup Pool is located in Rio Arriba, Sandoval, and San Juan Counties. The Sandoval County part of the pool is located in T. 23 N., R. 6 W. (Fig. 27; Map 40). The Lybrook Gallup Pool produces oil and associated gas from basal Niobrara Sandstones that are stratigraphically equivalent to the Tocito Sandstone Lentil of the Mancos Shale (Cretaceous). The pool is located in the southeast part of the San Juan Basin.

The Lybrook Gallup Pool was discovered in 1957 by the Harrell Budd No. 1 Dunn, located in Sec. 9, T. 23 N., R. 7 W., Rio Arriba County. The No. 1 Dunn drilled to a total depth of 5,896 ft (1,797 m) and was completed on March 11, 1957 for an initial flowing potential of 47 BOPD through perforations from 5,716 to 5,846 ft (1,742-1,782 m). As of December 31, 1982, the Sandoval County part of the Lybrook Gallup Pool had produced a cumulative total of 97,673 BO, or 7% of the 1,352,368 BO produced by the entire pool. Annual production data for the Sandoval

County part of the pool are summarized in Table 32; production data subdivided according to county are not available for years prior to 1972.

Table 32--Annual oil, gas, and water production from the Lybrook Gallup pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL GAS PRODUCTION (MCF)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1972	4,222	21,728	16	5
1973	3,577	16,353	13	5
1974	3,137	12,256	28	4
1975	3,084	13,780	17	4
1976	2,256	9,075	13	4
1977	1,389	3,706	9	4
1978	2,395	13,302	11	4
1979	2,662	13,544	6	4
1980	3,133	12,444	3	5
1981	3,168	18,918	9	6
1982	19,221	37,925	842	9

Oil in the Lybrook Gallup Pool is produced from stratigraphic traps formed by basal Niobrara sandstones which are equivalents of the Tocito Sandstone Lentil of the lower Mancos Shale (Reese, 1978e, p. 395). The Lybrook Gallup Pool is elongate in a northwest-southeast direction; this trend follows the elongation of the basal Niobrara sandstone lenses which were deposited as shallow marine barrier bars. The reservoirs are gray shaly sandstones; average net pay is 73 ft (22 m; Reese, 1978e, p. 395). The sandstone reservoirs are sealed by enveloping Mancos shale. Average porosity is 9.92% and average permeability is 0.56 millidarcy; some of the sandstones are fractured (Reese, 1978e, p. 395). Lybrook Gallup oil is paraffin based and has a gravity of 40^{o}API (Reese, 1978e, p. 395). Lybrook Gallup gas is dry, containing more than 90% methane and has a heating value of 1,344 BTU/ft^3 (Reese, 1978e, p. 395).

The estimated ultimate recovery using primary production methods is approximately 700,000 BO (Reese, 1978e, p. 395). Probably only a small fraction of that is located in Sandoval County.

Media Gallup Pool (oil)--The Media Gallup Pool is located in Sec. 22, T. 19 N., R. 3 W., and Sec. 23, T. 19 N., R. 3 W., Sandoval County, New Mexico (Fig. 27; Map 42). The Media Gallup Pool produces oil from sandstones in the Niobrara Shale Member of the Mancos Shale; these Niobrara sandstones are referred to as "Gallup" by convention but are not correlative with the type Gallup as described by Molenaar (1983b). The Media Gallup Pool overlies the Southwest Media Entrada Pool. It is located in the southeast part of the San Juan Basin.

The Media Gallup Pool was discovered in 1969 by the Don C. Wiley No. 3 Federal Media, an Entrada test that was plugged back to test the Gallup. The well was completed on June 4, 1969. Initial pumping production was 97 BOPD through perforations from 2,826 ft to 3,019 ft (861-920 m) . The well was stimulated with a sand-oil fracture. As of December 31, 1982, the Media Gallup Pool had produced a cumulative total of 29,576 BO. Annual production data of oil, gas, and water are summarized in Table 33. Data include production from wells that produced oil prior to official pool designation in 1977; data do not include production from Gallup wells located immediately northeast of the Media Gallup Pool in Sec. 14, T. 19 N., R. 3 W.

Table 33 - Annual oil and water production from the Media Gallup pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1969	3,123	101	1
1970	0	0	0
1971	302	1,010	0
1972	0	0	0
1973	5,378	2,090	1
1974	186	0	0
1975	7,966	0	1
1976	7,480	0	1
1977	1,776	0	2
1978	57	0	1
1979	1,487	3,060	2
1980	780	4,999	2
1981	1,040	7,650	1
1982	1	34	0

Initial production from the Media Gallup Pool was primary production with pumping equipment. The natural production mechanism is a solution gas drive (Reese, 1978c, p. 416). The low permeability of the Gallup and the low formation pressure (1,120 psi) caused by a small gas-oil ratio make economic primary oil production improbable. Formation pressures have been maintained by injection of water produced from the underlying Media Entrada Pool and Southwest Media Entrada Pool and this type of enhanced recovery makes the outlook for economic production more favorable (Reese, 1978c).

The Media Gallup Pool produces oil from a structurally-enhanced stratigraphic trap in the Gallup Sandstone. Gallup sandstone reservoirs are sealed by enveloping Mancos shale. The Media Gallup Pool produces from a northwest-oriented stratigraphic trend and the Gallup is arched over a north-plunging structural nose (Reese, 1978c). Areal limits of production have not been defined, but it is probable that the Gallup sandstone reservoirs in the Media Pool are lateral equivalents of the Gallup reservoir that produces oil in wells located approximately one-quarter mile northeast in SW/4 Sec. 14, T. 19 N., R. 3 W.

The reservoir in the Media Gallup Pool is a series approximately 500 ft (152 m) thick of interbedded gray shales and gray sandstones (Reese, 1978c, p. 416). Parts of the Gallup are naturally fractured. Average net pay thickness is 80 ft (24 m). Average sandstone porosity is 8% and average sandstone permeability is 0.56 millidarcies but is probably enhanced by fractures (Reese, 1978c, p. 416). Media Gallup oil is green, has a paraffin base, and has a gravity of 38°API.

Estimated ultimate recovery from the Media Gallup Pool is unknown because of the lack of production history and the presently unknown areal extent of the field.

Rusty Gallup Pool (oil, shut-in)--The one-well Rusty Gallup Pool is located in Sec. 16, T. 22 N., R. 7 W., Sandoval County, New Mexico (Fig. 27; Map 40). The pool has been shut in since 1976 and produced oil from thin, marine basal Niobrara sandstones that are stratigraphically equivalent to the Tocito Sandstone Lentil of the Mancos Shale (Cretaceous). The pool was discovered in 1975 by the Claude Kennedy No. 1 Dana State. That well drilled to a total depth of 4,980 ft (1,518 m) and was completed on July 14, 1975 for an initial flowing production of 16 BOPD, 75 MCFGPD, and 16 BWPD through perforations from 4,786 to 4,963 ft (1,459-1,513 m). Total production from discovery in 1975 until the field was shut in in 1976 was 34,450 BO. Oil gravity is 37°API.

San Ysidro Mancos Pool (oil)--The San Ysidro Mancos Pool is located in Sec. 28, T. 21 N., R. 3 W., Sec. 29, T. 21 N., R. 3 W., and Sec. 30, T. 21 N., R. 3 W., Sandoval County, New Mexico (Fig 27; Map 40). The San Ysidro Mancos Pool produces oil from the upper Mancos Shale. It is located in the southeast part of the San Juan Basin.

The San Ysidro Mancos Pool was discovered in 1981 by the Lewis Energy No. 1 Ceja Pelon 29, located in Sec. 29., T. 21 N., R. 3 W., Sandoval County. The Ceja Pelon well drilled to a total depth of 4,620 ft (1,408 m) and was completed on August 4, 1981. Initial production was 54 BOPD and 392 MCFGPD through an open-hole interval from 4,507 ft to 4,620 ft (1,374-1,408 m). As of December 31, 1982, the San Ysidro Mancos Pool had produced a cumulative total of 15,452 BO from three wells. Oil gravity ranges from 38°API to 39° API.

Rusty Menefee Pool (oil, abandoned)--The one-well Rusty Menefee Pool is located in Secs. 11, 13, and 14, T. 22 N., R. 7 W., Sandoval County, New Mexico (Fig. 27; Map 40). The Rusty Menefee Pool produced oil from the Menefee Formation of the Mesaverde Group (Cretaceous) and was abandoned in 1977. The pool is located in the southeast part of the San Juan Basin.

The Rusty Menefee Pool was discovered in 1974 by the Chace Oil Company No. 1 Rusty Federal, located in Sec. 11, T. 22 N., R. 7 W., Sandoval County. The No. 1 Rusty Federal drilled to a total depth of 4,911 ft (1,497 m) and was completed on November

7, 1974 for an initial pumping production of 48 BOPD and 14 MCFGPD through perforations from 3,383 to 3,395 ft (1,031-1,035 m). The Rusty Menefee Pool produced a cumulative total of 8,695 BO between field discovery in 1974 and abandonment in 1977. Annual production data are summarized below.

YEAR	ANNUAL OIL PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1974	1,165	1
1975	4,395	1
1976	2,399	1
1977	736	0

Otero Point Lookout Mesaverde Pool (oil, abandoned)--The Otero Point Lookout Mesaverde Pool is located in Sec. 32, T. 23 N., R. 4 W., Sandoval County, New Mexico (Fig. 27; Map 40). The Otero Point Lookout Mesaverde Pool produced oil from the Point Lookout Sandstone (Cretaceous) and was abandoned in 1961. It is located in the southeast part of the San Juan Basin.

The Otero Point Lookout Mesaverde Pool was discovered in 1955 by the Fred Turner Jr. No. 1 Jicarilla, located in Sec. 32, T. 23 N., R. 4 W., Sandoval County. The No. 1 Jicarilla drilled to a total depth of 4,417 ft (1,346 m) and was completed on January 21, 1955, for an initial potential of 28 BOPD through perforations from 4,382 to 4,394 ft (1,336-1,339 m). The pool was abandoned in 1961 after having produced 18,881 BO. Annual production data from field discovery in 1955 to abandonment in 1961 are summarized in Table 34.

Table 34 - Annual oil production from the Otero Point Lookout Mesaverde pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1955	3,371	1
1956	3,773	2
1957	4,343	2
1958	3,036	2
1959	1,972	2
1960	1,857	2
1961	529	0

The Otero Point Lookout Mesaverde Pool produced oil from a stratigraphic trap in the Point Lookout Sandstone (Pritchard, 1978b, p. 447). The trapping mechanism is the updip pinchout of the upper sandstone bed of the Point Lookout Sandstone. Average net pay is 10 ft (3 m) and the oil has a gravity of 38°API (Pritchard, 1978b, p. 447).

Parlay Mesaverde Pool (oil)--The Parlay Mesaverde Pool is located in Sec. 29, T. 22 N., R. 3 W., Sandoval County, New Mexico (Fig. 27; Map 40). The Parlay Mesaverde Pool produces oil from the Menefee Formation of the Mesaverde Group. It is located in the southeast part of the San Juan Basin.

The Parlay Mesaverde Pool was discovered in 1971 by the Tesoro Petroleum No. 1 Parlay, located in Sec. 29, T. 22 N., R. 3 W., Sandoval County. The No. 1 Parlay drilled to a total depth of 7,730 ft (2,356 m) in the Entrada Sandstone and was plugged back to a depth of 4,310 ft (1,314 m). It was completed on October 11, 1971, for an initial flowing production of 336 BOPD and 366 MCFGPD through perforations from 4,240 to 4,270 ft (1,292-1,301 m). As of December 31, 1982 the Parlay Mesaverde

Pool had produced a cumulative total of 85,766 BO. Annual production data of oil and casinghead gas are summarized in Table 35; annual production data prior to official pool designation in 1972 are not available.

Table 35 - Annual oil and gas production from the Parlay Mesaverde pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL GAS PRODUCTION (MCF)	NO. PRODUCING WELLS AT END OF YEAR
1972	16,233	30,050	2
1973	12,647	14,133	2
1974	9,630	22,518	2
1975	7,618	18,773	2
1976	6,579	16,518	2
1977	7,116	15,798	2
1978	5,661	36,545	2
1979	4,137	22,033	2
1980	4,623	0	2
1981	3,502	120	2
1982	2,869	160	2

The Parlay Mesaverde Pool produces oil from a combination structural/stratigraphic trap in the Menefee formation of the Mesaverde Group. The trap is formed by a sandstone lens that is draped over a north-plunging structural nose (Gray, 1978, p. 453).

The Menefee is 400 ft (122 m) thick in the Parlay area and produces from 34 ft (10 m) of tight shaly sandstones in the Parlay Mesaverde Pool (Gray, 1978). Average net pay is 15 ft (5 m); average porosity is 18% and average permeability is 6.45 millidarcies (Gray, 1978). Parlay Mesaverde oil is paraffin based and has a gravity of 44.2°API (Gray, 1978, p. 453).

The estimated ultimate recovery from the Parlay Mesaverde Pool is 121,200 BO (Gray, 1978, p. 453). Because 85,766 BO had been produced by the end of 1982, it is calculated that 35,434 BO, or 29% of the original recoverable oil, remains unproduced.

San Luis Mesaverde Pool (oil)--The San Luis Mesaverde Pool is located in the southeast quarter of Sec. 21, T. 18 N., R. 3 W., Sandoval County, New Mexico (Fig. 27; Map 42). The San Luis Mesaverde Pool produces oil from the Mesaverde Group (Cretaceous). It is located in the southeast part of the San Juan Basin.

The San Luis Mesaverde Pool was discovered in 1959 by the J. I. Harvey No. 1 Harvey Federal "A". The Harvey Federal drilled to a total depth of 918 ft (280 m)and was completed on April 20, 1959 for an initial production of 41 BOPD. As of December 31, 1982 cumulative production was 61,540 BO from nine wells, three of which are currently active. Annual oil and water production are summarized in Table 36.

Table 36 - Annual oil and water production from the San Luis Mesaverde pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1959	1,351	87	1
1960	4,854	75	1
1961	16,692	35	4
1962	8,349	68	4
1963	4,571	89	6
1964	1,331	75	4
1965	3,047	6,880	5
1966	3,637	4,285	4
1967	1,562	3,056	2
1968	1,235	2,486	2
1969	1,286	2,370	2
1970	1,004	2,196	2
1971	1,058	2,040	2
1972	1,080	2,271	2
1973	726	1,375	3
1974	698	0	4
1975	675	0	2

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1976	1,061	60	3
1977	575	0	3
1978	791	0	4
1979	1,255	0	4
1980	1,695	28,365	4
1981	1,593	0	3
1982	1,414	4,063	3

The San Luis Mesaverde Pool produces oil from sandstones in the Menefee Formation of the Mesaverde Group. Oil gravity is 35° API.

<u>South San Luis Mesaverde Pool (oil)</u>--The South San Luis Mesaverde Pool is located in the northeast quarter of Sec. 33, T. 18 N., R. 3 W., Sandoval County, New Mexico (Fig. 27; Map 42). The South San Luis Mesaverde Pool produces oil from the Mesaverde Group (Cretaceous). It is located in the southeast part of the San Juan Basin.

The South San Luis Mesaverde Pool was discovered in 1959 by the J. I. Harvey No. 1 Federal located in Sec. 33, T. 18 N., R. 3 W., Sandoval County. The No. 1 Federal drilled to a total depth of 353 ft (108 m) and was completed on October 15, 1959. Initial production was 10 BOPD. The South San Luis Mesaverde Pool was not officially designated as a pool until 1965. As of December 31, 1982, cumulative production was 361 BO from nine wells, two of which are currently active. Oil and water production data are summarized in Table 37. Annual production data prior to 1966 are not available.

Table 37 - Annual oil and water production in the South San Luis Mesaverde pool

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1966	96	45	2
1967	0	0	0
1968	0	0	0
1969	12	1	1
1970	22	42	1
1971	25	1	2
1972	0	0	0
1973	0	0	0
1974	0	0	0
1975	0	0	0
1976	0	0	0
1977	0	0	0
1978	0	0	0
1979	0	0	0
1980	0	0	0
1981	49	20	1
1982	157	70	2

The South San Luis Mesaverde Pool produces oil from sandstones in the Mesaverde Group. Most production appears to come from the approximate stratigraphic position of the Hosta Tongue of the Point Lookout Sandstone. Oil gravity ranges from 35°API to 40°API.

Venado Mesaverde Pool (oil)--The Venado Mesaverde Pool is located in Secs. 5, 6, 7, and 8, T. 22 N., R. 5 W., Sandoval County, New Mexico (Fig. 27; Map 40). The Venado Mesaverde Pool produces oil from the Menefee Formation of the Mesaverde Group. It is located in the southeast part of the San Juan Basin.

The Venado Mesaverde Pool was discovered in 1971 by the Warren Drilling Company No. 1 Littleton, located in Sec. 8, T. 22 N., R. 5 W., Sandoval County, New Mexico. The No. 1 Littleton drilled to a total depth of 6,623 ft (2,019 m) and after unsuccessfully testing the lower Mancos Shale, was plugged back to 5,092 ft (1,552 m) and completed in the Menefee Formation. The well was completed on August 17, 1971, for an initial pumping production of 75 BOPD, 50 MCFGPD, and 300 BWPD through perforations from 4,052 to 4,093 ft (1,235-1,248 m) As of December 31, 1982, the Venado Mesaverde Pool had produced a cumulative total of 54,096 BO. Annual production data of oil, gas, and water are summarized in Table 38. Annual data for production prior to official field designation in 1972 are not included.

Table 38 - Annual oil, gas, and water production from the Venado Mesaverde pool.

YEAR	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL GAS PRODUCTION (MCF)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1972	15,064	9,267	22,808	3
1973	6,369	2,070	8,100	2
1974	5,064	0	10,248	2
1975	3,864	0	9,562	2
1976	2,947	0	10,248	2
1977	2,997	0	9,592	2
1978	2,989	0	6,293	2
1979	2,805	0	3,670	2
1980	2,966	0	3,194	2
1981	3,060	0	1,402	2
1982	2,969	172	1,460	2

The Venado Mesaverde Pool produces oil from stratigraphic traps in the Menefee Formation of the Mesaverde Group (Pritchard, 1978a). The reservoirs are lenticular sandstones deposited by a fluvial system. The producing interval consists of approximately 550 ft (168 m) of interbedded sandstone, shale, and coal. Porosity is 16% and average net pay is 20 ft (6 m; Pritchard, 1978a, p. 548). Venado Mesaverde oil has a gravity of 46°API.

Rusty Chacra Pool (gas)--The Rusty Chacra Pool is located in T. 21 N., R. 6 W., T. 21 N., R. 7 W., T. 22 N., R. 6 W., and T. 22 N., R. 7 W., Sandoval County, New Mexico (Fig. 27; Map 40). The Rusty Chacra Pool produces gas from the Chacra producing interval (Cretaceous). The pool is located in the southeast part of the San Juan Basin.

The Rusty Chacra Pool was discovered in 1975 by the Chace Oil Company No. 2 Rusty Federal, located in Sec. 14, T. 22 N., R. 7 W., Sandoval County. The No. 2 Rusty Federal drilled to a total depth of 3,886 ft (1,184 m) and was plugged back to 1,910 ft (582 m) to test the Chacra. It was completed on April 19, 1975 for an initial potential of 460 MCFGPD through perforations from 1,880 to 1,884 ft (573-574 m). Production from the pool did not begin until 1978. As of December 31, 1982, cumulative production from the Rusty Chacra Pool was 814,204 MCFG. Annual production data are summarized in Table 39.

Table 39 - Annual gas and water production from the Rusty Chacra pool

YEAR	ANNUAL GAS PRODUCTION (MCF)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1978	184,685	6,493	14
1979	119,771	4,700	14
1980	65,768	2,643	14
1981	52,958	975	15
1982	391,022	436	42

The Rusty Chacra Pool produces gas from a stratigraphic trap in the Chacra producing interval (Kennedy, 1978). The Chacra producing interval is defined by the New Mexico Oil Conservation Commission as the interval in the Lewis Shale extending from the

Huerfanito Bentonite Bed to a depth of 750 ft (229 m) below the Huerfanito. The reservoirs are gray to white, very fine-grained, clean, friable sandstones; average net pay is 40 ft (12 m; Kennedy, 1978). Average porosity is 12% and average permeability is 0.50 millidarcy (Kennedy, 1978, p. 477). Rusty Chacra gas has a specific gravity of 0.640 and a heating value of 1,116 BTU/ft^3 (Kennedy, 1978, p 477). There are 1.112 gallons (4.21 liters) condensate/MCFG and the gas has the following composition (Kennedy, 1978, p. 477): 88.48% methane, 6.22% ethane, 2.21% propane, 0.78% butane, 0.25% pentane, 0.41% hexane, 1.56% nitrogen, and 0.08% carbon dioxide.

The estimated ultimate recovery from the Rusty Chacra Pool is 375,000 MCFG per well (Kennedy, 1978, p. 477), or 15.75 BCFG for all 42 wells. Because 814,204 MCFG had been produced by the end of 1982, 14.94 BCFG, or 95% of the original recoverable gas, remains unproduced.

Ballard Pictured Cliffs Pool (gas)--The Ballard Pictured Cliffs Pool is located in Rio Arriba and Sandoval Counties, New Mexico. The Sandoval County part of the pool is located in T. 22 N., R. 2 W., T. 22 N., R. 3 W., T. 23 N., R. 3 W., and T. 23 N., R. 4 W. Only the southeasternmost part of the pool is present in Sandoval County. The Ballard Pictured Cliffs Pool produces gas from the Pictured Cliffs Sandstone (Cretaceous). The pool is located in the southeast part of the San Juan Basin.

The Ballard Pictured Cliffs Pool was discovered in 1953 by the H. S. Riddle No. 1 Riddle located in Sec. 4, T. 25 N., R. 7 W., Rio Arriba County. The No. 1 Riddle drilled to a total depth of 2,304 ft (702 m). It was completed on April 22, 1953 for an initial potential of 396 MCFGPD; the producing interval ranged from a depth of 2,208 ft to 2,304 ft (673-702 m) in the Pictured Cliffs Sandstone. The well was artificially stimulated with a nitroglycerine fracture treatment. As of December 31, 1982 the Sandoval County part of the Ballard Pictured Cliffs Pool had produced a cumulative total of 18,146,463 MCFG, or 5% of the 331,049,863 MCFG produced by the entire pool. Annual production data for the Sandoval County part of the pool are summarized in Table 40. Production data subdivided according to counties are not available prior to 1971.

Table 40 - Annual gas, oil, and water production from the Ballard Pictured Cliffs pool

YEAR	ANNUAL GAS PRODUCTION (MCF)	ANNUAL OIL PRODUCTION (BBLS)	ANNUAL WATER PRODUCTION (BBLS)	NO. PRODUCING WELLS AT END OF YEAR
1971	1,114,071	0	0	30
1972	912,871	0	0	31
1973	738,576	0	0	37
1974	1,017,887	0	0	43
1975	754,124	0	0	43
1976	623,725	0	0	48
1977	952,375	0	6	60
1978	963,675	0	65	64
1979	767,948	0	79	65
1980	602,695	0	84	65
1981	710,633	0	352	77
1982	1,058,725	242	804	80

The Ballard Pictured Cliffs Pool produces gas from a stratigraphic trap in the Pictured Cliffs Sandstone (C. F. Brown, 1978a, p. 195) that may be modified by hydrodynamic mechanisms (Silver, 1968). The trap is formed by elongate, northwest-trending, lenticular bar and beach sandstones. The reservoir consists of 30-80 ft (9-24 m) of very fine- to medium-grained sandstone; average net pay is 25 ft (8 m; C. F. Brown, 1978a, p. 195). Average porosity is 15% and average permeability is 5.4 millidarcies (C. F. Brown, 1978a, p. 195). Ballard Pictured Cliffs gas has a specific gravity of 0.681 and a heating value of 1,187 BTU/ft^3; the gas is dry and has the following composition (C. F. Brown, 1978a, p. 195): 85.12% methane, 6.69% ethane, 3.90% propane, 1.92% butane, 0.64% pentane, 0.30% hexane, 1.43% other components.

South Blanco Pictured Cliffs Pool (gas)--The South Blanco Pictured Cliffs Pool is an elongate, southeast-trending gas pool located in Rio Arriba, San Juan, and Sandoval Counties, New Mexico (Fig. 27; Maps 40, 41). Only the southeast part of the pool is present in the Rio Puerco Resource Area where it occupies part of T. 23 N., R. 1 W., and T. 23 N., R. 2 W., Sandoval County, New Mexico. The South Blanco Pictured Cliffs Gas Pool produces nonassociated gas from the Pictured Cliffs Sandstone (Cretaceous). The pool is located in the central and southeast parts of the San Juan Basin.

The South Blanco Pictured Cliffs Gas Pool was discovered in 1951 by the Caulkins Oil Company No. 1-B Doswell Federal, located in Sec. 15, T. 26 N., R. 6 W., Rio Arriba County. The Doswell Federal was completed on June 19, 1951 for an initial potential of 1,900 MCFGPD through a depth interval of 2,861-2,929 ft (872-893 m). As of December 31, 1982, the Sandoval County part of the South Blanco Pictured Cliffs Pool had produced a cumulative total of 5,453,344 MCFG or 0.6% of the 928,932,444 MCFG produced by the entire pool. Annual production data from the Sandoval County part of the pool are summarized in Table 41; annual production data for individual county parts of the pool are not available for years prior to 1971.

Table 41 - Annual gas and water production from the South Blanco Pictured Cliffs pool

YEAR	ANNUAL GAS PRODUCTION (MCF)	ANNUAL WATER PRODUCTION (MCF)	NO. PRODUCING WELLS AT END OF YEAR
1971	345,615	0	12
1972	312,523	0	13
1973	244,594	0	13
1974	213,641	0	13
1975	198,485	0	13
1976	198,183	0	13
1977	176,787	0	12
1978	166,258	0	12
1979	176,479	0	13
1980	206,226	865	14
1981	180,621	1,500	15
1982	190,311	8,423	19

The South Blanco Pictured Cliffs Pool produces gas from a stratigraphic trap in the Pictured Cliffs Sandstone (C. Silver, 1968; C. F. Brown, 1978a, b). Hydrodynamic forces may have modified the trapping mechanisms (C. Silver, 1968). C. F. Brown (1978b) described the reservoir rocks as "lenticular bar and beach" sandstones that trend northwest. Hydrodynamic recharge of groundwater from Pictured Cliffs outcrops at the basin margins may partially seal the gas in the Pictured Cliffs Sandstone and localize the gas accumulations.

The Pictured Cliffs Sandstone is 50-120 ft (15-37 m) thick in the Resource Area (Stone and others, 1983, fig. 37). Average net pay on the South Blanco Pool is 30 ft (9 m; C. F. Brown, 1978b, p. 230). The Pictured Cliffs Sandstone is fine to medium grained; average porosity is 15% within the gas pool and permeability ranges from 0 to 5.5 millidarcies (C. F. Brown, 1978b, p. 230). The gas has a specific gravity of 0.776 and a heating value of 1,117 BTU/ft^3; the gas has the following composition (C. F. Brown, 1978b, p. 230): 86.70% methane, 6.49% ethane, 3.57% propane, 1.62% butane, 0.54% pentane, 0.22% hexane, and 0.86% other components.

The ultimate recovery from the South Blanco Pictured Cliffs Pool is unknown but is certainly only a small fraction of the estimated ultimate recovery of 1,377,618,000 MCF for the entire pool (C. F. Brown, 1978b, p. 230).

Occurrences other than Oil and Gas Pools

Apart from designated oil and gas pools, there have been numerous occurrences of oil and gas in the Rio Puerco Resource Area (Appendix 6; Maps 44-46). The occurrences are both shows of oil and gas and solitary wells that have produced marginal quantities of oil or gas from undesignated pools. All productive occurrences are located in the San Juan Basin. Productive occurrences are in the Entrada Sandstone (Jurassic), Dakota Sandstone (Cretaceous), Graneros Shale Member of Mancos Shale (Cretaceous), Sanostee member of Mancos Shale (Cretaceous, equivalent term for Juana Lopez Member of Mancos Shale), Hospah sandstone (Cretaceous), upper Mancos Shale (Cretaceous), basal sandstones of the Niobrara Shale Member of the upper Mancos Shale (Cretaceous; "Gallup" sandstone of many workers), Mesaverde Group (Cretaceous), Menefee Formation of the Mesaverde Group (Cretaceous), and the Pictured Cliffs Sandstone (Cretaceous). As of December 31, 1982, a cumulative total of 179,206 BO had been produced from petroleum occurrences in the Rio Puerco Resource Area. Nonproductive oil and gas shows in the San Juan Basin part of the RPRA have been encountered in the Madera Group (Pennsylvanian), Glorieta Sandstone (Permian), Entrada Sandstone (Jurassic), Hospah sandstone (Cretaceous), Point Lookout Sandstone (Cretaceous), Menefee Formation of the Mesaverde Group (Cretaceous), and the Pictured Cliffs Sandstone (Cretaceous). Nonproductive shows in the Albuquerque Basin have been encountered in the Dakota Sandstone (Cretaceous) and the Santa Fe Formation (Tertiary).

Occurrences in Paleozoic rocks--Only five occurrences of oil and gas have been reported from Paleozoic rocks in the Rio Puerco Resource Area. Two of these occurrences are two shows of oil and gas in the Continental Oil Company No. 1 Evans, located in Sec. 2, T. 13 N., R. 4 W., Sandoval County (Map 44). The first oil and gas show was at 2,900 ft (884 m) in the Glorieta Sandstone (Permian). The second oil and gas show was at 3,280 ft (1,000 m) in rocks that may be either the Glorieta or the upper part of the Yeso Formation (Permian). A third show was located approximately five miles east in the Texaco No. 1 Howard Major, located Sec. 10, T. 13 N., R. 3 W., Sandoval County (Map 44); in the No. 1 Major, gas was recovered from the Madera (Pennsylvanian) by a drill-stem test from 5,540 to 5,660 ft (1,684-1,725 m). The fourth show was in the Hagan Basin where an oil show was reported from Pennsylvanian (probably Madera) rocks at a depth of 870 ft (265 m) in the Albuquerque Associated No. 1 Vigil "J", located in

Sec. 14, T. 12 N., R. 6 E., Sandoval County. The fifth show is in the San Juan Basin in the Union Oil of California No. 1 Caldwell, located in Sec. 13, T. 21 N., R. 5 W., Sandoval County; the No. 1 Caldwell had a slight oil show in the Madera by a drill-stem test from 11,145 to 11,270 ft (3,397-3,435 m).

Occurrences in Triassic rocks--There are no known natural occurrences of oil or gas in Triassic rocks of the Rio Puerco Resource Area. A man-made reservoir of natural gas is at the Las Milpas Gas Storage Unit, located in T. 15 N., R. 1 E., Sandoval County (Sharrock, 1978). At the Las Milpas Unit, natural gas is injected into and stored in the Agua Zarca Sandstone Member of the Chinle Formation. The trap is formed by a faulted anticline and depth to the Agua Zarca is approximately 2,200 ft (670 m). The Agua Zarca Sandstone Member is 145 ft (44 m) thick at the storage unit and has a porosity of 16.7% and an effective permeability of 5,000 millidarcies (Sharrock, 1978, p. 5). There are currently nine injection and withdrawal wells in the Las Milpas Gas Storage Unit.

Occurrences in Jurassic rocks--The only known petroleum occurrences in Jurassic rocks of the RPRA are in the Entrada Sandstone in the San Juan Basin. Apart from the producing pools discussed previously, one well had produced a cumulative total of 1,574 BO from the Entrada as of December 31, 1982. Additional wells have reported oil shows in the Entrada (Appendix 6; Maps 42, 43).

Occurrences in Cretaceous rocks--Cretaceous rocks are prolific producers of oil and 14 oil pools and three gas pools have produced petroleum from Cretaceous rocks in the San Juan Basin part of the Resource Area (Fig. 1). Productive occurrences of oil and gas other than the designated pools come only from the San Juan Basin. Productive occurrences are in the following Cretaceous units (Appendix 6; Maps 44, 45, 46); Hospah sandstone (equivalent to the Torrivio Sandstone Member of the Gallup Sandstone; Molenaar, 1977b, p. 162), the Dakota Sandstone, the Graneros and Sanostee members of the lower Mancos Shale, the upper Mancos Shale and basal ("Gallup") sandstones of the Niobrara Shale Member of the upper Mancos Shale, the Mesaverde Group, the Menefee Formation of the Mesaverde Group, and the Pictured Cliffs Sandstone. Accumulative oil and gas production as of December 31, 1982 is summarized below.

PRODUCING UNIT	ACCUMULATIVE OIL PRODUCTION (BBLS)
Dakota	8,623
Graneros	12,864
Gallup	143,261
Mancos	285
Mesaverde	6,361
Other	6,238
Total production	177,632

Productive intervals in the upper Mancos Shale include the Niobrara Shale Member as well as other overlying parts of the upper Mancos Shale ("transgressive Gallup" of some workers, including Reese, 1977).

Nonproductive shows of oil and gas come from both the San

Juan Basin and the Albuquerque Basin. Three shows in the Dakota Sandstone in the Albuquerque Basin, the lowest Cretaceous unit, are in the following three wells drilled (Map 45).

Operator, well no., and lease	Location, (section-township-range, county)	Total depth ft	Remarks
Shell Oil Co. No. 1 Santa Fe	18-13N-3E, Sandoval	11,045	Black (1982, p. 315) reported show of C_1-C_5 hydrocarbons in Dakota Sandstone. Dakota top at 6,600 ft; Dakota base at 6,907 ft.
Shell Oil Co. No. 3 Santa Fe	28-13N-1E, Sandoval	10,276	Black (1982, fig. 7) reported gas show in in Dakota Sandstone. Dakota top at 8,731 ft; Dakota base at 9,078 ft.
Shell Oil Co. No. 1-24 West Mesa Federal	24-11N-1E, Bernalillo	19,375	Gas show in Dakota from 19,090 to 19,132 ft.

Occurrences in Tertiary rocks--Although there is no production from Tertiary rocks in the RPRA, two wells have encountered shows in the Tertiary rocks that are probably the Santa Fe Formation. Both shows are in the Albuquerque Basin (Map 45).

Operator, well no., and lease	Location (section-township-range, county)	Total depth ft	Remarks
Tejon Oil & Development Co. No. 1	7-14N-6E, Sandoval	1,850	Oil show in Santa Fe Fm. from 1,000 ft to 1,087 ft.
F. H. Carpenter No. 1 Atrisco Grant	28-10N-1E, Bernalillo	6,652	Oil show in Santa Fe Fm. from 3,350 ft to to 3,360 ft.

Petroleum geology and petroleum resource potential

San Juan Basin--The potential for the occurrence of additional petroleum resources in the San Juan Basin part of the RPRA is moderate to high (Maps 47-52; Fig. 28). Oil is produced from Jurassic and Cretaceous rocks in northwest Sandoval County. Gas is produced from Cretaceous rocks in northwest Sandoval County. Documented source rocks and reservoirs occur throughout most of the San Juan Basin part of the study area.

Jurassic and Cretaceous rocks are the sources of the oil and gas produced in the San Juan Basin part of the RPRA. Organic-rich limestones of the Todilto Formation (Jurassic) appear to be the source of the oil reservoired in the Entrada Sandstone (Jurassic; Ross, 1980; Vincelette and Chittum, 1981, p. 2,551-2,553). Petroleum produced from Cretaceous rocks probably has Cretaceous sources. Oil produced from the basal Niobrara ("Gallup") sandstones and the upper Mancos Shale was probably generated in marine shales of the Mancos Shale (Ross, 1980). The oil produced from the upper Mancos Shale at the San Ysidro Mancos Pool also probably originated in marine Mancos shales. Oil produced from the Mesaverde Group at the South San Luis Mesaverde Pool may have originated in either coaly nonmarine strata of the Mesaverde Group or in marine Mancos shales (Ross, 1980). The major source of the nonassociated gas produced from the Pictured Cliffs Sandstone at the South Blanco Pool is probably coal in the overlying Fruitland Formation (Rice, 1983, p. 1,215-1,216).

It is also possible, but undocumented, that marine limestones and shales of the Magdalena Group (Pennsylvanian) are petroleum source rocks. Paleotemperature estimates of Upper

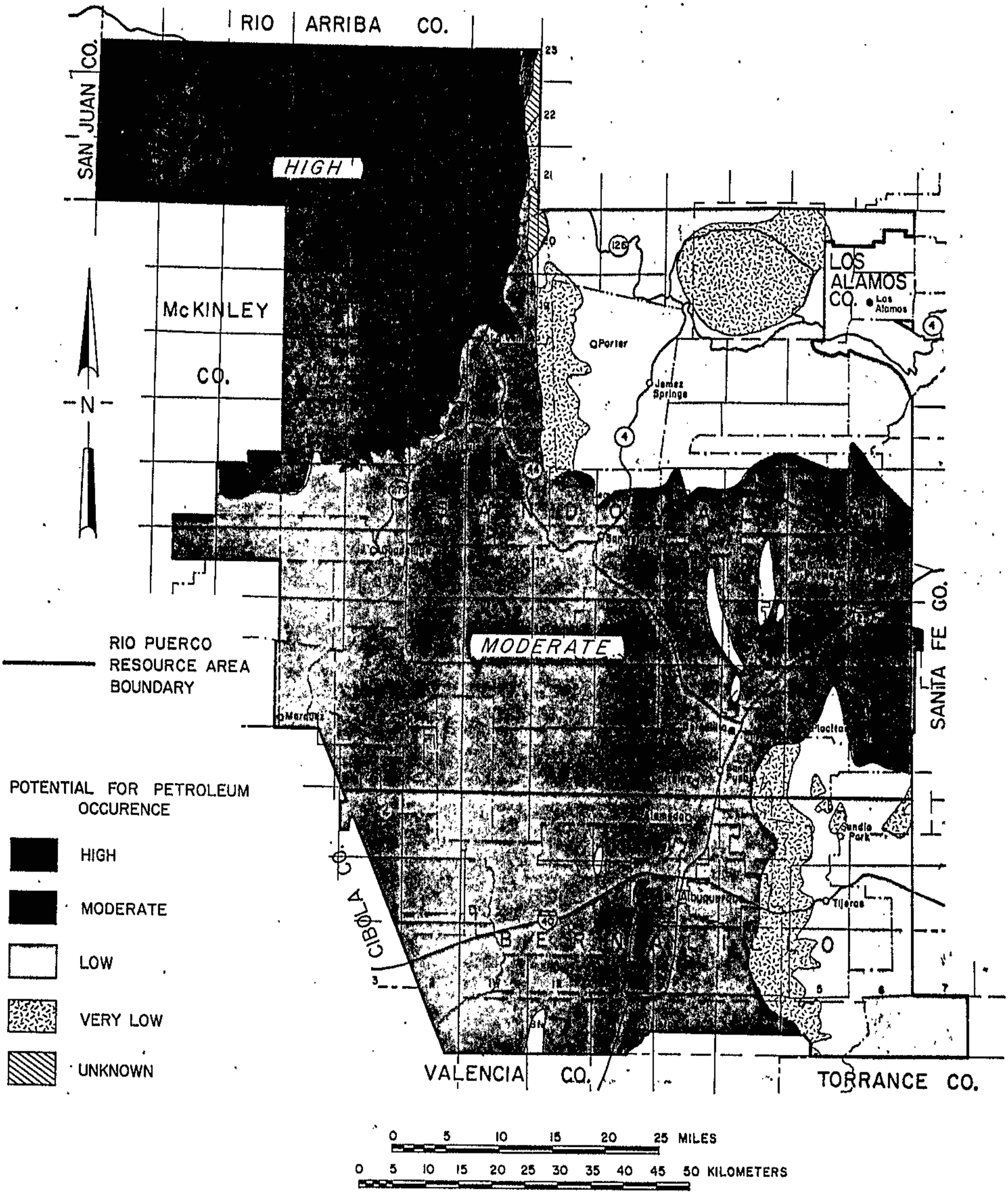

FIGURE 28 – PETROLEUM RESOURCE POTENTIAL IN THE NORTHERN RIO PUERCO RESOURCE AREA.

Pennsylvanian rocks in the southern San Juan Basin are compatible with the preservation of wet gas (Reiter and Clarkson, 1983, p. 336) or possibly oil. It is not known if Paleozoic rocks have ever generated petroleum in the southeast part of the San Juan Basin. Pennsylvanian rocks may have generated oil in the northwest part of the Basin (Ross, 1980).

The best reservoir rocks in the San Juan Basin part of the RPRA are the Entrada Sandstone (Jurassic) and Upper Cretaceous sandstones. The Entrada is a porous, fine- to medium-grained sandstone that is an excellent reservoir in the Media Entrada and Southwest Media Entrada Pools. Vincelette and Chittum (1981, fig. 7) indicated that the Entrada should have well-developed porosity and permeability over the entire San Juan Basin part of the Resource Area. Potential Cretaceous reservoirs are the Dakota Sandstone, the Hospah Sandstone, the basal Niobrara ("Gallup") sandstones, the upper Mancos Shale, the Hosta Sandstone, the Point Lookout Sandstone, and the Chacra producing interval. All of those units produce petroleum in the San Juan Basin. The basal Niobrara sandstones and the upper Mancos Shale produce oil within the San Juan Basin part of the Resource Area. The Pictured Cliffs Sandstone (Cretaceous) is present only in extreme northwest Sandoval County where it is a reservoir and produces gas at the South Blanco Pictured Cliffs Pool. All of the Cretaceous sandstones, except some of the basal Niobrara sandstones, tend to be tight and are more suitable as gas reservoirs than as oil reservoirs. Some of the basal Niobrara sandstones produce significant quantitites of oil northwest of the Resource Area at the Bisti Gallup, Cha Cha Gallup, Gallegos

Gallup, and Horseshoe Gallup Pools. The Dakota Sandstone produces large volumes of gas and some oil northwest of the Resource Area at the Basin Dakota Pool.

The reservoir quality of Paleozoic rocks in the San Juan Basin part of the RPRA is virtually unknown. The Glorieta Sandstone (Permian), a clean, fine- to medium-grained, well-sorted sandstone, is a good potential reservoir 0-150 ft (0-46 m) thick in the RPRA and is absent only in northwest Sandoval County in the vicinity of Regina and Cuba (Baars and Stevenson, 1977, fig. 4). Limestones and sandstones of the Magdalena Group (Pennsylvanian) may be reservoirs; age-equivalent rocks in southeast Utah contain porous algal bioherms that are the reservoirs for the prolific Greater Aneth Oil Field (Babcock, 1978a, b; Freeman, 1978; Irwin, 1978). Pennsylvanian rocks are approximately 1,500-2,000 ft (457-610 m) thick in the San Juan Basin part of the RPRA (Wengerd and Matheny, 1958, fig. 19). However, there are facies changes that limit the potential for finding Pennsylvanian reservoirs in New Mexico. Most of the algal bioherms were deposited in southeast Utah while dense marine carbonates and shallow marine clastics were deposited to the south and southeast in New Mexico (J. A. Peterson and others, 1965, p. 2,087-2,094). However, the Magdalena Group has not been described adequately in the San Juan Basin part of the Resource Area.

The potential for petroleum occurrence in the San Juan Basin part of the RPRA is moderate to high (Maps 47-52; Fig. 28). The greatest potential for undiscovered petroleum accumulations is in stratigraphic and/or hydrodynamic traps in the Entrada Sandstone and in Upper Cretaceous sandstones. Trends of stratigraphic traps in Cretaceous sandstones are most likely to be developed parallel to northwest depositional strike in the Basin. The probability of the occurrence of petroleum accumulations decreases to the south and east because of erosional truncation of reservoirs at the ground surface and because of proximity to outcrops of reservoir units and thus a susceptibility to flushing by ground water.

Petroleum potential is considered to be high northwest of the outcrop belt of the Point Lookout Sandstone for two reasons. First, there are four rock units in the subsurface that are productive in the Resource Area: the Entrada Sandstone (Jurassic), the basal Niobrara ("Gallup") sandstones, the upper Mancos Shale, and the Pictured Cliffs Sandstone. Second, all four units have production and unproductive shows northwest of the outcrop belt of the Point Lookout.

The San Juan Basin part of the RPRA southeast of the outcrop belt of the Point Lookout is considered to have moderate petroleum potential for five reasons. First, there is no production and only a few reported shows in this area in spite of the presence of several petroleum test wells. Second, three important potential reservoirs, the Pictured Cliffs Sandstone, the Point Lookout Sandstone, and the Chacra producing interval have been removed by Cenozoic erosion from the entire area and two other potential reservoir units, the Hosta Sandstone and the basal Niobrara sandstones, have been removed by erosion from most of the area. However, the Dakota Sandstone and the Entrada Sandstone are present on the subsurface of most of the area and the Magdalena Group is present throughout the entire area. Third, the area contains outcrops of all potential reservoirs; because of this, the reservoirs may have been flushed by groundwater. Fourth, Cretaceous marine shales and fetid limestones of the Todilto Formation (Jurassic) should be local petroleum source rocks. Fifth, the area lies structurally updip from known source rocks in the San Juan Basin from which petroleum could have migrated.

The southwest part of Sandoval County and part of McKinley County north of the Point Lookout outcrop belt has moderate petroleum potential for three reasons. First, it is geologically similar to productive areas to the north and northeast. Second, there is no production and only a few oil shows even though several petroleum test wells have been drilled in the area. Third, the presence of several small Tertiary-age plutons scattered in the area are a negative factor when considering the preservation of petroleum, especially oil.

Albuquerque and Hagan Basins--The potential for petroleum occurrence in the Albuquerque and Hagan Basins is moderate (Maps 50-54; Fig. 28). Adequately matured source rocks appear to be present as are structures and stratigraphic facies variations favorable to the entrapment of petroleum. Also, several wells have encountered oil and gas shows in the Albuquerque Basin. The Albuquerque and Hagan Basins are not assigned a high potential for petroleum occurrences because no oil or gas have ever been produced from the two basins. As discussed below, however, stratigraphy, structure, and organic geochemistry indicate that there is an excellent possibility that economic quantities of oil or natural gas are present in the Albuquerque and Hagan Basins. Detailed stratigraphic, structural, and organic geochemical studies of these two basins would undoubtedly result in the delineation of areas with high potential for petroleum occurrence.

Potential source rocks in the Albuquerque and Hagan Basins are bituminous shales of the Magdalena Group (Pennsylvanian), fetid limestones of the Todilto Formation (Jurassic), and Upper Cretaceous bituminous marine shales. Black (1982) used Levels of Organic Metamorphism (abbreviated LOM; see Hood and others, 1975) derived from vitrinite reflectance data to rate source-rock maturity in the Albuquerque Basin. In the north end of the Basin in the Shell No. 1 Santa Fe Pacific and the Shell No. 3 Santa Fe Pacific (Appendix 6), Cretaceous shales have LOM's as low as 8 (Black, 1982, p. 319) which are in the window of oil generation according to the scale of Van Gijzel (1982, fig. 1). Cretaceous rocks at a depth of 12,600 ft (3,840 m) have LOM's of 12-14 in the Humble No. 1 Santa Fe Pacific located approximately 10 mi (16 km) south of the Resource Area in Valencia County; those rocks may have generated wet or dry gas. Black (1982, p. 317) reported that Cretaceous marine shales in the Albuquerque Basin are lipid rich. Therefore, it appears that Cretaceous shales have the right type of organic matter and have been matured sufficiently to have generated oil and gas in the Albuquerque Basin.

Because they are buried more deeply than the Cretaceous shales, Pennsylvanian and Jurassic rocks may be too mature to have generated and preserved oil or wet gas, but dry gas may be preserved in them. Pennsylvanian and Jurassic source rocks may have had LOM's in excess of 15 in many areas of the Basin (Black, 1982, p. 319), a value indicating thermal maturity in excess of the preservation limits of oil and wet gas according to the scale of Van Gijzel (1982, fig. 1). Thermal maturity of Jurassic sources may be within the preservation limits of oil or wet gas where the Jurassic has been less deeply buried, as in intra-basin horsts or shallow fault blocks near the Basin margins.

The best reservoir objectives in the Albuquerque and Hagan Basins are Upper Cretaceous marine and fluvial sandstones. These rocks should be similar in origin and lithology to the productive Upper Cretaceous sandstones of the San Juan Basin. An early phase of calcite cementation has preserved depositional porosity even in deeper parts of the Albuquerque Basin; porosities in Cretaceous sandstones range from 16 to 24% in the Shell No. 1 Laguna-Wilson Trust in Bernalillo County and the Shell No. 3 Santa Fe Pacific in southern Sandoval County (Black, 1982, p. 319). Other potential but undocumented reservoirs in the two basins are the Entrada Sandstone (Jurassic), Pennsylvanian and Permian sandstones, and Pennsylvanian limestones.

Potential petroleum traps in the Albuquerque and Hagan Basins are numerous. Tilted normal fault blocks formed during Tertiary rifting (V. C. Kelley, 1977, p. 35-49; Black, 1979) may have formed traps similar to productive traps formed by tilted normal fault blocks found in other rifts, such as the Viking graben of the North Sea (J. J. Williams and others, 1975; Blair, 1975), the Reconcavo Basin of Brazil (Ghignone and deAndrade, 1970), and the Sirte Basin of Libya and the Suez Basin of Egypt (Harding, 1984). Traps may form by structural truncation of Paleozoic and Cretaceous reservoirs within the fault blocks or by drape folding of Cenozoic sediments over the fault blocks. Because some normal faults in the Albuquerque Basin may be listric with depth, rollover anticlines formed on the downthrown sides of the faults provide additional possibilities for traps similar to those traps formed by rollover anticlines along the U.S. Gulf Coast (Harding and Lowell, 1979, p. 1,043-1,048). Other possible traps are lenses and pinchouts of Upper Cretaceous sandstones similar to the prolific traps found in the San Juan Basin.

The potential for petroleum occurrence in the Albuquerque and Hagan Basins is rated moderate because there appear to be properly matured source rocks as well as good quality reservoirs. In addition, there are numerous possibilities for both structural and stratigraphic traps and several wells have encountered promising petroleum shows in Cretaceous and Tertiary rocks. Detailed stratigraphic, structural, and geochemical studies would undoubtedly result in the delineation of areas with high potential for petroleum occurrence within the Albuquerque and Hagan basins. However, oil and gas have not produced from these basins. The petroleum potential is ranked low in the vicinity of Tertiary intrusive rocks because the high temperatures generated by these intrusive rocks may have caused decomposition of reservoired petroleum.

Española Basin--The potential for petroleum occurrence in the Española Basin is rated low (Map 50; Fig. 28). Although source rocks and reservoirs have not been studied because the Basin has not been drilled by petroleum test wells, it is probable that the extensive Tertiary volcanism in the RPRA part of the Basin has raised paleotemperatures above the preservation limits of oil, wet gas, and possibly dry gas. Because of this problem, the petroleum potential of the Española Basin should be considered low until data are acquired which prove otherwise. The petroleum potential is ranked very low in the vicinity of the Jemez and Toledo calderas where intrusive volcanism has been more intensive.

Sandia Mountains--The potential for petroleum occurrence in the Sandia Mountains is rated very low where Precambrian basement rocks crop out (Map 52; Fig. 28). The potential for petroleum occurrence is rated low elsewhere because a thin cover of Pennsylvanian and Permian rocks occurs on the east side of the Sandias. Possible reservoirs are limestones and sandstones of the Magdalena Group (Pennsylvanian) and Permian sandstones. Hydrocarbon traps are unlikely to have formed except where Paleozoic rocks have been faulted down against Precambrian basement because of the thin Paleozoic section and the lack of any obvious stratigraphic barriers to updip migration of petroleum.

Nacimiento Uplift--The potential for petroleum occurrence is rated very low where Precambrian basement rocks crop out (Map 50; Fig. 28). The potential for petroleum occurrence is rated low elsewhere because a thin cover of Pennsylvanian and Permian rocks occurs over most of the Nacimiento Mountains. Possible reservoirs are limestones and sandstones of the Magdalena Group (Pennsylvanian) and Permian sandstones. Hydrocarbon traps are unlikely to have formed except where Paleozoic rocks have been faulted down against Precambrian basement because of the thin Paleozoic section and the lack of any obvious stratigraphic barriers to updip migration of petroleum.

The potential for petroleum occurrence is rated unknown in the northwest Nacimientos in the two areas where there may be thin thrust sheets of Precambrian basement rock overlying Paleozoic or Mesozoic rocks (Fig. 28; Chamberlin, this report, p. 98-103). If the two areas have thrust sheets of Precambrian overlying Paleozoic or Mesozoic rocks, then those two areas have a moderate to high rating because of potential subthrust reservoirs and structural traps. However, if the two triangular areas are not thrust sheets and do not have Paleozoic or Mesozoic reservoirs underlying the outcrops of Precambrian rocks, then those two areas have a potential for petroleum occurrence of low to zero.

The side of the Nacimiento uplift is bounded by high-angle reverse faults that have faulted Precambrian basement rocks on the east up against Paleozoic and Mesozoic sediments on the west (Woodward, 1984). There is a narrow zone of unknown width on the western side of the Nacimientos where upfaulted Precambrian basement overlies structurally warped, upturned, and truncated Paleozoic and possibly Cretaceous, reservoirs (Woodward, 1984, fig. 42). There are good possibilities for structural traps to be present in this narrow zone (Harding and Lowell, 1979, p. 1029).

Oil Shales

(by Robert M. Colpitts)

Thin, black, carbonaceous shales of Pennsylvanian age occur in the Nacimiento, Sandia, and Manzano Mountains and underlie most of the Resource Area. Destructive distillation tests of samples taken from the Manzano and Sandia Mountains yielded traces of oil (Foster and others, 1966). Winchester (1933, p. 188-190) reports a yield of 41 gallons of oil per ton (182 liters of oil per metric ton) of shale was obtained from samples of black Pennsylvanian-aged shales collected near Scholle, New Mexico. However, Foster and others (1966) could not confirm this figure in their tests of samples from the same area.

The Todilto Formation consists of black, fetid bituminous limestone and occurs over part of central Sandoval and Rio Arriba Counties (Foster, 1965a). Destructive distillation tests of samples collected in central Rio Arriba County yielded less than 2 gallons of oil per ton (9 liters per metric ton) of limestone (Foster, 1965a).

Thick, black, Cretaceous shales occur over or underlie much of the northern Rio Puerco Resource area. Two units generally contain black shale; the Mancos Shale and the Mesaverde Group. Destructive distillation tests of samples of the Mancos Shale in adjacent areas yielded traces of oil (Foster and others, 1966). Samples of the lower Mancos (Graneros) Shale from San Juan County yielded 1 to 5 gallons of oil per ton (4.4-22 liters per metric ton) of shale. Destructive distillation of black Mesaverde shales gave higher yields than the Mancos Shale. Foster and others (1966) report as much as 9.5 gallons of oil per ton (42 liters per metric ton) of shale from a sample collected at a coal mine dump.

Teritary sedimentary rocks contain thick, black shale beds in the northwest part of the northern RPRA. These shales are usually associated with coal beds. Destructive distillation tests of samples from the Resource Area yielded only traces of oil (Foster and others, 1966).

In order for oil shales to be economically competitive with other energy sources, they should yield more than 30 gallons of oil per ton (133 liters per metric ton) of material (Foster and others, 1966). Since none of the samples tested yielded more than a few gallons of oil per ton of material, these shale deposits are probably not commercially important. Therefore, the resource potential for oil shales in the northern RPRA is very low.

SUMMARY

As is true with all preliminary investigations, additional studies are necessary to adequately assess the mineral-resource potential in Sandoval and Bernalillo Counties and adjacent parts of McKinley, Cibola, and Santa Fe Counties. These assessments must be re-evaluated as economic conditions, geologic interpretations, and models change (Brobst and Goudarzi, 1984).

The mineral-resource potentials for various commodities in the northern RPRA are summarized in Table 42 and Figures 21, 22, 23, 25, 26, and 28. The most important commodity in the northern RPRA is petroleum in the northeastern portion of the San Juan Basin in Sandoval County (Fig. 28). High potential also exists for coal, uranium, sand and gravel, gypsum, and humates in portions of the San Juan Basin. High potential exists for precious metal veins, pumice, and geothermal resources in the Jemez Mountains. Limestone and clay in the Tijeras Canyon area have a high resource potential and are used to manufacture cement. Clays in the vicinity of the Hattie mine have a high potential. The barite-fluorite-galena veins found in the Tunnel Springs and Landsend areas of the Placitas district have a high mineral-resource potential. Additional work is necessary to calculate reserves and resources in these areas.

Table 42 - Summary of mineral-resource potential in the northern Rio Puerco Resource Area. See Figures 21, 22, 23, 25, 26, and 28.

Commodity or type of deposit	Formation	Geographic location	Mineral-resource potential
Stratabound, sedimentary copper deposits (± Ag, Au, U, V, Pb, Zn)	Agua Zarca Sandstone Member (Chinle Formation)	Nacimiento Mountains	moderate
	Abo Formation (± Madera Group)	Nacimiento Mountains Jemez Springs, Gallinas, Coyote, Placitas, and Tijeras Canyon districts	low to moderate
Au-Ag veins	Bland Group	Cochiti district southern Jemez Mountains	high unknown
with Te, Sb		Cochiti district	unknown
Ag-Pb veins	Precambrian	La Luz	moderate
Base-metal veins	Precambrian, Madera Group	Montezuma Tijeras Canyon district	low to moderate low to moderate
Placer gold	Quaternary Quaternary	northern Placitas district west drainages of Sandia, Manzanita, and Manzano Mountains	unknown unknown
Au-Ag and massive sulfide deposits	Precambrian greenstones	Tijeras Canyon-Coyote Canyon district subsurface in northeast-belt in southern Bernalillo County	moderate unknown
Barite-fluorite-galena (± silver)	Madera Group Madera Group contact between Precambrian and Madera Group	Tunnel Springs, Landsend Montezuma Sandia Mountains	high low to moderate unknown
Barite-fluorite-galena (± silver) and fluorite-galena veins	Precambrian and Madera Group	Tijeras Canyon-Coyote Canyon district	low to moderate
Manganese (± uranium)	San Jose Formation	west of Cuba	low
Adobe	Quaternary	streams and terraces	high
Building stone	Paleozoic, Precambrian	Sandia, Manzanita, Manzano, and Nacimiento Mountains	low to moderate
Bitumens	Pennsylvanian, Jurassic Cretaceous, Tertiary	entire Resource Area	very low
Carbon dioxide	---	San Juan Basin, Jemez Mountains	very low to low
Clays			
Portland Cement	Pennsylvanian	Tijeras Canyon	high
Bricks	Pennsylvanian Cretaceous	Southeast Bernalillo County Tongue area	 moderate
Gypsum	Jurassic Todilto Formation	San Juan Basin, San Felipe Pueblo Cañoncito	high low
Humate	Cretaceous	San Juan Basin	high
Limestone	Madera Group Pennsylvanian, Permian, Jurassic	Tijeras Canyon ---	high high
Mica	Precambrian	Sandia, Nacimiento Mountains	low
Perlite	Bandelier Tuff	Jemez Mountains	low
Pumice	Bandelier Tuff	Jemez Mountains	low to high
Quartz	Precambrian	Sandia, Manzano Mountains	low to moderate
Sand and gravel	Quaternary	---	high
Scoria	Tertiary	Cat Hills	moderate
Semi-precious Stones	---	---	low to unknown
Silica sand	Glorieta Sandstone	Nacimiento Mountains, Hagan Basin	low to moderate
Sulfur	Tertiary-Quaternary	Jemez Mountains	moderate
Travertine	Quaternary	Nacimiento, Jemez Mountains	moderate

Table 42 (cont'd)

Commodity or type of deposit	Formation	Geographic location	Mineral-resource potential
Uranium	Morrison Formation	Marquez-Bernabe Montaño areas	high
		adjacent to Marquez-Bernabe Montano areas	moderate
		Nacimiento Mountains (Dennison Bunn, Collins-Warm Springs)	moderate
		Majors Ranch and Ojito Springs areas	low to moderate
		middle San Juan Basin	low
	Dakota and Menefee Formation	Butler Brothers mine	moderate
		La Ventana area	moderate
	Ojo Alamo Sandstone	Mesa Portales	low to moderate
	Galisteo Formation	Hagan Basin	moderate, low to moderate
	Precambrian	Manzano Mountains	unknown
Coal	Cretaceous	Tijeras field	low
	Mesaverde Group	Rio Puerco field	low
	Crevasse Canyon Formation	East Mt. Taylor field	low to moderate
	Menefee Formation	La Ventana field	high
	Menefee Formation	Chacra Mesa field	high
	Menefee Formation	San Mateo field	high
	Menefee Formation	Hagan and Placitas fields	low to moderate
	Fruitland Formation	Star Lake	high
Geothermal	---	Jemez Mountains	low to high
	---	Rio Grande rift	low to high
	---	San Juan Basin	low
Petroleum	Entrada, Dakota, Sanostee, Gallup, Mancos, Menefee, Mesaverde, Graneros	San Juan Basin	moderate to high
		Albuquerque and Hagan basins	moderate
		Española Basin	low
		Sandia Mountains	low to zero
		Nacimiento Uplift	low to zero, unknown
Oil shales	Jurassic, Cretaceous	---	very low

RECOMMENDATIONS

1. Any areas with active claims should be field checked.
2. Seismic reflection studies are needed in the Nacimiento Mountains to determine the petroleum potential within overthrust areas.
3. Aggregate resources should be mapped and sampled in greater detail prior to extraction of such minerals.
4. Geochemical sampling is required in the Cochiti district to understand the origin of the deposits and the potential for antimony and tellurium.
5. Detailed geophysical studies are needed within the northeast-trending belt of gravity and magnetic highs, including the Tijeras fault zone, in the Manzano Mountains and to the east to adequately assess the potential for gold and massive sulfide deposits (Fig. 20, Areas A, B).
6. Geophysical studies are necessary in the southern portion of the Jemez caldera (Area H, Fig. 20) to determine the potential for geothermal resources.
7. Additional heat-flow measurements and detailed geophysical studies in western Bernalillo County and near Albuquerque to determine the geothermal-resource potential.
8. Additional mapping is required in the Placitas district to determine the extent of the mineral deposits. The Placitas Basin area needs to be examined in the subsurface for barite-fluorite-galena deposits.
9. The Nacimiento Formation and the contact between the Fruitland and Kirtland Formations should be examined for

potential bedded barite-strontinite deposits (Fig. 20; Areas M and N).

10. If the uranium industry should improve, geochemical sampling and radiometric surveying are required in the Hells Canyon district to determine the nature of uranium mineralization in the Precambrian units.

11. Chemical sampling of the Glorieta Sandstone Member is required to determine the potential for high-silica sand resources.

12. Detailed studies of the mineralogy and chemistry of clay deposits are required to assess the potential for clays.

13. Additional mapping of pumice deposits in the Jemez Mountains is required should additional resources be required.

14. Examine the Tertiary and Quaternary lake deposits downstream from the Jemez volcanics for bentonite and zeolite deposits. Finally, but not least, the mineral-resource potential of this area should be re-examined on a timely basis to update the mineral-resource potential due to new information.

15. Geologic mapping and geochemical samples of the Pennsylvanian limestones in the Sandia Mountains is needed to determine their potential for high-calcium limestones.

16. The magnetic high in the Hagan Basin should be examined by geophysical studies and drilling. The area could have potential for Cerrillos- and La Bajada-type deposits if this high is due to igneous intrusives similar to that found in the Cerrillos Hills.

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Preliminary Report on the Geology and Mineral Resource Potential of the northern Rio Puerco Resource Area in Sandoval and Bernalillo Counties and Adjacent parts of McKinley, Cibola and Santa Fe Counties, New Mexico

by

Virginia T. McLemore,
Gretchen H. Roybal,
Ronald F. Broadhead,
Richard Chamberlin,
Robert M. North,
JoAnne Cima Osburn,
Brian W. Arkell,
Robert M. Colpitts,
Mark R. Bowie,
Kent Anderson,
James M. Barker,
and
Frank Campbell

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APPENDICES

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by V.T. McLemore and others. Dec. 1984

APPENDIX 1

MINERAL AND OTHER COMMODITY OCCURRENCES, DEPOSITS, AND MINES IN SANDOVAL AND BERNALILLO COUNTIES AND ADJACENT PARTS OF MCKINLEY, VALENCIA, AND SANTA FE COUNTIES

Introduction

The following compilation of mineral and other commodity occurrences (excluding oil, gas, and CO_2 tests) is the most comprehensive tabulation of mineral occurrences in the area. It is probable that additional occurrences will be discovered in the future. For the purposes of this report, any locality where mineralization or materials prospects are found is considered an occurrence, including sand and gravel (materials) pits. Only the major mines in the Cochiti district are included because of the numerous prospects and claims in the area.

Each description is a brief account of the location, commodities present, production, and geology of the occurrence that was compiled from the literature, unpublished sources, and field reconnaissance. Each occurrence is plotted on Maps 1-7, 15-20, and 26-30. Metal occurrences are arranged alphabetically and the industrial materials are arranged by township and range. Lists of metal occurrences by township and range and by district are also included.

Explanation of descriptions

The descriptions of mineral occurrences in this section are brief summaries of published and unpublished information. However, not all of the available information could be included; information for some occurrences is considered confidential by a company or the information is very extensive. Very little information could be obtained for some occurrences. Each description consists of 12 entries or less (depending on available information), and the entries are listed by number as described below.

1: Occurrence number refers to the location or approximate location of each mineral occurrence, prospect, deposit, or mine. The numbering system used is based upon the township, range, and section land-grid system (Fig. 3) and is used by the New Mexico State Engineer for numbering water wells and springs. By this system, each occurrence has a unique location number consisting of four parts separated by periods (e.g., 3N.5E.15.441). The first part refers to the township, the second part to the range, and the third part to the section. The fourth part places the occurrence within the nearest quarter-quarter-quarter section block as indicated in Figure 3. An occurrence designated 3N.5E.15.441 is located in the NW 1/4 SE 1/4 SE 1/4 of section 15, T. 3 N., R. 5 E. Some occurrences are located only to the nearest section, quarter-section, or quarter-quarter section because the occurrence can not be located more accurately or the occurrence extends over the entire given area. Some occurrences are listed by township and range and located in the center of the township. In unsurveyed areas the locations are approximated by projecting section lines.

2: Name of the occurrence, prospect, deposit, or mine as found in the literature. Aliases are given in parentheses.

3: Location of the occurrence by the section, township, and range and by latitude and longitude.

4: Names of the 7 1/2-minute or 15-minute topographical quadrangle maps; the 30-minute by 60-minute topographical quadrangle map is in parentheses.

5: Mining district or geographical area.

6: Commodities present at the locality.

7: The extent of development or prospecting.

8: Production statistics for various commodities.

9: The formation name and geologic age of the host rock.

10: Brief description of the geology, host rock, and character of the deposit; including chemical analyses and other pertinent information.

11: Comments or additional information.

12: References or sources of information are listed in an abbreviated form and arranged in chronological order. Published reports are listed with last name of author(s) and year of publication in parentheses; the complete citation may be found in the reference section. Unpublished sources are abbreviated as follows: FN (field notes); NMBMMR files (New Mexico Bureau of Mines and Mineral Resources unpublished files); USAEC files (U.S. Atomic Energy Commission files); PRR (Preliminary Reconnaissance Reports of the Atomic Energy Commission); USBM files (U.S. Bureau of Mines files); CRIB (Computerized Resource Information Bank, U.S. Geological Survey); MILS (Mineral Industry Location Survey, U.S. Bureau of Mines); NMSHD (New Mexico State Highway Department, 1975); PC (personal communication); and WC (written communication).

Copies of most of these reports are available for inspection at the New Mexico Bureau of Mines and Mineral Resources.

Number	Name	Commodity	District
8N.4E.1.444	Unknown	Pb, F, Au, Ag	Coyote Canyon
8N.5E.4.311	Swastika	F, Ba, Pb, Ag, Au	Coyote Canyon
8N.5E.6.341	Lucky Bill (Moore Prospect, Quail)	Pb, F, Au, Ag	Coyote Canyon
8N.5E.7.121	Long View	Cu, Ag, Au	Coyote Canyon
8N.5E.8.414	Galena King (Octoroon, Nellie)	Pb, F, Ag, Au, Ba, Cu	Coyote Canyon
8N.5E.9.311	Unknown	Pb, F	Coyote Canyon
8N.5E.20.242	Hardinand Claim	Au, Ag	Coyote Canyon
8N.5E.28	Lady Betsey	---	Coyote Canyon
9N.4E.1.144	Alpha	REE	Tijeras Canyon
9N.4E.23	Lone Hill Group	---	Coyote Canyon
9N.4E.24	River View Placer	placer Au	Coyote Canyon
9N.4-1/2E.1.423	Grass Roots #1-4	F	Sandia Mountains
9N.4-1/2E.12.212	Unknown	Cu, Au, Ag	Tijeras Canyon
9N.5E.2	Tijeras Canyon (Public Domain)	U, Cu, F	Tijeras Canyon
9N.5E.6.144	Little Apples Co. Mine (Moore)	F, Au, Ag, Cu, Pb	Tijeras Canyon
9N.5E.6.213	York	Cu, Au, Zn	Coyote-Tijeras Canyons
9N.5E.6.431	Mary M (Little Apples Mining Co.)	Au, Ag, Cu, Pb, Zn	Coyote-Tijeras Canyons
9N.5E.7.111	Great Combination Group	Au, Ag, Cu	Coyote-Tijeras Canyons
9N.5E.7.123	Cerro Pelon (Grandview Mining Co., Wac mine)	U, Cu, F, Pb	Tijeras Canyon
9N.5E.16.414	Coyote Springs	Fe	Sandia Mountains
9N.5E.17.231	Red Hill	F	Coyote-Tijeras Canyons
9N.5E.17.442	Blackbird Mine (Red Hill, Manzano fluorspar)	F, Ba, Pb	Coyote-Tijeras Canyons
9N.5E.20.222	Eighty-five Prospect	F	Coyote-Tijeras Canyon
9N.5E.31.423	Highland Mary	Pb, F, Cu, Ag, Au	Coyote Canyon
9N.6E.6	La Don Mine	Cu	
9N.1W.1.333	Cerro Colorado-Archuleta	U, Ba	Albuquerque Basin
9N.1W.11,12	White Lovelace Claims	U, Mn	Albuquerque Basin
10N.4E.14.433	Unknown	F	Sandia Mountains
10N.4E.25.144	Lucky Strike claim	U	Tijeras Canyon
10N.5E.6	Inspiration	Ni, Cr, Ti	Tijeras Canyon
10N.5E.21.343	Unknown	Cu	Tijeras Canyon
10N.5E.22,23	Unknown (Public Domain)	U, Cu	Tijeras Canyon
10N.5E.23.133	Copper Prospect	Cu, Ag, U	Tijeras Canyon
10N.5E.26.144	Shakespeare (Pound G, Santa Domingo)	Ba, F, Cu, Ag, U, Pb	Tijeras Canyon
10N.5E.29.122	Silver Ring-Verdan claims	Pb, Au, Ag, F	Tijeras Canyon
10N.5E.30.441	Unknown	Au, Ag, Cu	Tijeras Canyon
10N.5E.31.224	Unknown	Au, Ag, Cu	Tijeras Canyon
10N.5E.31.311	Unknown	Au, Ag, Cu	Tijeras Canyon
10N.5E.31.344	Unknown	Au, Ag, Cu	Tijeras Canyon
10N.5E.32.113	Unknown	Au, Ag, Cu	Tijeras Canyon
11N.4E.1.100	Unknown	Cu	Placitas
11N.4E.3.411	La Quava and La Madera	Li, Be, REE, Zr(?), Au, Cu	Sandia Mountains
11N.5E.1.311	Aragon and Little Prospect	F	Placitas
11N.5E.2.441	Mohawk Chief and Lion Claims	F, Pb, Ba, Cu	Placitas
11N.5E.5.200	Schmidt Prospect	F, Pb, Ba	Placitas
11N.5E.6.400	La Luz Mine (Ruppe, Clara)	F, Pb, Ag, Cu, Au, Ba	Placitas
11N.5E.10.221	Darrel Prospect	F, Pb	Placitas
11N.5E.11.231	La Madera	F, Ba, Pb	Placitas
11N.5E.13,14	Tejano Canyon	Ba, F	Placitas
11N.5E.22.444	Old Drop	F	Placitas
11N.6E.11.444	Unknown	Ba, F	Sandia Mountains
11N.6E.16.222	Unknown	Ba, F	Sandia Mountains
11N.6E.16.300	Monte Largo Carbonatite	U, Nb, Th, REE	Sandia Mountains
11N.1W.5.300	Bernabe (Conoco)	U	M-B-M
11N.1W.30	Angell	U	Albuquerque Basin
11N.2W.1.100	Bernabe (Conoco)	U	M-B-M
11N.2W.6.200	Bernabe (Conoco)	U	M-B-M
11N.2W.16.200	Herrera Ranch	U, Th, Ti	Albuquerque Basin
11N.2W.25	Angell	U	Albuquerque Basin

M-B-M - Marquez-Bernabe Montaño area

Albuquerque Basin

Name	Number	Commodity
Cerro Colorado-Archuleta	9N.1W.1.333	U, Ba
White-Lovelace Claims	9N.1W.11,12	U, Mn
Angell	11N.1W.30	U
Herrera Ranch	11N.2W.16.200	U, Th, Ti
Angell	11N.2W.25	U

Coyote Canyon

Name	Number	Commodity
Unknown	8N.4E.1.444	Pb, F, Au, Ag
Swastika	8N.5E.4.311	F, Ba, Pb, Ag, Au
Lucky Bill	8N.5E.6.341	Pb, F, Au, Ag
Longview	8N.5E.7.121	Cu, Ag, Au
Galena King	8N.5E.8.414	Pb, F, Ag, Au, Ba, Cu
Unknown	8N.5E.9.311	Pb, F
Hardinand Claim	8N.5E.20.242	Au, Ag
Lady Betsey	8N.5E.28	—
Lone Hill Group	9N.4E.23	—
River View Placer	9N.4E.24	placer Au
Highland Mary	9N.5E.31.423	Pb, F, Cu, Ag, Au

Coyote Canyon-Tijeras Canyon

Name	Number	Commodity
York	9N.5E.6.213	Cu, Au, Zn
Mary M	9N.5E.6.431	Au, Ag, Cu, Pb, Zn
Great Combination Group	9N.5E.7.111	Au, Ag, Cu
Red Hill	9N.5E.17.231	F
Blackbird Mine	9N.5E.17.442	F, Ba, Pb
Eighty-five Prospect	9N.5E.20.222	F

Marquez-Bernabe Montaño--Grants Uranium District

Name	Number	Commodity
Bernabe (Conoco)	11N.1W.5.300	U
Bernabe (Conoco)	11N.2W.1.100	U
Bernabe (Conoco)	11N.2W.6.200	U

Placitas

Name	Number	Commodity
Aragon & Little Prospect	11N.5E.1.311	F
Mohawk, Chief & Lion Claims	11N.5E.2.441	F, Pb, Ba, Cu
Schmidt Prospect	11N.5E.5.200	F, Pb, Ba
La Luz Mine	11N.5E.6.400	F, Pb, Ag, Cu, Au, Ba
Darrel Prospect	11N.5E.10.221	F, Pb
La Madera	11N.5E.11.231	F, Pb, Ba
Tejano Canyon	11N.5E.13,14	Ba, F
Old Drop	11N.5E.22.444	F

Sandia Mountains

Name	Number	Commodity
Grass Roots #1-4	9N.4-1/2E.1.423	F
Coyote Springs	9N.5E.16.414	Fe
Unknown	10N.4E.14.433	F
La Quava and La Madera	11N.4E.3.411	Li, Be, REE, Zr(?)
Unknown	11N.6E.11.444	Ba, F
Unknown	11N.6E.16.22	Ba, F
Monte Largo Carbonatite	11N.6E.16.300	U, Nb, Th, REE

Tijeras Canyon

Name	Number	Commodity
Alpha	9N.4E.1.444	REE
Unknown	9N.4-1/2E.12.212	Cu, Au, Ag
Tijeras Canyon	9N.5E.2	U, Cu, F
Little Apples Co. Mine	9N.5E.6.144	F, Au, Ag, Cu, Pb
Cerro Pelon	9N.5E.7.123	U, Cu, F, Pb
Lucky Strike Claim	10N.4E.25.144	U
Inspiration	10N.5E.6	Ni, Cr, Ti
Unknown	10N.5E.21.343	Cu
Unknown (Public Domain)	10N.5E.22,23	U, Cu
Copper Prospect	10N.5E.23.133	Cu, Ag, U
Shakespeare	10N.5E.26.144	Ba, F, Cu, Ag, U, Pb
Silver Ring-Verdan Claims	10N.5E.29.122	Pb, Au, Ag, F
Unknown	10N.5E.30.441	Au, Ag, Cu
Unknown	10N.5E.31.224	Au, Ag, Cu
Unknown	10N.5E.31.311	Au, Ag, Cu
Unknown	10N.5E.31.344	Au, Ag, Cu
Unknown	10N.5E.32.113	Au, Ag, Cu
Unknown	11N.4E.1.100	Cu

Number	Name	Commodity	District
12N.4E.1.414	Unknown	Ag, Ba, Cu, Pb	Placitas
12N.4E.12.323	Unknown	Cu	Placitas
12N.4E.12.422	Buckeye Claim (Kleinwort)	Cu, Pb, Ag	Placitas
12N.4E.12.423	Unknown	Cu	Placitas
12N.4E.13.314	Unknown	Cu	Placitas
12N.4E.14.214	Unknown	Cu, Ag	Placitas
12N.4E.14.223	Unknown	Cu (?)	Placitas
12N.4E.26.222	Unknown	Cu (?)	Placitas
12N.4E.35.333	Unknwon	Cu (?)	Placitas
12N.5E.5.340	Unknown	Cu, Pb, Zn	Placitas
12N.5E.7.321	Unknown	Ba	Placitas
12N.5E.7.411	Unknown	Ba	Placitas
12N.5E.7.142	Unknown	Cu, Pb, Zn, Ag	Placitas
12N.5E.8.110	San Jose Group (Victo Group, Kleinwort)	Cu, Pb, Ag, Zn	Placitas
12N.5E.8.220	Victo-Roco-Novo Group	Cu, Pb, Zn, Ba, F	Placitas
12N.5E.8.300	Unknown	Ba	Placitas
12N.5E.9.311	Unknown	Ba, F, Pb	Placitas
12N.5E.15	Donnell Prospect	Cu, Au, Ag	Placitas
12N.5E.16.210	Unknown	Ba, F, Pb	Placitas
12N.5E.16,21	Placitas Hematite	Fe	Placitas
12N.5E.24	Crummy #1 Prospect	Cu, Pb, F	Hagan Basin
12N.5E.26.300	Blue Sky (Goldstar)	F, Ba, Pb, Cu, Ag, Au	Placitas
12N.5E.28.342	Las Huertas Prospects (El Faro?)	Cu, F, Fe, Ag	Placitas
12N.5E.29.300	Landsend Prospect (Lone Star)	Ba, F, Pb	Placitas
12N.5E.33.441	Capulin Peak	Ba, F, Pb	Placitas
12N.6E.3.413	Mimi #1-4 (Roadrunner Claims)	U	Hagan Basin
12N.6E.12	A" Placer (New Mexico Placer)	placer Au	Hagan Basin
12N.6E.35.444	Unknown	Ba, F	Monte Largo Hills
12N.6E.36.133	Unknown	Ba, F	Monte Largo Hills
12N.2W.5.322	Unknown	U	Majors Ranch
12N.2W.6.221	Unknown	U	Majors Ranch
12N.2W.17	Section 17 Prospects	U	M-B-M
12N.2W.18	Section 18 Prospects	U	M-B-M
12N.2W.19	Section 19 Prospects	U	M-B-M
12N.2W.20	Section 20 Prospects	U	M-B-M
12N.2W.29.111	Unknown	U	Majors Ranch
12N.2W.31.420	Herrera Ranch-Anaconda	U, Th, REE	San Juan Basin
12N.2W.31.441	Unknown	U	Majors Ranch
12N.2W.35.200	Bernabe (Conoco-Bernabe Montano)	U	M-B-M
12N.3W.8	Unknown	U	M-B-M
12N.3W.8.122	Dory (Dorie, Doerrie, Anomaly #1)	U	M-B-M
12N.3W.14	Section 14 Prospects	U	M-B-M
12N.3W.15.440	B and G	U	M-B-M
12N.3W.16.300	Brookhaven	U	M-B-M
12N.3W.17.323	Betty	U	M-B-M
12N.3W.18.141	Rio Puerco (Kerr-McGee)	U	M-B-M
12N.3W.20	Section 20 Prospects	U	M-B-M
12N.3W.21	Section 21 Prospects	U	M-B-M
12N.3W.27	Section 27 Prospects	U	M-B-M
12N.3W.28	Section 28 Prospects	U	M-B-M
12N.3W.29	Section 29 Prospects	U	M-B-M
12N.3W.30	Section 30 Prospects	U	M-B-M
12N.4W.1.200	Unknown	U	M-B-M
12N.4W.12.143	Unknown	U	M-B-M
12N.4W.13.200	Section 13 (UN, Westvaco)	U	M-B-M
12N.4W.23.411	Unknown	U	M-B-M
12N.4W.24	Section 24 Prospects	U	M-B-M
13N.5E.15.200	Alamos Altos Placers	placer Au	Placitas
13N.5E.22,27	Cuchilla de San Francisco Mines	Cu	Placitas
13N.5E.34.113	Montezuma (Las Huertas)	Ba, F, Pb, Fe, Ag, Cu, Au	Placitas
13N.5E.34.344	Las Huertas	Ba, F, Pb	Placitas
13N.5E.34	Las Huertas Creek (near Tecolote)	placer Au	Placitas
13N.6E.4,5	We Hope #4	U, Se, Mo, V	Hagan Basin
13N.6E.6.400	North Blackshere Ranch (D. Dial Expl.)	U	Hagan Basin
13N.6E.9,10	Dial Exploration Claims (Blackshere Ranch)	U, Se, Mo, V	Hagan Basin
13N.6E.16.124	Diamond Tail (Union Carbide)	U, Se, Mo, V	Hagan Basin
13N.6E.22.320	Coyote #1-10 (Babacka, Diamond Tail)	U, Se, V	Hagan Basin
13N.6E.26.211	Unknown	placer Au	Hagan Basin
13N.2W.9.132	Anomaly #2 (Anomaly #7)	U	Majors Ranch
13N.4W.25	Unknown	U	M-B-M
13N.4W.32.300	Marquez Grant (Bokum Resources)	U	M-B-M
14N.1E.27.400	Unknown	U	Nacimiento Mtns.
14N.1E.31	Garcia Fault Zone	U	Nacimiento Mtns.
14N.6E.6	Ace Claims	U	Hagan Basin
14N.6E.10	Blackshere	U(?)	Hagan Basin
14N.6E.19	Dial Exploration Co. (Lib Claims)	U	Hagan Basin
14N.6E.30	Ben Claims (Mata)	U	Hagan Basin
14N.6E.32	We(e) Hope, Rabac, DEC Claims, (North Blackshere Ranch)	U, Se, Mo, V	Hagan Basin
15N.1E.17.414	Anomaly #3 (Morris-Peters #17)	U	White Mesa-Nacimiento Mtns.
15N.1E.17	Morris-Peters #17	U	Nacimiento Mtns.
15N.1E.20.441	Morris-Peters #20 (Collins Prospect, Anomaly #14)	U	Nacimiento Mtns.
15N.1E.21.441	Morris-Peters #21	U	Nacimiento Mtns.
15N.1E.22.144	Unknown	U	Nacimiento Mtns.
15N.1E.22.433	Unknown	Au, U	Nacimiento Mtns.
15N.1E.26.110	Anomaly #5 (Lone Star Mining and Dev. Corp.)	Coal, U, Au	White Mesa
15N.1E.27.200	Lone Star Mining and Dev. Corp.	Coal, U	White Mesa
15N.1E.31	Unknown	U	Nacimiento Mtns.
15N.4E.27	Unknown	U(?)	Hagan Basin
15N.1W.8.223	Unknown	U	Ojito Springs area
15N.1W.9.441	Unknown	U	Ojito Springs area
15N.1W.10.210	Unknown	U	Ojito Springs area
15N.1W.10.444	Lone Wolf Group (Unknown)	U	Ojito Springs area
15N.1W.11.321	Lone Wolf Group (Unknown)	U	Ojito Springs area
15N.1W.11.414	Lone Wolf Group (Unknown)	U	Ojito Springs area
15N.1W.14.400	Rattlesnake Group (Unknown)	U	Ojito Springs area
15N.1W.15.124	Polka Dot Uranium Group	U	Ojito Springs area
15N.1W.15.223	Polka Dot Uranium Group (Unknown)	U	Ojito Springs area

Number	Name	Commodity	District
15N.1W.21.214	Yellow Cliffs Group	U	Ojito Springs area
15N.1W.21.441	Unknown	U	Ojito Springs area
15N.1W.22.441	Unknown	U	Ojito Springs area
15N.1W.23.400	Unknown	U	Ojito Springs area
15N.1W.27	Unknown	U(?)	Ojito Springs area
15N.1W.33	Unknown	U(?)	Ojito Springs area
15N.1W.34	Unknown	U(?)	Ojito Springs area
15N.1W.35	Unknown	U(?)	Ojito Springs area
16N.1E.8.300	Anomaly #2	U(?)	Nacimiento Mtns.
16N.1E.12.110	Anomaly #1	U(?)	Nacimiento Mtns.
16N.1E.13.400	Anomaly #6-10-Jemez Reservation	Cu, U	Nacimiento Mtns.
16N.1E.17.214	Anomaly #2-Jemez Reservation	U	Nacimiento Mtns.
16N.1E.20.412	Anomaly #4-Jemez Reservation	U, travertine	Nacimiento Mtns.
16N.1E.21.123	Anomaly #5-Jemez Reservation	U, travertine	Nacimiento Mtns.
16N.1E.21.233	Anomaly #3-Jemez Reservation	U(?)	Nacimiento Mtns.
16N.1E.29.123	Anomaly #10	U(?), travertine	Nacimiento Mtns.
16N.1E.29.133	Anomaly #11	U(?), travertine	Nacimiento Mtns.
16N.1E.29.130	Anomaly #12	U(?), travertine	Nacimiento Mtns.
16N.1E.29.413	Unknown	U	Nacimiento Mtns.
16N.1E.32.211	Unknown	U	Nacimiento Mtns.
16N.2E.7.100	Unknown	U	Nacimiento Mtns.
16N.2E.18.212	Anomaly #11-Jemez Reservation	Cu, U	Nacimiento Mtns.
16N.3E.1.244	Canovas #13 Group	Cu, pumice (?)	Jemez Mtns.
17N.1E.26.144	Unknown	Cu	Nacimiento Mtns.
17N.2E.3.340	Spanish Queen West	Ag, Au, Cu, U	Jemez Springs Dist.-Jemez Mtns.
17N.2E.3.400	Spanish Queen (East, Burnett)	Ag, Au, Cu, U, barite	Jemez Springs Dist.-Jemez Mtns.
17N.2E.8	Anomaly #7 (Jemez)	U(?), travertine	Nacimiento Mtns.
17N.2E.17	Anomaly #8	U(?)	Nacimiento Mtns.
17N.2E.18	Anomaly #6-Jemez Reservation	U(?)	Nacimiento Mtns.
17N.2E.21,22	Anomaly #9	U(?)	Nacimiento Mtns.
17N.4E.1.200	Sun Group	Au, Ag, U	Cochiti
17N.4E.10,15	Peralta Canyon (A-1 Lode, O.B.S., Peralta Lion Group)	Au, Ag, U(?), Cu, V(?)	Cochiti
17N.5E.9.410	Peralta Canyon (?)-Copper Prospect	Cu, U, Au, Ag	Cochiti
17N.1W.11.300	Goodner-Section 11	U	Nacimiento Mtns.
17N.1W.12.220	Burcar (Unknown, Ojo-del Espirito Santo Grant)	U	Nacimiento mtns.
17N.1W.14	Anomaly #5 (Ojo del Espirito Santo Grant)	U	Nacimiento Mtns.
17N.1W.15.211	Unknown (Ojo del Espirito Santo Grant)	U	Nacimiento Mtns.
17N.1W.23.411	Collins Prospect	U, V	Nacimiento Mtns.
17N.1W.25.112	Collins (Warm Springs, Burke-Goodner Lease, Goodner, Walker #1)	U, V	Nacimiento Mtns.
17N.1W.25.113	Collier (Section 25)	U, V	Nacimiento Mtns.
17N.1W.25.420	Unknown-Collins Lease (Kroeger #1)	U, V	Nacimiento Mtns.
17N.1W.26	J. Walker #1	U	Nacimiento Mtns.
17N.1W.27.222	Unknown (Anomaly #4, Ojo del Espirito Santo Grant)	U	Nacimiento Mtns.
17N.1W.35.240	Anomaly #6	U	Nacimiento Mtns.
17N.1W.36.323	Unknown	U	Nacimiento Mtns.
17N.1W.36.300	Section 36 (Anomaly #3 and #7)	U	Nacimiento Mtns.
17N.4W.34.332	B.P. Hovey Ranch (Torrean Wash Area)	U, Th, Ti, REE	San Juan Basin
18N.1E.19.134	Unknown	Cu	Nacimiento Mtns.
18N.1E.30.322	Unknown	Cu	Nacimiento Mtns.
18N.1E.35.144	Deer Creek	U, Cu, Ag, Au	Gilman area-Nacimiento Mtns.
18N.2E.13.200	Northeast of Soda Dam	Cu, U	Jemez Springs Dist.-Jemez Mtns.
18N.2E.13.300	Jemez Springs	Ba	Jemez Springs
18N.2E.13.400	Soda Dam (Perry Robb)	U, travertine	Jemez Springs Dist.-Jemez Mtns.
18N.2E.34	Tex-N (Tex M)	Cu, U	Jemez Springs Dist.-Jemez Mtns.
18N.4E.24.340	Last Chance Lode	Au, Ag	Cochiti
18N.4E.25.113	Miners Union	Au, Ag, Cu	Cochiti
18N.4E.25.124	Laura S. (Tip Top)	Au, Ag	Cochiti
18N.4E.25.131	Mogul Group	Au, Ag	Cochiti
18N.4E.25.142	Crown Point	Au, Ag, Pb, Zn, Fe, Cu	Cochiti
18N.4E.25.322	Giant	Au, Ag, Pb	Cochiti
18N.4E.25.324	Iron King Group	Au, Ag, Pb, Zn, Fe, Cu	Cochiti
18N.4E.25.344	Lonestar Mine (Navajo Tunnel)	Au, Ag, Pb, Zn, Fe, Cu	Cochiti
18N.4E.25.410	Uncle Joe #2	Au, Ag	Cochiti
18N.4E.25.433	North Star	Au, Ag, Cu	Cochiti
18N.4E.25.441	Bull of the Woods	Au, Ag	Cochiti
18N.4E.25.443	Little Casino	Au, Ag	Cochiti
18N.4E.35.221	Sheridon Lode	Au, Ag	Cochiti
18N.4E.35.420	Albemarle Group (Altoona, Antario, Pamlico)	Au, Ag, Zn, Pb, Fe, Cu	Cochiti
18N.4E.36	Iowa #2 (Iron King, Iron Queen)	Au, Ag	Cochiti
18N.4E.36.120	Dry Monopole	Au, Ag, Cu	Cochiti
18N.4E.36.124	Free Trade	Au, Ag	Cochiti
18N.4E.36.124	Washington	Au, Ag, Pb, Zn, Fe, Cu	Cochiti
18N.4E.36.213	Short Order Group	Au, Ag, Cu	Cochiti
18N.4E.36.223	Blue Bell	Au, Ag, Cu	Cochiti
18N.4E.36.232	Daisy Mine	Au, Ag, Cu	Cochiti
18N.4E.36.332	Sunny South Lode	Au, Ag	Cochiti
18N.4E.36.420	Fractional	Au, Ag, Cu	Cochiti
18N.4E.36.441	Little Mollie	Au, Ag	Cochiti
18N.5E.31.132	Empire Lode	Au, Ag	Cochiti
18N.5E.31.313	King Tut	Au, Ag	Cochiti
18N.5E.31.334	Arondale	Au, Ag	Cochiti
18N.1W.2.341	Unknown (South Butte)	U, Coal	La Ventana-Nacimiento Mtns.
18N.1W.12.240	Unknown	Cu	Nacimiento Mtns.
18N.1W.12.300	Unknown (De Dos Gordos)	U	Nacimiento Mtns.
19N.3E.28	La Plata Placer	Au (?)	
19N.1W.2.244	Mauldian	U	La Ventana-Nacimiento Mtns.

Number	Name	Commodity	District
19N.1W.4.110	Black Rose	U, Coal	La Ventana-Nacimiento Mtns.
19N.1W.11.440	Dennison-Bunn (Georgia Claims)	U	La Ventana-Nacimiento Mtns.
19N.1W.14.233	Cleary	U	La Ventana-Nacimiento Mtns.
19N.1W.19.230	Unknown	U, Coal	La Ventana-Nacimiento Mtns.
19N.1W.23.241	Butler Brothers	U, Coal, V	La Ventana-Nacimiento Mtns.
19N.1W.24.100	San Miguel Mine	U, Cu, V, Mo, Ag	La Ventana-Nacimiento Mtns.
19N.1W.28.300	North Butte (La Ventana Mesa)	U, Coal	La Ventana-Nacimiento Mtns.
19N.1W.30.221	Unknown	U, Coal	La Ventana-Nacimiento Mtns.
19N.1W.30.322	Unknown	U	La Ventana-Nacimiento Mtns.
19N.1W.32.232	Unknown	U, Coal	La Ventana-Nacimiento Mtns.
19N.1W.34.300	South Butte (La Ventana Mesa)	U, Coal	La Ventana-Nacimiento Mtns.
19N.1W.35.120	Rambler #2	U, Coal	La Ventana-Nacimiento Mtns.
19N.1W.36.232	Unknown	Cu	Nacimiento Mtns.
19N.2W.3.340	Houston (S. Houston, Unknown)	U	Cuba
19N.2W.4	Mesa Portales (Portal Claims, New Cinch)	U	Cuba
19N.2W.35	Cuba #13 (G. Adair/Wilcox)	U	La Ventana
19N.2W.36.223	Unknown	U, Coal	La Ventana-Nacimiento Mtns.
20N.1E.6.114	Cliff (Don #11)	U, Cu	Nacimiento Mtns.
20N.1E.6.300	Unknown	Cu, U	Nacimiento Mtns.
20N.1E.15.300	Jewell (Unknown)	U, Cu	Nacimiento Mtns.
20N.2E.3.130	Penas Negras	Cu	Nacimiento Mtns.
20N.2E.4.221	Minerals and Chemicals Group	Cu	Nacimiento Mtns.-Seven Springs area
20N.2E.7.211	Unknown	Cu	Nacimiento Mtns.
20N.1W.1.141	Nacimiento Mine (Copper City, Copper Glance, Cuprite)	Cu, U, Ag	Nacimiento Mtns.
20N.1W.2.223	Unknown	U	La Ventana-Nacimiento Mtns.
20N.1W.12.133	Bluebird	Cu, U	Nacimiento Mtns.
20N.1W.24.324	Unknown	Cu	Nacimiento Mtns.
20N.1W.24.341	Unknown	Cu	Nacimiento Mtns.
20N.2W.1.100	Unknown-Rio Puerco	U	Cuba
21N.1W.7.230	Unknown	U	Nacimiento Mtn.-Cuba
21N.1W.12.421	Morningstar Mining Corporation	Au, Cu, Mn	Nacimiento Mtns.
21N.1W.20.100	Unknown	U	Nacimiento Mtn.-Cuba
21N.1W.35.431	Unknown	Au, Ag	Nacimiento Mtns.
21N.1W.36.300	Chalcocite Prospect	Cu, Au, Ag	Nacimiento Mtn.
21N.3W.26.300	Taylor (Miller, Joel Taylor)	Mn	Cuba Manganese Dist.
21N.4W.22	Landers #2 (Crook #2)	Mn	Cuba Manganese Dist.
21N.4W.28.200	Landers #1 (Crook #1)	Mn	Cuba Manganese Dist.
22N.1W.1.134	Unknown	Cu	Nacimiento Mtns.
22N.4W.21	Jicarilla Apache Mn deposit (Mn Prospect)	Mn, U (occurrence)	Cuba Manganese Dist.
23N.1W.25.212	Corral #6	U, V, Cu	Vegitas Cluster area-San Pedro Mtns
23N.1W.25.221	Corral #3 (Corral #1, Sla-Tex)	U, Cu, V	Vegitas Cluster area-San Pedro Mtns
23N.4W.31	Arrowhead Claims	U	Jicarilla Apache Indian Reservation San Juan Basin

M-B-M - Marquez-Barnabe Montaño area of the Grants uranium district.

METALLIC OCCURRENCES
Numerical Index - McKinley County

Number	Name	Commodity	District
13N.5W.25.100	Marquez Canyon	U	M-B-M
13N.5W.25.400	Marquez Canyon mine	U	M-B-M
13N.5W.32,33	Juan Tafoya-Marquez Grant	U	M-B-M
15N.6W.4.140	Miquel Creek Dome	U, Th, Ti	San Juan Basin

M-B-M - Marquez-Barnabe Montaño area of the Grants uranium district

Cochiti

Name	Number	Commodity
Sun Group	17N.4E.1.200	Au, Ag, U
Peralta Canyon	17N.4E.10,15	Au, Ag, U(?), V(?), Cu
Peralta Canyon(?)-Copper Prospect	17N.5E.9.410	Cu, U, Au, Ag
Last Chance Lode	18N.4E.24.340	Au, Ag
Miners Union	18N.4E.25.113	Au, Ag, Cu
Laura S.	18N.4E.25.124	Au, Ag
Mogul Group	18N.4E.25.131	Au, Ag
Crown Point	18N.4E.25.142	Au, Ag, Pb, Zn, Fe, Cu
Giant	18N.4E.25.322	Au, Ag, Pb
Iron King Group	18N.4E.25.324	Au, Ag, Pb, Zn, Fe, Cu
Lonestar Mine	18N.4E.25.344	Au, Ag, Pb, Zn, Fe, Cu
Uncle Joe #2	18N.4E.25.410	Au, Ag
North Star	18N.4E.25.433	Au, Ag, Cu
Bull of the Woods	18N.4E.25.441	Au, Ag
Little Casino	18N.4E.25.443	Au, Ag
Sheridon Lode	18N.4E.35.221	Au, Ag
Albemarle Group	18N.4E.35.420	Au, Ag, Pb, Zn, Fe, Cu
Iowa #2	18N.4E.36	Au, Ag
Dry Monopole	18N.4E.36.120	Au, Ag, Cu
Free Trade	18N.4E.36.124	Au, Ag
Washington	18N.4E.36.124	Au, Ag, Pb, Zn, Fe, Cu
Short Order Group	18N.4E.36.213	Au, Ag, Cu
Blue Bell	18N.4E.36.223	Au, Ag, Cu
Daisy Mine	18N.4E.36.232	Au, Ag, Cu
Sunny South Lode	18N.4E.36.332	Au, Ag
Fractional	18N.4E.36.420	Au, Ag, Cu
Little Mollie	18N.4E.36.441	Au, Ag
Empire Lode	18N.5E.31.132	Au, Ag
King Tut	18N.5E.31.313	Au, Ag
Arondale	18N.5E.31.334	Au, Ag

Cuba Manganese District

Name	Number	Commodity
Taylor	21N.3W.26.300	Mn
Landers #2	21N.4W.22	Mn
Landers #1	21N.4W.28.200	Mn
Jicarilla Apache Mn deposit	22N.4W.21	Mn, U (occurrence)

Hagan Basin

Name	Number	Commodity
Crummy #1 Prospect	12N.5E.24	Cu, Pb, F
Mimi #1-4	12N.6E.3.413	U
A" Placer	12N.6E.12	placer Au
We Hope #4	13N.6E.4,5	U, Se, Mo, V
North Blackshere Ranch	13N.6E.6.400	U
Dial Exploration Claims	13N.6E.9,10	U, Se, Mo, V
Diamond Tail	13N.6E.16.124	U, Se, Mo, V
Coyote #1-10	13N.6E.22.320	U, Se, V
Unknown	13N.6E.26.211	placer Au
Ace Claims	14N.6E.6	U
Blackshere	14N.6E.10	U(?)
Dial Exploration Co.	14N.6E.19	U
Ben Claims	14N.6E.30	U
We(e) Hope, Rabac, DEC Claims	14N.6E.32	U, Se, Mo, V
Unknown	15N.4E.27	U(?)

Jemez Springs District - Jemez Mtns.

Name	Number	Commodity
Canovas #13 Group	16N.3E.1.244	Cu, pumice (?)
Spanish Queen West	17N.2E.3.340	Ag, Au, Cu, U
Spanish Queen	17N.2E.3.400	Ag, Au, Cu, U
Northeast of Soda Dam	18N.2E.13.200	Cu, U
Jemez Springs	18N.2E.13.300	Ba
Soda Dam	18N.2E.13.400	U
Tex-N	18N.2E.34	Cu, U

La Ventana – Nacimiento Mountains

Name	Number	Commodity
Unknown	18N.1W.2.341	U, coal
Mauldian	19N.1W.2.244	U
Black Rose	19N.1W.4.110	U, coal
Dennison-Bunn	19N.1W.11.440	U
Cleary	19N.1W.14.233	U
Unknown	19N.1W.19.230	U, coal
Butler Brothers	19N.1W.23.241	U, coal, V
San Miguel Mine	19N.1W.24.100	U, Cu, V, Mo
North Butte	19N.1W.28.300	U, coal
Unknown	19N.1W.30.221	U, coal
Unknown	19N.1W.30.322	U
Unknown	19N.1W.32.232	U, coal
South Butte	19N.1W.34.300	U, coal
Rambler #2	19N.1W.35.120	U, coal
Cuba #13	19N.2W.35	U
Unknown	19N.2W.36.223	U, coal
Unknown	20N.1W.2.223	U, Cu

Majors Ranch

Name	Number	Commodity
Unknown	12N.2W.5.322	U
Unknown	12N.2W.6.221	U
Unknown	12N.2W.29.111	U
Unknown	12N.2W.31.441	U
Anomaly #2	13N.2W.9.132	U

Marquez-Bernabe Montaño—Grants Uranium District

Name	Number	Commodity
Section 17 Prospects	12N.2W.17	U
Section 18 Prospects	12N.2W.18	U
Section 19 Prospects	12N.2W.19	U
Section 20 Prospects	12N.2W.20	U
Bernabe	12N.2W.35.200	U
Unknown	12N.3W.8	U
Dory	12N.3W.8.122	U
Section 14 Prospects	12N.3W.14	U
B and G	12N.3W.15.440	U
Brookhaven	12N.3W.16.300	U
Betty	12N.3W.17.323	U
Rio Puerco	12N.3W.18.141	U
Section 20 Prospects	12N.3W.20	U
Section 21 Prospects	12N.3W.21	U
Section 27 Prospects	12N.3W.27	U
Section 28 Prospects	12N.3W.28	U
Section 29 Prospects	12N.3W.29	U
Section 30 Prospects	12N.3W.30	U
Unknown	12N.4W.1.200	U
Unknown	12N.4W.12.143	U
Section 13	12N.4W.13.200	U
Unknown	12N.4W.23.411	U
Section 24 Prospects	12N.4W.24	U
Unknown	12N.4W.25	U
Marquez Grant	13N.4W.32.300	U

Monte Largo Hills

Name	Number	Commodity
Unknown	12N.6E.35.444	Ba, F
Unknown	12N.6E.36.133	Ba, F

Nacimiento Mountains

Name	Number	Commodity
Unknown	14N.1E.27.400	U
Garcia Fault Zone	14N.1E.31	U
Anomaly #3	15N.1E.17.414	U
Morris-Peters #17	15N.1E.17	U
Morris-Peters #20	15N.1E.20.441	U
Morris-Peters #21	15N.1E.21.441	U
Unknown	15N.1E.22.144	U
Unknown	15N.1E.22.433	U, Au
Anomaly #5	15N.1E.26.110	Coal, U, Au
Lone Star Mining and Dev. Corp.	15N.1E.27.200	Coal, U
Unknown	15N.1E.31	U
Anomaly #2	16N.1E.8.300	U(?)
Anomaly #1	16N.1E.12.110	U(?)
Anomaly #6-10-Jemez Reservation	16N.1E.13.400	Cu, U
Anomaly #2-Jemez Reservation	16N.1E.17.214	U
Anomaly #4-Jemez Reservation	16N.1E.20.412	U, travertine
Anomaly #5-Jemez Reservation	16N.1E.21.123	U, travertine
Anomaly #3-Jemez Reservation	16N.1E.21.233	U(?)
Anomaly #10	16N.1E.29.123	U(?), travertine
Anomaly #11	16N.1E.29.133	U(?), travertine
Anomaly #12	16N.1E.29.130	U(?), travertine
Unknown	16N.1E.29.413	U
Unknown	16N.1E.32.211	U
Unknown	16N.2E.7.100	U
Anomaly #11-Jemez Reservation	16N.2E.18.212	Cu, U
Unknown	17N.1E.26.144	Cu
Anomaly #7 (Jemez)	17N.2E.8	U(?), travertine
Anomaly #8	17N.2E.17	U(?)
Anomaly #6-Jemez Reservation	17N.2E.18	U(?)
Anomaly #9	17N.2E.21,22	U(?)
Goodner-Section 11	17N.1W.11.300	U
Burcar	17N.1W.12.220	U
Anomaly #5	17N.1W.14	U
Unknown	17N.1W.15.211	U
Collins Prospect	17N.1W.23.411	U, V
Collins	17N.1W.25.112	U, V
Collier	17N.1W.25.113	U, V
Unknown-Collins Lease	17N.1W.25.420	U, V
J. Walker #1	17N.1W.26	U
Unknown	17N.1W.27.222	U
Anomaly #6	17N.1W.35.240	U
Unknown	17N.1W.36.323	U
Section 36	17N.1W.36.300	U
Unknown	18N.1E.19.134	Cu
Unknown	18N.1E.30.322	Cu
Deer Creek	18N.1E.35.144	U, Cu, Ag, Au
Unknown	18N.1W.12.240	Cu
Unknown	18N.1W.12.300	U
Unknown	19N.1W.36.232	Cu
Cliff	20N.1E.6.114	U, Cu
Unknown	20N.1E.6.300	Cu, U
Jewell	20N.1E.15.300	U, Cu
Penas Negras	20N.2E.3.130	Cu
Minerals and Chemicals Group	20N.2E.4.221	Cu
Unknown	20N.2E.7.211	Cu
Nacimiento Mine	20N.1W.1.141	Cu, U, Ag
Bluebird	20N.1W.12.133	Cu, U
Unknown	20N.1W.24.324	Cu
Unknown	20N.1W.24.341	Cu
Unknown-Rio Puerco	20N.2W.1.100	U
Unknown	21N.1W.7.230	U
Morningstar Mining Corp.	21N.1W.12.421	Au, Cu, Mn
Unknown	21N.1W.20.100	U
Unknown	21N.1W.35.431	Au, Ag
Chalcocite Prospect	21N.1W.36.300	Cu, Au, Ag
Unknown	22N.1W.1.134	Cu

Placitas

Name	Number	Commodity
Unknown	12N.4E.1.414	Ag, Ba, Cu, Pb
Buckeye Claim (Kleinwort)	12N.4E.12.422	Cu, Pb, Ag
Unknown	12N.4E.12.323	Cu
Unknown	12N.4E.12.423	Cu
Unknown	12N.4E.13.314	Cu
Unknown	12N.4E.14.214	Cu, Ag
Unknown	12N.4E.14.223	Cu(?)
Unknown	12N.4E.26.222	Cu(?)
Unknown	12N.4E.35.333	Cu(?)
Unknown	12N.5E.5.340	Cu, Pb, Zn
Unknown	12N.5E.7.142	Cu, Pb, Zn, Ag
Unknown	12N.5E.7.321	Ba
Unknown	12N.5E.7.411	Ba
San Jose Group	12N.5E.8.110	Cu, Pb, Ag, Zn
Victo-Roco-Novo Group	12N.5E.8.220	Cu, Pb, Zn
Unknown	12N.5E.8.300	Ba
Unknown	12N.5E.9.311	Ba, F, Pb
Donnell Prospect	12N.5E.15	Cu, Au, Ag
Unknown	12N.5E.16.210	Ba, F, Pb
Placitas Hematite	12N.5E.16,21	Fe
Blue Sky	12N.5E.26.300	F, Ba, Pb, Cu, Ag, Au
Las Huertas Prospects	12N.5E.28.342	Cu, F, Fe, Ag
Landsend Prospect	12N.5E.29.300	Ba, F, Pb
Capulin Peak	12N.5E.33.441	Ba, F, Pb
Alamos Altos Placers	13N.5E.15.200	placer Au
Cuchilla de San Francisco Mines	13N.5E.22,27	Cu
Montezuma	13N.5E.34.113	Ba,F,Pb, Fe, Ag, Cu, Au
Las Huertas	13N.5E.34.344	Ba, F, Pb
Las Huertas Creek	13N.5E.34	placer Au

San Juan Basin

Name	Number	Commodity
Herrera Ranch-Anaconda	12N.2W.31.400	U, Th, REE
Miguel Creek Dome (McKinley Co.)	15N.6W.4.140	U, Th, Ti
B.P. Hovey Ranch	17N.4W.34.332	U, Th, Ti, REE
Arrowhead Claims	23N.4W.31	U

Vegitas Cluster area-San Pedro Mountains

Name	Number	Commodity
Corral #6	23N.1W.25.212	U, V, Cu
Corral #3	23N.1W.25.221	U, Cu, V

METALLIC MINERAL OCCURRENCES
IN BERNALILLO COUNTY
(including uranium, barite, and fluorite occurrences)

1: 9N.4E.1.144
2: Alpha
3: 1 T9N R4E 35°2'15"N 106°28'23"W
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: REE
7: pits
8: no production
9: Precambrian Sandia granite
10: pegmatite or fault zone
12: MILS (1981)

1: 11N.5E.1.311
2: Aragon & Little Prospect
3: SW1/4 1 T11N R5E 35°12'30"N 106°21'57"W
4: Sandia Park 7-1/2 (Albuquerque) Elevation 7,150 ft
5: Placitas district
6: fluorite
7: short tunnels, shallow shafts
8: no production
9: Precambrian Sandia granite
10: small veins of fluorite along fractures and faults in granite
12: V. C. Kelley and Northrop (1975, p. 101); C. H. Phillips (1964); MILS (1981); PRR DEB-A-517 (1953)

1: 11N.1W.30
2: Angell
3: 30 T11N R1W 35°9'5"N 106°59'20"W
4: Benavidez Ranch 7-1/2 (Albuquerque)
5: Albuquerque Basin
6: U
7: no workings
8: no production
9: Cretaceous Mesaverde Formation-Gibson Coal(?)
10: radioactive carbonized wood in mudstone and coal
12: McLemore (1982, #55); Green and others (1982b, #276); Hilpert and Corey (1955); PRR ED-R-381 (1954); ED-R-290 (1954)

1: 11N.2W.25
2: Angell
3: 25 T11N R2W 35°9'5"N 106°59'45"W
4: Herrera 7-1/2, Benavidez Ranch 7-1/2 (Albuquerque)
5: Albuquerque Basin
6: U
7: no workings
8: no production
9: Cretaceous Mesaverde Formation-Gibson Coal
10: radioactive carbonized wood in mudstone and coal
12: McLemore (1982, #44); Green and others (1982b, #277); Hilpert and Corey (1955); PRR ED-R-381 (1954); ED-R-290 (1954)

1: 11N.1W.5.300
2: Bernabe (Conoco)
3: 5 T11N R1W
4: Benavidez Ranch 7-1/2 (Albuquerque)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
11: extension of Bernabe mine in Sandoval County
12: NMBMMR files (1980's)

1: 11N.2W.1.100
2: Bernabe (Conoco)
3: 1, 2 T11N R2W
4: Herrera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area
6: U
7: drillholes
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
11: extension of Bernabe mine in Sandoval County
12: NMBMMR files (1980's)

1: 11N.2W.6.200
2: Bernabe (Conoco)
3: 6 T11N R1W
4: Benavidez Ranch 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
11: extension of Bernabe mine in Sandoval County
12: NMBMMR files (1980's)

1: 9N.5E.17.442
2: Blackbird Mine (Red Hill, Manzano fluorspar mine)
3: 17 T9N R5E 35°00'4"N 106°24'57"W
4: Tijeras 7-1/2 (Albuquerque)
5: Coyote Canyon-Tijeras Canyon district
6: fluorite, Pb, barite
7: 85-ft shaft with 132 ft of drifts
8: 300 tons fluorite produced (75%)
9: Precambrian Sevilleta metarhyolite
10: fluorite veins in fault zone trending N30°W, up to 5 ft thick of 60% fluorite
12: Fulp and others (1982); Elston (1967, p. 12-16); F. E. Williams (1966, p. 12); Rothrock and others (1946, p. 40-41); MILS (1981); CRIB (1982); USBM files (1943); NMBMMR files (1944)

1: 9N.1W.1.333
2: Cerro Colorado-Archuleta (L. W. Claims, Junio, Rio Puerco claims)
3: SW1/4, NW1/4, 12 T9N R1W 35°1'50"N 106°54'00"W
4: La Mesita Negra 7-1/2 (Albuquerque) Elevation 5,630 ft
5: Albuquerque Basin-Rio Puerco area
6: U, barite, feldspar
7: pits
8: no production
9: Tertiary rhyolite/trachyte plugs intruding Tertiary volcanic sequence
10: fracture and fault controlled, sericitic alteration, yellow uranium minerals and barite reported, 0.007% U_3O_8 (NMBMMR, chem lab, 5/20/82, #2130); hydrothermal-vein deposit
11: Town of Atrisco Grant
12: FN 2/23/82; McLemore (1982, #117); Green and others (1982b, #18); O. J. Anderson (1980); U.S. Atomic Energy Commission (1970, p. 6); Hilpert (1965; 1969, p. 32); H. E. Wright (1943); NMBMMR files; PRR DAO-P-4-1480 (1955)

1: 9N.5E.7.123
2: Cerro Pelon (Grandview Mining Co., Wac Mine)
3: 6,7 T9N R5E
4: Tijeras 7-1/2 (Albuquerque) Elevation 6,730 ft
5: Tijeras Canyon district-Sandia Mountains
6: U, Cu, fluorite, Pb
7: 25-ft inclined shaft, 15-ft adit, 3 300-400 ft adits
8: no uranium production
9: Precambrian schist and quartzite
10: radioactive copper-fluorite veins along fractures and shear zones in quartzites
11: mine map by Kelley and Northrop (1975, p. 104)
12: McLemore (1982, #58); Fulp and others (1982); Connolly (1981); V. C. Kelley and Northrop (1975); Rothrock and others (1946); PRR DEB-RRA-643 (1953); MILS (1981)

1: 10N.5E.23.133
2: Copper Prospect
3: 23 T10N R5E 35°4'41"N 106°22'40"W
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: Cu, Ag, U
7: 60 ft incline
8: no production known
9: Permian Abo Formation
10: discontinuous 1-6 in thick seam on feldspathic and locally granulitic sandstone; 4% Cu, 0.2% Ba (Hedlund and others, 1984)
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975, p. 104); MILS (1981); PRR DEB-RRA-874 (1953)

1: 9N.5E.16.414
2: Coyote Springs
3: 16 T9N R5E?
4: Tijeras 7-1/2 (Albuquerque)
5: Sandia Mountains
6: Fe
7: no workings
8: no production
9: Quaternary hot spring deposit
10: red and yellow limonite ocher, probably a spring deposit
11: interest only as small local sources of mineral pigment
12: Harrer and Kelly (1963); Jones (1904)

1: 11N.5E.10.221
2: Darrel Prospect (La Madera)
3: 10 T11N R5E 35°11'47"N 106°23'49"W
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: fluorite, Pb
7: 3 shafts 25-35 ft deep
8: production unknown
9: Precambrian Sandia granite
10: 2 vertical veins striking N10°W in granite, fracture controlled, mostly fluorite and galena, lenses up to 2 ft x 5 ft
12: V. C. Kelley and Northrop (1975, p. 101); F. E. Williams (1966, p. 11); Rothrock and others (1946); MILS (1981); CRIB (1982); USBM files (1943)

1: 9N.5E.20.222
2: Eight-five Prospect
3: NE1/4 20 T9N R5E 34°59'45"N 106°25'00"W
4: Mt. Washington 7-1/2 (Belen) Elevation 6,380 ft
5: Coyote Canyon-Tijeras Canyon district
6: fluorite
7: 50 ft incline, 30 ft drift
8: few tons fluorite production
9: Precambrian Manzanita granite
10: fluorite vein striking N37°W 82°NE dip, 5 ft thick
12: Fulp and others (1982); F. E. Williams (1966, p. 13); Rothrock and others (1946, p. 40)

1: 8N.5E.8.414
2: Galena King (Octoroon, Nellie)
3: E1/2 8 T8N R5E 34°56'47"N 106°26'5"W
4: Mt. Washington 7-1/2 (Belen) Elevation 7,000 ft
5: Coyote Canyon district
6: Pb, fluorite, Ag, Au, barite, Cu
7: 2 adits with about 500 ft of drifts, 150 ft winze, 40 ft shaft
8: one carload of fluorite in 1920's; 48 tons ore, 0.2 oz Au, 69 oz Ag, 38,756 lbs Pb produced in 1910 and 1916; also produced in 1925
9: Precambrian Tijeras-Hell Canyon greenstone, Pennsylvanian Madera Group
10: veins of quartz (with gold), barite, fluorite, silver, galena, and copper oxides, veins up to 2 ft wide striking N8°E
11: patent #88658
12: Fulp and others (1982); Fulp and Woodward (1981); Parchman (1981); McAnulty (1978); V. C. Kelley and Northrop (1975); Myers and McKay (1970); F. E. Williams (1966, p 13); Rothrock and others (1946, p. 40); Talmage and Wootton (1937, p. 50, 74); Johnston (1928, p. 119); Ladoo (1927, p. 131); Ross (1909); MILS (1981); CRIB (1982); Diana Normand (unpublished report, 1982)

1: 9N.4-1/2E.1.423
2: Grass Roots #1-4
3: 1 T9N R4-1/2E 35°2'2"N 106°27'15"W
4: Tijeras 7-1/2 (Albuquerque)
5: Sandia Mountains
6: fluorite
7: pits
8: no production
9: Precambrian Sandia granite
12: Connolly (1981); MILS (1981)

1: 9N.5E.7.111
2: Great Combination Group
3: 7 T9N R5E 35°1'28"N 106°26'52"W
4: Tijeras 7-1/2 (Albuquerque)
5: Coyote Canyon-Tijeras Canyon district
6: Au, Ag, Cu, building stone
7: 255 ft adit with raise
8: total production unknown--3 oz Au and 4 oz Ag in 1952
9: Precambrian Tijeras-Hells Canyon greenstone
10: shear zone in greenstone, gold-bearing vein ends in quartzite
11: patented 1913, #330231, mineral survey no. 1428; mine map by V. C. Kelley and Northrop (1975)
12: Fulp and others (1982); Connolly (1981); Fulp and Woodward (1981); V. C. Kelley and Northrop (1975, p. 103); Elston (1967, p. 12-16); USBM (1942); Mineral Survey #1428 (1911); MILS (1981)

1: 8N.5E.20.242
2: Hardinand Claim
3: 20, 21 T8N R5E 34°54'17"N 106°25'15"W
4: Mt. Washington 7-1/2 (Belen)
5: Coyote Canyon district
6: Au, Ag
7: pits
8: no production
9: Precambrian Tijeras-Hell Canyon greenstone
11: survey #1862, patent #874493 (2/7/22)
12: MILS (1981)

1: 11N.2W.16.200
2: Herrera Ranch
3: NE1/4 16 T11N R2W
4: Herrera 7-1/2 (Grants)
5: Albuquerque Basin
6: U, Th, Ti
7: no workings
8: no production
9: Cretaceous Point Lookout Sandstone(?)
10: beach-placer sandstone deposit
11: could not locate on 9/2/81
12: FN 9/2/81; McLemore (1982, #41); Chenoweth (1957)

1: 9N.5E.31.423
2: Highland Mary
3: SE1/4 31 T9N R5E
4: Mount Washington 7-1/2 (Belen) Elevation 6,019 ft
5: Coyote Canyon district
6: Pb, fluorite, Cu, Ag, Au
7: 45 ft shaft
8: no production
9: Precambrian Manzanita granite
10: assay 26.9% Pb, 2.3% Cu, 8.7 oz/ton Ag, and 0.3 oz/ton Au (Ross, 1909), up to 8 in thick veins along faults
12: Ross (1909)

1: 10N.5E.6
2: Inspiration
3: 6 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: Ni, Cr, Ti
7: one adit
8: no production
9: Precambrian Sandia granite, mafic dike(?)
12: Northrop (1959); NMBMMR files (1948); USBM files (1948)

1: 9N.6E.6
2: La Don Mine
3: 6 T9N R6E
4: Sedillo 7-1/2 (Albuquerque)
6: Cu
7: pits?
8: no production
9: Pennsylvanian Madera Formation
12: MILS (1981)

1: 8N.5E.28
2: Lady Betsey
3: 28 T8N R5E
4: Mt. Washington 7-1/2 (Belen)
5: Coyote Canyon district
11: patent #385881, mineral survey #1507
12: NMBMMR files (1914)

1: 11N.5E.6.400
2: La Luz Mine (Ruppe, Clara, La Esperanza)
3: SW1/4 6 T11N R5E 35°12'26"N 106°26'57"W
4: Sandia Crest 7-1/2 (Albuquerque) Elevation 10,040 ft
5: Placitas district
6: fluorite, Pb, Ag, Cu, Au, barite
7: 272 ft adit
9: Precambrian Sandia granite faulted against Pennsylvanian Sandia Formation
10: 0.20 oz/ton Ag, 0.02 oz/ton Au, 0.23% Pb, 0.13% Zn, 0.12% Cu, 0.70% $BaSO_4$, 58.90% CaF_2 (NMBMMR chem lab, 1980); 0.43 oz/ton Ag, 2% Pb, 0.15% Ba (Hedlund and others, 1984)
11: patented 1926, #989911; mine map by V. C. Kelley and Northrop (1975, p. 102)
12: McLemore and North (1984); Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975, p. 101-102); Elston (1967, p. 29); F. E. Williams (1966, p. 9-10); Ellis (1922, p. 40-41); MILS (1981); USBM files (1943); Mineral Survey #1920; NMBMMR files (1975)

1: 11N.5E.11.231
2: La Madera
3: 11 T11N R5E
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: fluorite, barite, Pb
7: pits
8: no production
9: Precambrian Sandia granite
10: small veins
12: V. C. Kelley and Northrop (1975, p. 99)

1: 11N.4E.3.411
2: La Quava and La Madera (Quartz mine 2)
3: 3 T11N R4E 35°12'34"N 106°30'26"W
4: Alameda 7-1/2 (Albuquerque)
5: Sandia Mountains
6: Li, Be, REE, Zr(?), quartz, Au, Cu
7: pits, 15 ft adit, 15 ft shaft
8: no production
9: Precambrian pegmatite in Juan Tabo sequence
10: 0.012 oz/ton Au, 0.02% Cu (Hedlund and others, 1984)
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975); Hayes (1951); USBM (1950); MILS (1981)

1: 9N.5E.6.144
2: Little Apples Co. Mine (Moore)
3: 6 T9N R5E 35°1'47"N 106°26'41"W
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon
6: fluorite, Au, Ag, Cu, Pb
7: pits, adit
8: no production
9: Precambrian quartzite
10: veins in quartzite
12: Connolly (1981); USBM (1961); MILS (1981)

1: 9N.4E.23
2: Lone Hill Group
3: 23 T9N R4E
4: Mt. Washington 7-1/2 (Belen)
5: Coyote Canyon district
11: mineral survey #1023 a-e
12: NMBMMR files (1901)

1: 8N.5E.7.121
2: Long View
3: NW1/4 7 T8N R5E
4: Mount Washington 7-1/2 (Belen)
5: Coyote Canyon district
6: Cu, Ag, Au
7: 80 ft shaft
8: no production
9: Precambrian Manzanita granite
10: vein along fault striking N53°E up to 15 in thick, assay 7.49% Cu, 0.28 oz/ton Au, 0.45 oz/ton Ag
12: Ross (1909)

1: 8N.5E.6.341
2: Lucky Bill (Moore Prospect, Quail)
3: SW1/4 6 T8N R5E 34°56'53"N 106°27'11"W
4: Mount Washington 7-1/2 (Belen)
5: Coyote Canyon
6: Pb, fluorite, Au, Ag
7: one adit, several pits, 240 ft shaft
8: no production
9: Precambrian Manzanita granite
10: veins of quartz, calcite, fluorite, and galena, beryllium suspected to occur by USBM (1961) but not found; assay 0.4 oz/ton Au, 0.7 oz/ton Ag (Ross, 1909)
12: Ross (1909); USBM files (1961); MILS (1981)

1: 10N.4E.25.144
2: Lucky Strike claim
3: N1/2 25 T10N R4E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district-Sandia Mountains
6: U
7: open pit
8: no production
9: Precambrian pegmatite intruding quartz diorite porphyry
10: radioactive magnetite in fractured pegmatite
12: McLemore (1982, #56); V. C. Kelley and Northrop (1975); U.S. Atomic Energy Commission (1970, p. 5); PRR ASO-70 (1955)

1: 9N.5E.6.431
2: Mary M (Little Apple Mining Co.)
3: 6 T9N R5E 35°1'38"N 106°26'2"W
4: Tijeras 7-1/2 (Albuquerque)
5: Coyote Canyon-Tijeras Canyon district
6: Au, Ag, Cu, Pb, Zn
7: 220 ft adit, 75 ft raise, 2nd adit
8: production unknown--some Au production reported
9: Precambrian Tijeras-Hell Canyon greenstone
10: veins and lenses within greenstone, stratabound deposit
11: mine map by V. C. Kelley and Northrop (1975)
12: Fulp and others (1982); Connolly (1981); Fulp and Woodward (1981); V. C. Kelley and Northrop (1975, p. 103); Elston (1967); Mineral Survey #2185 (1958); MILS (1978); CRIB (1982)

1: 11N.5E.2.441
2: Mohawk, Chief & Lion Claims (Darrel, Schmidt)
3: SE1/4 2 T11N R5E 35°12'10"N 106°22'11"W
4: Sandia Park 7-1/2 (Albuquerque) Elevation 7,530 ft
5: Placitas district
6: fluorite, Pb, barite, Cu
7: 250 ft long, 30 ft wide, 20 ft deep cut, 122 ft adit, 75 ft adit, 20 ft and 30 ft shafts
8: production unknown
9: Precambrian Sandia granite
10: veins with fluorite, barite, galena and chalcopyrite trending N5°E, fracture-controlled, 4 ft wide
11: confused with Darrel and Schmidt claims in literature
12: McAnulty (1978, p. 16); V. C. Kelley and Northrop (1975, p. 101); F. E. Williams (1966, p 10-11); C. H. Phillips (1964, p. 60); MILS (1981); CRIB (1982); USBM files (1947)

1: 11N.6E.16.300
2: Monte Largo Carbonatite
3: SW1/4 16 T11N R6E 35°10'40"N 106°18'15"W
4: Sandia Park 7-1/2 (Albuquerque) Elevation 6,720 ft
5: Sandia Mountains (Monte Largo Hills)
6: U, Nb, Th, REE
7: no development or exploration
8: no production
9: Ordovician(?) carbonatites intruding Precambrian metamorphic rocks
10: 1,000 ft long dark brown dike (N35°W), light brown veins (N10°W), 0.005% U_3O_8 (NMBMMR chem lab, 5/20/82, #2135), 0.295% Nb_2O_5 reported by V. C. Kelley and Northrop (1975, p. 104)
11: San Pedro Grant
12: FN 2/23/82; McLemore (1983b; 1982, #114); V. C. Kelley and Northrop (1975, p. 104); Heinrich (1966); Lambert (1961); MILS (1981)

1: 11N.5E.22.444
2: Old Drop
3: 22 T11N R5E 35°10'17"N 106°24'9"W
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: fluorite
7: pits
8: no production
9: Pennsylvanian Madera Formation
12: V. C. Kelley and Northrop (1975); Mineral Survey #983; MILS (1981)

1: 9N.5E.17.231
2: Red Hill
3: C17 T9N R5E 35°00'05"N 106°24'57"W
4: Tijeras 7-1/2 (Albuquerque)
5: Coyote Canyon-Tijeras Canyon district
6: fluorite
7: pits, 42 ft shaft
8: reported production is 100 tons fluorite
9: Pennsylvanian Madera Formation and Precambrian Sevilleta metarhyolite
10: 4-1/2 ft mineralized vein
12: Fulp and others (1982); F. E. Williams (1966, p. 12); Rothrock and others (1946, p. 42); MILS (1981)

1: 9N.4E.24
2: River View Placer
3: 24 T9N R4E 34°59'35"N 106°28'14"W
4: Mount Washington 7-1/2 (Belen)
5: Coyote Canyon district
6: placer Au
8: no production
9: Quaternary gravels
10: placer gold in gravels
12: MILS (1981)

1: 11N.5E.5.200
2: Schmidt Prospect
3: NE1/4 5 T11N R5E 35°12'45"N 106°25'41"W
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: fluorite, Pb, barite
7: 35-ft adit, 2 pits
8: no production
9: Precambrian Sandia granite
10: vein striking N25°W, 1 ft wide, 250 ft long
11: not the vein reported by V. C. Kelley and Northrop (1975)
12: McAnulty (1980); Elston (1967, p. 29); F. E. Williams (1966, p. 11); Rothrock and others (1946); MILS (1981); USBM files (1942)

1: 10N.5E.26.144
2: Shakespeare (Pound G, Santo Domingo, Longfellow)
3: NW1/4 26 T10N R5E 35°4'3"N 106°22'45"W
4: Tijeras 7-1/2 (Albuquerque) Elevation 6,525 ft
5: Tijeras Canyon district
6: barite, fluorite, Cu, Ag, U, Pb
7: 285 ft shaft, 2 short adits, 75 ft shaft, pits
8: production unknown
9: Pennsylvannian Madera Limestone
10: small vein deposit of barite, fluorite, and minor copper oxides, uranium, lead, zinc, and silver trending N8°E 70°W dip, fault controlled; 16% Cu, 0.005% U_3O_8, 51% $BaSO_4$ (NMBMMR, chem lab, 3/84)
11: may have been mined during the early days of Spanish rule, reopened in 1840 (Northrop, 1959, p. 15)
12: McLemore and North (1984); V. C. Kelley and Northrop (1975, p. 105); Elston (1967); F. E. Williams (1965); F. E. Williams and others (1964); B. N. Brown (1962); Northrop (1959); Soulè (1956, p. 34); MILS (1981); CRIB (1982); USBM files (1951); Diana Normand (unpublished report, 1982)

1: 10N.5E.29.122
2: Silver Ring-Verdan claims (Hetty Green Group)
3: 29 T10N R5E 35°3'30"N 106°25'45"W
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: Pb, Au, Ag, fluorite
7: adits (13 ft, 25 ft, 21 ft, 36 ft, 52 ft, 93 ft), pits
8: no production
9: Precambrian Tijeras greenstone
10: veins or stratabound deposits; 0.274 oz/ton Au, 0.01% Cu (Hedlund and others, 1984)
11: patented 3/26/14, #394821
12: Hedlund and others (1984); Kness (1982); Connolly (1981); V. C. Kelley and Northrop (1975); USBM (1951); Mineral Survey #1408 (1910); MILS (1981)

1: 8N.5E.4.311
2: Swastika
3: NW1/4 SW1/4 4 T8N R5E
4: Mount Washington 7-1/2 (Belen)
5: Coyote Canyon district
6: fluorite, barite, Pb, Ag, Au
7: 40-ft shaft, 50-ft adit, pits
8: no production
9: Pennsylvanian Madera Formation(?) faulted with Precambrian Tijeras-Hell Canyon greenstone
10: assay 4.8% Pb, 0.5 oz/ton Ag, 0.2 oz/ton Au (Ross, 1909), vein along faults
12: Ross (1909)

1: 11N.5E.14.323
2: Tejano Canyon (Doc Long Picnic area)
3: 13, 14 T11N R5E
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: barite, fluorite
7: pit
8: no production
9: Pennsylvanian Madera Formation
12: V. C. Kelley and Northrop (1975); Northrop (1959, p. 132)

1: 9N.5E.2
2: Tijeras Canyon (Public domain)
3: 2 9N R5E
4: Tijeras 7-1/2, Sedillo 7-1/2 (Albuquerque)
5: Tijeras Canyon district-Sandia Mountains
6: U, Cu, fluorite
7: 40-ft adit
8: no uranium production
9: Pennsylvanian Madera Formation
10: radioactive lenses of coal in sandstone, veins of fluorite, sandstone/hydrothermal vein
12: McLemore (1982, #57); V. C. Kelley and Northrop (1975, p. 104); Anderson, E. C. (1957); PRR DEB-RRA-873 (1953); MILS (1981)

1: 8N.4E.1.444
2: Unknown
3: SE1/4 SE1/4 1 T8N R4E
4: Mount Washington 7-1/2 (Belen)
5: Coyote Canyon district
6: Pb, fluorite, Au, Ag
7: shaft
8: no production
9: Precambrian Manzanita granite
10: vein along fault, assay 1.05% Pb (Ross, 1909)
12: Ross (1909)

1: 8N.5E.9.311
2: Unknown
3: 9 T8N R5E
4: Mount Washington 7-1/2 (Belen)
5: Coyote Canyon district
6: Pb, fluorite
7: pits
8: no production
9: Precambrian Tijeras-Hill Canyon greenstone
10: extension of Galena Ring
12: Parchman (1981)

1: 9N.4-1/2E.12.212
2: Unknown
3: 12 T9N R4-1/2E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: Cu, Au, Ag
7: pits
8: no production
9: Precambrian Tijeras greenstone
12: Connolly (1981)

1: 10N.4E.14.433
2: Unknown
3: 14 T10N R4E 35°5'12"N 106°29'13"W
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: fluorite
7: pits
8: no production
9: Pennsylvanian Madera Formation faulted against Precambrian Sandia granite
12: MILS (1981)

1: 10N.5E.22,23
2: Unknown (Public domain)
3: 22, 23 T10N R5E 35°5'16"N 106°22'56"W
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district-Sandia Mountains
6: U, Cu
7: 70-ft adit, 4 pits
8: no uranium production
9: Permian Abo Formation
10: radioactive jasperized fossil logs in pink arkose with copper oxides, 0.06% U (Hilpert, 1969)
12: McLemore (1982, #55); Green and others (1982b, #7); V. C. Kelley and Northrop (1975, p. 104); Hilpert (1969, p. 32); PRR DEB-RRA-874 (1953); F-1027 (1954); MILS (1981)

1: 10N.5E.21.343
2: Unknown
3: 21 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district-Sandia Mountains
6: Cu
7: pits
8: no production
9: Precambrian Tijeras greenstone
10: 0.11% Cu
12: Hedlund and others (1984); Kness (1982)

1: 10N.5E.30.441
2: Unknown
3: 30 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: Au, Ag, Cu
7: pits
8: no production
9: Precambrian Cibola gneiss
10: 0.3 oz/ton Ag, 0.002% Cu along fault
12: Hedlund and others (1984); Kness (1982); Connolly (1981)

1: 10N.5E.31.224
2: Unknown
3: 31 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: Au, Ag, Cu
7: pits
8: no production
9: Precambrian Tijeras greenstone
12: Connolly (1981)

1: 10N.5E.31.311
2: Unknown
3: 31 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras CAnyon district
6: Au, Ag, Cu
7: pits
8: no production
9: Precambrian Cibola gneiss
12: Connolly (1981)

1: 10N.5E.31.344
2: Unknown
3: 31 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: Au, Ag, Cu
7: pits
8: no production
9: Precambrian Tijeras greenstone
12: Connolly (1981)

1: 10N.5E.32.113
2: Unknown
3: 32 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: Au, Ag, Cu
7: pits, shaft
8: no production
9: Precambrian Tijeras greenstone
12: Connolly (1981)

1: 11N.4E.1.100
2: Unknown
3: 1 T11N R4E
4: Alameda 7-1/2 (Albuquerque)
5: Placitas
6: Cu
7: pits
8: no production
9: Precambrian Sandia granite
10: copper stains along fractures
12: Kness (1982)

1: 11N.6E.11.444
2: Unknown
3: 11 T11N R6E
4: Sandia Park 7-1/2 (Albuquerque)
5: Sandia Mountains (Monte Largo Hills)
6: barite, fluorite
7: pits
9: Precambrian metamorphic rocks
12: V. C. Kelley and Northrop (1975); Lambert (1961)

1: 11N.6E.16.222
2: Unknown
3: 16 T11N R6E
4: Sandia Park 7-1/2 (Albuquerque)
5: Sandia Mountains (Monte Largo Hills)
6: barite, fluorite
7: pits
9: Precambrian metamorphic rocks
12: V. C. Kelley and Northrop (1975); Lambert (1961)

1: 9N.1W.11,12
2: White Lovelace Claims
3: 11, 12 T9N R1W 35°01'2"N 106°54'22"W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: Albuquerque Basin-Rio Puerco area
6: U, Mn
7: blasted cuts
8: no production
9: Tertiary rhyolite plugs intruding Tertiary volcanic sequence
10: fracture and fault controlled, vein deposit
11: Town of Atrisco Grant
12: FN 3/19/82; Green and others (1982b, #332); H. E. Wright (1943)

1: 9N.5E.6.213
2: York
3: NW1/4 NE1/4 6 T9N R5E 35°2'16"N 106°26'24"W
4: Tijeras Canyon 7-1/2 Elevation 6,680 ft (Albuquerque)
5: Coyote Canyon-Tijeras Canyon district
6: Cu, Au, Zn
7: 120 ft shaft
8: production unknown
9: Precambrian Tijeras-Hell Canyon greenstone
10: bedded deposit in 30 in-thick marble in greenish-gray greenstone (stratabound), consists of pyrite, chalcopyrite, sphalerite, and quartz, parallels foliation N20°E
12: Fulp and others (1982); Connolly (1981); Fulp and Woodward (1981); V. C. Kelley and Northrop (1975, p. 102-103); Elston (1967, p. 12-16); Bruns (1959, p. 30); CRIB (1982)

1: 13N.5W.32,33
2: Juan Tafoya-Marquez Grant (Bokum-S.E. orebody)
3: 32, 33 T13N R5W (unsurveyed) 35`18'25"N 107`17'05"W
4: Marquez 7-1/2 (Grants)
5: Marquez-Bernabe Montano area-Grants uranium district
6: U
7: orebody delineated by drilling-1,600 ft depth
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
10: ore zones in paleochannels associated with humates; coffinite and uraninite; 751,000 lbs U_3O_8 in reserve
11: part of orebody in Sandoval County
12: McLemore (1983a); Hatchell and Wentz (1981); Livingston (1980); Green and others (1982b, #58); Chenoweth and Holen (1980, p. 18-19, #29); Chapman, Wood, and Griswold, Inc. (1979, #E)

1: 13N.5W.25.400
2: Marquez Canyon mine (Bokum)
3: 25 T13N R5W (unsurveyed) 35`19'10"N 107`18'30"W
4: Marquez 7-1/2 Elevation 7,000 ft (Grants)
5: Marquez-Bernabe Montano area-Grants uranium district
6: U
7: shaft completed to 1,835 ft; target depth 2,100 ft
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
10: 3 ore zones in paleochannel sandstones, associated with humates; coffinite and uraninite; 10.7 mill lbs U_3O_8 reserves
11: suspended operations, mine currently flooded; orebody extends into sections 26, 27, 34, and 36
12: FN 3/4/82; McLemore (1983a); Hatchell and Wentz (1981); Livingston, (1980); Green and others (1982b, #62); Chapman, Wood, and Griswold, Inc. (1979, #E); Perkins (1979); W. T. Siemers and Austin (1979)

1: 13N.5W.25.100
2: Marquez Canyon (Kerr-McGee)
3: 25 T13N R5W (unsurveyed) 35`19'28"N 107`19'58"W
4: Marquez 7-1/2 Elevation 7,160 ft (Grants)
5: Marquez-Bernabe Montano area-Grants uranium district
6: U
7: proposed 1,950-ft shaft
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
10: mineralized sandstone; 6.8 mill lbs U_3O_8 reserves
11: in partnership with T.V.A.
12: McLemore (1983a); Green and others (1982b, #61); Chapman, Wood, and Griswold, Inc. (1979, #F); Tennessee Valley Authority (WC, 9/11/81)

1: 15N.6W.4.140
2: Miguel Creek Dome
3: SE1/4 NW1/4 4, NE1/4 SW1/4 8 T15N R6W (unsurveyed)
4: Mesa Cortada 7-1/2 (Chaco Mesa)
5: San Juan Basin area
6: U, Th, Ti
7: trenches, pits
8: no production
9: Cretaceous Crevasse Canyon Formation-Dalton Sandstone Member
10: 200-ft long, 100-ft wide
12: 0.04% ZrO_2, 4.0% TiO_2, 17.2% Fe, 0.03% ThO_2 (USBM files)
13: beach-placer sandstone
14: extends over both sections
15: Chenoweth (1957); USBM files (1958); CRIB (1972)

METALLIC MINERAL OCCURRENCES
IN SANDOVAL COUNTY
(Including uranium, barite, and fluorite occurrences)

1: 12N.6E.12
2: A" Placer (New Mexico Placer)
3: 12 T12N R6E 35°17'10"N 106°15'13"W
4: Hagan 7-1/2 (Albuquerque)
5: Hagan Basin
6: Au (placer)
7: pits
8: no production
12: MILS (1981)

1: 14N.6E.6
2: Ace Claims
3: 6 T14N R6E 35°28'19"N 106°20'41"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: Hagan Basin
6: U
7: no workings
8: no production
12: MILS (1981)

1: 13N.5E.15.200
2: Alamos Altos Placers
3: E1/2 15 T13N R5E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: placer Au
7: pits (?)
8: no production known
9: Quaternary alluvium
12: V. C. Kelley and Northrop (1975)

1: 18N.4E.35.420
2: Albemarle Group (Altoona, Antario, Pamlico)
3: 35 T18N R4E 35°44'47"N 106°29'4"W
4: Canada 7-1/2 Elevation 7,680 ft (Los Alamos)
5: Cochiti district
6: Au, Ag, Pb, Zn, Cu, Fe
7: 625 ft shaft, 2nd shaft, adits
8: produced from 1894 to 1902 about $667,500
9: Tertiary Monzonite porphyry of Keres Group replacement veins in faults and breccia zones patent in 1901 #34559, largest producer in district, deepest deposit in district
12: Elston (1967); Bundy (1954, 1957, 1958); Barbour (1908); Lindgren and others (1910); Mineral Survey #999; MILS (1981); CRIB (1983)

1: 16N.1E.12.110
2: Anomaly No. 1
3: NW1/4 12 T16N R1E
4: Gilman 7-1/2
5: Nacimiento Mountains (Los Alamos)
6: U(?)
7: no workings reported
8: no production
9: Precambrian granite or syenite
10: hydrothermal-vein? (fault-zone) or orthomagmatic deposit
11: Jemez Indian Reservation
12: Holen (1982); Green and others (1982, #256); L. A. Woodward, DuChene, and Martinez (1977); Easton (1955b); PRR ED-R-410 (1954)

1: 13N.2W.9.132
2: Anomaly #2 (Anomaly #7)
3: NW1/4 9 T13N R2W 35°22'25"N 107°3'30"W
4: Puerco Dam 7-1/2 (Grants)
5: Majors Ranch area
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member-Jackpile sandstone
10: radioactive asphaltite in thin sandstone near NE-trending fault
12: Santos (1975); Kittleman (1957, p. 41, #7); USAEC files (late 1950's)

1: 16N.1E.8.300
2: Anomaly #2
3: 8 T16N R1E 35°37'30"N 106°51'30"W
4: Gilman 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?)
7: no workings reported
8: no production
9: Precambrian granite
10: hydrothermal-vein? (fault-zone)
11: Jemez Indian Reservation
12: Green and others (1982b, #321); L. A. Woodward, DuChene, and Martinez (1977); Easton (1955); PRR ED-R-411 (1954)

1: 16N.1E.17.214
2: Anomaly #2-Jemez Reservation
3: N1/2 17 T16N R1E
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Precambrian granite
10: Orthomagmatic(?)
11: no commercial interest
12: Brassfield (1956)

1: 16N.1E.21.233
2: Anomaly #3-Jemez Reservation
3: C 21 T16N R1E 35°36'25"N 106°50'20"W
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?)
7: no workings
8: no production
9: Triassic Chinle Formation-Agua Zarca Sandstone Member
10: mineralized sandstone
11: this anomaly was not field checked by Brassfield (1956)
12: Brassfield (1956)

1: 15N.1E.17.414
2: Anomaly #3 (Morris-Peters #17)
3: SE1/4 17 T15N R1E 35°31'45"N 106°51'14"W
4: San Ysidro 7-1/2 Elevation 5,700 ft (Los Alamos)
5: White Mesa district-Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized lenses in faulted sandstone around mud galls
12: Green and others (1982b, #45); L. A. Woodward, and Ruetschilling (1976); Santos (1975); Hilpert (1969, p. 48); Easton (1955); PRR ED-R-382 (1954); ED-R-412 (1954); ED-R-287 (1954)

1: 16N.1E.20.412
2: Anomaly #4-Jemez Reservation
3: E1/2 20 T16N R1E 35°36'25"N 106°51'20"W
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U, travertine
7: no workings
8: no production
9: Quaternary Hot Springs deposits
10: radioactive travertine
11: no uranium potential
12: L. A. Woodward and Ruetschilling (1976); Brassfield (1956)

1: 16N.1E.21.123
2: Anomaly #5-Jemez Reservation
3: NW1/4 21 T16N R1E 35°36'30"N 106°50'40"W
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U, travertine
7: no workings
8: no production
9: Quaternary Hot Springs deposit
10: radioactive travertine
11: no uranium potential
12: L. A. Woodward, and Ruetschilling (1976); Brassfield (1956)

1: 15N.1E.26.110
2: Anomaly #5 (Lone Star Mining and Dev. Corp.)
3: NW1/4 NW1/4 26 T15N R1E 35°30'14"N 106°48'46"W
4: San Ysidro 7-1/2 (Los Alamos)
5: White Mesa district (San Ysidro)
6: Coal, U, Au
7: pits, ore dumps, drilling
8: no uranium production
9: Cretaceous Dakota Sandstone, Jurassic Morrison Formation (at depth)
10: sample of carbonaceous shale contained 0.006 oz/ton Au (Woodward and Ruetschilling, 1976)
11: Coal/Shale/Sandstone
12: FN 9/4/82; Holen (1982); Green and others (1982b, #255); L.A. Woodward and Ruetschillings (1976); Kittleman (1957, p. 42, #5); Lovering (1956); PRR ED-R-599 (1956); USAEC files (late 1950's)

1: 17N.1W.14
2: Anomaly #5 (Ojo del Espirito Santo Grant)
3: 14 T17N R1W
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings-outcrop anomaly
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
10: slight radioactive anomaly at contact between argillite and sandstone; 0.02% U_3O_8 (PRR, 1954)
12: L. A. Woodward and Martinez (1974); Siapno (1955); PRR ED-R-518 (1955); ED-R-459 (1955); ED-R-413 (1954); ED-R-1540 (1954)

1: 17N.2E.18.100
2: Anomaly #6 (Jemez Reservation)
3: NW1/4 18 T17N R2E
4: Gilman 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?)
7: no workings
8: no production
9: Tertiary volcanics
10: radioactive zone in tuffaceous pumice along Jemez fault
12: Green and others (1982b, #322); L. A. Woodward DuChene, and Martinez (1977); Easton (1955); PRR ED-R-1541 (1954); ED-R-414 (1954)

1: 17N.1W.35.240
2: Anomaly No. 6
3: NE1/4 35 T17N R1W
4: Holy Ghost Springs 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
10: radioactive zone in fine- to medium-grained, orange sandstone
11: Zia Indian Reservation
12: Siapno (1955); PRR ED-R-519 (1955); USAEC files (late 1950's); MILS (1981)

1: 16N.1E.13.400
2: Anomalies #6-10-Jemez Reservation
3: S1/2 13 T16N R1E 35°36'55"N 106°47'00"W
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: Cu, U
7: 2 pits
8: no production
9: Permian Abo Formation
10: discontinuous mineralized zone for about 1/2 mile; up to 4.36% U_3O_8, 10.32% Cu (Brassfield, 1956)
12: L. A. Woodward and Ruetschilling (1976); Chenoweth (1974); Brassfield (1956)

1: 17N.2E.8
2: Anomaly #7 (Jemez)
3: 8 T17N R2E (unsurveyed) 35°43'15"N 106°45'15"W
4: Gilman 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?), travertine
7: no workings
8: no production
9: Quaternary lava flow
10: radioactive pumice
11: no uranium potential
12: L. A. Woodward, DuChene, and Martinez (1977); U.S. Atomic Energy Commission (1966, p. 48, 54); Easton (1955); PRR ED-R-1542 (1954); ED-R-415 (1954)

1: 17N.2E.17
2: Anomaly #8
3: 17 T17N R2E (unsurveyed) 35°42'30"N 106°45'15"W
4: Gilman 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?)
7: no workings
8: no production
9: Quaternary lava-flow
10: radioactive pumice
11: no uranium potential
12: L. A. Woodward, DuChene, and Martinez (1977); U.S. Atomic Energy Commission (1966, p. 48, 54); Easton (1955); PRR ED-R-1543 (1954); ED-R-416 (1954)

1: 17N.2E.21, 22
2: Anomaly #9
3: 21, 22 T17N R2E
4: Ponderosa 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?)
7: no workings
8: no production
9: Quaternary lava flow
10: radioactive pumice
11: no uranium potential
12: U.S. Atomic Energy Commission (1966, p. 48); Easton (1955); PRR ED-R-1544 (1954); ED-R-417 (1954)

1: 16N.1E.29.123
2: Anomaly #10
3: NW1/4 29 T16N R1E (unsurveyed)
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?), travertine
7: no workings-hot springs deposit
8: no production
9: Quaternary Hot Springs deposits
10: radioactive travertine adjacent to hot springs; 0.005% U308 (Easton, 1955)
11: no uranium potential
12: L. A. Woodward and Ruetschilling (1976); Easton (1955); PRR ED-R-418 (1954); ED-R-1545 (1954); USAEC files (late 1950's)

1: 16N.2E.18.212
2: Anomaly #11-Jemez Reservation
3: NE1/4 18 T16N R2E
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: Cu, U
7: no workings
8: no production
9: Permian Abo Formation
10: radioactive copper sandstone deposit; 0.42% U_3O_8, 3.67% Cu (Brassfield, 1956)
12: L. A. Woodward and Ruetschilling (1976); Chenoweth (1974); Brassfield (1956); MILS (1981)

1: 16N.1E.29.133
2: Anomaly #11
3: W1/2 29 T16N R1E (unsurveyed)
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?), travertine
7: no workings-hot springs deposit
8: no production
9: Quaternary hot springs deposit
10: radioactive travertine; 0.006% U308 (Easton, 1955)
11: no uranium potential
12: L. A. Woodward, and Ruetschilling (1976); Easton (1955); PRR ED-R-419 (1954); ED-R-1546 (1954)

1: 16N.1E.29.130
2: Anomaly #12
3: W1/2 29 T16N R1E (unsurveyed)
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U(?), travertine
7: no workings-hot springs deposit
8: no production
9: Quaternary hot springs deposits
10: radioactive travertine; 0.005% U_3O_8 (Easton, 1955)
11: no uranium potential
12: L. A. Woodward and Ruetschilling (1976); Easton (1955); PRR ED-R-1547 (1954); ED-R-420 (1954)

1: 18N.5E.31.334
2: Arondale
3: 31 T18N R5E 35°45'22"N 106°26'52"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
8: production unknown
9: Tertiary Keres Group
10: patented 1902
12: Mineral Survey #1074; MILS (1981)

1: 23N.4W.31
2: Arrowhead Claims
3: 31 T23N R4W (unsurveyed) 36°10'30"N 107°17'45"W
4: Tancosa Windmill 7-1/2 Elevation 6,840 ft (Chaco Canyon)
5: Jicarilla Apache Indian Reservation-San Juan Basin
6: U
7: pits
8: no production
9: Jurassic Todilto Limestone
10: mineralized limestone
12: PRR ED-R-633 (1956)

1: 12N.3W.15.440
2: B and G (Section 15)
3: SW1/4 15 T12N R3W 35°15'50"N 107°8'55"W
4: La Gotera 7-1/2 Elevation 6,180 ft (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: no workings-drill holes
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member-Jackpile sandstone bed
10: sandstone
12: McLemore (1982, #9); Green and others (1982b, #52); Hilpert (1969, p. 48); MILS (1981)

1: 14N.6E.30
2: Ben Claims (Mata)
3: 30 T14N R6E 35°24'48"N 106°20'37"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: Hagan Basin
6: U
7: drill holes
8: no production
9: Eocene Galisteo Formation
12: MILS (1981)

1: 12N.2W.35.200
2: Bernabe (Conoco--Bernabe Montaño)
3: NE1/4 35 T12N R2W (unsurveyed) 35°13'45"N 107°00'40"W
4: Herrera 7-1/2, Arch Mesa 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: drill holes (over 2,000), 2 shafts planned (1,966-ft; 1,926-ft deep)
8: no production, 10-20 million pounds of U_3O_8 in reserve
9: Jurassic Morrison Formation-Westwater Canyon Member
10: mineralization associated with organic material (humate); ore trend 8,000 ft long; 500-2,000 ft wide; up to 80 ft thick; uraniferous humates, grades vary from trace-excess of 1% U_3O_8, coffinite; in stack sandstone deposit
11: discovered in 1971, Laguna Indian Reservation, most of orebodies lie in south half of section 35 and extends into north halfs of sections 1, 2, and 3 T22N R2W and 5 and 6 T11N R1W Bernalillo County
12: McLemore (1982, #42); Holen (1982); Green and others (1982b, #55); Kozusko and Saucier (1980); Perkins (1979); Chapman, Wood, and Griswold, Inc. (1979, #A); CRIB (1984)

1: 12N.3W.17.323
2: Betty (Section 17)
3: SW1/4 17 T12N R3W 35°16'10"N 107°10'45"W
4: La Gotera 7-1/2 Elevation 6,420 ft (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: 50-ft 10° decline, shaft (250-270 ft deep)
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member-Jackpile sandstone
10: 2 horizons, 4-13 ft thick
11: now owned by Kerr-McGee
12: FN 3/19/82; O. J. Anderson (1980); MILS (1981)

1: 19N.1W.4.110
2: Black Rose
3: 2 NE1/4 4 T19N R1W 35°54'30"N 106°56'40"W
4: San Pablo 7-1/2 (Los Alamos)
5: La Ventana district-Naciemento Mountains
6: U, Coal
7: adits, shafts
8: no uranium production
9: Cretaceous Mesaverde Group-Menefee Formation
10: less than 0.005% U_3O_8 reported by USBM
11: uranium mineralization reported to USBM but no mineralization was found (USBM)
12: FN 9/6/82; L. A. Woodward, Anderson, Kaufman, and Reed (1973); USBM files (1952); CRIB (1978)

1: 14N.6E.10
2: Blackshere
3: 10 T14N R6E 35°27'6"N 106°17'6"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: Hagan Basin
6: U(?)
7: no workings
8: no production
9: Tertiary Santa Fe Group
10: mineralization along bedding planes with carbonized fossil logs in sandstone
12: Green and others (1982b, #13); Hilpert (1969, p. 48)

1: 18N.4E.36.223
2: Blue Bell
3: 36 T18N R4E 35°45'45"N 106°27'56"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Cu
7: adit
8: production unknown
9: Tertiary Keres Group
12: Bundy (1958); MILS (1978)

1: 20N.1W.12.133
2: Bluebird
3: SW1/4 NW1/4 12 T20N R1W 35°59'35"N 106°56'13"W
4: San Pablo 7-1/2 (Los Alamos)
5: Nacimiento Mountains district
6: Cu, U
7: prospect pits
8: no production
9: Triassic Chinle Formation-Agua Zarca Sandstone Member
10: mineralized sandstone or Nacimiento fault
12: McLemore (1983a); Chenoweth (1974); L. A. Woodward, Anderson, Kaufman, and Reed (1973); Kaufman (1971); Soulè (1956); MILS (1978)

1: 12N.5E.26.300
2: Blue Sky (Goldstar)
3: SW1/4 26 T12N R5E 35°08'47"N 106°22'52"W
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: fluorite, barite, Pb, Cu, Ag, Au
7: 128 ft adit
8: production unknown
9: Pennsylvanian Madera Limestone faulted against Precambrian Sandia granite
10: 4 ft wide, 90 ft long vein along fault striking N40°W, consists of fluorite, barite, galena, chalcopyrite
11: mine map by V. C. Kelley and Northrop (1975, p. 101); C.H. Phillips (1964)
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975, p. 101); C. H. Phillips (1964); MILS (1981); CRIB (1984)

1: 17N.4W.34.332
2: B.P. Hovey Ranch (Torreon Wash area)
3: SW1/4 34 T17N R4W 35°39'42"N 107°14'57"W
4: Canada Callandita 7-1/2, Arroyo Empedrado 7-1/2 Elevation 6,100 ft (Chaco Mesa)
5: San Juan Basin
6: U, Th, Ti, REE
7: no workings
8: no production
9: Cretaceous Point Lookout Sandstone
10: 300 ft long, 2-4 ft thick "black sandstone" deposit; 0.013% U_3O_8 (NMBMMR chem lab, 5/20/82, #2131); 225 ppm Th (NMBMMR XRF lab, , 2/83, #2131)
11: may extend locally throughout area in Point Lookout
12: FN 9/1/81; Green and others (1982b, #330); Tabet and Frost (1979); Chenoweth (1957); Kittleman (1957, p. 42, #3); PRR ED-R-552 (1956); ED-R-554 (1956); USAEC files (late 1950's)

1: 12N.3W.16.300
2: Brookhaven
3: SW1/4 16T12N R3W 35°16'11"N 107°09'48"W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: no workings found on 3/19/82
8: no production
9: Jurassic Morrision Formation-Brushy Basin Member-Jackpile sandstone
10: sandstone
12: FN 3/19/82; McLemore (1982, #10); Green and others (1982b, #53); Hilpert (1969, p. 48)

1: 12N.4E.12.422
2: Buckeye Claim (Kleinwort)
3: 12 T12N R4E 35°17'1"N 106°28'25"W
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Cu, Pb, Ag
7: pits
8: production, if any, unknown
9: Pennsylvanian Madera Formation
10: fissure veins along Placitas fault
12: V. C. Kelley, and Northrop (1975, p. 101); Hayes (1951); Ellis (1922, p. 41); MILS (1981)

1: 18N.4E.25.441
2: Bull of the Woods
3: 25 T18N R4E 35°45'32"N 106°27'52"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: adit
8: production unknown
9: Tertiary Keres Group
12: Jones (1904); MILS (1981)

1: 17N.1W.12.220
2: Burcar (Unknown, Ojo-Del Espirito Grant)
3: NE1/4 12 T17N R1W 35°43'30"N 106°53'5"W
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings-outcrop
8: no production
9: Cretaceous Dakota Sandstone
10: radioactive bands and pods up to 1 ft thick around mud galls; carnotite, 0.04% U reported in sandstone
11: Zia Indian Reservation
12: Green and others (1982b, #31); Santos (1975); L. A. Woodward and Martinez (1974); Hilpert (1969, p. 48); PRR ED-R-197 (1952); ED-R-459 (1955)

1: 19N.1W.23.241
2: Butler Brothers
3: NE1/4 23 T19N R1W 35°51'50"N 106°54'10"W
4: La Ventana 7-1/2 Elevation 7,600 ft (Los Alamos)
5: La Ventana district-Naciemento Mountains
6: U, coal, V
7: 15-ft adit, 100-ft cut
8: 23 tons ore yielding 290 lbs U_3O_8 (0.63%), 56 lbs V_2O_5
9: Cretaceous Dakota Sandstone
10: up to 1.4% U_3O_8 (Gabelman, 1956) in sandstone and coal
11: mined 1954-1957 by Butler Brothers; geologic map by Gabelman (1956a)
12: Green and others (1982b, #23); O. J. Anderson (1980); Santos (1975); Chenoweth (1974b); L. A. Woodward and Schumacher (1973); Hilpert (1969, p. 49); Elston (1967); Gabelman (1956); PRR ED-R-404 (1954); USAEC files (1957); CRIB (1976)

1: 16N.3E.1.244
2: Canovas #13 Group
3: 1 T16N R3E 35°38'45"N 106°34'6"W
4: Bear Springs Peak 7-1/2 (Los Alamos)
5: Jemez Mountains
6: Cu, pumice(?)
7: pits
8: no production
9: Tertiary Bandelier Tuff
12: Mineral Survey #2189; MILS (1981)

1: 12N.5E.33.441
2: Capulin Peak
3: SE1/4 33 T12N R5E 35°13'13"N 106°24'43"W
4: Sandia Crest 7-1/2 Elevation 8,850 ft (Albuquerque)
5: Placitas district
6: fluorite, barite, Pb
7: 20 ft inclined shaft, pits, 200 ft crosscut
8: production, if any, unknown
9: Pennsylvanian Madera Limestone
11: 3 ft wide vein trending N30°W, 60°SW along the Ellis fault, fault breccia; 2% Pb, 6.3% Ba, 16% F (Hedlund and others, 1984)
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975); Elston (1967); F. E. Williams (1966, p. 10); F. E. Williams and others (1964); Rothrock and others (1946, p. 39-40); Johnston (1928); Diana Normand (unpublished Report, 1982); USBM (1958); MILS (1981); CRIB (1984); PRR DEB-RRA-673

1: 21N.1W.36.300
2: Chalcocite Prospect (Alarco and Alameda claims)
3: SW1/4 36 T21N R1W 36°00'18"N 106°53'40"W
4: Cuba 7-1/2 Elevation 7,650 ft (Abiquiu)
5: Nacimiento district
6: Cu, Au, Ag
7: 60 ft adit
8: no production
9: Precambrian schist-diabase dike
10: pyrite and chalcopyrite occur in a schist xenolith or diabse dike; sample 203 contained 7,000 ppm Pb, 5 ppm Ag, and 150 ppm Ni; sample 230c contained 0.005 oz/ton Ag, and 100 ppm Ni (Santos and others, 1975)
12: McLemore and North (1984); Santos and others (1975); Elston (1967); Lindgren and others (1910); CRIB (1984)

1: 19N.1W.14.233
2: Cleary
3: E1/2 14 T19N R1W 35°52'40"N 106°54'22"W
4: San Pablo 7-1/2 Elevation 7,100 ft (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U
7: 15-ft adit
8: no production
9: Cretaceous Dakota Sandstone
10: mineralized carbonaceous shale and coal seams up to 6 inches thick in brown sandstone; 0.038% U_3O_8 (NMBMMR chem lab, 3/3/82, #3146)
12: FN 9/6/82; Green and others (1982b, #22); Santos (1975); L. A. Woodward, Anderson, Kaufman, and Reed (1973); Hilpert (1969, p. 49); Vine and others (1953); Read (1952); PRR ED-R-239 (1953)

1: 20N.1E.6.114
2: Cliff (Don No. 11)
3: NW1/4 6 T20N R1E
4: San Pablo 7-1/2
5: Nacimiento Mountains district
6: U, Cu
7: adit
8: no uranium production
9: Triassic Chinle Formation-Agua Zarca Sandstone
10: radioactive copper sandstone deposit
12: L. A. Woodward, Anderson, Kaufman, and Reed (1973); Kaufman (1971); Elston (1967); Soulè (1956); PRR ED-R-506 (1954); MILS (1978)

1: 17N.1W.25.113
2: Collier (Section 25)
3: NW1/4 25 T17N R1W (unsurveyed) 35°40'35"N 106°54'00"W
4: Holy Ghost Springs 7-1/2 Elevation 6,430 ft (Los Alamos)
5: Nacimiento Mountains
6: U, V
7: 125-ft trench
8: production included with Collins (17N.1W.25.112)
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: Zia Indian Reservation
12: O. J. Anderson (1980); Green and others (1982b, #33, 34); L. A. Woodward and Martinez (1974); Chenoweth (1974); Hilpert (1969, p. 49); Kittleman and Chenoweth (1957); PRR ED-R-208 (1953); USAEC files (1959)

1: 17N.1W.25.112
2: Collins (Warm Springs, Burke-Goodner Lease, Goodner, J. Walker No. 1, Section 25)
3: NW1/4 25 T17N R1W (unsurveyed) 35°40'45"N 106°53'45"W
4: Holy Ghost Springs 7-1/2 Elevation 6,560 ft (Los Alamos)
5: Nacimiento Mountains
6: U, V
7: 100-ft trench, short adit
8: 395 tons ore yielding 989 lbs U_3O_8 (0.12%), 116 lbs V_2O_5
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: mined 1957-59; Zia Indian Reservation; uranium production included from Collier and Collins prospects (sec. 23)
12: O. J. Anderson (1980); Green and others (1982b, #32); Santos (1975); L. A. Woodward, and Martinez (1974); Chenoweth (1974); Hilpert (1969, p. 48); Kittleman and Chenoweth (1957); Siapno (1955); PRR ED-R-460 (1955); ED-R-208 (1953); ED-R-475 (1955); USAEC files (late 1950's); CRIB (1984); MILS (1981)

1: 17N.1W.23.411
2: Collins prospect
3: 23 T17N R1W (unsurveyed) 35°41'25"N 106°54'55"N
4: Holy Ghost Springs 7-1/2 Elevation 6,520 ft (Los Alamos)
5: Nacimiento Mountains
6: U, V
7: pit
8: uranium production included with Collins
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: Zia Indian Reservation
12: Chenoweth (1974); Kittleman and Chenoweth (1957); Siapno (1955); USAEC files (1959)

1: 23N.1W.25.221
2: Corral #3 (Corral #1, Sla-Tex)
3: NE1/4 25 T23N R1W 36°12'5"N 106°53'10"W
4: Regina 7-1/2 (Abiquiu)
5: Vegitas Cluster area-San Pedro Mountains
6: U, Cu, V
7: 260-ft long trench
8: 20 tons ore yielding 12 lbs U_3O_8 (0.03%), 24 lbs V_2O_5
9: Permian Abo Formation
10: spotty uranium mineralization in shale and sandstone related to organic material
11: mined 1956 by Sla-Tex Ventures; examined by Green and others (1982a)
12: FN 7/31/82; Merrick and Woodward (1982); Merrick (1980); O. J. Anderson (1980); Green and others (1982a, #29, 44); Vizcaino and others (1978); Santos and others (1975); Chenoweth (1974); L. A. Woodward, Kaufman, and Schumacher (1974); Hilpert (1969, p. 46); H. G. Brown (1955); PRR ED-R-610 (1956); USAEC files (1956); MILS (1981); CRIB (1984)

1: 23N.1W.25.212
2: Corral No. 6
3: NE1/4 25 T23N R1W 36°12'00"N 106°53'23"W
4: Regina 7-1/2 Elevation 8,260 ft (Abiquiu)
5: Vegitas Cluster area-San Pedro Mountains
6: U, V, Cu
7: blasting at outcrop
8: no production
9: Permian Abo Formation
10: 1.14% U_3O_8 in sandstone (Green and others, 1982a)
12: Merrick and Woodward (1982); Green and others (1982a, #85); Santos and others (1975); Chenoweth (1974); H. G. Brown (1955)

1: 13N.6E.22.320
2: Coyote No. 1-10 (Babacka, Diamond Tail)
3: SW1/4 22 T13N R6E 35°20'5"N 106°17'40"W (approximate)
4: Hagan 7-1/2 Elevation approximately 5,900 ft (Albuquerque)
5: Hagan Basin area
6: U, Se, V
7: shallow open pit reported
8: no production
9: Eocene Galisteo Formation
10: yellow-green uranium minerals associated with organic material in claystone lense in upper sandstone member, 0.24% U_3O_8 reported
11: no workings found 2/24/82
12: FN 2/24/82; PRR unnumbered (6/29/58); DEB-RRA-698 (1953)

1: 18N.4E.25.142
2: Crown Point
3: 25 T18N R4E 35°45'55"N 106°28'15"W
4: Bland 7-1/2 Elevation 7,560 ft (Los Alamos)
5: Cochiti district
6: Au, Ag, Pb, Zn, Fe, Cu
7: 250 ft winze, open cut, adit, 1,000 ft of drifts
8: production from 1893 to 1902 was $50,000
9: Tertiary Keres Group
10: continuation of Lonestar Vein, 6-20 ft wide, replacement veins in faults and breccia zones
11: patent 1898 #29267
12: Elston (1967); C. S. Ross and others (1961); Bundy (1954, 1958); Lindgren and others (1910); CRIB (1983); MILS (1981)

1: 12N.5E.24
2: Crummy #1 prospect
3: 24 T12N R5E 35°15'19"N 106°21'47"W
4: Hagan 7-1/2 (Albuquerque)
5: Hagan Basin
6: Cu, Pb, fluorite
7: 1 adit
8: no production
9: Precambrian granite
10: mineralization cementing breccia zone
12: PRR DEB-RRA-694 (1953); MILS (1981)

1: 19N.2W.35
2: Cuba #13 (G. Adair/Wilcox)
3: 35 T19N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa)
5: La Ventana district
6: U
8: no production
9: Tertiary Ojo Alamo Sandstone
10: radioactive zone in calcareous sandstone
12: Green and others (1982b, #20); Hilpert (1969, p. 50); PRR ED-R-510 (1954)

1: 13N.5E.22,27
2: Cuchilla de San Francisco mines
3: 22, 27 T13N R5E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas mining district
6: Cu
7: pits, 39 ft adit
8: no recent production--prehistoric production possible
9: Permian Abo Formation(?)
10: copper sandstone deposits
12: Warren and Weber (1979)

1: 18N.4E.36.232
2: Daisy Mine
3: 36 T18N R4E 35°45'6"N 106°27'52"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Cu
7: adit
8: production unknown
9: Tertiary Keres Group
12: Bundy (1958); MILS (1981)

1: 18N.1E.35.144
2: Deer Creek
3: C 35 T18N R1E (unsurveyed) 35°45'00"N 106°48'15"W
4: Gilman 7-1/2 San Miguel Mountain 7-1/2 Elevation 7,290 ft (Los Alamos)
5: Gilman area-Nacimiento Mountians
6: U, Cu, Ag, Au
7: 2 adits (caved and inaccessible)
8: no uranium production
9: Permian Abo Formation
10: mineralized gray to black carbonaceous shale lense interbedded with mineralized orange sandstone; chalcopyrite, azurite, malachite; 0.144% U_3O_8, 5.92% Cu (NMBMMR chem lab, 3/3/83, #3147)
11: mine plan included with PRR
12: FN 9/4/82; Green and others (1982b, #29); Hilpert (1969, p. 49); PRR ED-R-612 (1956); MILS (1981)

1: 19N.1W.11.440
2: Dennison-Bunn (Georgie Claims)
3: E1/2 SE1/2 11 T19N R1W 35°53'15"N 106°54'25"W
4: San Pablo 7-1/2 Elevation 7,400 ft (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U
7: road work exposing mineralized sandstones
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
10: thin mineralized lenses in gray to white sandstones and conglomeratic sandstones, at least three horizons; 0.082, 0.044% U_3O_8 (NMBMMR chem lab, 3/3/83, #3152, 3161); roll-type sandstone deposit
12: FN 9/6/82; Green and others (1982b, #337); Ridgley (1980); Chenoweth (1974); L. A. Woodward, Anderson, Kaufman, and Reed (1973); MILS (1981)

1: 14N.6E.19
2: Dial Exploration Co. (Lib Claims)
3: 19 T14N R6E 35°25'36"N 106°20'38"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: Hagan Basin area
6: U
7: drill holes
8: no production
9: Eocene Galisteo Formation
10: mineralized sandstone
12: PRR DEB-P-4-1475 (1956); USBM files (1955); MILS (1981)

1: 13N.6E.9,10
2: Dial Exploration Claims (Blackshere Ranch)
3: 9, 10 T13N R6E 35°22'15"N 106°13'20"W
4: Hagan 7-1/2, San Felipe Pueblo 15 Elevation 5,800 ft (Albuquerque)
5: Hagan Basin area
6: U, Se, Mo, V
7: numerous drill holes, deposit defined by Union Carbide
8: no production
9: Eocene Galisteo Formation
10: two bleached channel sandstones with uraninite and coffinite associated with organic material
11: on the Blackshere and Diamond Tail Ranches
12: FN 2/24/82; McLemore (1982, #51); Green and others (1982b, #15); J. C. Moore (1979); Perkins (1979); Chenoweth (1979); Hilpert (1969, p. 48); PRR DEB-P-4-1475 (1956); MILS (1981)

1: 13N.6E.16.124
2: Diamond Tail (Union Carbide)
3: NE1/4 16 T13N R6E 35°21'35"N 106°18'45"W
4: Hagan 7-1/2, San Felipe Pueblo 15 Elevation 5,810 ft (Albuquerque)
5: Hagan Basin area
6: U, Se, Mo, V
7: numerous drill holes, deposit defined by Union Carbide, 250-ft 19° decline
8: no production, 0.9 mill lbs U_3O_8 reserves
9: Eocene Galisteo Formation
10: two bleached gray, channel sandstones with uraninite, coffinite, and uranophane, average grade 0.09% U_3O_8; 0.064% U_3O_8, trace Se (NMBMMR chem lab, 5/2/82, #2129)
11: on the Diamond Tail Ranch
12: FN 2/24/82; 3/9/82; McLemore (1982, #52); Green and others (1982b, #284); J. C. Moore (1979); Chenoweth (1979); Perkins (1979); V. C. Kelley, and Northrop (1975); CRIB (1984)

1: 12N.5E.15
2: Donnell Prospect
3: 15 T12N R5E 35°15'44"N 106°23'30"W
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Cu, Au, Ag
9: Pennsylvanian Madera Formation
10: veins along fault zone(?)
11: not the Donnell coal mine
12: MILS (1978)

1: 12N.3W.8.122
2: Dory (Dorie, Doerrie, Anomaly #1)
3: NE1/4 8 T12N R3W (unsurveyed) 35°17'27"N 107°10'38"W
4: La Gotera 7-1/2 Elevation 6,240 ft (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: adit
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: small pod of mineralized, carbonaceous sandstone with asphalite and clay galls along bedding planes
12: Green and others (1982b, #51); Hilpert (1969, p. 48); Kittleman (1957, #1); Mathewson (1954); PRR ED-R-384 (1956)

1: 18N.4E.36.120
2: Dry Monopole
3: 25, 36 T18N R4E
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Cu
8: production, if any, unknown
9: Tertiary Keres Group
10: patented
12: NMBMMR files (1979)

1: 18N.5E.31.132
2: Empire Lode
3: 31 T18N R5E 35°45'3"N 106°27'30"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
8: production unknown
9: Tertiary Keres Group
12: MILS (1981)

1: 18N.4E.36.420
2: Fractional
3: 36 T18N R4E
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Cu
7: pits, adits
8: production, if any, unknown
9: Tertiary Keres Group
11: patent
12: MILS (1978)

1: 18N.4E.36.124
2: Free Trade
3: 36 T18N R4E
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: 45 ft adit
8: production unknown
9: Tertiary Keres Group
10: 12 ft vein, possibly an extension of Lonestar
12: NMBMMR files (1919, 1935); MILS (1978)

1: 14N.1E.31
2: Garcia fault zone
3: 31 T14N R1E
4: Sky Village NE 7-1/2, Sky Village NW 7-1/2 (Albuquerque)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation
10: friable mineralized sandstone with fractures
12: Kittleman (1957, p. 39, #2); USAEC files (late 1950's)

1: 18N.4E.25.322
2: Giant
3: 25 T18N R4E
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Pb
7: 75 ft adit, 50 ft shaft
8: production, if any, unknown
9: Tertiary Keres Group
12: NMBMMR files (1907); MILS (1981)

1: 17N.1W.11.300
2: Goodner-Section 11
3: 11 T17N R1W (unsurveyed) 35°43'15"N 106°55'00"W
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Chenoweth (1974); Santos (1975)

1: 12N.2W.31.420
2: Herrera Ranch-Anaconda
3: NE1/4 SE1/4 31 T12N R2W
4: Herrera 7-1/2 (Grants)
5: San Juan Basin
6: U, Th, REE
7: pits
8: no production
9: Cretaceous Gallup Sandstone
10: buff to gray "black sandstone deposit", beach-placer, 200 ft long, 12-14 inches thick, 0.01% U_3O_8 (PRR)
11: no tresspassing sign on gate on 9/2/81, inaccessible
12: FN 9/2/81; Chenoweth (1957); PRR ED-R-661 (1956); USAEC files (late 1950's)

1: 19N.2W.3.340
2: Houston (S. Houston, Unknown)
3: E1/2 SW1/4 3 T19N R2W 35°54'40"N 107°2'20"W
4: Mesa Portales 7-1/2 (Chaco Mesa)
5: Cuba area
6: U
7: 25-ft adit reported (could not be found by Chenoweth in 1955)
8: no production
9: Tertiary Ojo Alamo Sandstone
10: radioactive zone with organic material in conglomeratic sandstone, 54 ppm U_3O_8 (Green and others, 1982b)
11: claimed by New Cinch Uranium in 1970's
12: Green and others (1982b, #19); Vizcaino and O'Neill (1977); Hilpert (1969, p. 50); Chenoweth (1957, p. 15); PRR ED-R-244 (1953); MILS (1981)

1: 18N.4E.36
2: Iowa #2 (Iron King) (Iron Queen)
3: 36 T18N R4E 35°45'10"N 106°28'15"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: pits
8: production, if any, unknown
9: Tertiary Keres Group
12: MILS (1978)

1: 18N.4E.25.324
2: Iron King Group
3: 25 T10N R4E 35°45'30"N 106°28'13"W
4: Bland 7-1/2 Elevation 8,230 ft (Los Alamos)
5: Cochiti district
6: Au, Ag, Pb, Zn, Fe, Cu
7: 100 ft shaft, short adit
8: production from 1890 to 1902 about $50,000
9: Tertiary Keres Group-monzonite porphyry
10: veins along faults and breccia zones, 12-14 ft wide
11: patent 1898 1st mine located in district; presently owned by NICOR Mineral Ventures, Inc.
12: Elston (1967); C. S. Ross and others (1961); Bundy (1954, 1958); Lindgren and others (1910); Mineral Survey #942; MILS (1981); CRIB (1983)

1: 18N.2E.13.300
2: Jemez Springs
3: 13 T18N R2E
4: Jemez Springs 7-1/2 (Los Alamos)
5: Jemez Springs district
6: barite
7: no workings
8: no production
9: Precambrian granite
10: barite veins in granite
12: Normand (WC, 1982)

1: 20N.1E.15.300
2: Jewell (Unknown)
3: SW1/4 15 T20N R1E
4: Rancho del Chaparral 7-1/2 (Los Alamos)
5: Nacimiento Mountains district
6: U, Cu
8: no production
9: Triassic Chinle Formation
10: mineralized sandstone
12: Holen (1982); Green and others (1982b, #259); Vizcaino and others (1978); Chenoweth (1974)

1: 22N.4W.21
2: Jicarilla Apache Mn deposit (Manganese Prospect)
3: 21 T22N R4W (unsurveyed) 36o7'15"N 107o16'5"W
4: Deer Mesa 7-1/2 Elevation 6,410 ft (Chaco Canyon)
5: Cuba manganese district
6: Mn, U (occurrence)
7: large open cut 200 ft long
8: produced 276 long tons of 36% Mn in 1957-1958
9: Tertiary San Jose Formation
10: 1-3 ft thick zone slightly radioactive psilomelane concretions in basal part of gray to white sandstone and shale
12: FN 7/6/82; Dorr (1965); Farnham (1961); Chenoweth (1957); PRR ED-R-614 (1956); MILS (1978); CRIB (1984)

1: 18N.5E.31.313
2: King Tut
3: 31 T18N R5E 35o44'47"N 106o27'16"W
4: Cañada 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: 40 ft inclined winze, 600 ft adit
8: small production
9: Tertiary Keres Group
10: 15 ft wide vein along a curved fault
12: Bundy (1954, 1958); MILS (1978)

1: 21N.4W.28.200
2: Landers No. 1 (Crook No. 1)
3: NE1/4 28 T21N R4W 36o1'24"N 107o15'18"W
4: Deer Mesa 7-1/2 Elevation 6,900 ft (Chaco Canyon)
5: Cuba Manganese district
6: Mn
7: open cut 300 ft long, 100 ft wide, 8 ft deep
8: produced 1942-1955 intermittently, 2,000 long tons of 41% Mn in 1942, 60.5 long tons of 38% Mn in 1952-1955, 242 long tons of 41.4% Mn in 1955-1957 Farnham (1961)
9: Tertiary San Jose Formation
10: 3- to 5-ft thick zone of Mn nodules, reserves in 1958 of several hundred tons of 10-15% Mn (USBM files, 1958)
12: Elston (1967, p. 22); Dorr (1965); Farnham (1961, p. 75-77); MILS (1981); USBM files (1958); CRIB (1984)

1: 21N.4W.22
2: Landers No. 2 (Crook No. 2)
3: C 22 T21N R4W 36°2'7"N 107°14'51"W
4: Taylor Ranch 7-1/2 (Chaco Canyon)
5: Cuba manganese district
6: Mn
7: open cut 100 ft long, 60 ft wide, 35 ft deep
8: produced in 1942-1957, see Landers No. 1 (Farnham, 1961)
9: Tertiary San Jose Formation
10: 3- to 5-ft thick zone of Mn nodules, reserves negligible (USBM, 1958)
11: northeast of claims additional Mn occurrences, but probably too small and discontinuous to mine
12: Elston (1967, p. 22); Dorr (1965); Farnham (1961, p. 75-77); MILS (1978); USBM (1958); CRIB (1984)

1: 12N.5E.29.300
2: Landsend Prospect (Lone Star)
3: SW1/4 29 T12N R5E 35°14'42"N 106°25'53"W
4: Sandia Crest 7-1/2 Elevation 9,750 ft (Albuquerque)
5: Placitas district
6: barite, fluorite, Pb
7: trenches, pits
8: no production
9: Pennsylvanian Madera Formation
10: barite along bedding planes of limestone, minor replacement
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975, p. 105); F. E. Williams and others (1964, p. 23); Elston (1967, p. 259); Tom Smith (unpublished report, 1983); MILS (1981); CRIB (1984)

1: 19N.3E.28
2: La Plata Placer
3: 28 T19N R3E 35°50'53"N 106°37'45"W
4: Jemez Springs 7-1/2 (Los Alamos)
6: Au(?)
9: placer gold deposits
11: no additional information is known
12: MILS (1981)

1: 12N.5E.28.342
2: Las Huertas Prospects (El Faro?)
3: S1/2 28 T12N R5N 35°13'59"N 106°24'51"W
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: Cu, fluorite, Fe, Ag
7: 3 adits, 300 ft, 50-100 ft long
8: production unknown--probably none
9: Pennsylvanian Madera Formation
10: malachite, azurite, fluorite, chalcopyrite, hematite in 1-4 ft veins, 3 samples ranged from 0.04-0.78% oz/ton Ag, and up to 0.30% Cu (Eveleth, WC, 1980); hematite is brilliant red and may have some potential as pigment for small local ventures
12: V. C. Kelley and Northrop (1975, p. 107); V. C. Kelley (1949); R. W. Eveleth, unpublished report (1980, 3 p.); MILS (1981)

1: 13N.5E.34.344
2: Las Huertas
3: SW1/4 34 T13N R5E 35°18'24"N 106°23'56"W
4: Placitas 7-1/2 Elevation 6,450 ft (Albuquerque)
5: Placitas district
6: barite, fluorite, Pb
7: 100 ft adit, 60 ft adit, 20 ft adit
8: production unknown, if any
9: Mississippian Sandia Formation
10: barite, fluorite, and galena in overturned limestones and sandstones, up to 8-10 ft wide, S35°E; sample assayed 71.1% $BaSO_4$, 9.8% CaF_2, and 0.17% Pb (Williams and others, 1964)
11: mine map by V. C. Kelley and Northrop (1975)
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975, p. 105); F. E. Williams (1965); F. E. Williams and others (1964, p. 21-23); USBM files (1958); Diana Normand (unpublished report, 1982); Tom Smith (unpublished report, 1983); CRIB (1984)

1: 13N.5E.34
2: Las Huertas Creek (near Tecolote)
3: 34 T13N R5E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: placer Au
7: strip and panning
8: production unknown
9: Quaternary gravel conglomerate
12: V. C. Kelley and Northrop (1975, p. 101, 104); Wells and Wootton (1932, p. 16)

1: 18N.4E.24.340
2: Last Chance lode
3: 24, 25 T18N R4E 35°46'14"N 106°28'17"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: 4 adits, pit
8: production unknown
9: Tertiary Keres Group
12: Bundy (1958); MILS (1981)

1: 18N.4E.25.124
2: Laura S (Tip Top)
3: 25 T18N R4E
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: pits, adit
8: several carloads of ore produced prior to 1910
9: Tertiary Keres Group--monzonite porphyry
10: narrow vein striking N60°W
12: Bundy (1954, 1958); Lindgren and others (1910); MILS (1981)

1: 18N.4E.25.443
2: Little Casino
3: 25 T18N R4E 35°45'00"N 106°27'36"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: pits
8: shipped small amount of high-grade ore
9: Tertiary Keres Group-rhyolite
12: Bundy (1954, 1958); Lindgren and others (1910); MILS (1981)

1: 18N.4E.36.441
2: Little Mollie
3: 36 T18N R4E 35°44'50"N 106°27'50"W
4: Cañada 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: pits
8: small production
9: Tertiary Keres Group
10: massive quartz vein
12: Lindgren and others (1910); MILS (1978)

1: 18N.4E.25.344
2: Lonestar Mine (Navajo Tunnel)
3: 25, 36 T18N R4E 35°45'22"N 106°20'13"W
4: Bland 7-1/2 Elevation 8,100 ft (Los Alamos)
5: Cochiti district
6: Au, Ag, Pb, Zn, Fe, Cu
7: six adits totaling about 4,500 ft of workings
8: from 1893 to 1902 produced $250,000
9: Tertiary Keres Group-quartz diorite porphyry
10: veins along faults and breccia zones
12: Elston (1967); C. S. Ross and others (1961); Bundy (1954, 1958); Lindgren and others (1910); CRIB (1983); MILS (1978)

1: 15N.1E.27.200
2: Lone Star Mining and Dev. Corp.
3: NE1/4 27 T15N R1E 35°30'16"N 106°48'50"W
4: San Ysidro 7-1/2 (Los Alamos)
5: White Mesa district (San Ysidro)
6: Coal, U
7: pits, dumps, drilling
8: no uranium production
9: Jurassic Morrison Formation, Cretaeous Dakota Formation
10: mineralized sandstone
12: FN 9/4/82; Chenoweth (1974); PRR ED-R-599 (1956)

1: 15N.1W.10.444
2: Lone Wolf Group (Unknown)
3: SE1/4 10 T15N R1W 35°32'20"N 106°55'15"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill holes-mineralized outcrop
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Green and others (1982b, #38); Flesch (1974); Hilpert (1969, p. 48)

1: 15N.1W.11.321
2: Lone Wolf Group (Unknown)
3: SW1/4 11 T15N R1W 35°32'35"N 106°54'59"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill holes-mineralized outcrop
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Flesch (1974)

1: 15N.1W.11.414
2: Lone Wolf Group (Unknown)
3: SE1/4 11 T15N R1W 35°32'25"N 106°54'30"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill hole-mineralized outcrop
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Green and others (1982b, #39); Santos (1975); Flesch (1974); Hilpert (1969, p. 48); MILS (1981)

1: 13N.4W.32.300
2: Marquez Grant (Bokum Resources)
3: SW1/4 32 T13N R4W 35°18'25"N 107°17'5"W
4: Marquez 7-1/2 (Grants)
5: Marquez-Bernabe-Montaño area-Grants uranium district
6: U
7: drill holes (1,600 ft depth)
8: no production; 751,000 lbs U_3O_8 in reserves
9: Jurassic Morrison Formation-Westwater Canyon Member
10: ore zone in paleochannel sandstones, associated with humates; coffinite, uraninite
11: extension of Marquez mine in McKinley County
12: McLemore (1982, #3); Hatchell and Wentz (1981); Livingston (1980); Green and others (1982b, #58); Chapman, Wood, and Griswold, Inc. (1979, #E); CRIB (1984)

1: 19N.1W.2.244
2: Mauldian
3: NE1/4 2 T19N R1W 35°54'18"N 106°53'45"W
4: San Pablo 7-1/2 Elevation 7,120 ft (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U
7: no workings reported
8: no production
9: Cretaceous Dakota Sandstone
10: mineralized sandstone/shale
12: Green and others (1982b, #21); Santos (1975); L. A. Woodward, Anderson, Kaufman, and Reed (1973); Hilpert (1969, p. 49); MILS (1981)

1: 19N.2W.4
2: Mesa Portales (Portal Claims, New Cinch)
3: 4, 3, 9, 10 T19N R2W, 33, 34 T20N R2W
4: Mesa Portales 7-1/2 (Chaco Mesa)
5: Cuba area
6: U
7: deposit defined by drilling
8: no production
9: Tertiary Ojo Alamo Sandstone
10: radioactive zones in two or more limonite-stained channel sandstones, associated with organic trash, clay galls, and green shale beds; blanket-like geometry, low-grade deposit--up to 0.05% U_3O_8 in drill hole sample
12: Green and others (1982b); NMBMMR files (1979)

1: 12N.6E.3.413
2: Mimi #1-4 (Roadrunner Claims)
3: E1/2 5, SE1/4 4, SW1/4 3 T12N R6E 35°18'00"N 106°17'50"W
4: Hagan 7-1/2 Elevation 5,920-6,100 ft (Albuquerque)
5: Hagan Basin area-Placitas district
6: U
7: blasting, dog holes
8: no production
9: Tertiary latitic dikes and sills intruding Cretaceous Mesaverde Group
10: radioactive fractured gray latite dikes and sills, autunite reported; 0.018% U_3O_8 (NMBMMR chem lab, 5/20/82, #2134); 171 ppm Th (NMBMMR XRF lab, 2/83, #2134)
11: numerous dikes and sills in area-Diamond Tail Ranch
12: FN 3/9/82; McLemore (1982, #53); Green and others (1982b, #16); V. C. Kelley and Northrop (1975); Hilpert (1969, p. 48); PRR DEB-P-4-1444 (1955)

1: 20N.2E.4.221
2: Minerals & Chemicals Group (Penas Negreo Cabin prospect)
3: 4 T20N R2E 35°59'14"N 106°43'38"W
4: Seven Springs 7-1/2 (Los Alamos)
5: Nacimiento Mountains-Seven Springs area
6: Cu
7: trenches, drill holes
8: no production known
9: Permian Cutler Formation
10: mineralized sandstone
12: Timmer (1975); Wood and Northrop (1946); MILS (1981); PRR ED-R-507 (1954)

1: 18N.4E.25.113
2: Miners Union
3: 25 T18N R4E
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Cu
8: production, if any, unknown
9: Tertiary Keres Group
11: patented
12: NMBMMR files (1899)

1: 18N.4E.25.131
2: Mogul Group
3: 25, 26 T18N R4E 35°46'4"N 106°28'37"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: pits
8: production, if any, unknown
9: Tertiary Keres Group
12: Bundy (1958); MILS (1981)

1: 13N.5E.34.113
2: Montezuma (Las Huertas)
3: NW1/4 34 T13N R5E 35°18'35"N 106°24'17"W
4: Placitas 7-1/2 Elevation 6,120 ft (Albuquerque)
5: Placitas district
6: barite, fluorite, Pb, Fe (hematite), Ag, Cu, Au
7: 4 shafts, 90 ft deep, 65 ft deep, 400 ft of drifts
8: 1920 and 1926 35 tons ore yielding 48 oz Ag, 2,400 lbs Cu, 5,962 lbs Pb and worth about $848 were produced
9: Mississippian Arroyo Peñasco Formation faulted against Precambrian schists and greenstones
10: vein mineralization along Las Huertas fault containing barite, fluorite, galena, and ocher hematite; 0.10 oz/ton Ag, trace Au, 0.19% Pb, 0.001% Zn, 0.004% Cu, 62.41% CaF_2 (NMBMMR chem lab, 1984)
12: McLemore and North (1984); Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975, p. 100); Elston (1967); Ellis (1922, p. 41); MILS (1978); CRIB (1984)

1: 21N.1W.12.421
2: Morningstar Mining Corporation (Rio Puerco claims)
3: 12 T21N R1W 36°3'48"N 106°53'19"W
4: Cuba 7-1/2 Elevation 9,145 ft (Abiquiu)
5: Nacimiento Mountains
6: Au, Cu, Mn
7: pits
8: production, if any, unknown
9: Precambrian quartz monzonite
10: 3-4 ft wide vein along fault zone of sheared quartz monzonite with disseminated copper and free gold; sample #2318 0.42 oz/ton Ag and 0.10 oz/ton Au (Santos and others, 1975)
11: worked by the Morningstar Mining Corp. in 1970
12: McLemore and North (1984); Santos and others (1975); L. A. Woodward and others (1972); MILS (1981); R. H. Weber (field notes, 9/14/61); CRIB (1984)

1: 15N.1E.17
2: Morris-Peters #17
3: 17 T15N R1E
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation
10: mineralized sandstone
12: Green and others (1982b, #45); PRR ED-R-287 (1954); ED-R-382 (1954); MILS (1981)

1: 15N.1E.20.441
2: Morris-Peters #20 (Collins prospect, Anomaly #4)
3: SE1/4 20 T15N R1E 35°30'45"N 106°51'14"W
4: San Ysidro 7-1/2 Elevation 5,740 ft (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized lenses in faulted sandstone
12: Green and others (1982b, #46); L. A. Woodward and Ruetschilling (1976); Santos (1975); Chenoweth (1974); Hilpert (1969, p. 48); PRR ED-R-287 (1954); ED-R-382 (1954); USAEC files (late 1950's); MILS (1981)

1: 15N.1E.21.441
2: Morris-Peters #21
3: SE1/4 21 T15N R1E 35°30'45"N 106°50'00"W
4: San Ysidro 7-1/2 Elevation 5,880 ft (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized lenses in faulted sandstone around mud galls
12: Green and others (1982b, #47); L. A. Woodward and Ruetschilling (1976); Santos (1975); Hilpert (1969, p. 48); PRR ED-R-382 (1954); ED-R-460 (1955); ED-R-287 (1954); MILS (1981)

1: 20N.1W.1.141
2: Nacimiento Mine (Copper City, Copper Glance, Cuprite)
3: NW1/4 1 T20N R1W 35°59'39"N 106°53'49"W
4: San Pablo 7-1/2 (Los Alamos)
5: Nacimiento Mountains district
6: Cu, U, Ag
7: open pits (1,200 ft x 1,000 ft)
8: total copper production unknown--largest mine in district
9: Triassic Chinle Formation-Agua Zara Sandstone
10: radioactive copper sandstone deposit; chemical analyses up to 85% Cu and 300 ppm Ag reported by LaPoint (1979)
11: reserves estimated as 9.6 mill. tons at 0.71% copper (L. A. Woodward, in press), mined intermittently from 1880's to 1918 and 1971 to 1975
12: Green and others (1982b, #280); LaPoint (1979; 1976; 1974); Talbott (1974); L. A. Woodward, Anderson, Kaufman, and Reed (1973); Kaufman (1971); Elston (1967); Soulè (1956); Hilpert and Corey (1955); Gott and Erickson (1951, #1; 1952); PRR unnumbered (1951); CRIB (1981)

1: 13N.6E.6.400
2: North Blackshere Ranch (D. Dial Exp.)
3: S1/2 6 T13N R6E 35°22'43"N 106°20'30"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: Hagan Basin area
6: U
7: no workings
8: no production
9: Cretaceous Mesaverde Group
10: 0.54% eU_3O_8 reported in sandstone
12: Green and others (1982b, #14); Hilpert (1969, p. 48); PRR DEB:P-4-1475 (1955)

1: 19N.1W.28.300
2: North Butte (La Ventana Mesa)
3: SE1/4 29, S1/2 28, NE1/4 32, NW1/4 33 T19N R1W 35°50'35"N 106°57'00"W
4: La Ventana 7-1/2 Elevation 7,600 ft (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U, Coal
7: pits, drill holes
8: no uranium production
9: Cretaceous Mesaverde Group-La Ventana Tongue of Cliff House Sandstone
10: radioactive coal around most of mesa in 3 horizons, up to 0.62% U (Vine and others, 1953), coffinite
11: geologic and assay map by Vine and others (1953)
12: Green and others (1982b, #24); Santos (1975); L. A. Woodward, and Schumacher (1973); Hilpert (1969, p. 49); Bachman and others (1959); Hilpert and Corey (1955); Vine and others (1953); MILS (1981); USAEC files (1960)

1: 18N.2E.13.200
2: Northeast of Soda Dam
3: NE1/4 13 T18N R2E (unsurveyed)
4: Jemez Springs 7-1/2 (Los Alamos)
5: Jemez Springs district-Jemez Mountains
6: Cu, U
7: no workings-outcrop anomaly
8: no production
9: Permian Abo Formation-basal sandstone
10: small discontinuous lense of copper-uranium mineralization in sandstone, 97 ppm U_3O_8 (Green and others, 1982b)
11: access denied (private property) on 9/5/82
12: FN 9/5/82; Green and others (1982b, #27); Hilpert (1969, p. 49); PRR ED-R-608 (1956); MILS (1981)

1: 18N.4E.25.433
2: North Star
3: 25, 36 T18N R4E
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Cu
8: production, if any, unknown
9: Tertiary Keres Group
11: patented 1903
12: Mineral Survey #1007

1: 20N.2E.3.130
2: Penas Negras
3: 3 T20N R2E
4: Seven Springs 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: several pits, trenches, adit
8: no production
9: Permian Cutler Formation
12: Timmer (1975)

1: 17N.4E.10, 15
2: Peralta Canyon (A-1 Lode, O.B.S., Peralta Lion Group)
3: 10, 15 T17N R4E (unsurveyed) 35°42'30"N 106°30'00"W
4: Bear Springs Peak 7-1/2 Elevation 6,800 ft (Los Alamos)
5: Cochiti district
6: Au, Ag, U(?), V(?), Cu
7: 126-ft adit, 55-ft adit (A-1), 46-ft adit (Peralta Lion #1), 206-ft adit (Peralta Lion #2)
8: no uranium production
9: Tertiary Keres Group-rhyolite
10: gold-silver veins and breccia-fillings along faults containing secondary yellow uranium minerals in rhyolite; Ag values up to 5 oz/ton, Au values up to 0.1 oz/ton in quartz veins cutting rhyolite
11: patent 1926 #989033
12: Chenoweth (1974); Elston (1967); Lindgren and others (1910); Mineral Survey #1875; CRIB (1984); NMBMMR files (1921); MILS (1981)

1: 17N.5E.9.410
2: Peralta Canyon(?)-Copper Prospect (A. B. Group, Mediodia Canyon prospect)
3: E1/2 9 T17N R5E (unsurveyed) 35°43'7"N 106°24'40"W
4: Cañada 7-1/2 Elevation 6,312 ft (Los Alamos)
5: Cochiti district
6: Cu, U(?), Au, Ag
7: adit, shaft
8: no production
9: Tertiary Lapilli tuff (rhyolite)
10: copper oxides filling fractures and fault zones
11: worked by Benham and Sayer prior to 1910, patented 1922
12: Green and others (1982b, #12); Chenoweth (1974); Hilpert (1969, p. 49); Lindgren and others (1910, p. 162); NMBMMR files (1906); MILS (1981); CRIB (1983); Mineral Survey #1803

1: 12N.5E.16,21
2: Placitas Hematite
3: 16, 21 T12N R5E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Fe
8: no production
10: small hematite deposits along fissures in the Las Huertas fault
11: interest only as small local source of mineral pigment
12: V. C. Kelley and Northrop (1975, p. 107); Harrer and Kelley (1963); V. C. Kelley (1949)

1: 15N.1W.15.124
2: Polka Dot Uranium Group
3: NW1/4 15 T15N R1W 35°32'00"N 106°55'50"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill hole-mineralized outcrop
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: NMBMMR files (1979)

1: 15N.1W.15.223
2: Polka Dot Uranium Group (Unknown)
3: NE1/4 15 T15N R1W 35°32'00"N 106°55'25"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill hole-mineralized outcrop
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Green and others (1982b, #41); Santos (1975); Hilpert (1969, p. 48)

1: 19N.1W.35.120
2: Rambler No. 2
3: NE1/4 NW1/4 35 T19N R1W 35°50'25"N 106°54'45"W
4: La Ventana 7-1/2 Elevation 7,100 ft (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U, Coal
7: pits
8: no production
9: Cretaceous Mesaverde Group-Menefee Formation
10: radioactive coal, sandstone, and carbonaceous shale, 0.065% U_3O_8 reported (Vine and others, 1953)
12: O. J. Anderson (1980); Green and others (1982b, #26); Santos (1975, #77); Chenoweth (1974); Hilpert (1969, p. 49); Bachman and others (1959, #77); Hilpert and Corey (1955); Vine and others (1953); Read (1952); MILS (1978)

1: 15N.1W.14.400
2: Rattlesnake Group (Unknown)
3: SE1/4 14 T15N R1W 35°31'35"N 106°54'40"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill holes-mineralized outcrop
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Green and others (1982b, #40); Santos (1975); Hilpert (1969, p. 48); MILS (1981); NMBMMR files (1979)

1: 12N.3W.18.141
2: Rio Puerco (Kerr-McGee, Section 18)
3: N1/2 18 T12N R3W 35°16'15"N 107°10'35"W
4: La Gotera 7-1/2 Elevation 6,410 ft (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: 810-ft mine shaft
8: 3.2 million pounds U_3O_8 reserves--production unknown
9: Jurassic Morrison Formation-Westwater Canyon Member
10: ore body 6,000 ft long; 1,000 ft wide (several bodies); 2 horizons, 4-13 ft thick, average grade 0.16%
11: located on 3/4/8--locked gates; mined 1979-1980; orebody extends throughout southern half of section 18 and northern half of section 19
12: FN 3/4/82; Green and others (1982b, #56, 57); Perkins (1979); W. T. Siemers and Austin (1979); Chapman, Wood, and Griswold, Inc. (1979, #12, 13); CRIB (1981); MILS (1981)

1: 12N.5E.8.110
2: San Jose Group (Victo Group, Kleinwort)
3: 5, 8 T12N R5E 35°17'16"N 106°26'18"W
4: Placitas 7-1/2 Elevation 6,000 ft (Albuquerque)
5: Placitas district
6: Cu, Pb, Ag, Zn, barite, fluorite
7: 2 shafts (25 ft, 15 ft), adits(19 ft, 57 ft, 44 ft)
8: production, if any, unknown
9: Pennsylvanian Madera Formation and Precambrian Sandia granite
10: fissure veins along Placitas fault
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975, p. 101); Ellis (1922, p. 41); Mineral Survey #2012 (1930); MILS (1981); PRR DEB-RRA-696 (1953)

1: 19N.1W.24.100
2: San Miguel Mine
3: NE1/4 24 T19N R1W 35°52'00"N 106°53'15"W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U, Cu, V, Mo, Ag
7: pits, one shaft
8: no uranium production, about 5,000,000 pounds of copper produced
9: Triassic Chinle Formation-Agua Zarca Sandstone Member
10: radioactive copper-sandstone deposit
300 ppm Mo, 300 ppm V (CRIB, 1974); reportedly 2-1/2 - 3 oz/ton Ag (Lindgren and others, 1910)
11: inaccessible on 9/6/82 (road washed out); mine map by Soulè (1956)
12: FN 9/6/82; Green and others (1982b, #281); L. A. Woodward and Schumacher (1973); Elston (1967); Soulè (1956); Hilpert and Corey (1955); Lindgren and others (1910); PRR unnumbered (1951); CRIB (1974)

1: 12N.4W.13.200
2: Section 13 (UN, Westvaco)
3: NE1/4 13 T12N R4W 35°16'10"N 107°12'40"W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: drill hole (366-400 ft deep)
8: no production
9: Jurassic Morrision Formation-Brushy Basin Member
10: one horizon in sandstone, 6-12 ft thick
12: Green and others (1982b, #49); Hilpert (1969, p. 48); USAEC files (late 1950's); MILS (1981)

1: 12N.3W.14
2: Section 14 Prospects
3: 14 T12N R3W 35°16'17"N 106°6'56"W
4: Puerco Dam 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.2W.17
2: Section 17 Prospects
3: 17 T12N R2W 35°16'15"N 107°4'5"W
4: Puerco Dam 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.2W.18
2: Section 18 Prospects
3: 18 T12N R2W 35°15'58"N 107°5'12"W
4: Puerco Dam 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.2W.19
2: Section 19 Prospects
3: 19 T12N R2W 35°15'30"N 107°5'19"W
4: Puerco Dam 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.2W.20
2: Section 20 Prospects
3: 20 T12N R2W 35°15'15"N 107°4'19"W
4: Puerco Dam 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.3W.20
2: Section 20 Prospects
3: 20 T12N R3W 35°15'25"N 107°10'35"W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.3W.21
2: Section 21 Prospects
3: 21 T12N R3W 35°15'26"N 107°9'28"W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.4W.24
2: Section 24 Prospects
3: 24 T12N R4W 35°15'26"N 107°12'30"W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.3W.27
2: Section 27 Prospects
3: 27 T12N R3W 35°14'38"N 107°8'35"W
4: Arch Mesa 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.3W.28
2: Section 28 Prospects
3: 28 T12N R3W 35°14'47"N 107°9'47"W
4: Arch Mesa 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.3W.29
2: Section 29 Prospects
3: 29 T12N R3W 35°14'26"N 107°10'34"W
4: Arch Mesa 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.3W.30
2: Section 30 Prospects
3: 30 T12N R3W 35°14'25"N 107°11'33"W
4: Arch Mesa 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 17N.1W.36.300
2: Section 36 (Anomaly #3 and 7)
3: SW1/4 36 T17N R1W 35°39'30"N 106°54'00"W
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
10: mineralized sandstone
11: incorrect location given in PRR
12: Green and others (1982b, #35); Chenoweth (1974); Hilpert (1969, p. 49); Siapno (1955); PRR ED-R-520 (1955)

1: 18N.4E.35.221
2: Sheridon Lode
3: 35 T18N R4E 35°45'20"N 106°28'56"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: pits
8: production, if any, unknown
9: Tertiary Keres Group
12: MILS (1981)

1: 18N.4E.36.213
2: Short Order Group
3: 36 T18N R4E 35°44'59"N 106°28'15"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Cu
8: production, if any, unknown
9: Tertiary Keres Group
10: extension of Washington deposit
11: patented 1900
12: Jones (1904, p. 187); MILS (1981);

1: 18N.2E.13.400
2: Soda Dam (Perry Robb)
3: 13 T18N R2E (unsurveyed) 35°47'30"N 106°41'20"W
4: Jemez Springs 7-1/2 Elevation 6,460 ft (Los Alamos)
5: Jemez Springs district-Jemez Mountains
6: U, travertine
7: no workings-natural dam and caves
8: no production
9: Recent Hot Springs deposit (Tufa)
10: radioactive calcite tufa deposit forming a natural dam 50 ft wide, 50 ft high, 300 ft long; 0.001% U_3O_8, 35.9% Ca (NMBMMR chem lab, 3/3/83, #3160)
11: shown on Jemez Springs topographic map
12: FN 5/9/82; PRR unnumbered (1951)

1: 19N.1W.34.300
2: South Butte (La Ventana Mesa)
3: E1/2 33, S1/2 34 T19N R1W, NE1/4 3, W1/2 2 T18N R1W 35°49'58"N 106°55'55"W
4: La Ventana 7-1/2 Elevation 7,560 ft (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U, coal
7: pits, drill holes
8: no uranium production
9: Cretaceous Mesaverde Group-La Ventana Tongue of Cliff House Sandstone
10: radioactive coal around most of mesa, up to 0.42% U (Vine and others, 1953)
11: geologic and assay map by Vine and others (1953)
12: Green and others (1982b, #25); Santos (1975); L. A. Woodward, and Schumacher (1973); Bachman and others (1959); Hilpert and Corey (1955); Vine and others (1953); USAEC files (late 1950's)

1: 17N.2E.3.400
2: Spanish Queen (East, Burnett)
3: 3 T17N R2E (unsurveyed) 35°43'55"N 106°42'33"W
4: Ponderosa 7-1/2 Elevation 6,050 ft (Los Alamos)
5: Jemez Springs district-Jemez Mountains
6: Ag, Au, Cu, U, barite
7: 2 adits with 2 shafts and interconnecting drifts
8: no uranium production, Cu-Ag-Au production (Elston, 1967, p. 24)
9: Permian Abo Formation
10: discontinuous lenses of ore associated with woody material in black to gray shale interbedded with bleached sandstone, several horizons, malachite, azurite, chalcocite; 0.018% U_3O_8, 4.90% Cu (NMBMMR chem lab, 3/3/83, #3150)
11: mine map by Bachman and Read (1951)
12: FN 9/5/82; Holen (1982); Green and others (1982b, #258); Elston (1967); Soulè (1956); Gott and Erickson (1951, #6); Bachman and Read (1951); PRR unnumbered (1951); USBM files (1943); CRIB (1984)

1: 17N.2E.3.340
2: Spanish Queen West
3: 3 T17N R2E (unsurveyed) 35°43'45"N 106°42'55"W
4: Ponderosa 7-1/2 Elevation 6,050 ft (Los Alamos)
5: Jemez Springs district-Jemez Mountains
6: Ag, Au, Cu, U
7: 1 adit (now caved and inaccessible)
8: no uranium production, Cu-Ag-Au production unknown
9: Permian Abo Formation
10: discontinuous ore zone associated with carbonaceous material in gray shale interbedded with orange to buff sandstone, chalcocite, malacite, azurite; 0.006% U_3O_8, 3.49% Cu, 1.06 oz/ton Ag (NMBMMR chem lab, 3/3/83, #3144)
11: mine map by Bachman and Read (1951)
12: FN 9/5/82; Soulè (1956); Gott and Erickson (1951, #7); Bachman and Read (1951); PRR unnumbered (1951)

1: 17N.4E.1.200
2: Sun Group
3: 1 T1N R4E 35°38'43"N 106°27'53"W
4: Cañada 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, U
7: adits, pits
8: production unknown
9: Tertiary Keres Group-monzonite
12: Bundy (1954, 1958); MILS (1978)

1: 18N.4E.36.332
2: Sunny South Lode
3: 36 T18N R4E 35°44'53"N 106°28'45"W
4: Canada 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: 45 ft shaft, adit
8: production unknown
9: Tertiary Keres Group
10: 4 ft wide vein, southern extension of the Washington deposits
11: patent in 1914, #382236
12: NMBMMR files (1935); MILS (1981)

1: 21N.3W.26.300
2: Taylor (Miller, Joel Taylor)
3: SW1/4 26 T21N R3W 36°01'10"N 107°07'46"W
4: Taylor Ranch 7-1/2 Elevation 7,060 ft (Chaco Canyon)
5: Cuba Manganese district
6: Mn
7: open pit
8: produced 1944-1947 about 800 tons of concentrates (38% Mn)
and in 1957 (Farnham, 1962)
9: Tertiary San Jose Formation
10: 5 ft thick zone of Mn nodules in shale
12: Dorr (1965); Farnham (1961, p. 77-78); MILS (1978); USBM
files (1942); CRIB (1984)

1: 18N.2E.34
2: Tex-N (Tex M)
3: C 34 T18N R2E 35°45'00"N 106°42'55"W (approximate)
4: Ponderosa 7-1/2, Jemez Springs 7-1/2 (Los Alamos)
5: Jemez Springs district-Jemez Mountains
6: Cu, U
7: 1 short adit
8: no uranium produciton, unknown copper production
9: Permian Abo Formation
10: mineralized zone along carbonaceous seams in sandstone and
shale, 0.07% U_3O_8, 5.76% Cu reported
11: could not locate 9/5/82
12: FN 9/5/82; Green and others (1982b, #28); Hilpert (1969, p.
49); PRR unnumbered (1955); ED-R-609 (1955)

1: 18N.4E.25.410
2: Uncle Joe #2
3: 25 T18N R4E 35°45'32"N 106°28'4"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag
7: adits
8: production unknown
9: Tertiary Keres Group
12: MILS (1981)

1: 12N.2W.5.322
2: Unknown
3: C 5 T12N R2W 35°17'50"N 107°04'30"W
4: Puerco Dam 7-1/2 (Grants)
5: Majors Ranch area
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
10: mineralized sandstone
11: Bolivar Uranium Corp.
12: Santos (1975)

1: 12N.2W.6.221
2: Unknown
3: NE1/4 6 T12N R2W 35°18'15"N 107°05'10"W
4: Puerco Dam 7-1/2
5: Majors Ranch area
6: U
7: no workings-drill holes
8: no production
9: Jurassic Morrison Formation
10: mineralized sandstone
11: Bolivar Uranium Corp.
12: Santos (1975)

1: 12N.2W.29.111
2: Unknown
3: NE1/4 29 T12N R2W 35°20'00"N 107°03'58"W
4: Puerco Dam 7-1/2 (Grants)
5: Majors Ranch area
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
10: mineralized sandstone
11: Bolivar Uranium Corp.
12: Green and others (1982b, #253); Santos (1975)

1: 12N.2W.31.441
2: Unknown
3: SE1/4 31 T12N R2W 35°18'35"N 107°05'00"W
4: Puerco Dam 7-1/2 (Grants)
5: Majors Ranch area
6: U
7: no workings-drill holes
8: no production
9: Jurassic Morrison Formation
10: mineralized sandstone
11: Bolivar Uranium Corp.
12: Santos (1975)

1: 12N.3W.8
2: Unnamed Prospect
3: 8 T12N R3W 35°17'6"N 107°10'57"W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 12N.4W.1.200
2: Unknown (Base Metals)
3: NE1/4 1 T12N R4W 35°17'55"N 107°12'25"W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: 4 mineralized drill holes
12: Green and others (1982b, #48); Hilpert (1969, p. 48); USAEC files (late 1950's)

1: 12N.4E.1.414
2: Unknown
3: SE1/4 1 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Ag, barite, Cu, Pb
7: pits
8: production unknown
9: Triassic Chinle Formation
10: rock sample contained 200 ppm Ag, >2% Cu, 300 ppm Pb, 100 ppm Ba
11: located within a wildlife refuge
12: Hedlund and others (1984); Kness (1982); Hendzel and others (1983)

1: 12N.4W.12.143
2: Unknown (Section 12)
3: C W1/2 12 T12N R4W 35°16'52"N 107°13'00"W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: drill hole
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Green and others (1982b, #50); Hilpert (1969, p.48); MILS (1981)

1: 12N.4E.12.323
2: Unknown
3: 12 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Cu
7: pit
8: no production
9: Precambrian Juan Tabo sequence near contact with Magdalena Group
12: Hedlund and others (1984); Kness (1982); Hayes (1951)

1: 12N.4E.12.423
2: Unknown
3: 12 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Cu
7: pit
8: no production
9: Precambrian Juan Tabo sequence
10: along a northeast trending fault
12: Hedlund and others (1984); Kness (1982); Hayes (1951)

1: 12N.4E.13.314
2: Unknown
3: 13 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
5; Placitas district
6: Cu
7: pit
8: no production
9: Precambrian Juan Tabo sequence
10: 0.008% Cu (Hedlund and others, 1984)
12: Hedlund and others (1984); KNess (1982); Hayes (1951)

1: 12N.4E.14.214
2: Unknown
3: NE1/4 14 T2N R4E
4: Placitas 7-1/2 (Albuquerque)
6: Cu, Ag
7: 80 ft adit
8: no production
9: Precambrian Juan Tabo sequence
10: 1.4 oz/ton Ag and 0.02% Cu near Rincon fault
12: Hedlund and others (1984); Kness (1982)

1: 12N.4E.14.223
2: Unknown
3: 14 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Cu(?)
7: pit
8: no production
9: Precambrian Juan Tabo sequence
12: Hayes (1951)

1: 12N.4W.23.411
2: Unknown
3: C 23 T12N R4W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: drill holes
8: no production
9: Jurassic Morrison Formation-Westwater Canyon Member
10: mineralized sandstone, may be extension of Rio Puerco orebody
11: Anaconda-Laguna Indian Reservation; extends into section 24
12: Green and others (1982b, #54); USAEC files (late 1950's); NMBMMR files (1980's)

1: 12N.4E.26.222
2: Unknown
3: 26 T12N R4E
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: Cu(?)
7: pits
8: no production
9: Precambrian Sandia granite
12: Hayes (1951)

1: 12N.4E.35.333
2: Unknown
3: 35 T12N R4E
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: Cu(?)
7: pits
8: no production
9: Precambrian Juan Tabo sequence
10: along north-south fault
12: Hayes (1951)

1: 12N.5E.5.340
2: Unknown
3: 5 T12N R5E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Cu, Pb, Zn, Au, barite
7: pits, 19 ft adit, 18 ft adit
8: no production
9: Pennsylvanian Madera Group
10: veins in limestone
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975)

1: 12N.5E.7.142
2: Unknown
3: 7 T12N R5E 35°16'52"N 106°27'5"W
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Cu, Pb, Zn, Ag
7: pits
8: production, if any, unknown
9: Pennsylvanian Madera Formation
10: fissure veins in limestone
12: Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975, p. 101); MILS (1981)

1: 12N.5E.7.321
2: Unknown
3: SE1/4 7 T12N R5E (unsurveyed)
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Ba
7: 21 ft adit, 29 ft adit
8: no production
9: Pennsylvanian Madera Formation
10: barite veins along fault in limestones and sandstones
12: Hedlund and others (1984); Kness (1982)

1: 12N.5E.7.411
2: Unknown
3: 7 T12N R5E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Ba
7: pits
8: no production
9: Pennsylvanian Madera Formation
10: thin barite veins in limestone
12: Hedlund and others (1984); Kness (1982)

1: 12N.5E.8.300
2: Unknown
3: 8 T12N R5E (unsurveyed)
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: barite
7: 14 ft adit, 39 ft adit
8: no production
9: Pennsylvanian Madera Formation
10: veins of barite terminating at fault contact with Sandia granite (Precambrian), 11% Ba, 0.1% Pb, 0.01% Cu
12: Hedlund and others (1984); Kness (1982)

1: 12N.5E.9.311
2: Unknown
3: SW1/4 9 T12N R5E 35°16'41"N 106°25'22"W
4: Placitas 7-1/2 Elevation 7,000 ft (Albuquerque)
5: Placitas district
6: barite, fluorite, Pb, Ag
7: pits, trenchesf, 25 ft shaft, 15 ft adit
8: no production
9: Pennsylvanian Madera Formation
10: veins of barite, fluorite, and galena along a fault zone trending N10°W, some replacement of limestone; 0.46 oz/ton Ag, 4.99% Pb, 0.65% Zn, 0.0007% Cu, 18.3% $BaSO_4$, 38.88% CaF_2 (NMBMMR chem lab, 1984)
12: FN 12/14/83; McLemore and North (1984); Hedlund and others (1984); KNess (1982); V. C. Kelley and Northrop (1975, p. 105); MILS (1981)

1: 12N.5E.16.210
2: Unknown
3: 16 T12N R5E
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: barite, fluorite, Pb
7: pits
8: no production
9: Pennsylvanian Madera Formation
10: barite veins in fault breccia
12: Hedlund and others (1984); Kness (1982)

1: 12N.6E.35.444
2: Unknown
3: 35 T12N R6E (unsurveyed)
4: Sandia Park 7-1/2 (Albuquerque)
5: Monte Largo Hills
6: barite, fluorite(?)
7: pits
8: no production
9: Precambrian gneiss
12: Lambert (1961)

1: 12N.6E.36.133
2: Unknown
3: 36 T12N R6E (unsurveyed)
4: Sandia Park 7-1/2 (Albuquerque)
5: Monte Largo Hills
6: barite, fluorite(?)
7: pits
8: no production
9: Precambrian quartz-feldspar gneiss
12: Lambert (1961)

1: 13N.4W.25
2: Unknown
3: E1/2 25 T13N R4W
4: La Gotera 7-1/2 (Grants)
5: Marquez-Bernabe Montaño area-Grants uranium district
6: U
7: drill hole
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member-Jackpile sandstone
10: mineralized sandstone
12: Hilpert (1969, p. 48)

1: 13N.6E.26.211
2: Unknown
3: N1/2 26 T13N R6E
4: Hagan 7-1/2 (Albuquerque)
5: Hagan Basin
6: placer Au
8: no production
9: Tertiary Galisteo Formation
12: V. C. Kelley and Northrop (1975, p. 99)

1: 14N.1E.27.400
2: Unknown
3: SE1/4 27 T14N R1E 35°29'55"N 106°49'1"W
4: Sky Village NE 7-1/2 (Albuquerque)
5: Nacimiento Mountains
6: U
7: trench
8: no production
9: Cretaceous Mancos Shale
10: mineralized marine shale
11: no uranium potential; incorrect location given on table by Green and others (1982b)
12: Green and others (1982b, #254)

1: 15N.1E.22.144
2: Unknown
3: C 22 T15N R1E 35°31'00"N 106°49'28"W
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: pit
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Chenoweth (1974); L. A. Woodward and Ruetschilling (1976)

1: 15N.1E.22.433
2: Unknown
3: 22, 27 T15N R1E
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimento Mountains
6: Au, U
7: pits
8: no production
9: Cretaceous Dakota Formation
10: gold in carbonaceous shale (see 15N.1E.26.110)
12: L. A. Woodward and Ruetschilling (1976)

1: 15N.1E.31
2: Unknown
3: 31 T15N R1E 35°29'13"N 106°52'30"W
4: Sky Village NE 7-1/2, Sky Village NW 7-1/2 (Albuquerque)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Cretaceous Dakota Sandstone
10: slighty radioactive coal and sandstone
12: Green and others (1982b, #275); Hilpert and Corey (1955); Bachman and Read (1951)

1: 15N.4E.27
2: Unnamed Prospect
3: 27 T15N R4E 35°29'45"N 106°29'44"W
4: San Filipe Pueblo 7-1/2 (Los Alamos)
5: Hagan Basin
6: U(?)
7: drill holes
8: no production
12: MILS (1981)

1: 15N.1W.33
2: Unnamed Prospect
3: 33 T14N R1W 35°29'23"N 106°56'33"W
4: Sky Village NW 7-1/2 (Albuquerque)
6: U(?)
7: drill hole
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 15N.1W.34
2: Two Unnamed Prospects
3: 34 T15N R1W 35°29'15"N 106°55'29"W
4: Sky Village NW 7-1/2 (Albuquerque)
6: U(?)
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 15N.1W.35
2: Unnamed Prospects
3: 35 T15N R1W 35°29'15"N 106°55'3"W
4: Sky Village NW 7-1/2 (Albuquerque)
6: U(?)
7: drill holes
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 15N.1W.8.223
2: Unknown
3: NE1/4 8 T15N R1W 35°32'50"N 106°57'30"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill hole
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: Nacimiento Uranium Mining Corp.
12: Green and others (1982b, #36); Santos (1975); Hilpert (1969, p. 48)

1: 15N.1W.9.441
2: Unknown
3: SE1/4 9 T15N R1W 35°32'25"N 106°56'30"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill hole
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone in drill hole
11: Nacimiento Uranium Mining Corp.
12: Green and others (1982b, #37); Santos (1975); Hilpert (1969, p. 48)

1: 15N.1W.10.210
2: Unknown (Nacimiento, Polka Dot)
3: NE1/4 10 T15N R1W 35°32'45"N 106°55'30"W
4: Ojito Spring 7-1/2 (Los Alamos)
5:
6: U
7: drill holes-anomalous radioactivity over outcrops
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: Nacimiento Uranium Mining Corp.
12: Chenoweth (1974); NMBMMR files (1979)

1: 15N.1W.21.441
2: Unknown
3: SE1/4 21 T15N R1W 35°30'40"N 106°56'30"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill hole-mineralized outcrop
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone in drill hole
11: Nacimiento Uranium Mining Corp.
12: Green and others (1982b, #42); Santos (1975); Hilpert (1969, p. 48)

1: 15N.1W.22.441
2: Unknown
3: SE1/4 22 T15N R1W 35°30'45"N 106°55'25'W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill hole-mineralized outcrop
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: Nacimiento Uranium Mining Corp.
12: Green and others (1982b, #43); Santos (1975); Hilpert (1969, p. 48); MILS (1981)

1: 15N.1W.23.400
2: Unknown
3: SE1/4 23 T15N R1W 35°30'35"N 106°54'25"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill hole
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: Nacimiento Uranium Mining Corp.
12: Green and others (1982b, #44); Hilpert (1969, p. 48)

1: 15N.1W.27
2: Unnamed Prospect
3: 27 T15N R1W 35°29'52"N 106°56'7"W
4: Sky Village NW 7-1/2 (Los Alamos)
6: U(?)
7: drill hole
8: no production
9: Jurassic Morrison Formation
12: MILS (1981)

1: 16N.1E.29.413
2: Unknown
3: S1/2 29 T16N R1E 35°35'8"N 106°51'30"W
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings--radioactive anomalies
8: no production
9: Jurassic Summerville or Entrada Formation, Todilto Formation
10: mineralized sandstone and limestone
12: Santos (1975); U.S. Atomic Energy Commission (1966, p. 54)

1: 16N.1E.32.211
2: Unknown
3: NE1/4 32 T16N R1E 35°34'50"N 106°51'30"W
4: San Ysidro 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Summerville or Entrada Formation
10: mineralized sandstone
12: Santos (1975); U.S. Atomic Energy Commission (1966, p. 54)

1: 16N.2E.7.100
2: Unknown
3: NW1/4 7 T16N R2E 35°38'2"N 106°46'20"W
4: Gilman 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
10: Pennsylvanian Madera Formation (?)
10: mineralized sandstone (?)
12: Holen (1982); Green and others (1982b, #257); L. A. Woodward, DuChene, and Martinez (1977)

1: 17N.1W.15.211
2: Unknown (Ojo del Espirito Santo Grant)
3: N1/2 15 T17N R1W (unsurveyed)
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Siapno (1955)

1: 17N.1W.25.420
2: Unknown-Collins Lease (Kroeger #1)
3: SW1/4 25 T17N R1W (unsurveyed) 35°40'15"N 106°53'15"W
4: Holy Ghost Springs 7-1/2 Elevation 6,400 ft (Los Alamos)
5: Nacimiento Mountains
6: U, V
7: no workings-drill holes, outcrop anomalies
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
11: Zia Indian Reservation, similar to Collins prospect
12: Kittleman and Chenoweth (1957); Siapno (1955, p. 15, #1); PRR ED-R-520 (1955), ED-R-475 (1955)

1: 17N.1E.26.144
2: Unknown
3: 26 T17N R1E (unsurveyed)
4: Gilman 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: pits
8: no production
9: Permian Abo Formation
10: copper sulfides and oxides in arkose
12: L. A. Woodward, DuChene, and Martinez (1977)

1: 17N.1W.27.222
2: Unknown (Anomaly #4, Ojo del Espirato Santo Grant)
3: NE1/4 27 T17N R1W (unsurveyed)
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Brushy Basin Member
10: mineralized sandstone
12: Chenoweth (1974); Siapno (1955)

1: 17N.1W.36.323
2: Unknown
3: 36 T17N R1W (unsurveyed) 35°39'29"N 106°53'35"W
4: Holy Ghost Springs 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Entrada Sandstone
10: mineralized 1 to 1-1/2 ft sandstone along 0.2 mile of outcrop
12: Santos (1975, p. 18)

1: 18N.1W.2.341
2: Unknown (South Butte)
3: SW1/4 2 T18N R1W 35o49'00"N 106o54'40"W
4: La Ventana 7-1/2 Elevation 7,240 ft (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U, Coal
7: no workings
8: no uranium production
9: Cretaceous Mesaverde Group-La Ventana Tongue of Cliff House Sandstone, Menefee Formation
10: 0.003% U in coal (Vine and others, 1953)
12: Bachman and others (1959); Vine and others (1953)

1: 18N.1E.19.134
2: Unknown
3: 19 T18N R1E
4: La Ventana 7-1/2 Elevation 7,950 ft (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: pit
8: no production
9: Permian Abo Formation
10: mineralized sandstone
12: L. A. Woodward and Schumacher (1973); Schumacher (1972)

1: 18N.1E.30.322
2: Unknown
3: 30 T18N R1E
4: La Ventana 7-1/2 Elevation 7,700 ft (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: pit
8: no production
9: Permian Yeso Formation
10: mineralized sandstone
12: L. A. Woodward and Schumacher (1973); Schumacher (1972)

1: 18N.1W.12.240
2: Unknown
3: 12 T18N R1W
4: La Ventana 7-1/2 Elevation 7,820 ft (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: pit
8: no production
9: Pennsylvanian Madera Formation
10: mineralized sandstone
12: L. A. Woodward and Schumacher (1973); Schumacker (1972)

1: 18N.1W.12.300
2: Unknown (de dos Gordos)
3: SW1/4 12 T18N R1W (unsurveyed) 35°47'15"N 106°34'00"W
4: La Ventana 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Cretaceous Dakota Sandstone
10: radioactive shale, 0.002% U
12: Green and others (1982b, #30); Santos (1975); Chenoweth (1974); Hilpert (1969, p. 49); Bachman and others (1959); Vine and others (1953); Read (1952); MILS (1981)

1: 19N.1W.19.230
2: Unknown
3: NE1/4 19 T19N R1W 35°53'55"N 106°58'40"W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana district- Nacimiento Mountains
6: U, Coal
7: no workings
8: no production
9: Cretaceous Mesaverde Group-La Ventana Tongue of Cliff House Sandstone-Menefee Formation
10: radioactive bone in coal, 0.002% U (Vine and others, 1953)
11: Coal
12: L. A. Woodward and Shumacher (1973); Bachman and others (1959); Vine and others (1953)

1: 19N.1W.30.221
2: Unknown
3: NE1/4 30 T19N R1W 35°51'15"N 106°58'30"W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U, Coal
7: no workings
8: no production
9: Cretaceous Mesaverde Group-La Ventana Tongue of Cliff House Sandstone, Menefee Formation
10: radioactive coal and bones, 0.002% U (Vine and others, 1953)
12: Green and others (1982b, #323); Santos (1975); L. A. Woodward and Schumacher (1973); Bachman and others (1959); Vine and others (1953)

1: 19N.1W.30.322
2: Unknown
3: C 30 T19N R1W 35°50'50"N 106°58'50"W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U
7: no workings
8: no production
9: Cretaceous Mesaverde Group-La Ventana Tongue of Cliff House Sandstone, Menefee Formation
10: radioactive clinker bed and natural ash bed, 0.009% U (Vine and others, 1953)
12: L. A. Woodward and Schumacher (1973); Bachman and others (1959); Vine and others (1953)

1: 19N.1W.32.232
2: Unknown
3: NE1/4 32 T19N R1W 35°50'10"N 106°57'35"W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U, Coal
7: pit
8: coal produced, no uranium production
9: Cretaceous Mesaverde Group-Menefee Formation
10: radioactive coal, 0.001% U (Vine and others, 1953)
12: Bachman and others (1959); Vine and others (1953)

1: 19N.1W.36.232
2: Unknown
3: 36 T19N R1W
4: La Ventana 7-1/2 Elevation 7,940 ft (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: pit
8: no production
9: Pennsylvanian Madera Formation
10: mineralized sandstone
12: L. A. Woodward and Schumacher (1973)

1: 19N.2W.36.223
2: Unknown
3: NE1/4 36 T19N R2W 35°50'20"N 106°59'30"W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U, coal
7: no workings
8: no production
9: Cretaceous Mesaverde Group-La Ventana Tongue of Cliff House Sandstone, Menefee Formation
10: radioactive 2-ft coal bed, 0.004% U (Vine and others, 1953)
12: Bachman and others (1959); Vine and others (1953)

1: 20N.1W.2.223
2: Unknown
3: NE1/4 2 T20N R1W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana district-Nacimiento Mountains
6: U
7: no workings--radioactive anomalies
8: no development
9: Cretaceous Dakota Sandstone
12: Santos (1975)

1: 20N.1E.6.300
2: Unknown
3: SW1/4 6 T20N R1E 35o59'10"N 106o52'35"W
4: San Pablo 7-1/2 (Los Alamos)
5: Nacimiento Mountains district
6: Cu, U
8: no production
9: Permian Abo Formatin
10: mineralized sandstone
12: Holen (1982); Green and others (1982b, #260); L. A. Woodward, Kaufman, and Reed (1973)

1: 20N.1W.24.324
2: Unknown
3: 24 T20N R1W
4: San Pablo 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: pit
8: no production
9: Precambrian quartz monzonite
12: L. A. Woodward, Anderson, Kaufman, and Read (1973)

1: 20N.1W.24.341
2: Unknown
3: 24 T20N R1W
4: San Pablo 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: pit
8: no production
9: Permian Abo Formation
12: L. A. Woodward, Anderson, Kaufman, and Read (1973)

1: 20N.2W.1.100
2: Unknown-Rio Puerco
3: NW1/4 1 T20N R2W
4: Mesa Portales 7-1/2 (Chaco Mesa)
5: Cuba area
6: U
7: no workings
8: no production
9: Eocene San Jose Formation-Yegua Canyon facies-Cuba Mesa sandstone
10: 0.003% U_3O_8 in sandstone (Chenoweth, 1957)
12: Green and others (1982b, 267); Chenoweth (1957, p. 16-17); Bachman and others (1953)

1: 20N.2E.7.211
2: Unknown
3: 7 T20N R2E
4: Rancho del Chaparral 7-1/2 Elevation 8,440 ft (Los Alamos)
5: Nacimiento Mountains
6: Cu
7: 3 pits
8: no production
9: Permian Abo Formation
10: mineralized sandstone
12: Hill (1980); L. A. Woodward, Kaufman, and Reed (1973); PRR ED-R-507 (1954)

1: 21N.1W.7.230
2: Unknown
3: NE1/4 SW1/4 7 T21N R1W
4: Cuba 7-1/2 (Abiquiu)
5: Nacimiento Mountains-Cuba area
6: U
7: no workings
8: no production
9: Eocene San Jose Formation-Yegua Canyon facies-Cuba Mesa sandstone
10: radioactive fossil wood in sandstone
12: Chenoweth (1957, p. 16-17)

1: 21N.1W.20.100
2: Unknown
3: NW1/4 20 T21N R1W
4: Cuba 7-1/2 (Abiquiu)
5: Nacimiento Mountains-Cuba area
6: U
7: no workings
8: no production
9: Eocene San Jose Formation-Yegua Canyon facies-Cuba Mesa sandstone
10: radioactive fossil wood in shale and siltstone, 0.002% U (Chenoweth, 1957)
12: Green and others (1982a, #64); L. A. Woodward and others (1972); Chenoweth (1957, p. 16-17); Hilpert and Corey (1955)

1: 21N.1W.35.431
2: Unknown
3: SE1/4 3 T21N R1W
4: Cuba 7-1/2 (Abiquiu)
5: Nacimiento district
6: Au, Ag
7: pit
8: no production
9: Cretaceous Dakota Sandstone
10: dump sample 2305 contained 0.005 oz/ton Au and 0.24 oz/ton Ag (Santos and others, 1975)
12: Santos and others (1975)

1: 22N.1W.1.134
2: Unknown (San Jose Creek claims)
3: W1/2 1 T22N R1W
4: Regina 7-1/2 Elevation 8,380 ft (Abiquiu)
5: Nacimiento Mountains
6: Cu
7: pits
8: no production
9: Permian Abo Formation
10: mineralized sandstone; sample #195 2,000 ppm Cu, #2316 tr Ag and 5,000 ppm Cu (Santos and others, 1975)
12: Merrick and Woodward (1982); Santos and others (1975)

1: 12N.5E.8.220
2: Victo-Roco-Novo Group
3: 8 T12N R5E 35°17'45"N 106°26'7"W
4: Placitas 7-1/2 (Albuquerque)
5: Placitas district
6: Cu, Pb, Zn, barite, fluorite
7: pits, trenches
8: no production
9: Pennsylvanian Madera Formation
10: numerous thin veins of copper, lead, and zinc; 0.2 oz/ton Ag, 0.21% Pb, 0.0006% Zn, 0.001% Cu, 52.51% $BaSO_4$, 10.99% CaF_2 (NMBMMR chem lab, 1984)
12: FN 12/14/83; McLemore and North (1984); Hedlund and others (1984); Kness (1982); V. C. Kelley and Northrop (1975); Mineral Survey No. 2203 (1956); MILS (1981)

1: 18N.4E.36.124
2: Washington
3: 36 T18N R4E 35°45'10"N 106°28'13"W
4: Bland 7-1/2 (Los Alamos)
5: Cochiti district
6: Au, Ag, Pb, Zn, Fe, Cu
7: 300 ft adit, 200 ft adit, 2-50 ft shafts
8: 1893 to 1902 produced $75,000
9: Tertiary Keres Group-monzonite
10: stockwork and veins along a curved fault
11: patented 1902; currently owned by Bland Mining Co.
12: Bundy (1954, 1958); Mineral Survey #1034; MILS (1978); CRIB (1983)

1: 17N.1W.26
2: J. Walker #1
3: 26 T17N R1W
4: Holy Ghost Springs 7-1/2 (Los Alamos)
5: Nacimiento Mountains
6: U
7: no workings
8: no production
9: Jurassic Morrison Formation-Brushy Basin member
10: mineralized sandstone
12: PRR ED-R-474 (1955); MILS (1984)

1: 13N.6E.4,5
2: We Hope #4 (MGM, Rabac)
3: 4, 5 T13N R6E 35°23'15"N 106°19'00"W
4: San Felipe Pueblo NE 7-1/2, San Felipe Pueblo 15' Elevation 5,700 ft (Albuquerque)
5: Hagan Basin area
6: U, Se, Mo, V
7: numerous drill holes, deposit defined by Union Carbide
8: no production
9: Eocene Galisteo Formation
10: two bleached channel sandstones with reported uraninite, coffinite, and uranophane
11: on the Blackshire Ranch
12: McLemore (1982, #50); Green and others (1982b, #15); J. C. Moore (1979); Chenoweth (1979); U.S. Atomic Energy Commission (1970, p. 125); Hilpert (1969, p. 48); MILS (1981)

1: 14N.6E.32
2: We(e) Hope, Rabac, DEC claims (North Blackshere Ranch)
3: 32 T14N R6E, 4, 5, 6 T13N R6E 35°23'00"N 106°19'00"W
4: San Felipe Pueblo NE 7-1/2, San Felipe Pueblo 15 Elevation 5,700 ft (Albuquerque)
5: Hagan Basin area
6: U, Se, Mo, V
7: numerous drill holes (170 ft deep), deposit defined by Union Carbide
8: no production
9: Eocene Galisteo Formation
10: two bleached channel sandstones with uraninite, and coffinite reported
11: Blackshire Ranch
12: FN 2/24/82; McLemore (1982, #49); Green and others (1982b, #14); J. C. Moore (1979); Chenoweth (1979); U.S. Atomic Energy Commission (1970, p. 125); Hilpert (1969, p. 48); PRR unnumbered (1958); MILS (1981)

1: 15N.1W.21.214
2: Yellow Cliffs Group
3: C NW1/4 NE1/4 21 T15N R1W 35°31'12"N 106°56'41"W
4: Ojito Spring 7-1/2 (Los Alamos)
6: U
7: drill holes(?)
8: no production
9: Jurassic Morrison Formation
10: mineralized sandstone
12: NMBMMR files (1979)

Occurrence no.	Name
9N.2E.28.434	Adobe Enterprises, Inc.
10N.2E.3.400	Frank Gutierrez
10N.2E.26.200	Manuel Ruiz
10N.2E.27	Western Adobe
11N.2E.24.120	Pete Garcia
11N.3E.5.340	Lawrence Tenorio
11N.3E.15.400	New Mexico Earth

Adobe - Sandoval County

Occurrence no.	Name
12N.2E.36.100	Big "M" Sand and Cinder
16N.6E.31.400	D. Sandoval/E. Trujillo

Clay - Bernalillo County

Occurrence no.	Name
8N.5E.2	Kinney Clay Pit
9N.6E.18,19	Hattie (Hawks B64-1)
10N.3E.29	New Mexico Clay Products Co. pit
10N.5E.22	Tijeras Mine
11N.2E.35.210	Hawks TDB-100
11N.3E.2	Pit #57-45-F
11N.5E.14.300	Hawks B65-2
11N.5E.24.114	Hawks B65-8
11N.6E.29	Hawks B65-4
11N.6E.29.300	Hawks B65-6

Clay - Sandoval County

Occurrence no.	Name
12N.4E.1.211	Hawks SD64-5, SD65-7
12N.4E.1.214	Hawks SD64-4
13N.5E.1.300	Hawks SD65-13
13N.5E.12.100	Hawks SD65-14
13N.5E.22.241	Hawks C-111
13N.5E.27.331	Hawks C-113 (C-112)
13N.6E.6.300	Hawks SD65-3
13N.6E.7.311	Hawks SD66-1 (SD65-4)
13N.6E.17.133	Hawks SD64-9
13N.6E.17.342	Hawks SD65-6
13N.6E.18.111	Tongue Clay Pit (Hawks SD64-3, SD66-3, SD66-2, NP-30)
14N.2E.32.200	Unknown
14N.3E.29	Vibro Block Co. Clay #101
15N.1E.22.300	Whale #1, Hawks SD64-12
15N.1E.26.140	Unknown
15N.1E.32.230	Unknown
15N.1E.32.230	Unknown
15N.2E.34.100	Hawks SD65-12
15N.3E.31,32	Unknown
15N.1W.27.210	Unknown
19N.1W.31.220	Location 7
19N.1W.31.240	Location 8

Occurrence no.	Name
9N.1W.1.333	Cerro Colorado-Archuleta (L. W. Claims, Junio, Rio Puerco Claims)
10N.4E	Unknown

Feldspar - Sandoval County

Occurrence no.	Name
12N.4E	Unknown
18N.4E.36	Unknown
18N.4E.36	Unknown
18N.4E.36	Unknown
19N.3E.32	Unknown
none	moonstone occurrence
none	anorthite occurrence

Gypsum - Bernalillo County

Occurrence no.	Name
11N.5E.36.300	Cañoncito deposit

Gypsum - Sandoval County

Occurrence no.	Name
13N.5E.1,2	San Felipe
13N.5E.1	Tongue Deposit
13N.5E.1.300	San Felipe Pit
14N.5E.35	Duke City Mine
15N.1E.14	White Mesa
15N.1E.16	Blue Sky
15N.1E.28	J and W
18N.1W.1.100	Gypsum #2
19N.1W.14,23	Gypsum #1
23N.1W.36.113	Frontier 1-5

Humate - Sandoval County

Occurrence no.	Name
14N.1E.3	World Humate
14N.1E.8	Tenorio
19N.1W.9.100	Clod Buster No. 1
19N.1W.16	San Ysidro No. 1
20N.1W.26.300	Alpha Mine of Natural Organic Humus, Inc.

Limestone - Bernalillo County

Occurrence no.	Name
8N.4E.12.100	NMSHP pit 0916
8N.6E	Wild Acres Pit
9N.5E	New Pueblo Limestone Quarry
9N.5E	Tijeras Lime Pit
9N.5E.1	Pit #73-16-5
9N.5E.2	Surface Pit #72-6-S
9N.5E.2	NMSHD pit 6330
10N.4E.14,23	NMSHD pit 5843
10N.5E.22,27	Tijeras
10N.5E.24.400	NMSHD pit 0693
10N.5E.34.400	NMSHD pit 5915
10N.6E.8	Materials Pit #65-56-S
10N.6E.8.124	NMSHD pit 5726
10N.6E.9.400	NMSHD pit 5809
10N.6E.10	Pit #65-55-S
10N.6E.10.400	NMSHD pit 6556
10N.6E.16	Limestone Quarry
10N.6E.36.300	NMSHD pit 0691
11N.5E.3.300	Unknown
11N.5E.6	NMSHD pit 6124, La Luz Mine(?)
11N.5E.15	NMSHD pit 58129
11N.5E.34.100	Unknown
11N.5E.36.300	NMSHD pit 0698
11N.6E.34.200	NMSHD pit 6245

Material Pits - Bernalillo County

Occurrence no.	Name
8N.2E.11.100	NMSHD pit 6741
8N.2E.15	Parea Mesa Pit
8N.2E.23	Unknown
8N.3E.5	State Pit
8N.3E.9.140	Unknown
8N.3E.16.113	Unknown
8N.3E.21.111	Unknown
8N.4E.17	Materials Pit #56-115-5
8N.5E	Blackbird no. 202
9N.2E.3	Riverside Construction Co. Pit
9N.2E.3	Sena Pit
9N.2E.4	NMSHD pit 6061
9N.2E.10	NMSHD pit 6023
9N.2E.10.100	pit 5433 (Star Pit)
9N.2E.16.100	Unknown
9N.2E.26	Unknown
9N.2E.28	McElroy Pit
9N.2E.33	NMSHD pit 6739
9N.3E.2	Unknown
9N.3E.4	Unknown
9N.3E.4.100	NMSHD pit 602
9N.3E.4.341	NMSHD pit 603
9N.3E.9	Unknown
9N.3E.10.412	Unknown
9N.3E.15	Unknown
9N.3E.17	Unknown
9N.3E.22	Unknown
9N.3E.32.400	NMSHD pit 0915
9N.5E.2	Lowder Milk Pit
9N.5E.7.212	NMSHD pit 0694
9N.5E.10	Unknown
9N.1W	NMSHD pit 5389
9N.1W.1.200	NMSHD pit 5514
9N.1W.3	Unknown
9N.1W.3.400	NMSHD pit 5387
9N.1W.4.200	NMSHD pit 5537
9N.1W.4.400	NMSHD pit 5512
9N.1W.10	NMSHD pit 546
9N.1W.10.100	NMSHD pit 5538
9N.1W.11	NMSHD pit 53127
9N.1W.11	Unknown
9N.1W.11.200	NMSHD pit 5513
9N.1W.32.200	NMSHD pit 5511
10N.2E.3	Westland
10N.2E.24	Unknown
10N.2E.24	NMSHD pit 5077
10N.2E.34	Saavedra Pit
10N.2E.34	Schulte and Lindsay Pit
10N.2E.34.442	NMSHD pit 5510 (Ben's Pit)
10N.2E.35	Efren and Sons Pit
10N.3E	Ambrell Pit
10N.3E	Douglas Pit
10N.3E	Isleta
10N.3E	Martin Pit
10N.3E	Unknown
10N.3E.4	Carmany Road Pit
10N.3E.4	Montgomery Pit
10N.3E.4	NMSHD pit 6060
10N.3E.9,16	NMSHD pit 6075
10N.3E.14.300	NMSHD pit 5487
10N.3E.28	Unknown
10N.3E.32	Unknown
10N.3E.32	Unknown

Material Pits of Bernalillo County (cont'd)

Occurrence no.	Name
10N.3E.33	Shakespeare Pit
10N.4E	Osuna
10N.4E.4	Materials Pit #58-127-S
10N.4E.12.400	NMSHD pit 0697
10N.4E.22.100	Unknown
10N.4E.25	Farrington Pit
10N.4E.27.400	NMSHD pit 5493
10N.4E.27.400	NMSHD pit 5725
10N.4E.31	Scott Pit
10N.4E.33	Unknown
10N.5E.29.200	NMSHD pit 0695
10N.5E.32	Unknown
10N.5E.34	Unknown
10N.6E.11	Unknown
10N.6E.12	Unknown
10N.6E.15	Unknown
10N.1W.14	Unknown
10N.1W.16	Unknown
10N.1W.30	Unknown
10N.1W.35	Unknown
11N.2E.14.342	NMSHD pit 5490
11N.2E.27.412	NMSHD pit 5489
11N.3E	Saco C-30
11N.3E.1	A. F. Cole Pit
11N.3E.1	Johnson Pit
11N.3E.1	Morris Pit
11N.3E.1	New Sedillo Pit
11N.3E.1	North Edith Pit
11N.3E.2	Springer Pit
11N.3E.2.342	NMSHD pit 5410
11N.3E.5.400	Unknown
11N.3E.11	Wylie Pit
11N.3E.11.400	Unknown
11N.3E.12.300	NMSHD pit 4876
11N.3E.12.400	NMSHD pit 5495
11N.3E.12.400	NMSHD pit 5696
11N.3E.14.200	NMSHD pit 5488
11N.3E.15.400	Unknown
11N.3E.22	Unknown
11N.3E.26	NMSHD pit 5492
11N.3E.34.321	Albuquerque Gravel Products Co. Pit
11N.4E.1	Unknown
11N.4E.2.100,300	NMSHD pit 0699
11N.5E.10	Unknown
11N.6E.23	Unknown
11N.6E.29	Unknown

Material Pits of Sandoval County

Occurrence no.	Name
12N.2E.11	Unknown
12N.2E.22	Gravel Pit
12N.2E.25	Gravel Pit
12N.2E.34	Gravel Pit
12N.3E.1.240	NMSHD pit 6716
12N.3E.4.240	NMSHD pit 696
12N.3E.14.130	Pit #76-17-S
12N.3E.36	Gravel Pit
12N.3E.36	NMSHD pit 6062
12N.4E.1.142	NMSHD pit 0702
12N.4E.12.230	NMSHD pit 0701
12N.4E.12.340	NMSHD pit 0700
12N.4E.18.210	NMSHD pit 5413
12N.4E.18.230	NMSHD pit 5691
12N.6E.23	NMSHD pit 5877
12N.6E.34.311	Gravel Pit
13N.1E.23.210	Unknown
13N.3E.36	NMSHD pit 6649
13N.4E.5	Gravel Pit
13N.4E.13.430	NMSHD pit 0703
13N.4E.13.410	NMSHD pit 0704
13N.4E.15.342	NMSHD pit 5692
13N.4E.18	Gravel pit
13N.4E.19	Coronado Pit
13N.4E.28	North Pit
13N.4E.30.320	NMSHD pit 6148
13N.4E.34	Montoya Pit
13N.4E.35	Unknown
13N.5E.4	Unknown
13N.5E.7	Unknown
14N.2E.2	Gravel Pit
14N.3E.19.114	Gravel Pit
14N.3E.21	Gravel Pit
14N.4E.15.420	NMSHD pit 0673
14N.5E.9.420	NMSHD pit 0674
14N.5E.10.430	NMSHD pit 0675
14N.5E.11	Pit #78-1-S
14N.5E.15.430	NMSHD pit 0676
14N.5E.27.230	NMSHD pit 0680
14N.5E.27.330	NMSHD pit 0615
14N.5E.28	Pit #67-37-S

Material Pits - Sandoval County (cont'd)

Occurrence no.	Name
14N.6E.24.330	NMSHD pit 0679
15N.1E.17	Pit #76-18-S
15N.2E.17.300	NMSHD pit 7110
15N.2E.29.440	NMSHD pit 749
15N.6E.13.121	Unknown
15N.6E.29	Pit #76-9-S
15N.6E.29.330	NMSHD pit 6617
15N.6E.36	Gravel Pit
15N.6E.36.230	NMSHD pit 0677
16N.1E.5.220	NMSHD pit 601
16N.1E.6.334	Pit
16N.2E.11.340	NMSHD pit 5753
16N.2E.14.220	NMSHD pit 5951
16N.2E.21.410	NMSHD pit 7511
16N.2E.28.240	NMSHD pit 5543
16N.2E.28.320	Pit #75-10-S
16N.2E.28.410	San Ysidro Pit
16N.2E.32.124	NMSHD pit 605
16N.2E.32.140	NMSHD pit 6016
16N.2E.32.142	NMSHD pit 6017
16N.2E.33.140	Gravel Pit
16N.5E.24.212	Unknown
16N.5E.24.112	Unknown
16N.6E.4.240	Atkinson Co. Quarry
16N.6E.19.322	Unknown
16N.6E.20.434	NMSHD pit 609
16N.6E.30.311	Unknown
16N.6E.32.140	Gravel pit
16N.6E.32.230	Gravel pit
16N.6E.34.320	Pit #77-1-S
16N.1W.25.424	NMSHD pit 636
17N.2E.10	NMSHD pit 6042
17N.2E.22	Walsh Pit
17N.4E.26.130	NMSHD pit 9739
17N.4E.34.110	NMSHD pit 0737
17N.4E.35.320	NMSHD pit 738
17N.5E.26.240	Two Gravel Pits
17N.1W.13	Unknown
17N.1W.28	NMSHD pit 5316
17N.1W.36	Pit #80-5-S
18N.3E.6	Gravel Pit
18N.4E.3.424	NMSHD pit 735
18N.4E.9.130	NMSHD pit 744
18N.5E.34.140	NMSHD pit 736
18N.1W.14	Unknown
18N.1W.20	NMSHD pit 6543
18N.1W.23.100	Pit
18N.1W.35	NMSHD pit 6329
19N.3E.20.140	NMSHD pit 6456
19N.3E.23.332	Gravel Pit
19N.4E.10	Materials Pit
19N.4E.10.313	NMSHD pit 733
19N.4E.34.442	NMSHD pit 734
19N.5E.26.114	Unknown
19N.1W.4	Gravel Pit
19N.1W.22.200	Pit #61-34-S
19N.1W.29.130	NMSHD pit 53121
20N.1W.6.330	NMSHD pit 606
20N.1W.7.113	Gravel Pit
20N.1W.18.121	Gravel Pit
20N.1W.18.131	Gravel Pit
20N.1W.21.431	Gravel Pit
20N.1W.31.144	NMSHD pit 5422
20N.1W.31.431	Gravel Pit
20N.2W.1	Pit #78-2-S
20N.2W.12.242	Unknown
20N.2W.13.244	Unknown
20N.2W.13.420	NMSHD pit 6219
21N.1W.5	Gravel Pit
21N.1W.7.220	Gravel Pit
21N.1W.8.240	NMSHD pit 5845
21N.1W.8.330	NMSHD pit 6634
21N.1W.29	Cuba Pit
21N.1W.30	Gravel Pit Group
21N.1W.30.330	NMSHD pit 6133
21N.1W.30.410	NMSHD pit 6631
21N.1W.34.313	Sand Pit
21N.1W.34.314	Sand Pit
21N.1W.35	Eureka Mesa Quarry
21N.2W.8	Gravel Pit
21N.5W.31.200	NMSHD pit 876
22N.1W.18	Pit #79-5-S
22N.1W.18.342	NMSHD pit 5874
22N.1W.21	Pit #78-17-S

Material Pits - Sandoval County (cont'd)

Occurrence no.	Name
22N.3W.19	Gravel Pit
22N.4W.6	Borrow Pit
22N.5W.1	Borrow Pits (2)
22N.5W.2	Borrow Pit
23N.1W.28.431	Gravel Pit
23N.1W.33.143	NMSHD pit 5883
23N.1W.33.313	NMSHD pit 5875
23N.4W.16	Borrow Pit
23N.4W.28	Borrow Pit
23N.5W.26.300	NMSHD pit 875
23N.5W.33	Borrow Pits (2)
23N.5W.34	Borrow Pit
23N.5W.35	Borrow Pit
23N.6W.22	Pit #78-20-S
23N.6W.24	Pit #79-3-S
15N.7E.20.100	NMSHD pit 744
16N.7E.18.100	prospect pit 740
16N.7E.28	NMSHD pit 741
16N.8E.32.300	NMSHD pit 742

Material Pits - Santa Fe County

Occurrence no.	Name
15N.7E.7.100	NMSHD pit 743

Mica - Bernalillo County

Occurrence no.	Name
10N.5E.20.300	Unknown

Mica - Sandoval County

Occurrence no.	Name
17N.2E	Unknown

Miscellaneous deposits - Bernalillo County

Occurrence no.	Name
8N.3E	Unknown
8N.5E.16.100	Isleta Quartz Mine
9N.4-1/2E.12.200	Great Combination
10N.5E.16.442	Ross Pit
11N.3E.25	Unknown
11N.4E.3	Quartz Mine #2
11N.4E.5	Quartz Mine #1

Miscellaneous deposits - Sandoval County

Occurrence no.	Name
14N.3E.21,22	Unknown
16N.6E.8	Unknown
19N.3E.32	Unknown
23N.7W.33.444	Unknown

Perlite - Sandoval County

Occurrence no.	Name
17N.4E.29,32	Unknown
17N.5E.19.200	Peralta Canyon deposit
17N.5E.25.331	Bland Canyon deposit
17N.5E.29	Peralta Canyon deposit
17N.5E.30.130	Peralta Canyon deposit

Pumice - Sandoval County

Occurrence no.	Name
15N.1E.13	Jonas Pumice and Gypsum
15N.4E.27	Volcalite Mine
16N.4E.2.142	Pumice Group
16N.4E.2.144	Pumice Mine
16N.4E.11.122	Pumice Mine
16N.4E.11.123	Pumice Mine
16N.4E.11.142	Pumice Group
17N.2E.3	Pyramid Pumice
17N.3E.9	Strip Mine
17N.3E.9.422	Strip Mine
17N.3E.10.112	Strip Mine
17N.3E.15.211	Strip Mine
17N.4E.35.232	Pumice Mine
17N.5E.10.241	Pumice
17N.5E.10.424	Pumice
17N.5E.11.333	Pumice Mine
17N.5E.11.341	Pumice Mine
17N.5E.14.141	Pumice Group
17N.5E.14.311	Pumice Mine
17N.5E.15.421	Santa Barbara Group
17N.5E.28	Otto Pit
17N.5E.28.442	Pumice Mine
18N.3E.34	Esquire Claims 5-9
18N.4E.13.223	Valle Grande Pumice Mine

Scoria - Bernalillo County

Occurrence no.	Name
8N.1E.18.200	NMSHD pit 914
8N.1E.18.240	Black Bird
8N.1E.20	Quarry
8N.2E.20	Edgar D. Otto Mine
8N.5E.6	Quail Lode

Sulfur - Sandoval County

Occurrence no.	Name
19N.3E.4	Sulfur Springs (Sulfur Bank Group)
19N.3E.28	San Diego sulfur deposits

Travertine - Sandoval County

Occurrence no.	Name
15N.1E.16,21	Unknown
16N.1E.18	Unknown
16N.1E.24,25,36	Unknown

Adobe in Bernalillo County

1: 9N.2E.28.434
2: Adobe Enterprises, Inc.
3: SE1/4 28 T9N R2E
4: Isleta 7-1/2 (Belen)
6: adobe bricks
7: operating; 6000 Powers Way, SW, Albuquerque, NM
8: 500,000 bricks/yr
12: E. W. Smith (1982a,b)

1: 10N.2E.3.400
2: Frank Gutierrez
3: SE1/4 3 T10N R2E
4: Albuquerque West (Albuquerque)
6: adobe bricks
7: active mine and processing plant
8: 20,000 bricks/yr
11: west side of Albuquerque
12: E. W. Smith (1981, 1982a, b)

1: 10N.2E.26.200
2: Manuel Ruiz
3: SE1/4 23, NE1/4 26 T10N R2E
4: Albuquerque West 7-1/2 (Albuquerque)
6: adobe bricks
7: active mine and processing plant
8: 175,000 bricks/yr
11: Albuquerque, NM
12: E. W. Smith (1981, 1982a, b)

1: 10N.2E.27
2: Western Adobe
3: 27 T10N R2E
4: Albuquerque West 7-1/2 (Albuquerque)
6: adobe bricks
7: active mine and processing plant; 7800 Tower Rd., SW, Albuquerque, NM
8: 250,000 bricks/yr
12: E. W. Smith (1982a, b)

1: 11N.2E.24.120
2: Pete Garcia
3: NW1/4, NE1/4 24 T11N R2E
4: Los Griegos 7-1/2 (Albuquerque)
6: adobe bricks
7: active mine and processing plant
8: 45,000 bricks/yr
11: near Paradise Hills
12: E. W. Smith (1981, 1982a, b)

1: 11N.3E.5.340
2: Lawrence Tenorio
3: SE1/4 SW1/4 and SW1/4 SE1/4 5 T11N R3E
4: Los Griegos 7-1/2 (Albuquerque)
6: adobe bricks
7: active mine and processing facility
8: 10,000 bricks/yr
11: Alameda
12: E. W. Smith (1981, 1982a, b)

1: 11N.3E.15.400
2: New Mexico Earth
3: SW1/4 14, SE1/4 15, NE1/4 22, T11N R3E
4: Alameda 7-1/2 (Albuquerque)
6: adobe bricks
7: active mine and processing plant
8: 700,000 bricks/yr
11: Alameda, NM, corner of Edith and Pueblo Roads
12: E. W. Smith (1981, 1982a, b)

Adobe in Sandoval County

1: 16N.6E.31.400
2: D. Sandoval/E. Trujillo
3: SE1/4 31, SW1/4 32 T16N R6E
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
6: adobe bricks
7: active mine with hand processing equipment
8: 2,000 bricks/yr
11: Peña Blanca, NM
12: E. W. Smith (1981, 1982a, b)

1: 12N.2E.36.100
2: Big "M" Sand & Cinder
3: NW1/4 36 T12N R2E
4: Alameda 7-1/2 (Albuquerque)
6: adobe bricks
7: active mine and processing facility
8: 9,000 bricks/yr
11: across river from Corrales
12: E. W. Smith (1981, 1982a, b)

1: 8N.5E.2
2: Kinney Clay Pit
3: 2 T8N R5E 34°56'54"N 106°23'7"W
4: Mount Washington 7-1/2 (Belen)
6: clay
8: production unknown
12: MILS (1981)

1: 9N.6E.18,19
2: Hattie (Hawks B64-1)
3: 18 and 19 T9N R6E 35°00'4"N 106°20'14"W
4: Sedillo 7-1/2 (Albuquerque)
5: Tijeras Canyon, 8.5 miles south of Tijeras
6: clay
7: open pit
8: 80 tons per day in 1984-active
9: Pennsylvanian Pine Shadow Member of Wild Cow Formation (Madera Group)
11: This clay is being mined by the Kinney Brick Company for the manufacture of common and face brick.
12: Barker and others (1984); W. T. Siemers and Austin (1979); Hawks (1970)

1: 10N.3E.29
2: New Mexico Clay Products Co. pit
3: 29 T10N R3E
4: Albuquerque West 7-1/2 (Albuquerque)
6: common clay
7: open pit
8: production unknown
9: Holocene floodplain clays
12: Talmage and Wootton (1937)

1: 10N.5E.22
2: Tijeras Mine
3: 22 T10N R5E 35°4'18"N 106°23'50"W
4: Tijeras 7-1/2 (Albuquerque)
6: clay
7: open pit
8: production unknown
9: Pennsylvanian Wild Cow Formation (Madera Group)
12: V. C. Kelley and Northrop (1975); MILS (1981); CRIB (1982)

1: 11N.2E.35.210
2: Hawks TDB-100
3: W1/2 NE1/4 and E1/2 NW1/4 35 T11N R2E
4: Los Griegos 7-1/2 (Albuquerque)
6: clay
7: open pit
8: production unknown
10: bedded clay 5.5 ft thick
11: was used in red common brick and tile manufacture; burns red in brick kiln; contains traces of limestone.
12: Hawks (1970); T. D. Benjovsky (unpublished report, 1946)

1: 11N.3E.2
2: Pit #57-45-F
3: 2 T11N R3E 35°12'27"N 106°35'25"W
4: Alameda 7-1/2 (Albuquerque)
6: common clay
8: production unknown
12: MILS (1981)

1: 11N.5E.14.300
2: Hawks B65-2
3: SW1/4 14 T11N R5E
4: Sandia Crest 7-1/2 (Albuquerque)
5: 1 mile northwest of Sandia Park
6: clay
7: sample location, no development
8: no production
9: Pennsylvanian Sandia Formation
10: sample taken from a roadcut east of State Highway 44
11: The clay develops a good brick-red color and could be used in structural clay products
12: Hawks (1970)

1: 11N.5E.24.114
2: Hawks B65-8
3: NW1/4 24 T11N R5E
4: Sandia Park 7-1/2 (Albuquerque)
5: 0.2 miles west of Sandia Park
6: clay
7: sample location, no development
8: no production
9: Permian Abo Formation
10: sample taken from roadcut north of State Highway 44
11: Sample B65-8 was the only specimen of Abo shale in the Sandia Park area that did not show lime-popping in the fired bars. Sample also had good fired colors and would be suitable for structural clay products.
12: Hawks (1970)

1: 11N.6E.29
2: Hawks B65-4
3: C 29 T11N R6E
4: Sandia Park 7-1/2 (Albuquerque)
5: taken near center of section
6: clay
7: sample location, no developement
8: no production
9: Cretaceous Mancos Shale
10: samples from Gutierrez Canyon area
11: The bars fired at 1,800`F and 1,900`F were badly cracked and had black cores, indicating a high carbon content and low fusion. Further testing might prove it useful as a lightweight aggregate.
12: Hawks (1970)

1: 11N.6E.29.300
2: Hawks B65-6
3: SW1/4 29 T11N R6E
4: Sandia Park 7-1/2 (Albuquerque)
5: 1,000 ft south of sample Hawks B65-4
6: clay
7: sample location, no development
8: no production
9: Cretaceous Mancos Shale
10: samples from Gutierrez Canyon area
11: The sample had a high sand content that produced rather low modules of rupture readings. If blended with a fatter clay, this material might be used in clay products.
12: Hawks (1970)

1: 12N.4E.1.211
2: Hawks SD64-5, SD65-7
3: NE1/4 1 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
5: 2.5 miles west of Placitas
6: clay
7: sample locations
8: no production
9: Mancos Shale Cretaceous
10: Sample was the greenish-gray shale in the roadcut on the north side of State Highway 44
11: The dry and fired physical properties of these two samples were quite similar except for color. The buff colors developed by sample SD65-7 would produce premium-grade face brick.
12: Hawks (1970)

1: 12N.4E.1.214
2: Hawks SD64-4
3: NE1/4 1 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
6: clay
7: sample location, no development
8: no production
9: Jurassic Morrison Formation
10: red mudstone taken from the southwall of a small west-flowing arroyo
11: The lime pops at 1,800`F were eliminated by firing to 2,000`F. The interesting colors of the 2,100`F bars might be used to develop a broad range of colors in face brick.
12: Hawks (1970)

1: 13N.5E.1.300
2: Hawks SD65-13
3: SW1/4 1 T13N R5E
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: 3.5 miles east of U.S. Highway 85
6: clay
7: sample location
8: no production
9: Triassic Chinle Formation
10: Sample represents the top of Chinle exposed on the east side of Arroyo Tongue.
11: The low shrinkage and high absorption indicate high sand content. This material might be used to control the shrinkage in structural clay products.
12: Hawks (1970)

1: 13N.5E.12.100
2: Hawks SD65-14
3: NW1/4 12 T13N R5E
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: 0.5 miles south of Hawks SD65-13
6: clay
7: sample location, no development
8: no production
9: Quaternary alluvium
10: Sample is alluvium on the west side of Arroyo Tongue. The red color suggests that the alluvium is mostly weathered Triassic Chinle shale.
11: The bars fired to the best brick-red colors of any of the clays in the area.
12: Hawks (1970)

1: 13N.5E.22.241
2: Hawks C-111
3: NE1/4 22 T13N R5E
4: Placitas 7-1/2 (Albuquerque)
5: 3 miles north-northeast of Placitas
6: clay
7: sample location, no development
8: no production
9: Cretaceous Mesaverde Formation
10: A 7-ft cut was made perpendicular to the bedding at the collar of an inclined prospect shaft. This is a tan and gray shale.
11: It is rather sandy and contains a few nodules of limestone.
12: Hawks (1970)

1: 13N.5E.27.331
2: Hawks C-113 (C-112)
3: SW1/4 27 T13N R5E
4: Placitas 7-1/2 (Albuquerque)
5: taken near an abandoned coal mine 1 mile north of Placitas
6: clay
7: sample location, no development
8: no production
9: Cretaceous Mesaverde Formation
10: Sample was a light-gray clay from above the coal seam in the mine. The beds from which C-113 and C-112 were cut strike N80`W and dip 70`N.
11: It was thought that this material might be a fire clay.
12: Hawks (1970)

1: 13N.6E.6.300
2: Hawks SD65-3
3: SW1/4 6 T13N R6E
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: 1.6 miles north of Tongue clay pit
6: clay
7: sample location, no development
8: no production
9: Cretaceous Mancos shale
10: samples taken from Tongue area
11: The high sand content results in a rather high absorption. Its physical properties are similar to those of the Tongue pit clays, but it contains less lime. This material could be used for shrinkage control when blended with more plastics clays.
12: Hawks (1970)

1: 13N.6E.7.311
2: Hawks SD66-1 (SD65-4)
3: SW1/4 7 T13N R6E
4: Hagan 7-1/2 (Albuquerque)
5: 0.5 miles north of Tongue clay pit
6: clay
7: sample location, no development
8: no production
9: Cretaceous Mancos shale
10: samples taken from Tongue area
11: The fired bars appear to contain a considerable number of lime particles, but have developed enough strength to keep lime popping to a minimum. This clay would be usable in most heavy clay products.
12: Hawks (1970)

1: 13N.6E.17.133
2: Hawks SD64-9
3: 17 T13N R6E
4: Hagan 7-1/2 (Albuquerque)
5: 1,000 ft west of Coyote coal mine
6: clay
7: sample location
8: no production
9: Cretaceous Mesaverde Group
10: grab sample of a gray shale
11: No test bars were made of this sample. The pyrometric cone equivalent (PCE) was cone 15-16, spotted medium gray.
12: Hawks (1970)

1: 13N.6E.17.342
2: Hawks SD65-6
3: SW1/4 17 T13N R6E
4: Hagan 7-1/2 (Albuquerque)
5: 2,000 ft southeast of Coyote coal mine
6: clay
7: sample location, no development
8: no production
9: Cretaceous Mesaverde Formation
10: clay samples from Coyote area
11: The bars dried satisfactorily but cracked when fired to 1,800`F. Firing to 1,900`F developed enough strength to stop the cracking. This clay could be used for structural and pipe products.
12: Hawks (1970)

1: 13N.6E.18.111
2: Tongue Clay Pit (Hawks SD64-3, SD66-3, SD66-2, NP-30)
3: NW1/4 18 T13N R6E 35`21'43"N 106`21'14"W
4: Hagan 7-1/2 (Albuquerque)
6: clay
7: open pit
8: production unknown, mined for adjacent Albuquerque Brick and Tile Company from the early 1930's to 1944.
9: Cretaceous Mancos Shale
11: different samples from this pit show different properties (Hawks, 1970)
12: V. C. Kelley and Northrop (1975, p. 110); Hawks (1970, p. 15); Reynolds (1954, p. 71); MILS (1981)

1: 14N.2E.32.200
2: Unknown
3: 32 T14N R2E
4: Bernalillo NW 7-1/2 (Albuquerque)
6: clay
12: NMBMMR files

1: 14N.3E.29
2: Vibro Block Co. Clay #101
3: SW1/4 and SE1/4 29 T14N R3E
4: Santa Ana Pueblo 7-1/2 (Albuquerque)
5: 2 mi WSW of Santa Ana Pueblo
6: clay
7: pit
12: Hawks (1970); T. D. Benjovsky (unpublished report, 12/46)

1: 15N.1E.22.300
2: Whale #1, Hawks SD64-12
3: SW1/4 22 T15N R1E
4: San Ysidro 7-1/2 (Los Alamos)
5: 4.5 miles southwest of San Ysidro
6: semi-flint fireclay
7: prospect pit
8: no production
9: Jurassic Morrison Formation
10: Sample was a gray shale from a prospect pit on Gossett claim.
11: The clay could be classified as a "semi-flint" fire clay and would be suitable for the manufacture of high-duty fire brick. The cracking that occurs during firing could be eliminated by the addition of calcined fire clay. This clay could also be used to produce premium-grade, buff-colored face brick.
12: Hawks (1970)

1: 15N.1E.26.140
2: Unknown
3: 26 T15N R1E
4: San Ysidro 7-1/2 (Los Alamos)
6: clay
7: pit
8: no production
9: Cretaceous Mancos Shale-Clay Mesa Shale Tongue
11: Russell (1979) determined from structural and chemical tests that clays were marginal for lightweight aggregate and have no economic potential for ceramic or refractory uses.
12: Russell (1979)

1: 15N.1E.32.230
2: Unknown
3: 32 T15N R1E
4: Sky Village NE 7-1/2 (Albuquerque)
6: clay
7: no development
8: no production
9: Cretaceous Dakota Sandstone-Oak Canyon Member
10: thin bentonite beds
11: Russell (1979) determined from structural and chemical tests that clays were marginal for lightweight aggregate and too soft for structural products and have no economic potential for ceramic or refractory uses.
12: Russell (1979)

1: 15N.1E.32.230
2: Unknown
3: 32 T15N R1E
4: Sky Village NE 7-1/2 (Albuquerque)
6: clay
7: no development
8: no production
9: Cretaceous Mancos Shale-Clay Mesa Shale Tongue
11: probably no economic potential
12: Russell (1979)

1: 15N.1W.27.210
2: Unknown
3: 27 T15N R1W
4: Sky Village NW 7-1/2 (Los Alamos)
6: clay-bensonite and kaolinite beds
7: no development
8: no production
9: Cretaceous Dakota Sandstone-Oak Canyon Member
10: Russell (1979) determined from structural and chemical tests that clays were marginal for lightweight aggregate and too soft for structural products and have no economic potential for ceramic or refractory uses.
12: Russell (1979)

1: 15N.2E.34.100
2: Hawks SD65-12
3: NW1/4 34 T15N R2E
4: Bernalillo NW 7-1/2 (Albuquerque)
5: 6.5 miles west of San Ysidro
6: clay
7: sample location, no development
8: no production
9: Triassic Chinle Formation
11: The high lime content and the bloating at 2,000°F make it unsuitable for structural clay products. Further testing might prove this clay could be used as a lightweight aggregate.
12: Hawks (1970)

1: 15N.3E.31,32
2: Unknown
3: 30, 31 T15N R3E
4: Santa Ana Pueblo 7-1/2 (Albuquerque)
5: just south of Santa Ana Pueblo
6: montmorillonite
7: prospect
12: Elston (1967)

1: 19N.1W.31.220
2: Location 7
3: NE1/4 NE1/4 31 T19N R1W
4: La Ventana 7-1/2 (Los Alamos)
6: clay
7: prospect pit
9: Upper Cretaceous Mesaverde Group
10: 6 ft of gray to pale yellow brown shales
11: PCE = 17, could be used for low duty fire-brick manufacture
12: J. van Sandt (unpublished report, 1964)

1: 19N.1W.31.240
2: Location 8
3: SE1/4 NE1/4 31 T19N R1W
4: La Ventana 7-1/2 (Los Alamos)
6: clay
7: prospect pit
9: Upper Cretaceous Mesaverde Group
10: 5 ft shale between two thin coal beds
11: could be used as brick when fired at 1,900°F
12: J. van Sandt (unpublished report, 1964)

Feldspar in Bernalillo County

1: 9N.1W.1.333
2: Cerro Colorado-Archuleta (L. W. claims, Junio, Rio Puerco claims)
3: SW1/4 SW1/4 SW1/4 1 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque) Elevation 5,630 ft
5: Albuquerque Basin-Rio Puerco area
6: orthoclase
7: pits
8: no production
9: Tertiary rhyolite (trachyte plugs intruding Tertiary volcanic sequence)
10: white, gray, pink, red; as crystals about 1 in. long
11: Town of Atrisco Grant
12: Northrop (1959); H. E. Wright (1943)

1: 10N.4E
2: Unknown
3: T10N R4E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: orthoclase
8: no production
10: white, gray, pink, red; as crystals about 1 in. long in granite and gneiss. Crystals occur up to 3 in. long.
11: several localities between Placitas and Tijeras Canyon districts--not plotted
12: Northrop (1959)

Feldspar in Sandoval County

1: 12N.4E
2: Unknown
3: T12N R4E
4: Sandia Crest 7-1/2 (Albuquerque)
5: Placitas district
6: orthoclase
8: no production
10: phenocrysts up to 10 mm long in metomorphic and igneous rocks
11: in Juan Tabo area--not plotted
12: Northrop (1959); Hayes (1951)

1: 18N.4E.36
2: Unknown
3: 36 T18N R4E
4: Cañada 7-1/2 (Los Alamos)
5: Cochiti district
6: moonstone
8: occurrence only
10: in obsidian cobbles of San Antonio Creek, in Valle Grande, intergrowths of orthoclase and cristobalite, in perlite, in Jemez region
11: location unknown--center of Cochiti district
12: Boyer and Robinson (1956); Northrop (1959); Mills (1952)

6: moonstone
8: occurrence only
10: widespread over entire Jemez Plateau
11: location unknown--not plotted
12: Northrop (1959)

1: 18N.4E.36
2: Unknown
3: 36 T18N R4E
4: Cañada 7-1/2 (Los Alamos)
5: Cochiti district
6: orthoclase
8: production unknown
10: in perlite; in several rocks of the Jemez region. In obsidian cobbles of San Antonio Creek, in the Valle Grande; intergrowths of orthoclase and cristobalite (Boyer and Robinson, 1956)
11: location unknown--center of Cochiti district
12: Northrop (1959); Boyer and Robinson (1956)

5: White Rock Canyon of the Rio Grande
6: anorthite
10: in basalt
11: location unknown--not plotted
12: Northrop (1959)

1: 19N.3E.32
2: Unknown
3: 32 T19N R3E
4: Jemez Springs 7-1/2 (Los Alamos)
5: Cochiti and Jemez Sulfur districts
6: wood-opal
8: production unknown
10: in Jemez Sulfur district; in volcanic tuff near Battleship Rock; white, gray, green, and other colors
11: location unknown
12: Northrop (1959)

1: 18N.4E.36
2: Unknown
3: 36 T18N R4E
4: Cañada 7-1/2 (Los Alamos)
5: Cochiti district
6: opals, mostly wood, occasionally a precious one
8: production unknown
10: opals occur in a matrix of hydrated quartz over an area 8 miles long and 2 miles wide from the north bank of Colla to Bear Canyon
11: location unknown--center of Cochiti district
12: Northrop (1959)

1: 11N.5E.36.300
2: Cañoncito deposit
3: SW1/4 36 T11N R5E
4: Sandia Park 7-1/2 (Albuquerque)
6: gypsum
7: was mined in early 1960's by Ideal Cement Company as feedstock from a local lens at steeply-dipping Todilto gypsum
9: Jurassic Todilto Formation
12: MILS (1981); Weber and Kottlowski (1959); V. C. Kelley and Northrop (1975)

1: 13N.5E.1,2
2: San Felipe
3: 1 and 2 T13N R5E
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
5: Placitas district
6: gypsum
8: 25,000 tons per year in 1984-active
9: Jurassic Todilto Formation
11: Ernest Teeter Trucking
12: Barker and others (1984); W. T. Siemers and Austin (1979); V. C. Kelley and Northrop (1975, p. 108)

1: 13N.5E.1
2: Tongue Deposit
3: 1 T13N R5E
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
6: gypsum
8: production unknown
9: Jurassic Todilto Formation
12: Weber and Kottlowski (1959)

1: 13N.5E.1.300
2: San Felipe Pit
3: SW1/4 1 T13N R5E 35`23'7"N 106`22'9"
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
6: gypsum
8: production unknown
9: Jurassic Todilto Formation
12: V. C. Kelley and Northrop (1975); Weber (1965a); Elston (1967)

1: 14N.5E.35
2: Duke City Mine
3: 35 T14N R5E 35`23'36"N 106`22'26"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
6: gypsum
8: production unknown
9: Jurassic Todilto Formation
12: Logsdon (1982b); MILS (1978)

1: 15N.1E.14
2: White Mesa
3: 14 T15N R1E 35`32'5"N 106`47'55"W
4: San Ysidro 7-1/2 (Los Alamos)
6: gypsum
7: open pit
8: 180,000 tons per year in 1984-active
9: Jurassic Todilto Formation
10: Pomeroy, Inc.
12: Barker and others (1984); W. T. Siemers and Austin (1979); MILS (1981)

1: 15N.1E.16
2: Blue Sky
3: 16 T15N R1E 35`31'42"N 106`50'31"W
4: San Ysidro 7-1/2 (Los Alamos)
6: gypsum
8: production unknown
9: Jurassic Todilto Formation
12: Logsdon (1982b); MILS (1981)

1: 15N.1E.28
2: G and W
3: 28 T15N R1E
4: Sky Village 7-1/2 (Los Alamos)
6: gypsum
7: open pit
8: 250 tons per day-standby 1984
9: Jurassic Todilto Formation
11: Boyd Warner-used for fertilizer
12: FN 9/4/82; Barker and others (1984)

1: 18N.1W.1.100
2: Gypsum #2
3: NW1/4 1 T18N R1W
4: La Ventana 7-1/2 (Los Alamos)
5: east of La Ventana, NM
6: gypsum
8: no produced; assessed for War Plants Corp., 1946
9: Jurassic Todilto Formation
12: NMBMMR files (1946)

1: 19N.1W.14,23
2: Gypsum #1
3: E1/2 14 and E1/2 23, T19N R1W
4: La Ventana 7-1/2 (Los Alamos)
5: east of La Ventana, NM
6: gypsum
8: not produced; evaluation done for War Plants Corp., 1946
9: Jurassic Todilto Formation
12: NMBMMR files (1946)

1: 23N.1W.36.113
2: Frontier 1-5
3: NW1/4 36 T23N R1W 36°10'46"N 106°53'37"W
4: Regina 7-1/2 (Abiquiu)
6: gypsum
8: production unknown
9: Jurassic Todilto Formation
12: Merrick and Woodward (1982); MILS (1981)

1: 14N.1E.3
2: World Humate
3: 3 T14N R1E
4: Sky Village NE 7-1/2 (Albuquerque)
5: App. 9 mi SE San Ysidro
6: humate
7: open pit
8: production unknown
9: lower part of Cretaceous Menefee Formation
10: humic acid analysis of stockpile 31.5% humic acid
12: C. T. Siemers and Wadell (1977)

1: 14N.1E.8
2: Tenorio
3: 8 14N R1E
4: Sky Village NE 7-1/2 (Albuqueque)
6: humate
7: open cut
8: 6,000 tons per year in 1979
9: Cretaceous Menefee Formation
10: carbonaceous shales used as soil conditioner
12: W. T. Siemers and Austin (1979)

1: 19N.1W.9.100
2: Clod Buster No. 1
3: NW1/4 9 T19N R1W
4: La Ventana 7-1/2 (Los Alamos)
5: Jemez Springs district
6: humate
7: open cut
8: 100 tons per day as of 1984-active
9: upper part Cretaceous Menefee Formation
10: Carbonaceous shales used as soil conditioner sold by Farm Guard Products. Humic acid analysis of stockpile, 9.5%
12: Barker and others (1984); W. T. Siemers and Austin (1979); C. T. Siemers and Wadell (1977)

1: 19N.1W.16
2: San Ysidro No. 1
3: 16 T19N R1W
4: La Ventana 7-1/2 (Los Alamos)
5: Jemez Springs district
6: humate
7: open cut
8: production unknown
9: Cretaceous Menefee Formation
10: carbonaceous shales used as soil conditioner
12: W. T. Siemers and Austin (1979)

1: 20N.1W.26.300
2: Alpha Mine of Natural Organic Humus, Inc.
3: SW1/4 26 T20N R1W
4: La Ventana 7-1/2 (Los Alamos)
5: App. 7 mi south of Cuba
6: humate
7: open pit
8: 200 tons per day as of 1979
9: upper part Cretaceous Menefee Formation
10: humic acid analyses (2) 18.6%, 15.6%
12: W. T. Siemers and Austin (1979); C. T. Siemers and Wadell (1977)

1: 8N.4E.12.100
2: NMSHD pit 0916
3: NW1/4 12 T8N R4E
4: Hubbell Spring 7-1/2 (Belen)
6: limestone
7: open pit
8: production unknown
9: Permian San Andres Limestone
11: NMSHD quantity estimate 500,000 cu yd
12: NMSHD (1975)

1: 8N.6E
2: Wild Acres Pit
3: T8N R6E 34°57'00"N 106°20'00"W
4: Mount Washington 7-1/2 (Belen)
6: limestone
8: production unknown
12: MILS (1978)

1: 9N.5E.2
2: Surface Pit #72-6-S
3: 2 T9N R5E 35°2'3"N 106°22'37"W
4: Tijeras 7-1/2 (Albuquerque)
6: limestone, calcium
8: production unknown
12: MILS (1981)

1: 9N.5E
2: New Pueblo Limestone Quarry
3: T9N R5E 35°3'00"N 106°22'00"W
4: Tijeras 7-1/2 (Belen)
6: limestone
8: production unknown
12: MILS (1978)

1: 9N.5E.2
2: NMSHD pit 6330
3: 2 T9N R5E 35°2'13"N 106°22'27"W
4: Tijeras 7-1/2 (Albuquerque)
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
12: NMSHD (1975); MILS (1981)

1: 9N.5E
2: Tijeras Lime Pit
3: T9N R5E 35°3'00"N 106°22'00"W
4: Tijeras 7-1/2 (Belen)
6: limestone
8: production unknown
12: MILS (1978)

1: 9N.5E.1
2: Pit #73-16-S
3: 1 T9N R5E 35°2'4"N 106°21'34"W
4: Sedillo 7-1/2 (Albuquerque)
6: limestone
8: production unknown
12: MILS (1981)

1: 10N.4E.14,23
2: NMSHD pit 5843
3: 14 and 23 T10N R4E 35°5'38"N 106°29'16"W
4: Tijeras 7-1/2 (Albuquerque)
5: 3-1/2 mi NW of Carnue, NM
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
11: NMSHD quantity estimate 750,000 cu yds
12: Kness (1982); NMSHD (1975); MILS (1981)

1: 10N.5E.22, 27
2: Tijeras
3: 22 and 27 T10N R5E 35°3'52"N 106°32'55"W
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon
6: limestone, clay
7: open pit
8: 4,000 tons per day in 1984-active
9: Pennsylvanian Madera Limestone
11: Used by Ideal BAsics in manufacturing cement
12: Barker and others (1984); W. T. Siemers and Austin (1979); MILS (1981); CRIB (1982)

1: 10N.5E.24.400
2: NMSHD pit 0693
3: SE1/4 24 T10N R5E
4: Sedillo 7-1/2 (Albuquerque)
5: 3-1/2 mi SW of Sedillo, NM
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
11: NMSHD estimates unlimited quantities
12: NMSHD (1975)

1: 10N.5E.34.400
2: NMSHD pit 5915
3: SE1/4 34 T10N R5E 35°3'3"N 106°22'24"W
4: Tijeras 7-1/2 (Albuquerque)
5: 4 mi east of Carnue, NM
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
11: NMSHD estimates 500,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 10N.6E.8.
2: Materials Pit #65-56-S
3: 8 T10N R6E 35°6'41"N 106°19'20"W
4: Sedillo 7-1/2 (Albuquerque)
6: limestone
8: production unknown
9: Pennsylvanian Madera Limestone
11: NMSHD estimates 360,000 cu yds
12: MILS (1981)

1: 10N.6E.8.124
2: NMSHD pit 5726
3: N1/2 8 T10N R6E 35°6'44"N 106°17'23"W
4: Sedillo 7-1/2 (Albuquerque)
5: 1 mi NE of Sedillo, NM
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
11: NMSHD estimates 200,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 10N.6E.9.400
2: NMSHD pit 5809 (Sedillo Hill quarry)
3: SE1/4 9 T10N R6E 35°6'15"N 106°18'13"W
4: Sedillo 7-1/2 (Albuquerque)
5: 1/2 mi north of Sedillo, NM
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
10: NMSHD estimates 180,000 cu yds
11: registered 11/24/80 by Corn Construction Co.
12: NMSHD (1975); MILS (1981); V. C. Kelley and Northrop (1975, p. 109)

1: 10N.6E.10
2: Pit #65-55-S
3: 10 T10N R6E 35°6'18"N 106°17'25"W
4: Sedillo 7-1/2 (Albuquerque)
6: limestone
8: production unknown
9: Pennsylvanian Madera Limestone
12: MILS (1981)

1: 10N.6E.10.400
2: NMSHD pit 6556
3: SE1/4 10 T10N R6E
4: Sedillo 7-1/2 (Albuquerque)
5: 1-1/2 mi E of Sedillo, NM
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
11: NMSHD estimates 380,000 cu yds
12: NMSHD (1975)

1: 10N.6E.16
2: Limestone Quarry
3: 16 T10N R6E 35°5'27"N 106°18'16"W
4: Sedillo 7-1/2 (Albuquerque)
6: calcium, limestone
8: production unknown
9: Pennsylvanian Madera Limestone
12: MILS (1981)

1: 10N.6E.36.300
2: NMSHD pit 0691
3: SW1/4 36 T10N R6E
4: Sedillo 7-1/2 (Albuquerque)
5: 2-1/2 mi W of Edgewood, NM
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
12: NMSHD (1975)

1: 11N.5E.3.300
2: Unknown
3: 3 T11N R5E
4: Sandia Crest 7-1/2 (Albuquerque)
5: north of Hwy 44
6: limestone
7: pit
9: Pennsylvanian Madera Formation
12: Hedlund and others (1984)

1: 11N.5E.6
2: NMSHD pit 6124, La Luz Mine(?)
3: 6 T11N R5E(?)
4: Sandia Crest 7-1/2 (Albuquerque)
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
11: 250,000 cu yds
12: NMSHD (1975)

1: 11N.5E.15
2: NMSHD pit 58129
3: 15 T11N R5E
4: Sandia Crest 7-1/2 (Albuquerque)
5: 2-1/2 mi S of Sandoval/Bernalillo County line
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
11: NMSHD estimates unlimited resource
12: Hedlund and others (1984); NMSHD (1975)

1: 11N.5E.34.100
2: Unknown
3: 34 T11N R5E
4: Sandia Crest 7-1/2 (Albuquerque)
5: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Formation
12: Hedlund and others (1984); Kness (1982)

1: 11N.5E.36.300
2: NMSHD pit 0698
3: SW1/4 36 T11N R5E
4: Sandia Park 7-1/2 (Albuquerque)
5: 1-1/2 mi E of Canoncito
6: gypsiferous limestone
7: open pit
8: production unknown
9: Jurassic Todilto Formation
11: NMSHD estimates 10,000 cu yds
12: NMSHD (1975)

1: 11N.6E.34.200
2: NMSHD pit 6245
3: NE1/4 34 T11N R6E 35°8'19"N 106°17'2"W
4: Sandia Park 7-1/2 (Albuquerque)
5: 2-1/2 mi NE of Sedillo
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Limestone
11: NMSHD estimates 600,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 8N.1W.15.330
2: NMSHD pit 0913
3: SW1/4 15 T8N R1W
4: Dalies NW 7-1/2 (Belen)
5: 3-1/4 mi N of Bernalillo County line
6: sand
7: prospect pit
8: production unknown
9: Quaternary Eolian deposits
11: NMSHD volume estimate 150,000 cu yds
12: NMSHD (1975)

1: 8N.2W.2
2: Unknown
3: 2 T8N R2W (unsurveyed)
4: South Garcia 7-1/2 (Acoma Pueblo)
5: north of Rio Puerco
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary colluvium over Precambrian
12: Hunt (1978)

1: 8N.2E.11.100
2: NMSHD pit 6741
3: NW1/4 11 T8N R2E 34°56'23"N 106°42'29"W
4: Isleta 7-1/2 (Belen)
5: 2 mi SW of Las Padillas
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary pediment gravels
11: NMSHD volume estimate 250,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 8N.2E.15
2: Parea Mesa Pit
3: 15 T8N R2E 34°55'14"N 106°43'11"W
4: Isleta 7-1/2 (Belen)
8: production unknown
9: basalt
12: MILS (1981)

1: 8N.2E.23
2: Unknown
3: 23 T8N R2E 34°54'7"N 106°42'35"W
4: Isleta 7-1/2 (Belen)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 8N.3E.5
2: State Pit
3: 5 T8N R3E 34°56'54"N 106°38'43"W
4: Isleta 7-1/2 (Belen)
6: sand and gravel
8: production unknown
12: MILS (1981); Hunt (1978)

1: 8N.3E.9.140
2: Unknown
3: 9 T8N R3E
4: Isleta 7-1/2 (Belen)
5: northeast of Isleta Pueblo
6: road fill, sand and gravel
7: open pit
9: Quaternary alluvium
12: Hunt (1978)

1: 8N.3E.16.113
2: Unknown
3: NW1/4 16 T8N R3E
4: Isleta 7-1/2 (Belen)
5: northeast of Isleta Pueblo
6: road fill, sand and gravel
7: open pit
9: Quaternary alluvium
12: Hunt (1978)

1: 8N.3E.21.111
2: Unknown
3: NW1/4 21 T8N R3E
4: Isleta 7-1/2 (Belen)
5: north of Isleta Pueblo
6: road fill, sand and gravel
7: open pit
9: Quaternary alluvium
12: Hunt (1978)

1: 8N.4E.17
2: Materials Pit #56-115-S
3: 17 T8N R4E 34°55'21"N 106°32'56"W
4: Hubbel Spring 7-1/2 (Belen)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 8N.5E
2: Blackbird No. 202
3: T8N R5E 34°57'00"N 106°22'00"W
4: Mount Washington 7-1/2 (Belen)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 9N.2E.3
2: Riverside Constr. Co. Pit
3: 3 T9N R2E 35°2'8"N 106°43'00"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 9N.2E.3
2: Sena Pit
3: 3 T9N R2E 35°2'6"N 106°43'00"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 9N.2E.16.100
2: Unknown
3: NW1/4 16 T9N R2E 35°00'42"N 106°44'36"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 9N.3E.2
2: Unknown
3: 2 T9N R3E 35°2'16"N 106°35'37"W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 9N.2E.4
2: NMSHD pit 6061
3: 4 T9N R2E 35°2'5"N 106°38'20"W
4: Albuquerque West 7-1/2 (Albuquerque)
5: 2-1/2 mi E of Armijo
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary gravel
12: NMSHD (1975); MILS (1981)

1: 9N.2E.10
2: NMSHD pit 6023
3: 10 T9N R2E 35°1'32"N 106°43'15"W
4: Albuquerque West 7-1/2 (Albuquerque)
5: 3 mi SSW of Five Points, Atrisco Grant
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 200,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 9N.2E.10.100
2: 5433 (Star Pit)
3: NW1/4 10 T9N R2E 35°00'58"N 106°43'42"W
4: Albuquerque West 7-1/2 (Albuquerque)
5: 3 mi SW of Armijo, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 9N.2E.26
2: Unknown
3: 26 T9N R2E (unsurveyed)
4: Isleta 7-1/2 (Belen)
5: south of Pajarito
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 9N.2E.28
2: McElroy Pit
3: 28 T9N R2E 34°58'48"N 106°44'11"W
4: Isleta 7-1/2 (Belen)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 9N.2E.33
2: NMSHD pit 6739 (Sanchez Pit)
3: 33 T9N R2E 34°57'49"N 106°44'4"W
4: Isleta 7-1/2 (Belen)
5: 2-1/2 mi W of Pajarita
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary Tertiary Santa Fe Formation
11: NMSHD volume estimate 250,000 cu yds; registered mine 5/8/84 by Ed Hoskins
12: NMSHD (1975); MILS (1981)

1: 9N.3E.4.341
2: NMSHD pit 603
3: S1/2 4 T9N R3E
4: Albuquerque West 7-1/2 (Albuquerque)
5: 4 mi S of Armijo
6: sand and minor gravel
7: open pit
8: production unknown
9: Quaternary gravel
11: NMSHD volume estimate 40,000 cu yds
12: NMSHD (1975)

1: 9N.3E.4
2: Unknown
3: 4 T9N R3E 35°2'16"N 106°38'16"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 9N.3E.4.100
2: NMSHD pit 602
3: NW1/4 4 T9N R3E
4: Albuquerque West 7-1/2 (Albuquerque)
5: 3-1/2 mi SE of Armijo
6: sand and minor gravel
7: open pit
8: production unknown
9: Quaternary gravel
11: NMSHD volume estimate >150,000 cu yds
12: NMSHD (1975)

1: 9N.3E.9
2: Unknown
3: 9 T9N R3E 35°1'22"N 106°38'11"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 9N.3E.10.412
2: Unknown
3: 10 T9N R3E 35°1'4"N 106°36'15"W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel, road fill
8: production unknown
9: Quaternary alluvium
12: MILS (1981); Hunt (1978)

1: 9N.3E.15
2: Unknown
3: 15 T9N R3E
4: Hubbell Spring 7-1/2 (Albuquerque)
5: northeast of Isleta Pueblo
6: road fill, snad, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 9N.3E.17
2: Unknown
3: 17 T9N R3E 35°00'34"N 106°38'38"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 9N.3E.22
2: Unknown
3: 22 T9N R3E
4: Hubbell Spring 7-1/2 (Belen)
5: northeast of Isleta Pueblo
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 9N.3E.32.400
2: NMSHD pit 0915
3: SE1/4 32 T9N R3E
4: Isleta 7-1/2 (Belen)
6: coarse sand
7: prospect pit
8: no production
9: Quaternary pediment deposit
12: NMSHD (1975)

1: 9N.1W.10
2: NMSHD pit 546
3: 10 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: Atrisco Grant
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 20,000 cu yds
12: NMSHD (1975)

1: 9N.1W
2: NMSHD pit 5389
3: T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
6: sand
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975)

1: 9N.1W.1.200
2: NMSHD pit 5514
3: NE1/4 1 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: 1-1/2 mi east of La Mesita Negra
6: coarse sand
7: open pit
8: production unknown
9: Quaternary Tertiary Santa Fe Formation
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975)

1: 9N.1W.3.400
2: NMSHD pit 5387
3: SE1/4 3 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: 1-1/2 mi south of Mesita Negra
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
12: NMSHD (1975); Hunt (1978)

1: 9N.1W.3
2: Unknown
3: 3 T9N R1W (unsurveyed)
4: La Mesita Negra 7-1/2 (Albuquerque)
5: east of La Mesita Negra
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 9N.1W.4.200
2: NMSHD pit 5537
3: NE1/4 4 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: 2 mi WNW of La Mesita Negra
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace gravels
11: NMSHD volume estimate 60,000 cu yds
12: NMSHD (1975)

1: 9N.1W.4.400
2: NMSHD pit 5512
3: SE1/4 4 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: on Atrisco Grant
6: basalt
7: open pit
8: production unknown
9: Quaternary basalt
11: NMSHD volume estimate >500,000 cu yds
12: NMSHD (1975)

1: 9N.1W.10.100
2: NMSHD pit 5538
3: NW1/4 10 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: Atrisco Grant
6: basalt
7: open pit
8: production unknown
9: Quaternary basalt
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975)

1: 9N.1W.11
2: NMSHD pit 53127
3: 11 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: 2 mi south of La Mesita Negra
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary Tertiary Santa Fe Formation
11: NMSHD volume estimate 23,000 cu yds
12: NMSHD (1975)

1: 9N.1W.11
2: Unknown
3: 11 T9N R1W (unsurveyed)
4: La Mesita Negra 7-1/2 (Albuquerque)
5: southwest of Cerro Colorado
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 9N.1W.11.200
2: NMSHD pit 5513
3: NE1/4 11 T9N R1W
4: La Mesita Negra 7-1/2 (Albuquerque)
5: on Cerro Colorado
6: cinder
7: open pit
8: production unknown
9: Quaternary volcanics (note: I'll bet they have a spatter cone, not rhyolite dome as indicated. JCO 10/20/83)
11: NMSHD volume estimate >200,000 cu yds
12: NMSHD (1975)

1: 9N.1W.32.200
2: NMSHD pit 5511
3: NE1/4 32 T9N R1W
4: Dalies NW 7-1/2 (Belen)
5: 2 mi NW of La Mesita Negra
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace gravels
11: NMSHD volume estimate 200,000 cu yds
12: NMSHD (1975)

1: 9N.5E.2
2: Lowder Milk Pit
3: 2 T9N R5E 35°2'00"N 106°22'33"W
4: Tijeras 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary colluvium
12: MILS (1981); Hunt (1978)

1: 9N.5E.7.212
2: NMSHD pit 0694
3: NE1/4 7 T9N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: 4 mi west of San Antonio, NM
6: quartzite
7: open pit
8: production unknown
9: Precambrian quartzite
11: NMSHD estimates unlimited quantities
12: NMSHD (1975)

1: 9N.5E.10
2: Unknown
3: 10 T9N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: in Madera Canyon
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary colluvium
12: Hunt (1978)

1: 10N.1W.14
2: Unknown
3: 14 T10N R1W (unsurveyed)
4: La Mesita Negra 7-1/2 (Albuquerque)
5: southwest of El Rincon
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 10N.1W.16
2: Unknown
3: 16 T10N R1W (unsurveyed)
4: La Mesita Negra 7-1/2 (Albuquerque)
5: in valley of Rio Puerco
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: floodplain and channel deposits (Holocene)
12: Hunt (1978)

1: 10N.1W.30
2: Unknown
3: 30 T10N R1W (unsurveyed)
4: La Mesita Negra 7-1/2 (Albuquerque)
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvium
12: Hunt (1978)

1: 10N.1W.35
2: Unknown
3: 35 T10N R1W (unsurveyed)
4: La Mesita Negra 7-1/2 (Albuquerque)
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 10N.2E.3
2: Westland
3: 3 T10N R2E 35°2'36"N 106°42'49"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.2E.24
2: Unknown
3: 24 T10N R2E 35°3'9"N 106°42'7"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.2E.24
2: NMSHD pit 5077
3: 24 T10N R2E
4: Albuquerque West 7-1/2 (Albuquerque)
5: 1-1/2 mi west of Five Points
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
12: NMSHD (1975)

1: 10N.2E.34
2: Saavedra Pit
3: 34 T10N R2E 35°3'8"N 106°42'46"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.2E.34
2: Schultz and Lindsay Pit
3: 34 T10N R2E 35°2'49"N 106°42'47"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.2E.34.442
2: NMSHD pit 5510 (Ben's Pit)
3: SE1/4 34 T10N R2E 35°2'53"N 106°42'43"W
4: Albuquerque West 7-1/2 (Albuquerque)
5: 2-1/2 mi southwest of Five Points
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 200,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 10N.2E.35
2: Efren and Sons Pit
3: 35 T10N R2E 35°3'19"N 106°42'34"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.3E
2: Ambrell Pit
3: T10N R3E 35°3'00"N 106°32'00"W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 10N.3E
2: Douglas Pit
3: T10N R3E 35°3'00"N 106°32'00"W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 10N.3E
2: Isleta
3: T10N R3E 35°10'N 106°33'W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
12: MILS (1978)

1: 10N.3E
2: Martin Pit
3: T10N R3E 35°3'N 106°32'W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 10N.3E
2: Unknown
3: T10N R3E 35°03'53"N 106°41'29"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.3E.4
2: Carmany Road Pit
3: 4 T10N R3E 35°7'33"N 106°37'27"W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
12: MILS (1977)

1: 10N.3E.4
2: Montgomery Pit
3: 4 T10N R3E 35°7'30"N 106°37'27"W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.3E.4
2: NMSHD pit 6060
3: 4 T10N R3E 35°7'22"N 106°37'35"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
7: prospect pit
8: no production
9: Quaternary alluvium
12: NMSHD (1975); MILS (1981)

1: 10N.3E.9,16
2: NMSHD 6075
3: 9 and 16 T10N R3E
4: Albuquerque East 7-1/2 (Albuquerque)
5: 3 mi northeast of Atrisco
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975)

1: 10N.3E.14.300
2: NMSHD pit 5487
3: SW1/4 14 T10N R3E
4: Alameda 7-1/2 (Albuquerque)
5: 3 mi east of Ranchos de Albuquerque
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace gravels
12: NMSHD (1975)

1: 10N.3E.28
2: Unknown
3: 28 T10N R3E 35°3'58"N 106°38'16"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.3E.32
2: Unknown
3: 32 T10N R3E 35°3'16"N 106°39'3"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.3E.32
2: Unknown
3: 32 T10N R3E 35°3'00"N 106°38'21"W
4: Albuquerque West 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.3E.33
2: Shakespeare Pit
3: 33 T10N R3E 35°5'55"N 106°37'45"W
4: Albuquerque 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 10N.4E
2: Osuna
3: T10N R4E 35°2'N 106°35'W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 10N.4E.4
2: Materials Pit #58-127-S
3: 4 T10N R4E 35°07'31"N 106°31'27"W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 23,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 10N.4E.12.400
2: NMSHD pit 0697
3: SE1/4 12 T10N R4E
4: Tijeras 7-1/2 (Albuquerque)
6: granite
7: open pit
9: Precambrian granite
11: improperly located by MILS (1981)
12: NMSHD (1975); MILS (1981)

1: 10N.4E.22.100
2: Unknown
3: NW1/4 22 30 T10N R4E
4: Albuquerque East 7-1/2 (Albuquerque)
5: northwest of Highway 66 and I-40 interchange
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvium
12: Hunt (1978)

1: 10N.4E.25
2: Farrington Pit
3: 25 T10N R4E 35°3'36"N 106°28'7"W
4: Tijeras 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.4E.27.400
2: NMSHD pit 5493
3: SE1/4 27 T10N R4E
4: Albuquerque East 7-1/2 (Albuquerque)
5: 9 mi east of Five Points
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary pediment deposits
11: NMSHD volume estimate 40,000 cu yds
12: NMSHD (1975)

1: 10N.4E.27.400
2: NMSHD pit 5725
3: SE1/4 27 T10N R4E 35°4'11"N 106°30'5"W
4: Albuquerque East 7-1/2 (Albuquerque)
5: 3 mi west of Carnue
6: gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 200,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 10N.4E.31
2: Scott Pit
3: 31 T10N R4E
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 10N.4E.33
2: Unknown
3: 33 T10N R4E 35°3'6"N 106°31'22"W
4: Albuquerque East 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 10N.5E.29.200
2: NMSHD pit 0695
3: NE1/4 29 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: 2-1/2 mi east of Carnue, NM
6: gravel
7: open pit
8: production unknown
9: Quaternary alluvium
12: NMSHD (1975)

1: 10N.5E.32
2: Unknown
3: 32 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: northeast of Cerro Pelon
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Precambrian
12: Hunt (1978)

1: 10N.5E.34
2: Unknown
3: 34 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: west of Cedro Canyon
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: floodplain and channel deposits (Holocene)
12: Hunt (1978)

1: 10N.6E.11
2: Unknown
3: 11 T10N R6E
4: Sedillo 7-1/2 (Albuquerque)
5: north of Comers
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary colluvium
12: Hunt (1978)

1: 10N.6E.12
2: Unknown
3: 12 T10N R6E
4: Sedillo 7-1/2 (Albuquerque)
5: east of Comers
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 10N.6E.15
2: Unknown
3: 15 T10N R6E
4: Sedillo 7-1/2 (Albuquerque)
5: south of Comers
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary colluvium
12: Hunt (1978)

1: 11N.2E.14.342
2: NMSHD pit 5490
3: S1/2 14 T11N R2E
4: Los Griegos 7-1/2 (Albuquerque)
5: 2 mi south of Paradise Hills
6: sand and gravel; road fill
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 60,000 cu yds; northeast of Indian Petroglyph State Park
12: NMSHD (1975); Hunt (1978)

1: 11N.2E.27.412
2: NMSHD 5489 pit
3: NW1/4 SE1/4 27 T11N R2E, S1/2 NE1/4 27 T11N R2E
4: Los Griegos 7-1/2 (Albuquerque)
6: gravel, road fill
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 50,000 cu yds; south of Indian Petroglyph State Park
12: NMSHD (1975); Hunt (1978)

1: 11N.3E.1
2: A. F. Cole Pit
3: 1 T11N R3E 35°12'6"N 106°35'55"W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 11N.3E.1
2: Johnson Pit
3: 1 T11N R3E 35°12'24"N 106°35'43"W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 11N.3E.1
2: Morris Pit
3: 1 T11N R3E 35°10'N 106°35'W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 11N.3E.1
2: New Sedillo Pit
3: 1 T11N R3E 35°10'N 106°35'W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 11N.3E.1
2: North Edith Pit
3: 1 T11N R3E 35°10'N 106°35'W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 11N.3E
2: Saco C-30
3: T11N R3E 35°10'N 106°36'W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 11N.3E.2
2: Springer Pit
3: 2 T11N R3E 35°10'N 106°35'W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1978)

1: 11N.3E.5.400
2: Unknown
3: 5 T11N R3E 35°12'21"N 106°38'49"W
4: Los Griegos 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 11N.3E.2.342
2: NMSHD pit 5410
3: S1/2 2 T11N R3E
4: Alameda 7-1/2 (Albuquerque)
5: 2-1/2 mi south
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate >100,000 cu yds
12: NMSHD (1975)

1: 11N.3E.11
2: Wylie Pit
3: 11 T11N R3E (unsurveyed) 35°11'54"N 106°35'54"W
4: Alameda 7-1/2 (Albuquerque)
6: stone, road fill, sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
12: MILS (1981); Hunt (1978)

1: 11N.3E.11.400
2: Unknown
3: SE1/4 11 T11N R3E
4: Alameda 7-1/2 (Belen)
5: 1 mile west of Coronado Airport
6: road fill, sand and gravel
7: open pit
9: Quaternary alluvium
12: Hunt (1978)

1: 11N.3E.12.300
2: NMSHD pit 4876
3: SW1/4 12 T11N R3E
4: Alameda 7-1/2 (Albuquerque)
5: 4 mi south-southeast of Corrales
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
12: NMSHD (1975)

1: 11N.3E.12.400
2: NMSHD pit 5495
3: SE1/4 12 T11N R3E
4: Alameda 7-1/2 (Albuquerque)
5: on Gutierrez Land Grant
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary pediment gravels
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975)

1: 11N.3E.12.400
2: NMSHD pit 5696
3: SE1/4 12 T11N R3E 35°12'21"N 106°35'30"W
4: Alameda 7-1/2 (Albuquerque)
5: 3-1/2 mi southeast of Corrales, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 11N.3E.14.200
2: NMSHD pit 5488
3: NE1/4 14 T11N R3E
4: Alameda 7-1/2 (Albuquerque)
5: 3 mi east of Ranchos de Albuquerque
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 100,000 cu yds
12: NMSHD (1975)

1: 11N.3E.15.400
2: Unknown
3: SE1/4 15 T11N R3E
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
12: Hunt (1978)

1: 11N.3E.22
2: Unknown
3: 22 T11N R3E (unsurveyed)
4: Alameda 7-1/2 (Albuquerque)
5: northeast of Los Ranchos de Albuquerque
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvium
12: Hunt (1978)

1: 11N.3E.26
2: NMSHD pit 5492
3: 26 T11N R3E
4: Alameda 7-1/2 (Albuquerque)
5: 3-1/2 mi northeast of Ranchos de Albuquerque
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate >500,000 cu yds
12: NMSHD (1975)

1: 11N.3E.34.321
2: Albuquerque Gravel Prods. Co. Pit (Rocky Mountain Stone Co., Inc.)
3: 34 T11N R3E 35°8'6"N 106°37'3"W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 11N.4E.1
2: Unknown
3: 1 T11N R4E (unsurveyed)
4: Sandia Crest 7-1/2 (Albuquerque)
5: west of the crest
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary colluvium over Precambrian
12: Hunt (1978)

1: 11N.4E.2.130
2: NMSHD pit 0699
3: W1/2 2 T11N R4E
4: Sandia Crest 7-1/2 (Albuquerque)
6: mica schist
7: prospect pit
8: production unknown
9: Precambrian
12: NMSHD (1975)

1: 11N.5E.10
2: Unknown
3: 10 T11N R5E (unsurveyed)
4: Sandia Crest 7-1/2 (Albuquerque)
5: southeast of Tecolate Peak
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary colluvium on Precambrian
12: Hunt (1978)

1: 11N.6E.23
2: Unknown
3: 23 T11N R6E
4: Sedillo 7-1/2 (Albuquerque)
5: south of Monte Largo
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 11N.6E.29
2: Unknown
3: 29 T11N R6E
4: Sedillo 7-1/2 (Albuquerque)
5: southeast of San Antonito
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Holocene floodplain and channel deposits
12: Hunt (1978)

1: 12N.2E.11
2: Unknown
3: 11 T12N R2E (unsurveyed)
4: Loma Machete 7-1/2 (Albuquerque)
5: northwest of Rio Rancho
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits on Santa Fe Group
12: Hunt (1978)

1: 12N.2E.22
2: Gravel Pit
3: 22 T12N R2E 35°14'56"N 106°43'1"W
4: Los Griegos 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary Santa Fe Formation, Ceja Member
12: MILS (1981); V. C. Kelley (1977)

1: 12N.2E.25
2: Gravel Pit
3: 25 T12N R2E 35°14'2"N 106°40'44"W
4: Los Griegos 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary Santa Fe Formation, Ceja Member
12: MILS (1981); V. C. Kelley (1977)

1: 12N.2E.34
2: Gravel Pit
3: 34 T12N R2E 35°13'34"N 106°42'56"W
4: Los Griegos 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary Santa Fe Formation, Ceja Member
12: MILS (1981)

1: 12N.3E.1.240
2: NMSHD pit 6716
3: N1/2 1 T12N R3E 35°17'18"N 106°35'36"W
4: Bernalillo 7-1/2 (Albuquerque)
5: Alameda Grant
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 200,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 12N.3E.4.240
2: NMSHD pit 696
3: 4 T12N R3E
4: Bernalillo 7-1/2 (Albuquerque)
5: 4-1/2 mi north of Corrales
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 75,000 cu yds
12: NMSHD (1975)

1: 12N.3E.14.130
2: Pit #76-17-S
3: 14 T12N R3E 35°16'16"N 106°36'11"W
4: Bernalillo 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary alluvium
12: MILS (1981); V. C. Kelley (1977)

1: 12N.3E.36
2: Gravel Pit
3: 36 T12N R3E 35°13'47"N 106°34'41"W
4: Alameda 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary terrace and pediment deposits
12: MILS (1981); V. C. Kelley (1977)

1: 12N.3E.36
2: NMSHD pit 6062
3: 36 T12N R3E 35°13'40"N 106°34'57"W
4: Alameda 7-1/2 (Albuquerque)
5: 2-1/2 mi southeast of Corrales, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace gravels
11: NMSHD volume estimate 200,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 12N.4E.1.142
2: NMSHD pit 0702
3: N1/2 1 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
6: sand and gravel
7: prospect pit
8: no production
9: Quaternary terrace deposits

12: NMSHD (1975)

1: 12N.4E.12.230
2: NMSHD pit 0701
3: 12 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
6: limestone
7: prospect pit
8: production unknown
9: Pennsylvanian Madera Limestone
12: NMSHD (1975)

1: 12N.4E.12.340
2: NMSHD pit 0700
3: S1/2 12 T12N R4E
4: Placitas 7-1/2 (Albuquerque)
6: limestone
7: open pit
8: production unknown
9: Pennsylvanian Madera Formation
12: NMSHD (1975)

1: 12N.4E.18.210
2: NMSHD pit 5413
3: N1/2 18 T12N R4E
4: Bernalillo 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: no production
9: Quaternary terrace deposits
11: NMSHD volume estimate 500,000 cu yds
12: NMSHD (1975)

1: 12N.4E.18.230
2: NMSHD pit 5691
3: N1/2 18 T12N R4E 35°16'12"N 106°33'32"W
4: Bernalillo 7-1/2 (Albuquerque)
5: 4 mi northwest of Corrales, NM
6: sand and gravel
7: open pit
8: no production
9: Quaternary terrace deposits
11: NMSHD volume estimates 500,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 12N.6E.23
2: pit #5877
3: 23 T12N R6E 35°14'53"N 106°16'22"W
4: Sandia Park 7-1/2 (Albuquerque)
6: gravel
7: open pit
8: production unknown
9: Quaternary older pediment deposits
11: NMSHD volume estimate >100,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 12N.6E.34.311
2: Gravel Pit
3: 34 T12N R6E 35°13'17"N 106°17'51"W
4: Sandia Park 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary Ortiz pediment gravel
12: MILS (1981); V. C. Kelley (1977);

1: 13N.1E.23.210
2: Unknown
3: NE1/4 23 T13N R1E
4: Sky Village 7-1/2 (Albuquerque)
6: road fill, sand and gravel
9: Quaternary alluvial fan deposits
12: Hunt (1978)

1: 13N.3E.36
2: NMSHD pit 6649
3: 36 T13N R3E 35°18'47"N 106°34'23"W
4: Bernalillo 7-1/2 (Albuquerque)
5: 3-1/2 mi southwest Santa Ana Pueblo
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 200,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 13N.4E.5
2: Gravel Pit
3: 5 T13N R4E 35°23'15"N 106°32'21"W
4: Santa Ana Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary alluvium
12: MILS (1981); V. C. Kelley (1977)

1: 13N.4E.13.410
2: NMSHD pit 0704
3: E1/2 14 T13N R4E
4: Placitas 7-1/2 (Albuquerque)
6: sand and gravel
7: prospect pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate lists unlimited material
12: NMSHD (1975)

1: 13N.4E.13.430
2: NMSHD pit 0703
3: 14 T13N R4E
4: Placitas 7-1/2 (Albuquerque)
6: sand and gravel
7: prospect pit
8: production unknown
9: Quaternary alluvium
12: NMSHD (1975)

1: 13N.4E.15.342
2: NMSHD pit 5692 (Gallegos pit)
3: S1/2 15 T13N R4E 35°20'57"N 106°30'8"W
4: Bernalillo 7-1/2 (Albuquerque)
5: 1 mi west of Santa Ana Pueblo
6: sand
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 450,000 cu yds; registered 9/15/83 by Gallegos Sand Products
12: NMSHD (1975)

1: 13N.4E.18
2: Gravel Pit
3: 18 T13N R4E 35°21'11"N 106°32'58"W
4: Bernalillo 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary Santa Fe Formation
12: MILS (1981); V. C. Kelley (1977)

1: 13N.4E.19
2: Coronado Pit
3: 19 T13N R4E 35°20'45"N 106°33'26"W
4: Bernalillo 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary terrace deposits
12: MILS (1981)

1: 13N.4E.28
2: North Pit
3: 28 T13N R4E 35°19'32"N 106°31'22"W
4: Bernalillo 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary upper Santa Fe Formation
12: MILS (1981); Spiegel (1961)

1: 13N.4E.30.320
2: NMSHD pit 6148
3: SW1/4 30 T13N R4E 35°19'23"N 106°33'30"W
4: Bernalillo 7-1/2 (Albuquerque)
5: 2 mi southwest Santa Ana Pueblo
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 750,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 13N.4E.34
2: Montoya Pit
3: 34 T13N R4E 35°18'44"N 106°29'54"W
4: Placitas 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary upper Santa Fe Formation
12: MILS (1981); Spiegel (1961)

1: 13N.4E.35
2: Unknown
3: 35 T13N R4E (unsurveyed)
4: Placitas 7-1/2 (Albuquerque)
5: northwest of Placitas
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits over Santa Fe Group
12: Hunt (1978)

1: 13N.5E.4
2: Unknown
3: 7 T13N R5E
4: Placitas 7-1/2 (Albuquerque)
5: northeast of Las Colonias
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary/Tertiary Santa Fe Group
12: Hunt (1978)

1: 13N.5E.7
2: Unknown
3: 7 T13N R5E
4: Placitas 7-1/2 (Albuquerque)
5: east of Las Colonias
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary/Tertiary Santa Fe Group
12: Hunt (1978)

1: 13N.5E.18
2: Chavez no. 1
3: 18 T13N R5E
4: Placitas 7-1/2 (Albuquerque)
6: gravel
7: open pit
9: Quaternary
11: registered 4/21/83 by Aggregate Specialists of NM
12: NMBMMR files (1983)

1: 14N.2E.2
2: Gravel Pit
3: 2 T14N R2E 35°28'42"N 106°42'18"W
4: Bernalillo NW 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary Santa Fe Formation, Zia Member
12: MILS (1981); Manley (1978)

1: 14N.3E.19.114
2: Gravel Pit
3: 19 T14N R3E 35°25'57"N 106°40'2"W
4: Bernalillo NW 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary alluvium
12: MILS (1981); Manley (1978)

1: 14N.3E.21
2: Gravel Pit
3: 21 T14N R3E 35°25'27"N 106°37'17"W
4: Santa Ana Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary alluvium
12: MILS (1981); Manley (1978)

1: 14N.4E.15.420
2: NMSHD pit 0673
3: E1/2 15 T14N R4E
4: San Felipe Pueblo 7-1/2 (Albuquerque)
6: basalt
7: open pit
8: production unknown
9: Quaternary basalt
11: NMSHD estimate unlimited volume
12: NMSHD (1975)

1: 14N.5E.9.420
2: NMSHD pit 0674
3: 9 T14N R5E
4: San Felipe Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975)

1: 14N.5E.10.430
2: NMSHD pit 0675
3: 10 and 11 T14N R5E
4: San Felipe Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD estimate unlimited volume
12: NMSHD (1975)

1: 14N.5E.11
2: Pit #79-1-S
3: 11 T14N R5E 35°27'54"N 106°23'7"W
4: San Felipe Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary Santa Fe Formation
12: MILS (1981); V. C. Kelley (1977)

1: 14N.5E.15.430
2: NMSHD pit 0676
3: SE1/4 15 T14N R5E
4: San Felipe Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD estimate unlimited volume
12: NMSHD (1975)

1: 14N.5E.27.230
2: NMSHD pit 0680
3: NE1/4 27 T14N R5E
4: San Felipe Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimate volume 150,000 cu yds
12: NMSHD (1975)

1: 14N.5E.27.330
2: NMSHD pit 0615
3: SW1/4 27 T14N R5E 35°24'48"N 106°24'27"W
4: San Felipe Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary Tertiary Santa Fe Formation
11: NMSHD volume estimate 535,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 14N.5E.28
2: Pit #67-37-S
3: 28 T14N R5E 35°24'38"N 106°24'39"W
4: San Felipe Pueblo 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Tertiary Santa Fe Formation
12: MILS (1981); V. C. Kelley (1977); Spiegel (1961)

1: 14N.6E.24.330
2: NMSHD pit 0679
3: 24 T14N R6E
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary-Tertiary Santa Fe Formation
11: NMSHD volume estimate 500,000 cu yds
12: NMSHD (1975)

1: 15N.1E.17
2: Pit #76-18-S
3: 17 T15N R1E 35°32'2"N 106°50'57"W
4: San Ysidro 7-1/2 (Los Alamos)
6: stone
8: production unknown
9: Quaternary alluvium
12: MILS (1981); Woodward and Ruetschilling (1976)

1: 15N.2E.17.300
2: Pit 7110
3: SW1/4 17 T15N R2E
4: Jemez Pueblo 7-1/2 (Los Alamos)
5: 2-1/2 mi west-northwest of Zia Pueblo
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 250,000 cu yds
12: NMSHD (1975); MILS (1981)[MILS location incorrect]

1: 15N.2E.29.440
2: Pit 749
3: SW1/4 29 T15N R2E
4: Jemez Pueblo 7-1/2 (Los Alamos)
5: 3 mi southwest of Jemez Pueblo, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 90,000 cu yds
12: NMSHD (1975); MILS (1981) [location incorrect]

1: 15N.6E.6
2: Pena Blanca no. 1
3: 6 T15N R6E
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
6: sand and gravel
7: open pit
11: registered 9/15/83 by Pena Blanca Ltd. Partnership
12: NMBMMR files (1983)

1: 15N.6E.13.121
2: Unknown
3: 13 T15N R6E
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
5: southwest of La Bajada
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary alluvial fan deposits over Santa Fe Group
12: Hunt (1978)

1: 15N.6E.29.330
2: NMSHD pit 6617 (Brown Construction Co.)
3: W1/2 29 T15N R6E 35°28'56"N 106°20'3"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 400,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 15N.6E.29
2: Pit #76-9-S
3: 29 T15N R6E 35°29'44"N 106°19'43"W
4: San Felipe Pueblo NE 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Tertiary Santa Fe Formation
12: MILS (1981); V. C. Kelley (1977)

1: 15N.6E.36
2: Gravel Pit
3: 36 T15N R6E 35°29'35"N 106°15'8"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
6: sand and gravel
8: production unknown
9: Quaternary pediment gravels
12: MILS (1981); V. C. Kelley (1977)

1: 15N.6E.36.230
2: NMSHD pit 0677
3: 36 T15N R6E
4: San Felipe Pueblo NE 7-1/2 (Albuquerque)
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
11: NMSHD volume estimate 150,000 cu yds
12: NMSHD (1975)

1: 16N.1E.5.220
2: Pit 601
3: NE1/4 5 T16N R1E 35°38'32"N 106°52'55"W
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Espiritu Santo Grant
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 100,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 16N.1E.6.334
2: Pit
3: 6 T15N R1E
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Jemez Mountains
6: sand and gravel
7: pit
8: production unknown
9: Tertiary terrace and pediment deposits
12: Woodward and Martinez (1974)

1: 16N.1W.25.424
2: Pit 636
3: SW1/4 30 SE1/4 25 T16N R1E and R1W 35°35'18"N 106°53'9"W
4: Ojito Spring 7-1/2 (Los Alamos)
5: 1/2 mi southwest of Penasco Springs
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 5,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 16N.2E.11.340
2: Pit 5753
3: 11 T16N R2E 35°37'47"N 100°42'2"W
4: Ponderosa 7-1/2 (Los Alamos)
5: 2-1/2 mi WNW of Jemez Pueblo, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary pediment deposit
11: NMSHD volume estimate 50,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 16N.2E.14.220
2: Pit 5951
3: NE1/4 14 T16N R2E 35°37'40"N 106°41'54"W
4: Ponderosa 7-1/2 (Los Alamos)
5: 2-1/2 mi west of Jemez Pueblo
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 60,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 16N.2E.21.410
2: Pit 7511
3: SE1/4 21 T16N R2E 35°35'52"N 106°43'34"W

4: Jemez Pueblo 7-1/2 (Los Alamos)
5: 2 mi southwest of Jemez Pueblo, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD volume estimate 90,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 16N.2E.28.320
2: Pit #75-10-S
3: SW1/4 28 T16N R2E 35°35'19"N 106°43'58"W
4: Jemez Pueblo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Quaternary alluvium
12: MILS (1981); Hunt (1978)

1: 16N.2E.28.410
2: San Ysidro Pit
3: SE1/4 28 T16N R2E 35°35'25"N 106°44'18"W
4: Jemez Pueblo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 16N.2E.28.240
2: Pit 5543
3: NE1/4 28 T16N R2E
4: Jemez Pueblo 7-1/2 (Los Alamos)
5: 3-1/2 mi NE of San Ysidro, NM
6: sand and gravel
7: open pit
8: production unknown
9: Tertiary Santa Fe Formation
11: NMSHD estimate 40,000 cu yds
12: NMSHD (1975)

1: 16N.2E.32.142
2: PIt 6017
3: N1/2 32 T16N R2E 35°34'00"N 106°45'28"W
4: San Ysidro 7-1/2 (Los Alamos)
5: 1-1/2 mi NE of San Ysidro, NM
6: sand
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimate 3,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 16N.2E.32.124
2: Pit 605
3: N1/2 32 T16N R2E 35°34'46"N 106°44'57"W
4: Jemez Pueblo 7-1/2 (Los Alamos)
5: 1 mi northwest of San Ysidro, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimate 50,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 16N.2E.32.140
2: Pit 6016
3: NW1/4 32 T16N R2E 35°34'21"N 106°45'14"W
4: San Ysidro 7-1/2 (Los Alamos)
5: 2 mi northeast of San Ysidro, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimate 30,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 16N.2E.33.140
2: Gravel Pit
3: NW1/4 33 T16N R2E 35°34'43"N 106°44'21"W
4: Jemez Pueblo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 16N.5E.24.212
2: Unknown
3: 24 T16N R5E
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
5: west of Cochiti Pueblo
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Holocene floodplain and channel deposits
12: Hunt (1978)

1: 16N.5E.25.112
2: Unknown
3: NW1/4 25 T16N R5E
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
5: southwest of Cochiti Pueblo
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Quaternary sandy loam on Santa Fe Group
12: Hunt (1978)

1: 16N.6E.4.240
2: Atkinson Co. Quarry
3: 4 T16N R6E 35°38'36"N 106°18'52"W
4: Cochiti Dam 7-1/2 (Los Alamos)
6: stone, sand and gravel
8: production unknown
12: MILS (1981)

1: 16N.6E.19.322
2: Unknown
3: 19 T16N R6E
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
5: south of Cochiti Pueblo
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Holocene floodplain and channel deposits
12: Hunt (1978)

1: 16N.6E.20.434
2: Pit 609
3: SE1/4 20 T16N R6E 35°35'41"N 106°12'25"W
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
5: 2-1/2 mi north of Pena Blanca, NM
6: gravel
7: open pit
8: production unknown
9: Quaternary terrace deposits
12: NMSHD (1975); MILS (1981)

1: 16N.6E.30.311
2: Unknown
3: 30 T16N R6E
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
5: south of Cochiti Pueblo
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Holocene floodplain and channel deposits
12: Hunt (1978)

1: 16W.6E.32.140
2: Gravel Pit
3: NW1/4 32 T16N R6E 35°34'19"N 106°20'5"W
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 16N.6E.32.230
2: Gravel Pit
3: NE1/4 32 T16N R6E 35°34'17"N 106°19'29"W
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 16N.6E.34.320
2: Pit #77-1-S
3: SW1/4 34 T16N R6E 35°34'45"N 106°17'13"W
4: Santo Domingo Pueblo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 17N.1W.13
2: Unknown
3: 13 T17N R1W (unsurveyed)
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: west of Pajarito Peak
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Holocene alluvial fan deposits
12: Hunt (1978)

1: 17N.1W.28
2: Pit 5316
3: 28 T17N R1W 35°41'40"N 106°57'03"W
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Ojo del Espirito Santo Grant
6: sand and gravel
7: open pit
8: production unknown
9: Cretaceous Mancos Shale
12: NMSHD (1975)

1: 17N.1W.36
2: Pit #80-5-S
3: 36 T17N R1W 35°39'35"N 106°53'7"W
4: Holy Ghost Spring 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 17N.2E.10
2: Pit 6042
3: 10 T17N R2E 35°43'1"N 106°43'28"W
4: Ponderosa 7-1/2 (Los Alamos)
5: San Diego Grant
6: gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD quantity estimate 100,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 17N.2E.22
2: Walsh Pit
3: 22 T17N R2E 35°41'1"N 106°42'46"W
4: Ponderosas 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 17N.4E.26.130
2: Pit 9739
3: NW1/4 26 T17N R4E
4: Canada 7-1/2 (Los Alamos)
5: on Canada de Cochiti Grant
6: basaltic andesite
7: open pit
8: production unknown
9: Quaternary basalt
12: NMSHD (1975)

1: 17N.4E.34.110
2: NMSHD pit 0737
3: NW1/4 34 T17N R4E
4: Bear Springs Peak 7-1/2 (Los Alamos)
5: Jemez Indian Reservation
6: rhyolite
7: open pit
8: production unknown
9: Tertiary rhyolite
11: NMSHD estimates 375,000 cu yds
12: NMSHD (1975)

1: 17N.4E.35.320
2: Pit 0738
3: 35 T17N R4E 35°40'40"N 106°28'30"W
4: Canada 7-1/2 (Los Alamos)
5: Jemez Indian Reservation
6: basalt and other volcanics
7: open pit
8: production unknown
9: Tertiary volcanics undifferentiated
11: NMSHD estimates greater than 200,000 cu yds
12: NMSHD (1975)

1: 17N.5E.26.240
2: Two Gravel Pits
3: 26 T17N R5E 35°40'27"N 106°22'44"W
4: Canada 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 18N.1W.14
2: Unknown
3: 14 T18N R1W (unsurveyed)
4: La Ventana 7-1/2 (Los Alamos)
5: east of Highway 44, near Thompson Spring
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Holocene floodplain and channel deposits
12: Hunt (1978)

1: 18N.1W.20
2: Pit 6543
3: 20 T18N R1W 35°47'15"N 106°55'30"W
4: La Ventana 7-1/2 (Los Alamos)
5: 5 mi SE of La Ventana, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimates 125,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 18N.1W.23.110
2: Pit
3: 23 T18N R1W (unsurveyed)
4: La Ventana 7-1/2 (Los Alamos)
6: sand and gravel
7: pit
8: production unknown
9: Tertiary terrace and pediment deposit
10: 2-10 ft deposits
12: Woodward and Schumacher (1973)

1: 18N.1W.35
2: Pit 6329
3: 35°44'45"N 106°54'14"W
4: Holy Ghost Spring 7-1/2 (Los Alamos)
5: Jemez Indian Reservation
6: gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimates 375,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 18N.3E.6
2: Gravel Pit
3: 6 T18N R3E 35°49'20"N 106°39'46"W
4: Jemez Springs 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 18N.4E.3.424
2: Pit 0735
3: SE1/4 3 T18N R4E
4: Bland 7-1/2 (Los Alamos)
6: basalt
7: prospect pit
9: Tertiary basalt
12: NMSHD (1975)

1: 18N.4E.9.130
2: Pit 744
3: NW1/4 9 T18N R4E 35°48'28"N 106°31'19"W
4: Redondo Peak 7-1/2 (Los Alamos)
5: 7 mi SSE of Redondo Peak
6: gravel
7: open pit
8: production unknown
9: Tertiary andesite
12: NMSHD (1975); MILS (1981)

1: 18N.5E.34.140
2: Pit 0736
3: NW1/4 34 T18N R5E
4: Bland Preliminary 7-1/2 (Los Alamos)
5: 1 mi south of San Miguel Mountains
6: andesite
7: prospect pit
8: production unknown
9: Tertiary Paliza Canyon Andesite
11: NMSHD estimates 500,000 cu yds
12: NMSHD (1975)

1: 19N.4E.10
2: Materials Pit
3: 10 T19N R4E 35o53'37"N 106o30'5"W
4: Valle San Antonio 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Quaternary Valles Rhyolite
12: MILS (1981)

1: 19N.4E.10.313
2: Pit 0733
3: SW1/4 10 T19N R4E
4: Valles Toledo 7-1/2 (Los Alamos)
5: 3 mi southwest of Cerro del Medio
6: rhyolite
7: prospect pit
9: Quaternary Valles Rhyolite
11: NMSHD estimates 675,000 cu yds
12: NMSHD (1975)

1: 19N.4E.34.442
2: Pit 0734
3: SE1/4 34 T19N R4E
4: BlandPreliminary 7-1/2 (Los Alamos)
5: 5-1/2 mi southwest of Cerro del Medio
6: rhyolite
7: prospect pit
9: Quaternary Valles Rhyolite
11: NMSHD estimates 500,000 cu yds
12: NMSHD (1975)

1: 19N.3E.20.140
2: Pit 6456
3: SW1/4 17 T19N R3E 35°52'42"N 106°38'50"W
4: Seven Springs 7-1/2 (Los Alamos)
5: near La Cuera Spring
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimates 25,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 19N.3E.23.332
2: Gravel Pit
3: 23 T19N R3E 35°51'36"N 106°35'41"W
4: Redondo Peak 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Quaternary alluvium
12: MILS (1981); R. L. Smith and others (1970)

1: 19N.1W.4
2: Gravel Pit
3: 4 T19N R1W 35°54'41"N 106°56'41"W
4: San Pablo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
12: MILS (1981)

1: 19N.1W.22.200
2: Pit #61-34-S
3: NE1/4 22 T19N R1W 35°52'1"N 106°55'26"W
4: La Ventana 7-1/2 (Los Alamos)
6: sand and gravel
7: 2 pits
8: production unknown
9: Quaternary terrace and pediment deposits
12: MILS (1981); Woodward and Schumacher (1973)

1: 19N.1W.29.130
2: Pit 53121
3: NW1/4 29 T19N R1W 35°51'19"N 106°57'56"W
4: La Ventana 7-1/2 (Los Alamos)
5: 1-1/2 mi N of La Ventana, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary terrace and pediment deposits
12: NMSHD (1975); MILS (1981); Woodward and Schumacher (1973)

1: 19N.5E.26.114
2: Unknown
3: NW1/4 26 T19N R5E
4: Bland 7-1/2 (Los Alamos)
6: sand and gravel, road fill
7: open pit
9: Quaternary colluvium
12: Hunt (1978)

1: 20N.1W.6.330
2: Pit 606
3: SW1/4 6 T20N R1W 35°59'32"N 106°58'53"W
4: San Pablo 7-1/2 (Los Alamos)
5: 1/2 mi northwest of Lauinitas
6: sand and gravel
7: open pit
8: production unknown
9: quaternary alluvium
11: NMSHD estimates 60,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 20N.1W.7.113
2: Gravel Pit
3: NW1/4 7 T20N R1W 35°59'00"N 106°59'24"W
4: San Pablo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Quaternary terrace and pediment deposits
12: MILS (1981); Woodward and others (1973)

1: 20N.1W.18.121
2: Gravel Pit
3: NW1/4 18 T20N R1W
4: San Pablo 7-1/2 (Los Alamos)
6: gravel
7: open pit
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
12: Woodward and others (1973)

1: 20N.1W.18.131
2: Gravel Pit
3: 18 T20N R1W 35°58'11"N 106°59'3"W
4: San Pablo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
12: MILS (1981); Woodward and others (1973)

1: 20N.1W.21.431
2: Gravel Pit
3: 21 T20N R1W 35°56'40"N 106°56'41"W
4: San Pablo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Cretaceous Lewis Shale
12: MILS (1981); Woodward and others (1973)

1: 20N.1W.31.144
2: Pit 5422
3: NW1/4 31 T20N R1W
4: San Pablo 7-1/2 (Los Alamos)
5: 7 mi north of La Ventana, NM
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary/Tertiary terrace deposit
12: NMSHD (1975); Woodward and others (1973)

1: 20N.1W.31.431
2: Gravel Pit
3: 31 T20N R1W 35°54'57"N 106°58'51"W
4: San Pablo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
12: MILS (1981); Woodward and others (1973)

1: 20N.2W.1
2: Pit #78-2-S
3: 1 T20N R2W 35°59'18"N 106°59'36"W
4: San Pablo 7-1/2 (Los Alamos)
6: sand and gravel
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
12: MILS (1981); Woodward and others (1973)

1: 20N.2W.12.242
2: Unknown
3: 12 T20N R2W
4: San Pablo 7-1/2 (Los Alamos)
5: south of Mesa de Cuba on Highway 197
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Tertiary Nacimiento Formation
12: Hunt (1978)

1: 20N.2W.13.244
2: Unknown
3: 13 T20N R2W
4: San Pablo 7-1/2 (Los Alamos)
5: south of Mesa de Cuba on Highway 197
6: road fill, sand, gravel, caliche or other aggregates
7: open pit
9: Tertiary Ojo Alamo Sandstone
12: Hunt (1978)

1: 20N.2W.13.420
2: Pit 6219
3: SE1/4 13 T20N R2W 35°57'47"N 106°59'46"W
4: San Pablo 7-1/2 (Los Alamos)
5: 2 mi south-southwest of Lagunitas
6: gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimates 30,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 21N.1W.5
2: Gravel Pit
3: 5 T21N R1W 35°04'28"N 106°58'16"W
4: Cuba 7-1/2 (Abiquiu)
6: sand and gravel
7: pit
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
12: MILS (1981); Woodward and others (1970)

1: 21N.1W.8.140
2: Pit 5845
3: NW1/4 8 T21N R1W
4: Cuba 7-1/2 (Abiquiu)
5: 2-3/4 mi N of Cuba
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary pediment gravels
11: NMSHD estimate 9,000 cu yds
12: NMSHD (1975)

1: 21N.1W.8.330
2: Pit 6634
3: SW1/4 5 T21N R1W
4: Cuba 7-1/2 (Abiquiu)
5: 2-1/2 mi north of Cuba
6: gravel
7: open pit
8: production unknown
9: Quaternary pediment gravels
11: NMSHD estimates 15,000 cu yds
12: NMSHD (1975)

1: 21N.1W.7.220
2: Gravel Pit
3: NE1/4 7 T21N R1W 36°4'10"N 106°58'44"W
4: Cuba 7-1/2 (Abiquiu)
6: sand and gravel
7: pit
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
12: MILS (1981); Woodward and others (1970)

1: 21N.1W.29
2: Cuba Pit
3: 29 T21N R1W 36°1'22"N 106°57'36"W
4: Cuba 7-1/2 (Abiquiu)
6: sand and gravel
7: pit
8: production unknown
9: Quaternary alluvium
12: MILS (1978); Woodward and others (1970)

1: 21N.1W.30
2: Gravel Pit Group
3: 30 T21N R1W 36°1'19"N 106°59'04"W
4: Cuba 7-1/2 (Abiquiu)
6: sand and gravel
7: pits
8: production unknown
12: MILS (1981)

1: 21N.1W.30.330
2: Pit 6133
3: SW1/4 30 T21N R1W
4: Cuba 7-1/2 (Abiquiu)
5: 1-1/2 mi west of Cuba
6: sand and gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimates 30,000 cu yds
12: NMSHD (1975)

1: 21N.1W.30.410
2: Pit 6631
3: SE1/4 30 T21N R1W
4: Cuba 7-1/2 (Abiquiu)
5: 1/2 mi west of Cuba
6: gravel
7: open pit
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
11: NMSHD estimates 20,000 cu yds
12: NMSHD (1975); Woodward and others (1970)

1: 21N.1W.34.313
2: Sand Pit
3: 34 T21N R1W 36°00'15"N 106°56'6"W
4: Cuba 7-1/2 (Abiquiu)
6: sand and gravel
7: pit
8: production unknown
9: Tertiary Ojo Alamo Sandstone
12: MILS (1981); Woodward and others (1970)

1: 21N.1W.34.314
2: Sand Pit
3: SW1/4 34 T21N R1W
4: Cuba 7-1/2 (Abiquiu)
6: sand and gravel
7: pit
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
12: Woodward and others (1970); MILS (1981)

1: 21N.1W.35
2: Eureka Mesa Quarry
3: 35 T21N R1W 36°00'18"N 106°54'30"W
4: Cuba 7-1/2 (Abiquiu)
6: stone
7: pit
8: production unknown
12: MILS (1981)

1: 21N.2W.8
2: Gravel Pit
3: 8 T21N R2W 36°4'3"N 107°4'25"W
4: Arroyo Chijuillita 7-1/2 (Chaco Canyon)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 21N.5W.31.200
2: Pit 0876
3: NE1/4 31 T21N R5W
4: Mule Dam 7-1/2 (Chaco Canyon)
5: 2 mi south-southwest of Heart Mountain
6: sand and some gravel
7: prospect pit
8: production unknown
9: Quaternary pediment deposits
11: NMSHD estimate 250,000 cu yds
12: NMSHD (1975)

1: 22N.1W.18
2: Pit #79-5-S
3: 18 T22N R1W 36°08'28"N 106°58'46"W
4: Regina 7-1/2 (Abiquiu)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 22N.1W.18.342
2: Pit 5874
3: S1/2 18 T22N R1W 36°8'28"N 106°58'42"W
4: Regina 7-1/2 (Abiquiu)
5: 3-1/2 mi south of Regina
6: gravel
7: open pit
8: production unknown
9: Quaternary alluvium
11: NMSHD estimate 25,000 cu yds
12: NMSHD (1975); MILS (1981)

1: 22N.1W.21
2: Pit #78-17-S
3: 21 T22N R1W 36°7'5"N 106°57'12"W
4: Cuba 7-1/2 (Abiquiu)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 22N.3W.19
2: Gravel Pit
3: 19 T22N R3W 36°07'21"N 107°11'38"W
4: Taylor Ranch 7-1/2 (Chaco Canyon)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 22N.4W.6
2: Borrow Pit
3: 6 T22N R4W 36°9'33"N 107°17'27"W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 22N.5W.1
2: Borrow Pits
3: 1 T22N R5W 36°9'53"N 107°18'21"W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
6: sand and gravel
7: 2 pits
8: production unknown
12: MILS (1981)

1: 22N.5W.2
2: Borrow Pit
3: 2 T22N R5W 36°10'20"N 107°19'20"W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 23N.1W.28.431
2: Gravel Pit
3: 28 T23N R1W 36°11'23"N 106°56'46"W
4: Regina 7-1/2 (Abiquiu)
6: sand and gravel
7: pit
8: production unknown
9: Quaternary/Tertiary terrace and pediment deposits
12: MILS (1981); Merrick and Woodward (1982)

1: 23N.1W.33.313
2: Pit 5875
3: SW1/4 33 T23N R1W 36°10'41"N 106°57'18"W
4: Regina 7-1/2 (Abiquiu)
5: 1/2 mi SW of Regina, NM
6: gravel
7: open pit
8: production unknown
9: Quaternary pediment gravel
11: NMSHD estimates 16,000 cu yds
12: NMSHD (1975); MILS (1981); NMBMMR files; Merrick and Woodward (1982)

1: 23N.1W.33.143
2: Pit 5883
3: NW1/4 33 T23N R1W 36°10'53"N 106°57'4"W
4: Regina 7-1/2 (Abiquiu)
5: 1/4 mi NE Regina, NM
6: gravel
7: active open pit
8: production unknown
9: Quaternary terrace and pediment deposits
11: NMSHD estimates 8,000 cu yds
12: NMSHD (1975); MILS (1981); NMBMMR files; Merrick and Woodward (1982)

1: 23N.4W.16
2: Borrow Pit
3: 16 T23N R4W 36°12'54"N 107°15'7"W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 23N.4W.28
2: Borrow Pit
3: 28 T23N R4W 36°11'24"N 107°15'2"W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 23N.5W.26.300
2: Pit 0875
3: SW1/4 26 T23N R5W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
5: 9 mi WNW of Armijo Reservoir
6: gravel
7: open prospect pit
8: in prospecting and testing stage by NMSHD
9: Quaternary pediment gravel
12: NMSHD (1975)

1: 23N.5W.33
2: Borrow Pits
3: 33 T23N R5W 36°10'46"N 107°21'26"W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
6: sand and gravel
7: 2 pits
8: production unknown
12: MILS (1981)

1: 23N.5W.34
2: Borrow Pit
3: 34 T23N R5W 36°10'59"N 107°20'44"W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 23N.5W.35
2: Borrow Pit
3: 35 T23N R5W 36°11'3"N 107°20'12"W
4: Tancosa Windmill 7-1/2 (Chaco Canyon)
6: sand and gravel
7: pit
8: production unknown
12: MILS (1981)

1: 23N.6W.22
2: Pit #78-20-S
3: 22 T23N R6W 36°12'15"N 107°27'41"W
4: Counselor 7-1/2 (Chaco Canyon)
6: stone
7: pit
8: production unknown
12: MILS (1981)

1: 23N.6W.24
2: Pit #79-3-S
3: 24 T23N R6W 36°12'21"N 107°25'28"W
4: Counselor 7-1/2 (Chaco Canyon)
6: stone
7: pit
8: production unknown
12: MILS (1981)

Material pits in Santa Fe County

1: 15N.7E.7.100
2: NMSHD pit 0743
3: NW1/4 7 T15N R7E
4: Tetilla Peak 7-1/2 (Los Alamos)
5: 1/2 mi south of La Bajada, NM
6: gravel
7: prospect
8: production unknown
9: volcanic rock
11: NMSHD estimates 275,000 cu yds
12: NMSHD (1975)

1: 15N.7E.20.100
2: NMSHD pit 0744
3: NW1/4 20 T15N R7E
4: Tetilla Peak 7-1/2 (Los Alamos)
5: 5 mi due south Tetilla Peak
6: sand and gravel
7: open pit
8: production unknown
9: volcanic rocks
11: NMSHD estimates 75,000 cu yds
12: NMSHD (1975)

1: 16N.8E.32.300
2: NMSHD pit 0742
3: SW1/4 32 T16N R8E
4: Tetilla Peak 7-1/2 (Los Alamos)
5: 7 mi south of Cerro Portillo
6: gravel
7: open pit
8: production unknown
9: monzonite
11: NMSHD estimates 350,000 cu yds
12: NMSHD (1975)

1: 16N.7E.18.100
2: prospect pit 0740
3: NW1/4 18 T16N R7E
4: Tetilla Peak 7-1/2 (Los Alamos)
5: La Bajada Grant
6: gravel
7: prospect pit
8: production unknown
9: basalt
11: NMSHD estimates 750,000 cu yds
12: NMSHD (1975)

1: 16N.7E.28
2: NMSHD pit 0741
3: 28 T16N R7E
4: Tetilla Peak 7-1/2 (Los Alamos)
5: 1-1/2 mi south of Tetilla Peak
6: gravel
7: open pit
8: production unknown
9: basalt
11: NMSHD estimates 600,000 cu yds
12: NMSHD (1975)

Mica occurrences in Bernalillo County

1: 10N.5E.20.300
2: Unknown
3: 20 T10N RE
4: Tijeras Canyon 7-1/2 (Albuquerque)
5: Placitas and Tijeras Canyon districts
6: muscovite, mica, tourmaline, feldspar
9: Precambrian
11: Placitas district, in Juan Tabo area. Also in Sandia Mountains between Placitas and Tijeras Canyon districts. A notable occurrence is on the west side of the mountains just north of Embudo Canyon.
12: Kness (1982); Northrop (1959)

Mica occurrences in Sandoval County

1: 17N.2E
2: Unknown
3: T17N R2E
4: (Los Alamos)
5: Jemez Springs district
6: muscovite
11: exact location unknown
12: Northrop (1959)

Miscellaneous deposits in Bernalillo County

1: 9N.4-1/2E.12.200
2: Great Combination
3: NE1/4 12 T9N R4-1/2E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon mining district
6: building stone
7: quarrying of talas blocks
8: production unknown
9: Precambrian quartzite
12: Elston (1967, p. 59)

1: 8N.3E
2: Unknown
3: T8N R3E
4: (Belen)
5: east of Isleta Pueblo
6: wood-opal
10: milk-white and fluorescent
11: exact location unknown
12: Northrop (1959)

1: 10N.5E.16.442
2: Ross pit
3: 16 T10N R5E
4: Tijeras 7-1/2 (Albuquerque)
5: Tijeras Canyon district
6: graphite
7: pit
8: no production
9: Pennsylvanian Madera Group
10: 1-3 ft wide graphite vein within limestone and sandstone
12: V. C. Kelley and Northrop (1975); Elston (1967); Northrop (1959);Ellis (1922); Herrick (1900)

1: 11N.3E.25
2: Unknown
3: 25 T11N R3E
4: Alameda 7-1/2 (Albuquerque)
5: Sandia Mountains
6: graphite
10: no additional information available
12: NMBMMR files

1: 11N.4E.3.411
2: Quartz Mine #2 (La Quava and La Madera)
3: 3 T11N R4E 35°12'35"N 106°30'26"W
4: Alameda 7-1/2 (Albuquerque)
5: east-southeast of Sandia Tramway
6: quartz
9: Precambrian quartzite
12: MILS (1981)

1: 11N.4E.5
2: Quartz Mine #1
3: 5 T11N R4E 35°12'55"N 106°32'29"W
4: Alameda 7-1/2 (Albuquerque)
6: quartz crystal
12: MILS (1981)

1: 8N.5E.16.100
2: Isleta Quartz Mine
3: 16 T8N R5E 34°55'22"N 106°25'30"W
4: Mount Washington 7-1/2 (Belen)
6: quartz crystal
9: Precambrian quartzite
12: MILS (1981)

Miscellaneous deposits in Sandoval County

1: 14N.3E.21,22
2: Unknown
3: 21,22 T14N R3E
4: Bernalillo NW 7-1/2 (Albuquerque)
5: along Jemez River near Santa Ana Pueblo
6: roofing sand
7: open pit
8: was sold to Marrel Roofing Co. in Albuquerque in 1960's
9: Quaternary aeolian sand
12: Elston (1967, p. 59)

1: 16N.6E.8
2: Unknown
3: 8 T16N R6E
4: Cochiti Dam 7-1/2 (Los Alamos)
6: opal
9: sandy loam over Quaternary rhyolite flows
12: Hunt (1978); NMBMMR files

5: Jemez Mountains Valle Grande
6: diatomite
10: diatoms occur in lake deposits of Valle Grande
11: no location known--not plotted
12: Northrop (1959)

1: 19N.3E.32
2: Unknown
3: 32 T19N R32
4: Jemez Springs 7-1/2 (Los Alamos)
5: Jemez Mountains Valle Grande
6: hyalite
10: near Battleship Rock, small stalactites of hyalite occur in fissures of lava
12: Northrop (1959)

1: 23N.7W
2: Unknown
3: T23N R7W
4: (Chaco Canyon)
5: northwestern part of Sandoval County
6: alum
9: Quaternary alluvium
10: in sandstone
11: no location known--not plotted
12: Hunt (1978); Talmage and Wootton (1937); NMBMMR files

Perlite deposits in Sandoval County

1: 17N.4E.29,32
2: Unknown
3: 29, 32 T17N R4E
4: Bear Springs Peak 7-1/2 (Los Alamos)
5: near Bear Springs
6: perlite
7: explored and tests in the 1950's
9: Quaternary Chicoma perlite
12: Weber (1965c); Mills (1952)

1: 17N.5E.19.200
2: Peralta Canyon deposit
3: 19 T17N R5E
4: Cañada 7-1/2 (Los Alamos)
5: Jemez Mountains
6: perlite
7: no development
8: no production
9: Quaternary Chicoma perlite
11: extensive deposit in eastern half of section 19
12: R. L. Smith and others (1970); Mills (1952)

1: 17N.5E.25.331
2: Bland Canyon deposit
3: 25 T17N R5E
4: Cochiti Dam 7-1/2 (Los Alamos)
5: below the mining camp of Bland
6: perlite
7: prospect only, expansion tests look promising
9: Quaternary Chicoma perlite
12: Weber (1965c)

1: 17N.5E.28
2: Otto Pit
3: 28 T17N R5E 35`47'49"N 106`27'46"W
4: Cañada 7-1/2 (Los Alamos)
6: perlite
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 17N.5E.29
2: Peralta Canyon Deposit
3: 29 T17N R5E
4: Cañada 7-1/2 (Los Alamos)
6: perlite
7: open pit
8: production limited to a few small shipments
9: Quaternary Chicoma perlite
11: extensive beds of perlite throughout southern and northern parts of section 28 (Mills, 1952)
12: Weber (1965c); Elston (1967); Mills (1952)

1: 17N.5E.30.130
2: Peralta Canyon deposit
3: 30 T17N R5E
4: Cañada 7-1/2 (Los Alamos)
5: Jemez Mountains
6: perlite
7: no development
8: no production
9: Quaternary Chicoma perlite
12: R. L. Smith and others (1970); Mills (1952)

1: 15N.1E.13
2: Jonas Pumice and Gypsum
3: 13 T15N R1E 35`31'45"N 106`47'12"W
4: San Ysidero 7-1/2 (Los Alamos)
6: pumice, gypsum
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 15N.4E.27
2: Volcalite Mine
3: 27 T15N R4E 35`29'56"N 106`30'2"W
4: Santa Ana Pueblo 7-1/2 (Los Alamos)
6: pumice
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 16N.4E.2.142
2: Pumice Group
3: 2 T16N R4E 35`38'49"N 106`29'16"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 16N.4E.2.144
2: Pumice mine
3: 2 T16N R4E 35`38'45"N 106`29'17"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); topographic map (1953)

1: 16N.4E.11.122
2: Pumice Mine
3: 11 T16N R4E 35`38'21"N 106`29'18"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 16N.4E.11.123
2: Pumice mine
3: 11 T16N R4E 35`38'13"N 106`29'16"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); Topographic map (1953)

1: 16N.4E.11.142
2: Pumice Group
3: 11 T16N R4E 35`38'6"N 106`29'16"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 17N.2E.3
2: Pyramid Pumice
3: 3 T17N R2E 35`43'49"N 106`43'6"W
4: Ponderosa 7-1/2 (Los Alamos)
5: Jemez Mountains
6: pumice
7: pit
8: no production known
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1978)

1: 17N.3E.9.422
2: Strip Mine
3: 9 T17N R3E 35`42'55"N 106`37'26"W
4: Bear Springs Peak 7-1/2 (Los Alamos)
6: pumice
7: pits
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 17N.3E.9
2: Strip Mine
3: 9 T17N R3E 35`43'5"N 106`37'54"W
4: Ponderosa 7-1/2 (Los Alamos)
6: pumice
7: pits
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 17N.3E.10.112
2: Strip Mine
3: 10 T17N R3E 35`43'22"N 106`37'7"W
4: Bear Springs Peak 7-1/2 (Los Alamos)
6: pumice
7: pits
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 17N.3E.15.211
2: Strip Mine
3: 15 T17N R3E 35`42'30"N 106`36'54"W
4: Bear Springs Peak 7-1/2 (Los Alamos)
6: pumice
7: pits
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 17N.4E.35.232
2: Pumice Mine
3: 35 T17N R4E 35`39'42"N 106`29'13"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 17N.5E.10.241
2: Pumice
3: 10 T17N R5E
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: Ryan (1983); R. L. Smith and others (1970)

1: 17N.5E.10.424
2: Pumice
3: 10 T17N R5E 35`43'9"N 106`23'27"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: pits
8: production unknown
9: Quaternary Bandelier Tuff
12: Ryan (1983); R. L. Smith and others (1970); MILS (1981)

1: 17N.5E.11.333
2: Pumice Mine
3: 11 T17N R5E 35`42'45"N 106`23'15"W
4: CAñada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: Ryan (1983); R. L. Smith and others (1970); MILS (1981)

1: 17N.5E.11.341
2: Pumice mine
3: 11 T17N R5E 35`42'46"N 106`23'00"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: Ryan (1983); R. L. Smith and others (1970)

1: 17N.5E.14.141
2: Pumice Group
3: 14 T17N R5E 35`42'40"N 106`23'1"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: Ryan (1983); R. S. Smith and others (1970); MILS (1981)

1: 17N.5E.14.311
2: Pumice mine
3: 14 T17N R5E
4: Cañada 7-1/3 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: Ryan (1983); R. L. Smith and others (1970)

1: 17N.5E.15.421
2: Santa Barbara Group
3: 15 T17N R5E 35`42'24"N 106`23'22"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: Ryan (1983); R. L. Smith and others (1970); MILS (1981)

1: 17N.5E.28.442
2: Pumice Mine
3: 28 T17N R5E 35`40'10"N 106`24'35"W
4: Cañada 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

1: 18N.3E.34
2: Esquire Claims 5-9
3: 34T18N R3E
4: Redondo Peak 7-1/2 (Los Alamos)
5: Jemez Mountains
6: pumice
7: open cut
8: 160 cyd in 1984-active
9: Quaternary Bandelier Tuff
11: Utility Block Co.
12: Barker and others (1984); W. T. Siemers and Austin (1979);
R. L. Smith and others (1970)

1: 18N.4E.13.223
2: Valle Grande Pumice Mine
3: 13 T18N R4E 35`47'49"N 106`27'46"W
4: Bland 7-1/2 (Los Alamos)
6: pumice
7: open pit
8: production unknown
9: Quaternary Bandelier Tuff
12: R. L. Smith and others (1970); MILS (1981)

Scoria in Bernalillo County

1: 8N.1E.18.240
2: Black Bird
3: 18 T8N R1E 35°00'24"N 106°53'6"W
4: La Mesita Negra 7-1/2 (Belen)
6: scoria
7: open pit
8: 16 tons per day in 1979
9: Pliocene basaltic andesite
10: vesicular basaltic material deposited in a scoria cone
12: W. T. Siemers and Austin (1979); Cima (1978); MILS (1981)

1: 8N.2E.20
2: Edgar D. Otto Mine
3: 20 T8N R2E 34°53'59"N 106°51'57"W
4: Wind Mesa 7-1/2 (Belen)
6: scoria
8: production unknown
12: MILS (1981)

1: 8N.1E.18.200
2: NMSHD pit 0914
3: NE1/4 18 T8N R1E
4: Wind Mesa 7-1/2 (Belen)
6: scoria
7: open pit
8: production unknown
9: Quaternary cinder deposit
12: NMSHD (1975)

1: 8N.5E.6
2: Quail Lode
3: 6 T8N R5E 34°56'51"N 106°27'9"W
4: Mount Washington 7-1/2 (Belen)
6: scoria
8: production unknown
12: MILS (1981)

1: 8N.1E.20
2: Quarry
3: 20 T8N R1E 34°54'00"N 106°51'58"W
4: Wind Mesa 7-1/2 (Belen)
6: scoria
8: production unknown
9: Quaternary cinder deposit
12: MILS (1981)

1: 19N.3E.28
2: San Diego sulfur deposit
3: 28 T19N R3E 35`50'58"N 106`37'43"W
4: Jemez Springs 7-1/2 (Los Alamos)
5: Jemez Springs district
6: sulfur
7: prospect pits and cuts
8: no production
9: Carboniferous or Permian limestone
10: 700 ft long, 150 ft wide, 2 to 4 in thick irregular deposit, 15-34% S, associated with hot springs deposit
11: location is only estimated from descriptions by Broderick (1965) and P. S. Smith (1918)
12: Broderick (1965); F. J. Kelley (1962); Wideman (1957); Mansfield (1918); P. S. Smith (1918); MILS (1981)

1: 19N.3E.4
2: Sulfur Springs (Sulphur Bank Group)
3: 4 T19N R3E 35`54'30"N 106`36'55"W
4: Valle San Antonio 7-1/2 (Los Alamos)
5: Jemez Springs district
6: sulfur
7: prospect pits and cuts, adit
8: 100 tons of 60% S from 1902 to 1904
9: Quaternary caldera fill (rhyolite)
10: 9-acre deposit, sulfur along fractures in rhyolite
11: In 1933, the New Mexico Acid Co. erected an extraction plant which was unsuccessful. In 1934, 2 retorts were being installed.
12: Broderick (1965); Northrop (1959); Wideman (1957); Mansfield (1918); P. S. Smith (1918); MILS (1981)

Travertine deposits in Sandoval County

1: 15N.1E.16,21
2: Unknown
3: 16, 21 T15N R1E
4: San Ysidro 7-1/2 (Los Alamos)
6: travertine
7: occurrence
8: no production
9: Tertiary travertine
11: suitable for building stone
12: Woodward (1984); Woodward and Ruetschilling (1976)

1: 16N.1E.24,25,36
2: Unknown
3: 24,25,36 T16N R1E
4: San Ysidro 7-1/2 (Los Alamos)
6: travertine
7: several small deposits
9: Tertiary travertine
11: suitable for building stone, access poor, some deposits in area are radioactive
12: Woodward (1984); Woodward and Ruetschilling (1976)

1: 16N.1E.18
2: Unknown
3: 18 T16N R1E 35`37'30"N 106`52'30"W
4: San Ysidero 7-1/2 (Los Alamos)
5: near common corner of Holy Ghost, Gilman, and San Ysidro quadrangles on Zia Pueblo land
6: travertine
7: occurrence
9: Tertiary travertine
11: suitable for building stone
12: Woodward (1984); Woodward and Ruetschilling (1976)

Tijeras Coal Field - Bernalillo County

10N.5E.1.242	Section 1 mine
10N.5E.11.423	Prospect
10N.5E.14.121	Coal prospect
10N.5E.15.144	Mine
10N.6E.6.111	Mine
10N.6E.6.131	Mine
10N.6E.6.213	Mine
10N.6E.6.431	Holmes Mine
11N.6E.31.432	Tocco Mine

Placitas Coal Field - Sandoval County

13N.5E.29.423	Unnamed coal mine
13N.5E.31.314	Taraddei prospect
13N.5E.33.431	Unnamed coal mine

Chacra Mesa Coal Field - Sandoval County

17N.4W.34.231	Tachias Prosect, coal prospect, Padilla-Maestas Prospects

Monera Field - Sandoval County

23N.1W.23.333	Amik Prospect

Rio Puerco Coal Field - Bernalillo and Sandoval Counties

10N.2W.8.214	Canoncito Mine
10N.2W.18.132	Ferro Mine
10N.2W.18.132	Unnamed coal mine
12N.1W.28.124	Heron Prospect
14N.1E.1.112	Chavez Mine
14N.1E.4.223	Garcia Mine (Carlisle-Garcia prospect)
14N.1E.8.211	San Ysidro, Sanchez Mine, Sellers Prospect
14N.1E.8.323	Sanchez Mine (San Ysidro?)
14N.1E.8.223	Marez Prospect, Sellers prospect

Hagan Coal Field - Sandoval County

13N.6E.17.431	Coyote Mine (Sloan?)
13N.6E.17.431	Sloan Mine
13N.6E.18.214	Tejon Mine
13N.6E.17.312	Donnell Prospect
13N.6E.33.441	Hagan Mine(s) (New Mexico Fuel and Iron)
14N.6E.19.332	Karavanus Prospect
14N.6E.32.433	Pina Vititos Mine

Star Lake Coal Field - Sandoval County

19N.4W.7.444	prospect

La Ventana Coal Field - Sandoval County

17N.2W.10.132	Gallegos Yarbrough-San Luis Mine
17N.2W.16.141	Arroyo #1 Mine
18N.1W.5.411	Sanchez-Sandoval Prospect
18N.2W.1.312	untimbered prospect
18N.2W.2.212	Peacock No. 2
18N.2W.2.312	Prospect (Rhinehardt and Yardis-Gardenas Mine)
18N.2W.2.243	Prospect
18N.2W.3.444	coal prospect
18N.2W.11.313	prospect tunnel (Stackhouse)
18N.2W.11.133	prospect (Stackhouse)
18N.2W.14.111	prospect (Stackhouse)
18N.2W.14.331	prospect
18N.2W.21.324	Unnamed prospect (probably Brechtel prospect)
18N.2W.23.144	Tonapah Mine, Hinkley and Harris Mine
18N.2W.33.131	prospect pit
19N.1W.4.223	Black Rose Mine
19N.1W.4.223	Black Rose-Elena Mine
19N.1W.4.112	prospect permit to J. M. McDonald
19N.1W.4.312	prospect pit
19N.1W.4.132	prospect pit
19N.1W.4.241	prospect pit
19N.1W.9.321	Kaseman prospect
19N.1W.16.431	McDonald and Harps Mine
19N.1W.17.244	Weil prospect
19N.1W.19.324	Prospect by Sandoval Coal Co. Rio Puerco Mine?
19N.1W.19.132	Hoye Mine
19N.1W.20.431	prospect-Carlisle prospect-Carlisle Mine
19N.1W.20.431	Easley prospect
19N.1W.20.423	Jones Prospect
19N.1W.26.233	Wilkins no. 2
19N.1W.27.313	Wilkins no.1
19N.1W.29.143	Mitchell Prospect
19N.1W.30.123	Coal prospect unnamed
19N.1W.31.213	Cleary Mine, San Juan Coke and Coal, Co. San Juan Mine
19N.1W.31.311	Luciano Peacock no. 2
19N.1W.31.331	Loyd Sturgis Prospect
19N.1W.31.313	Peacock no. 3
19N.1W.32.413	Nance Mine, White Ash Mine
19N.1W.33.434	Jagels prospect
19N.2W.27.231	Sackett Mine (Anderson Sackett Mine)
19N.2W.35.214	Anderson Mine, Carbon Coal Co.
19N.2W.35.223	Casement prospect
19N.2W.35.434	prospect pit
19N.2W.36.423	Luciano Peacock no. 1
19N.3W.36.440	McDonald prospect
20N.1W.11.213	Senorita Mine
20N.1W.23.423	San Pablo Mine
20N.1W.26.121	prospect
20N.1W.28	La Ventana Mine
20N.1W.33.232	Padilla Mine
20N.1W.33.232	Padilla no. 2
20N.1W.33.232	San Miguel Mine
20N.1W.33.134	Sunny Slope, McCrary Mine

1: 10N.5E.1.242
2: Section 1 mine
3: NE1/4 1 T10N R5E
4: Sedillo 7-1/2 (Albuquerque) Elevation 6,870 ft
5: Tijeras coal field
6: coal
9: Mesaverde Group
11: On Kelly and Northrop map
12: Kelley and Northrop (1975); AML files (1982)

1: 10N.5E.11.423
2: prospect
3: SE1/4 11 T10N R5E
4: Sedillo 7-1/2 (Albuquerque) Elevation 6,640 ft
5: Tijeras coal field
6: coal
7: prospect
9: Mesaverde Group
10: 1 ft 7 in. coal in a steeply dipping area of the west limb of the Cedar Crest Syncline. Area is also faulted. Dips of 24°E
12: Lee and Knowlton (1917); Kelley and Northrop (1975)

1: 10N.5E.14.121
2: Coal prospect
3: NW1/4 14 T10N R5E
4: Tijeras 7-1/2 (Albuquerque) Elevation 6,360 ft
5: Tijeras coal field
6: coal
7: prospect
9: Mesaverde Group
10: 1 ft coal measured by Lee. Dip 77°SW strike to the NE. Prospect on left limb of Cedar Crest Syncline.
12: Lee and Knowlton (1917); Kelley and Northrop (1975); MILS (1981); AML files (1982)

1: 10N.5E.15.144
2: Mine
3: SE1/4 15 T10N R5E
4: Tijeas 7-1/2 (Albuquerque) Elevation 6,640 ft
5: Tijeras coal field
6: coal
9: Mesaverde Group
10: Highly faulted area. Coal beds of 1 and 2 ft. Beds dipping at high angle 67°SE.
11: On Lee and Knowlton's map
12: Lee and Knowlton (1917)

1: 10N.6E.6.111
2: Mine
3: NW1/4 6 T10N R6E
4: Sandia Park 7-1/2 (Albuquerque) Elevation 6,840 ft
5: Tijeras coal basin
6: coal
7: mine
9: Mesaverde Group
10: Dip of beds 19°NE on west limb of Tijeras Syncline. 3 to 1 ft of coal present. Faulting present in area.
12: Lee and Knowlton (1917); Kelley and Northrop (1975)

1: 10N.6E.6.131
2: mine
3: NW1/4 6 T10N R6E
4: Sedillo 7-1/2 (Albuquerque) Elevation 6,800 ft
5: Tijeras coal field
6: coal
9: Mesaverde Group
10: Six in. to 2 ft 3 in. of coal. Mine is on east limb of Tijeras Syncline. Dip is 16°E in area. Faulting is present in area.
12: Lee and Knowlton (1917); Kelley and Northrop (1975)

1: 10N.6E.6.213
2: prospect
3: SW1/4 6 T10N R6E
4: Sedillo 7-1/2 (Albuquerque) Elevation 6,740 ft
5: Tijeras coal field
6: coal
7: prospect
9: Mesaverde Group
10: 3 in. of coal to 1 ft. Prospect on west side of Tijeras Syncline. Deip 25°W-NW.
12: Lee and Knowlton (1917); Kelley and Northrop (1975); AML files (1982)

1: 10N.6E.6.431
2: Holmes mine
3: NW1/4 6 T10N R6E
4: Sedillo 7-1/2 (Albuquerque) Elevation 6,720 ft
5: Tijeras coal field
6: coal
7: tunnel driven N40°E
8: some production
9: Mesaverde Group
10: Mine near center of Tijeras Syncline, beds dipping 25°NW. Coals in sandstone sequence and tend to be variable. Coal ranges from 1.0-2.5 ft. Tijeras Basin has several faults running through it.
11: Analyses: moisture 1.6, volatile matter 31.1, fixed carbon 36.1, ash 31.1, sulfur 3.2, Btu 10,046
12: Fieldner and others (1914); Lee and Knowlton (1917); Kelley and Northrop (1975); MILS (1981); AML files (1982)

1: 10N.2W.8.214
2: Cañoncito mine
3: SE1/4 8 T10N R2W 35°06'33"N 106°04'10"W
4: Cañoncito School 7-1/2 (Grants) Elevation 5,740 ft
5: Rio Puerco coal field
6: coal
7: 90 ft drift
8: 1937-1942 13,748 tons
9: Crevasse Canyon Formation Gibson Member
10: 3 ft of coal, general dip of beds 7°SE
12: Hunt (1936); Tabet and Frost (1979); Nickelson unpub. data (1979); MILS (1981); AML files (1982)

1: 10N.2W.18.132
2: Ferro mine
3: NE1/4 18 T10N R2W 36°05'55"N 106°05'11"W
4: Cañoncito School 7-1/2 (Grants) Elevation 5,735 ft
5: Rio Puerco coal field
6: coal
7: entry 750 ft N70°E, numerous rooms
8: 1943-3,912 tons; 1944-3,239 tons
9: Menefee Formation, Gibson Member
10: General dip 8°SE. Coal 3.75 ft thick
11: Nickelson estimates production 17,239 tons
12: New Mexico State Mine Inspector (1903-1981); Tabet and Frost (1979); Nickelson unpub. data (1979); MILS (1981); AML files (1982)

1: 10N.2W.18.132
2: unnamed coal mine
3: NE1/4 18 T10N R2W 35°05'53"N 107°05'10"W
4: Cañoncito School 7-1/2 (Grants) Elevation 5,720 ft
5: Rio Puerco coal field
6: coal
9: Menefee Formation Gibson Member
10: Dip 8°SE
12: Hunt (1936); MILS (1981)

1: 11N.6E.31.432
2: Tocco Mine
3: NE1/4 31 T11N R6E
4: Sandia Park 7-1/2 (Albuquerque) Elevation 7,040 ft
5: Tijeras coal field
6: coal
7: tunnel to 260 ft on S12°E direction 28° slope
8: opened 1908-350 tons, 1909-300 tons, 1910-160 tons; 1911-160 tons
9: Mesaverde Group
10: Left limb of Tijeras Syncline, dip 20-25°S-SE. There is faulting in the area. Coal seams at mine - 1.5 ft and 3 ft thick.
11: Water in mine made mining difficult to impossible.
12: Lee and Knowlton (1917); Kelley and Northrop (1975); AML files (1982

Sandoval County Coal Occurrences

1: 12N.1W.28.124
2: Heron Prospect
3: SE1/4 28 T12N R1W
4: Benavidez Ranch 7-1/2 (Albuquerque) Elevation 5,680 ft
5: Rio Puerco coal field
6: coal
7: 4 pits
8: 85 tons
9: Crevasse Canyon Formation
10: Dip on beds 20-30°SE, coals ranging from 14 in. to 30 in. thick.
12: Nickelson unpub. data (1979); MILS (1981)

1: 13N.5E.29.423
2: unnamed coal mine
3: SW1/4 29 T13N R5E 35°19'26"N 106°26'11"W
4: Placitas 7-1/2 (Albuquerque) Elevation 5,640 ft
5: Placitas coal field
6: coal
9: Mesaverde Group
10: Beds dip 70°N-NE
12: Kelley and Northrop (1975); MILS (1981)

1: 13N.5E.31.314
2: Taraddei prospect
3: SE1/4 31 T13N R5E 35°18'30"N 106°27'07"W
4: Placitas 7-1/2 (Albuquerque) Elevation 5,970 ft
5: Placitas field
6: coal
7: slope started in alluvium driven 65 ft
8: 265 tons
9: Mesaverde Group
10: Area is faulted and dips range from 30-65° to the north. Coal is 3 ft thinning to 1 ft.
12: New Mexico State Mine Inspector (1933); Kelley and Northrop (1975); Nickelson unpubl. notes (1979); MILS (1981); AML files (1982)

1: 13N.5E.33.431
2: unnamed coal mine (Placitas?)
3: NW1/4 33 T13N R5E 35°18'46"N 106°25'23"W
4: Placitas 7-1/2 (Albuquerque) Elevation 5,940 ft
5: Placitas coal field
6: coal
9: Mesaverde Group
10: Beds dip 60°NE, some faulting in the area
12: Kelley and Northrop (1975); MILS (1981); AML files (1982)

1: 13N.6E.17.431
2: Coyote Mine (Sloan Mine?)
3: NW1/4 17 T13N R6E 35°21'12"N 106°20'03"W
4: Hagan 7-1/2 (Albuquerque) Elevation 5,660 ft
5: Hagan coal field
6: coal
8: Refer to Sloan mine
9: Mesaverde Group
10: on downdrop side of fault
11: probably the same mine as Sloan mine (Kelley and Northrop)
12: Kelley and Northrop (1975): MILS (1981); AML files (1982)

1: 13N.6E.17.431
2: Sloan mine
3: NW1/4 17 T13N R6E
4: Hagan 7-1/2 (Albuquerque) Elevation 5,660 ft
5: Hagan coal field
6: coal
8: 1918-1919 produced 200 tons
9: Mesaverde Group
10: Strike N-S, and dip is 20°E, heavily faulted area. Coal ranges in thickness from 1 ft to 4 ft. In section measured by Campbell eight coals were described. Coals occur in sandstone-dominated sequence.
11: Moisture 9.7%, volatile matter 42.3%. Mine close to NE-SW left offset oblique fault.
12: Campbell (1906); Ellis (1936); Harrison (1949); Elston (1967); Kelley and Northrop (1975); Keyes (1904); Nickelson unpubl. data (1979); AML files (1982)

1: 13N.6E.18.214
2: Tejon mine
3: SE1/4 17 T13N R6E 35°21'17"N 106°20'34"W
4: Hagan 7-1/2 (Albuquerque)
5: Hagan coal field
6: coal
8: 1926-557 tons; 1937-1,311 tons; 1939-5,137 tons
9: Mesaverde Group
10: On down drop side of normal fault south of mine. Coal 1.5 ft, shale 0.5 ft, coal 1 ft 3 in. Dip 22-27°E.
11: Nickelson: 1924-1928 - 1,238 tons; 1928-1933 - 5,379 tons; 1935-1942 - 21,039 tons produced. Poor quality coal, sold to brick plant.
12: Kelley and Northrop (1975); Nickelson unpubl. data (1979); MILS (1981): AML files (1982)

1: 13N.6E.17.312
2: Donnell Prospect
3: NW1/4 17 T13N R6E
4: Hagan 7-1/2 (Albuquerque) Elevation 5,720 ft
5: Hagan coal field
6: coal
7: 60 ft drift
8: none
9: Mesaverde Group
10: 1 ft 6 in. coal bed in coal-shale sequence. Faulting prevalent in area. General dip of beds 26°NE. Analyses: moisture 11%, volatile matter 38.5%, fixed carbon 44.3%, ash 6.2%, 0.6% sulfur, 5.8% hydrogen, 64.4% carbon, Btu/lb 11,410.
11: 10 in. of coal, 1 ft 3 in., shale 1 ft 6 in. coal reported by Nickelson
12: Ellis (1936); Tabet and Frost (1979); Nickelson unpubl. data (1979); MILS (1981)

1: 13N.6E.33.441
2: Hagan Mine(s), New Mexico Fuel and Iron
3: NW1/4 33 T13N R6E 35°18'58"N 106°18'33"W
4: Hagan 7-1/2 (Albuquerque) Elevation 5,820 ft
5: Hagan coal field
6: coal
7: 700 ft slope, with 15° dip
8: 1903-1909 - 11,888 tons; 1918-1919 - 300 tons; 1924-1930 - 75,156 tons
9: Mesaverde Group, Hopewell coal bed
10: Coal bed mined was 4 ft. Roof and floor of massive sandstone. Mine in area where dip changes from 20°N-NE, to 15°N. Analyses: moisture 7.8%, volatile matter 44.7%, fixed carbon 41.8%, ash 5.7%, sulfur 0.7%.
11: Nickelson field notes
12: Campbell (1907); Keyes (1904); New Mexico State Mine Inspector (1903-1909 1919, 1924-1930); Lee and Knowlton (1917); Ellis (1936); Harrison (1949); Elston (1967); Kelley and Northrop (1975); Tabet and Frost (1979); MILS (1981); AML files (1982)

1: 14N.1E.1.112
2: Chavez mine
3: NE1/4 1 T14N R1E 35°28'42"N 106°47'16"W
4: Sky Village NE 7-1/2 (Albuquerque) Elevation 5,720 ft
5: Rio Puerco coal field
6: coal
7: mine
9: Crevasse Canyon, Gibson Member
10: Dip 22°SE. Maximum thickness of individual coal seam is 1 ft. Coals in sequence of shale, sandy shale, and sandstones. Several thin coal seams in measured section by Hunt.
12: Hunt (1936); Tabet and Frost (1979); MILS (1981); AML files (1982)

1: 14N.1E.4.223
2: Garcia mine (Carlisle-Garcia prospect)
3: SE1/4 4 T14N R1E
4: Sky Village NE 7-1/2 (Albuquerque) Elevation 5,810 ft
5: Rio Puerco coal field
6: coal
7: 140 ft slope
8: no production
9: Crevasse Canyon Formation, Gibson Member
10: 4 ft coal, coal proved to be of too poor quality.
11: open 1930-1934
12: Hunt (1936); Nickelson unpubl. data (1979); AML file (1982)

1: 14N.1E.8.211
2: San Ysidro, Sanchez Mine, Sellers Prospect
3: SW1/4 8 T14N R1E
4: Sky Village NE 7-1/2 (Albuquerque) Elevation 6,000 ft
5: Rio Puerco coal field
6: coal
7: 550 ft, N70° trend dip 10°S, 5 rooms
8: total production 2,954 tons
9: Crevasse Canyon Formation, Gibson Member
10: 5-1/2 ft coal with a 6 in. parting at center of bed. Strike of bed N20°W dip 10-15°E. Area is faulted (northwest of mine) and folding is present.
12: Hunt (1936); Nickelson unpubl. data (1979); MILS (1981); AML fields (1982)

1: 14N.1E.8.323
2: Sanchez Mine (San Ysidro?)
3: NW1/4 8 T14N R1W
4: Sky Village NE 7-1/2 (Albuquerque) Elevation 6,000 ft
5: Rio Puerco coal field
6: coal
7: open 1938-1947
9: Crevasse Canyon Formation, Gibson Member
10: Highly faulted area. Dip 10-15°E, strike N20°W. 5.5 ft coal with 0.5 ft parting in middle
11: Same as San Ysidro mine
12: Nickelson unpubl. data (1979); MILS (1981); AML files (1982)

1: 14N.1E.8.223
2: Marez prospect, Sellers prospect
3: SW1/4 8 T14N R1E 35°27'21"N 106°51'44"W
4: Sky Village NE 7-1/2 (Albuquerque) Elevation 5,940 ft
5: Rio Puerco coal field
6: coal
7: slope 170-180 ft
8: 30 tons produced; open 1922-1924
9: Crevasse Canyon Formation, Gibson Member
10: Faulted area, 5 ft 7 in., 2 ft 10 in., and 3 ft. Also are in measured section. In sequence of sandstones, shales,a nd sandy shales.
11: Dip 25°E
12: Hunt (1936); Nickelson unpubl. data (1979); MILS (1981); AML files (1982)

1: 14N.6E.19.332
2: Karavanus prospect
3: NE1/4 19 T14N R6E 35°25'43"N 106°20'39"W
4: San Felipe Pueblo NE 7-1/2 (Albuquerque) Elevation 5,485 ft
5: Hagan coal field
6: coal
7: 200 ft drift on N33°E bearing
8: 27 tons
9: Mesaverde Group
10: Three coals, 1 ft 4 in., to 2 ft in thickness
12: Nickelson unpubl. data (1979); MILS (1981); AML files (1982)

1: 14N.6E.32.433
2: Pina Vititos mine
3: SW1/4 32 T14N R6E
4: San Felipe Pueblo NE 7-1/2 (Albuquerque) Elevation 5,490 ft
5: Hagan field
6: coal
7: incline N85°E dip 28°. Dug with auger (7 ft).
9: Mesaverde Group
10: 27 in. thick coal with a 2 in. carb shale parting. Analyses: moisture 9.03%, volatile matter 42.35%, fixed carbon 44.17%, ash 4.45%, sulfur 0.66%. Beds are dipping 20°E-NE.
12: Campbell (1906); Lee and Knowlton (1917); Harrison (1949); Kelley and Northrop (1975); Tabet and Frost (1979); AML files (1982).

1: 17N.2W.10.132
2: Gallegos Yarborough-San Luis Mine
3: NE1/4 10 T17N R2W
4: San Luis 7-1/2 (Chaco Mesa) Elevation 6,440 ft
5: La Ventana coal field
6: coal
8: opened in 1925 by Gallegos; 5,000 tons produced.
9: Menefee Formation, Cleary Coal Member
10: Measured section at area of mie show 5 ft coal.
11: Reopened in 1961 by Montoya, no production. Yarbrough Mine (1948) produced 4,999 tons.
12: Hunt (1936); New Mexico State Mine Inspector Report (1903-1981); Nickelson unpubl. data (1979); AML files (1982)

1: 17N.2W.16.141
2: Arroyo #1 mine
3: NW1/4 16 T17N R2W 35°42'19"N 107°03'05"W
4: San Luis 7-1/2 (Chaco Mesa) Elevation 6,420 ft
5: La Ventana coal field
6: coal
8: 1979 - 4,466 tons; 1980 - 15,478 tons
9: Menefee Formation, Cleary Coal Member
11: No production reported for 1981, 1982. Closed in early 1984 by State. Mine area shown on coal lease map.
12: Nickelson unpubl. data (1979); Tabet and Frost (1979); MILS (1981)

1: 17N.4W.34.231
2: Tachias prospect, coal prospect, Padilla-maestas prospects
3: SW1/4 34 T17N R4W
4: Cañada Callidita 7-1/2 (Chaco Mesa) Elevation 6,080 ft
5: Chacra Mesa coal field
6: coal
7: two parallel tunnels with cross cut joint
8: 1933-1935 92 tons produced (USGS lease)
9: Menefee Formation, Cleary Coal Member
10: Coal in general vicinity is 1 ft 2 in. to 1 ft 6 in. thick (from measured section by C. B. Hunt). Mine: roof shale, 2 ft coal, 1 ft bony coal, 20.5 ft shale, 22 in. coal, floor shale
11: Dirty coal. Reopened in 1939, 190 tons produced.
12: Hunt (1936); Nickelson unpubl. data (1979); Tabet and Frost (1979); MILS (1981); AML files (1982)

1: 18N.1W.5.411
2: Sanchez-Sandoval prospect
3: NW1/4 5 T18N R1 W 35°49'23"N 106°58'03"W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,600 ft
5: La Ventana coal field
6: coal
7: prospect
9: Menefee Formation
10: Essentially flat-lying beds 2-5°N-NW. Thin coal seam
12: Dane (1936); Shetiwy (1978); MILS (1981)

1: 18N.2W.1.312
2: untimbered prospect
3: NW1/4 1 T18N R2W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,780 ft
5: La Ventana coal field
6: coal
7: prospect tunnel 20 ft long 5 ft high
9: Menefee Formation, Cleary Coal Member
10: Overlying sandstone acts as roof for prospect of 1 ft 5 in. coal bed. Prospect near faulted zoen on upthrown side of fault. General dip in area 5-10°NW.
12: Dane (1936)

1: 18N.2W.2.212
2: Peacock No. 2 (Luciano and Montoya)
3: NE1/4 2 T18N R2W 35°49'29"N 107°00'40"W
4: Headcut Reservoir 7-1/2 (Chaco Mesa)
5: La Ventana coal field
6: coal
7: 300 ft length, 350 ft wide, 7.5 ft height, 10° dip
8: 4,000 ton total production
9: Menefee Formation, Allison Member
10: Strike S20°W, dip 3-10°W, 7.5 ft coal seam. Analyses: moisture 12.6%, volatile matter 34.6%, fixed carbon 42.5%, ash 10.3%, Btu (as received) 10,390 Btu/lb.
11: USBM Analyses
12: USBM (1944); MILS (1981)

1: 18N.2W.2.312
2: Prospect (Rhinehardt and Yardis-Gardenas mine)
3: NE1/4 2 T18N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,860 ft
5: La Ventana coal field
6: coal
7: tunnel 35 ft long, 8 ft wide, 7 ft high, N80°W dip 10°W
9: Menefee Formation, Allison Member
10: Six ft coal overlain by sandstone roof, some faulting in area.
12: Dane (1936); AML files (1982).

1: 18N.2W.243
2: prospect
3: SW1/4 2 T18N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,860 ft
5: La Ventana coal field
6: coal
7: two small prospect pits
9: Menefee Formation, Allison Member
10: Coal bed of 5 ft 7 in. exposed in northernmost pit. Southern pit in burned area of coal. No major faulting in general vicinity. General dip 6°W-NW
12: Dane (1936); AML files (1982)

1: 18N.2W.3.444
2: coal prospect
3: SE1/4 3 T18N R2W 35°48'50"N 107°01'32"W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,940 ft
5: La Ventana coal field
6: coal
7: prospect
9: Menefee Formation, Allison Member
10: Beds dipping 6°NE overlying bed is La Ventana Sandstone.
12: MILS (1981)

1: 18N.2W.11.313
2: prospect tunnel (Stackhouse)
3: SW1/4 11 T8N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,700 ft
5: La Ventana coal field
6: coal
7: 25 ft long - poor roof, shale
9: Menefee Formation, Allison Member
10: 6 ft 1 in. coal with a 0.5 in. shale parting 22 in. above base of coal. Coal bed is 40 ft below base of La Ventana Sandstone.
12: Dane (1936)

1: 18N.2W.11.133
2: prospect (Stackhouse)
3: SW1/4 11 T18N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 7,020 ft
5: La Ventana coal field
6: coal
7: tunnel 20 ft deep
9: Menefee Formation, Allison Member
10: Coal 3 ft 10 in. thick, top of coal bed 16 ft below La Ventana Sandstone. General dip of beds in area 7°W. No major faulting in area.
12: Dane (1936); Nickelson unpubl. data (1979).

1: 18N.2W.14.111
2: prospect (Stackhouse)
3: NW1/4 14 T18N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 7,000 ft
5: La Ventana coal field
6: coal
7: 100 ft long tunnel. Track laid to prospect.
9: Menefee Formation, Allison Member
10: 3 ft 8 in. coal exposed with 1 ft 2 in. dirty coal below. No major faulting in area. General dip of beds 7°W.
12: Dane (1936); Nickelson unpubl. data (1979).

1: 18N.2W.14.331
2: prospect
3: NW1/4 14 T18N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 7,100 ft
5: La Ventana coal field
6: coal
7: 20 ft in side of cliff
9: Menefee Formation, Allison Member
10: Dirty coal 2 ft 1 in. thick, 6 in. brown shale, principal coal 3 ft 9 in. No major faulting in area, 7°W dip of beds.
12: Dane (1936)

1: 18N.2W.21.324
2: Unnamed prospect (probably Brechtel prospect)
3: SE1/4 21 T18N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,640 ft
5: La Ventana coal field
6: coal
7: 40 ft tunnel to the west at 5° dip, timbered
9: Menefee Formation, Allison Member
10: 4 ft 2 in. coal seam exposed, sandy shale roof.
12: Dane (1936); Nickelson unpubl. data (1979); MILS (1981)

1: 18N.2W.23.144
2: Tonapah mine, Hinkley and Harris mine
3: SE1/4 23 T18N R2W 35°46'18"N 107°00'31"W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,535 ft
5: La Ventana coal field
6: coal
7: 65 ft long entry
8: 2,582 tons reported production
9: Menefee Formation, Cleary Coal Member
10: Seven ft coal seam at main entry. Dip 5°W
11: Includes sec. 26, and 27 except the NE,NE,NE,NE of 27
12: Dane (1936); MILS (1981): AML fiels (1982)

1: 18N.2W.33.131
2: prospect pit
3: NW1/4 33 T18N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,800 ft
5: La Ventana coal field
6: coal
9: Menefee Formation, Allison Member
10: Two coals at pit, one is 2 ft 11 in.
12: Dane (1936)

1: 19N.1W.4.223
2: Black Rose mine
3: SW1/4 4 T19N R1W
4: San Pablo 7-1/2 (Los Alamos) Elevation 6,980 ft
5: La Ventana coal field Elevation 6,980 ft
6: coal
7: Slope 170 ft long mining 9 ft of coal
8: 24,000 tons
9: Menefee Formation, Allison Member
10: 12 ft of coal. La Ventana Sandstone is overlying unit. General dip 10-12°E. Padilla coal seam.
11: Lease by Nick Luciana acquired 1944.
12: New Mexico State Mine Inspector Report (1947); MILS (1981); Nickelson unpubl. data (1979); Ideal Basic, La Ventana Mine Plan (1979)

1: 19N.1W.4.223
2: Black Rose-Elena mine
3: SW1/4 4 T19N R1W
4: San Pablo 7-1/2 (Los Alamos) Elevation 6,980 ft
5: La Ventana coal field
6: coal
8: 52 tons
9: Menefee Formation
11: Same as Black Rose
12: Nickelson unpubl. data (1979)

1: 19N.1W.4.112
2: prospect permit to J. M. McDonald
3: NE1/4 4 T19N R1W
4: San Pablo 7-1/2 (Los Alamos) Elevation 7,020 ft
5: La Ventana coal field
6: coal
7: slope 170 ft, dip 12°NW, lengthened to 205 ft
9: Menefee Formation, Allison Member (Padilla Coal Seam)
10: 9 ft coal exposed. General dip 10°NW. No major faulting in area. Near opening coal bed 6 ft 1 in. Analyses: moisture 17.7%, volatile matter 35.0%, fixed carbon 42.5%, ash 4.8%, sulfur, 2.1%, Hydrogen 6.1%, 10,310 Btu/lb
12: Dane (1936); Ellis (1936); MILS (1981); Ideal Basic, La Ventana Mine Plan (1979)

1: 19N.1W.4.312
2: prospect pit
3: NE1/4 4 T19N R1W
4: San Pablo 7-1/2 (Los Alamos) Elevation 7,025 ft
5: La Ventana coal field
6: coal
7: no development since 1926
8: pit
9: Menefee Formation, Allison Member
10: Three pits close together with coals measuring 4 to 6 ft.
12: Dane (1936)

1: 19N.1W.4.132
2: prospect pit
3: NE1/4 4 T19N R1W
4: San Pablo 7-1/2 (Los Alamos) Elevation 7,025 ft
5: La Ventana coal field
6: coal
7: pit (2 of 3)
9: Menefee Formation, Allison Member
11: no developments since 1926
12: Dane (1936)

1: 19N.1W.4.241
2: prospect pit
3: NE1/4 4 T19N R1W
4: San Pablo 7-1/2 (Los Alamos) Elevation 7,000 ft
5: La Ventana coal field
6: coal
7: prospect pit (3 of 3)
9: Menefee Formation, Allison Member
11: no developments since 1926
12: Dane (1936)

1: 19N.1W.9.321
2: Kaseman prospect
3: NE1/4 9 T19N R1W
4: San Pablo 7-1/2 (Los Alamos)
5: La Ventana coal field
6: coal
7: 43 ft adit and one churn drill hole
9: Menefee Formation, Allison Member
10: Coal seam 3 ft 9 in. thick just below the La Ventana Sandstone
12: Dane (1936); Nickelson unpubl. data (1979).

1: 19N.1W.16.431
2: McDonald and Hayes mine
3: NW1/4 16 T19N R1W 35°52'41"N 106°53'51"W
4: San Pablo 7-1/2 (Los Alamos) Elevation 6,680 ft
5: La Ventana coal field
6: coal
8: 442 tons
9: Menefee Formation
10: General dip of beds 15°NE
12: Nickelson unpubl. data (1979); MILS (1981); AML files (1982)

1: 19N.1W.17.244
2: Weil prospect
3: SE1/4 17 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,780 ft
5: La Ventana coal field
6: coal
7: prospect
9: Menefee Formation, Allison Member
10: Locally gentle dip of 3°NW. Coal bed is partly burned and of a dirty coal approximately 5 ft thick.
12: Dane (1936); AML files (1982)

1: 19N.1W.19.324
2: Prospect by Sandoval Coal Co., Rio Puerco mine?
3: SE1/4 19 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,570 ft
5: La Ventana coal field
6: coal
7: 5 prospect drifts maximum of 125 ft
8: 650 tons
9: Menefee Formation, Allison Member
10: Dirty coal with a maximum thickness of 4 ft 10 in. Faulting NW and SE of prospect-faults running NE-SE. Down dropped side to NE. Kaseman coal seam = Padilla coal seam.
11: began in 1925
12: Dane (1936); Ellis (1936); Nickelson unpubl. data (1979); MILS (1981); AML files (1982)

1: 19N.1W.19.132
2: Hoye mine
3: NE1/4 19 T19N R1W 35°51'52"N 106°58'24"W
4: La Ventana 7-1/2
5: La Ventana coal field
6: coal
7: two compartment shaft 75 ft deep, 360 ft sloep N10°W
8: 650 tons
9: Menefee Formation, Allison Member
10: Coal 5 to 5.5 ft thick dipping 6°NW. Mine on down-dropped side of fault and north of the fault.
12: Dane (1936); Beaumont and Shomaker (1974); Tabet and Frost (1979); MILS (1981); AML files (1982)

1: 19N.1W.20.431
2: prospect - Carlisle prospect - Carlisle mine
3: NW1/4 20 T19N R1W 35°51'47"N 107°57'58"W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,735 ft
5: La Ventana coal field
6: coal
7: Mined a 5 ft 3 in. seam
8: 1933-1934, 2,898 tons; 1934-1935, 7,257 tons; 1935-1936, 7,702 tons
9: Menefee Formation, Allison Member
10: Five coal seams ranging in thickness from 1 ft 7 in. to 8 in. Dip 2.5°NE
11: Prospect issued to S. Weil
12: New Mexico State Mine Inspector (1933-1936); Dane (1936); Nickelson unpubl. data (1979); MILS (1981); AML files (1982)

1: 19N.1W.20.431
2: Easley prospect
3: NW1/4 20 T19N R1W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana
6: coal
7: 120 ft drift
8: none
9: Menefee Formation
10: 4 ft coal
12: Nickelson unpubl. data (1979); MILS (1981)

1: 19N.1W.20.432
2: Jones prospect
3: SW1/4 20 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,720 ft
5: La Ventana
6: coal
7: 21 ft adit
8: none
9: Menefee Formation, Allison Member
10: Dip 12°E, N10°W, 6.5 ft coal, 2 in. shaley coal, 8 in. coal, 10 in. sandy shale, 2 ft 10 in. coal
12: Nickelson unpubl. data (1979)

1: 19N.1W.26.233
2: Wilkins no. 2
3: SW1/4 26 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 7,040 ft
5: La Ventana coal field
6: coal
7: 175 ft on S75°W direction
9: Menefee Formation, Cleary Coal Member
10: 4 ft coal overlain by sandstone. Dip of beds, 4°, N15°W. Floor of shale. Analyses: moisture 17.3%, volatile matter 34.4%, fixed carbon 40.8%, ash 6.6%, sulfur 0.9%, Btu/lb 10,280
11: No further development since 1928. Closed due to flooding
12: Dane (1936); Ellis (1936); Tabet and Frost (1979); MILS (1981); AML files (1982)

1: 19N.1W.27.313
2: Wilkins no. 1
3: SW1/4 26 T1N R19W
4: La Ventana 7-1/2 (Los Alamos) Elevation 7,060 ft
5: La Ventana coal field
6: coal
7: 125 ft drift S45°W
8: 551 tons
9: Menefee Formation, Cleary Coal Member
10: Measured section at face: shale roof, coal 2 in., shale 1 in., coal 3 in., "mother coal" 2.5 in., coal 3 ft 8 in., shale floor.
11: closed due to flooding in 1929
12: Dane (1936)

1: 19N.1W.29.143
2: Mitchell prospect
3: SW1/4 29 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,600 ft
5: La Ventana coal field
6: coal
7: drift
9: Menefee Formation, Allison Member and Cleary Coal Member
10: Coal 2 ft 1 in. thick. Beds dip 2°NW. Roof and floor of shale. Analyses: Moisture 22.1%, volatile matter 35.7%, fixed carbon 37.7%, ash 4.5%, 0.7 sulfur, 5.7% oxygen, Btu/lb 8,790.
11: Analyses on as received basis.
12: Dane (1936); Ellis (1936); Tabet and Frost (1979); AML files (1982)

1: 19N.1W.30.123
2: coal prospect unnamed
3: SW1/4 30 T1N R19W
4: La Ventana 7-1/2 (Los Alamos) Elevation 7,000 ft
5: La Ventana coal field
6: coal
7: prospect
9: Menefee Formation, Allison Member
10: Coal is in Allison member, 5 ft 6 in. at outcrop. Gentle dip in area of 5°NW. Some faulting in this area - fault running NE-SW down dropped to NE.
12: Dane (1936); Ellis (1936)

1: 19N.1W.31.213
2: Cleary mine, San Juan Coke and Coal Co., San Juan mine
3: SW1/4 31 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,700 ft
5: La Ventana coal field
6: coal
7: main slope 1,065 ft, 2 east & west entries N20°W
8: 1925-1927 - 500 tons; 1928 - 10,500 tons; 1929 - 18,000 tons; 1930 - 22,000; 1931 - 8,000 tons. Winter of 1932 - 362 tons
9: Menefee Formation, Cleary Coal Member
10: Two coal beds of approx. 3 ft each. Mine is between two NE-SW normal faults. Analyses: moisture 15.8%, volatile matter 34.5%, fixed carbon 43.8%, ash 5.9%, sulfur 0.6%, Btu 10,900 Btu/lb (as received)
12: Dane (1936); Ellis (1936); Beaumont and Shomaker (1974); Tabet and Frost (1979); Nickelson unpubl. data (1979); AML files (1982)

1: 19N.1W.31.331
2: Loyd Stugis prospect
3: NW1/4 31 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,720 ft
5: La Ventana
6: coal
7: 140 ft drift and 75 ft drift
8: none
9: Menefee Formation, Cleary Coal Member
10: Section from mine: 3 ft 8 in. coal, 2 in. parting, 2 ft 6 in. coal.
12: Nickelson unpubl. data (1979)

1: 19N.1W.31.311
2: Luciano Peacock no. 2
3: SW1/4 31 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,720 ft
5: La Ventana coal field
6: coal
8: combined estimated prodcution with no. 1 is 4,000 tons
9: Menefee Formation, Cleary Coal Member
11: opened in 1939
12: Nickelson, unpubl. data (1979)

1: 19N.1W.31.313
2: Luciano Peacock no. 3
3: SW1/4 31 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,700 ft
5: La Ventana coal field
6: coal
8: 1,349 tons 1938-1940
9: Menefee Formation, Cleary Coal Member
10: Dip 5°NE, 6 ft coal
12: Nickelson unpubl. data (1979); MILS (1981)

1: 19N.1W.32.413
2: Nance mine, White Ash mine
3: NE1/4 32 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,700 ft
5: La Ventana coal field
6: coal
7: entries 650 ft long N45°E at a 1° slope
8: 1929-1931 10,170 tons
9: Menefee Formation, Cleary Coal Member
10: Two coals of 2 ft and 3 ft separated by thin parting (1.5 in.). Beds show a gentle dip of 2° and no major faulting in this section.
11: 1933-1937 called the Sanders-Yardis mine poduced 5,958 tons.
12: Dane (1936); Ellis (1936); Beaumont and Shomaker (1974); Tabet and Frost (1979); Nickelson unpubl. data (1979); MILS (1981); AML files (1982)

1: 19N.1W.33.434
2: Jagels prospect
3: SE1/4 33 T19N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 7,560 ft
5: La Ventana coal field
6: coal
7: opened 1926, drift 30 ft
8: no production
9: Menefee Formation
10: Coal seam just below La Ventana Sandstone 3 ft 9 in. thick coal in upper part of Allison Member of Menefee Formation. Outcrop in cliff face of La Ventana Mesa. Locally gentle dips 2-5°N-NW.
11: closed 1929
12: Dane (1936); Nickelson unpubl. data (1979).

1: 19N.2W.27.231
2: Sackett mine (Anderson Sackett mine)
3: SW1/4 27 T19N R2W 35°51'33"N 107°00'56"W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,900 ft
5: La Ventana coal field
6: coal
7: opened 1930, slope 550 ft
8: up to 1932 8,744 tons. Total production 41,583 tons.
9: Menefee Formation, Allison Member and Cleary Coal Member
10: General dip 2°NE. Coal seam 6 ft 4 in.
11: Last production in 1956
12: Nickelson unpubl. data (1979); MILS (1981); AML fiels (1982)

1: 19N.2W.35.214
2: Anderson mine, Carbon Coal Co.
3: SE1/4 35 T19N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,820 ft
5: La Ventana coal field
6: coal
7: slope of 1,500 ft extending S15°W
8: July 1929-1930 3,500 tons; July 1930-1931 5,000 tons
9: Menefee Formation, Allison Member
10: Beds dip 9°, strike N15°E, thick coal 7-7.5 ft. Roof and floor of shale. Analyses: moisture 16.3%, volatile matter 32.6%, fixed carbon 43.8%, ash 7.3%, sulfur 1.3%, hydrogen 5.9%, carbon 60%, nitrogen 1.1%, Btu/lb 10,430
11: 1931-1932 225 tons. In 1932, lessee applied for relinquishment of lease. A spur from the Santa Fe Northwestern exited. Analyses are on an as received basis. Estimated total production 10,000 tons.
12: New Mexico State Mine Inspector (1928-1932); Dane (1936); Ellis (1936); Nickelson unpubl. data (1979); AML files (1982)

1: 19N.2W.35.223
2: Casement prospect
3: SW1/4 35 T19N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,860 ft
5: La Ventana coal field
6: coal
7: prospect
9: Menefee Formation, Allison Member
10: 5 ft 8 in. coal, 2 ft dirty coal. Analyses: moisture 14.8%, volatile matter 33.9%, fixed carbon 41.4%, ash 9.9%, sulfur 1.2%, hydrogen 5.5%, carbon 52.8%, nitrogen 1.1%, oxygen 29.5% 8,910 Btu. Beds dip 5-10°NE.
12: Dane (1936); Ellis (1936); Tabet and Frost (1979); MILS (1981); AML files (1982)

1: 19N.2W.35.434
2: prospect pit
3: SE1/4 35 T19N R2W
4: Headcut Reservoir 7-1/2 (Chaco Mesa) Elevation 6,800 ft
5: La Ventana coal field
6: coal
7: pit
9: Menefee Formation, Allison Member
10: Coal zone near base of overlying La Ventana Sandstone. Seven ft of coal exposed at prospect. General dip of beds 6-10°W-NW.
12: Dane (1936)

1: 19N.2W.36.423
2: Luciano Peacock no. 1
3: SE1/4 36 T19N R2W
4: La Ventana 7-1/2 (Los Alamos)
5: La Ventana coal field
6: coal
8: estimated production 4,000 tons with Peacock no. 2
9: Menefee Formation, Cleary Coal Member
11: opened in 1936
12: Nickelson, unpubl. data (1979)

1: 19N.3W.36.440
2: McDonald prospect
3: SE1/4 36 T19N R3W
4: Headcut Reservoir 7-1/2 (Chaco Mesa)
5: La Ventana coal field
6: coal
7: 100 ft drift N35°W
8: 8 tons
9: Menefee Formation, Allison Member and Cleary Coal Member
10: 5 ft 9 in. coal bed; southern pit 4 ft of coal.
11: Prospect permit to J. M. McDonald - leased to R. A. Kistler
12: Dane (1936); Nickelson unpubl. data (1979)

1: 19N.4W.7.444
2: prospect
3: SE1/4 7 T19N R4W
4: Ojo Encino Mesa 7-1/2 (Chaco Mesa) Elevation 6,700 ft
5: Star Lake coal field
6: coal
7: tunnel 4.5 ft wide, 60 ft long
9: Fruitland Formation
10: Face of tunnel shows 6 ft of coal. Roof of clayey shale, floor of carb shale. Dip is 1°NE, essentially flat lying beds.
12: Dane (1936); AML fiels (1982)

1: 20N.1W.11.213
2: Senorita mine
3: SW1/4 11 T10N R1W 35°58'39"N 106°54'52"W
4: San Pablo 7-1/2 (Los Alamos) Elevation 7,140 ft
5: La Ventana coal field
6: coal
7: opened earlay 1900's
9: Menefee Formation, Allison Member and Cleary Coal Member
10: Coal bed 6 ft thick. Beds dip 70°E associated with overturned monocline near Nacimiento Uplift.
12: Gardner (1908); Nickelson unpubl. data (1979); MILS (1981); AML files (1982).

1: 20N.1W.23.423
2: San Pablo mine
3: SE1/4 23 T20N R1W
4: San Pablo 7-1/2
5: La Ventana coal field
6: coal
7: opened 1880's-1890's
9: Menefee Formation, Allison Member and Cleary Coal Members
10: Coal 7.5 ft strike S30°W, dips 75°W
12: Dane (1936); Nickelson unpubl. data (1979); AML files (1982)

1: 20N.1W.26.121
2: prospect
3: NE1/4 26 T20N R1W
4: San Pablo 7-1/2 (Los Alamos)
5: La Ventana coal field
6: coal
9: Menefee Formation, Allison Member
10: Dip of beds 40°W
12: Woodward, Anderson, Kauffman,and Reed (1973)

1: 20N.1W.28
2: La Ventana mine
3: all section 28 T20N R1W
4: San Pablo 7-1/2 (Los Alamos)
5: La Ventana coal field
6: coal
7: underground
9: Menefee Formation
10: Beds average 8.5 ft. Depth of cover increases to 1,400 ft from east to northeast. Near Nacimiento Uplift. 10,406 Btu/lb, sulfur 1.76%, moisture 15.8%, ash 8.5%, volatile matter 34%. Padilla coal seam.
11: No production yet, permitted 1982. Includes T20N R1W sec. 28-33, T20N R2W sec. 25-36, T19N R1W sec. 4-9, T19N R2W sec. 1, 12-13. Mine area on coal lease map.
12: MILS (1981); Ideal Basic Industries, La Ventana Mine Plan (1979); Bureau of Surface Mining (November, 1982)

1: 20N.1W.33.232
2: Padilla mine
3: NE1/4 33, T20N R1W
4: San Pablo 7-1/2 (Los Alamos) Elevation 6,860 ft
5: La Ventana coal field
6: coal
8: total to 1968 73,500 tons
9: Menefee Formation, Allison Member and Cleary Coal Member
10: Dip 16°NE
11: Operation 1917-1968. Same mine as San Miguel, operated under Padilla name from 1950 on.
12: New Mexico State Mine Inspector Report (1952); Nickelson, unpubl. data (1979); Ideal BAsic, La Ventana Mine Plan (1979); MILS (1981); AML files (1982)

1: 20N.1W.33.232
2: Padilla no. 2
3: NW1/4 33 T20N R1W
4: La Ventana 7-1/2 (Los Alamos) Elevation 6,840 ft
5: La Ventana coal field
6: coal
9: Menefee Formation, Allison Member and Cleary Coal Member
11: Owned by Padilla Coal Co.
12: AML files (1982)

1: 20N.1W.33.232
2: San Miguel mine
3: NE1/4 33 T20N R1W 35°55'19"N 106°56'34"W
4: San Pablo 7-1/2 (Los Alamos) Elevation 6,910 ft
5: La Ventana coal field
6: coal
7: mined few hundred tons for nearby smelter
9: Menefee Formation, Allison Member and Cleary Coal Member
10: Coal reported 8 ft 6 in. with upper 2 ft 6 in. resinous and poor quality coal. General dip of beds 10°W. No major faulting in area. Kaseman seam or Padilla seam.
11: Older than Padilla mine, used as aircourse for Padilla mine.
12: Dane (1936); Nickelson unpubl. data (1979); Ideal Basic, La Ventana Mine Plan (1979); MILS (1981)

1: 20N.1W.33.134
2: Sunny Slope, McCrary mine
3: SE1/4 33 T20N R1W
4: San Pablo 7-1/2 (Los Alamos) Elevation 7,000 ft
5: La Ventana coal field
6: coal
8: 1959-1969 estimated production 18,500 tons
9: Menefee Formation, Allison Member and Cleary Coal Member.
10: 4 ft of coal reported in Dane at prospect in same area. General dip of beds 8°NE. Nickelson - 8.5 ft coal at mine.
11: Padilla Coal Co., formerly Western Coal Operations 1938-1969
12: Nickelson unpubl. data (1979); AML files (1982); New Mexico State Mine Inspector Report (1903-1981)

1: 23N.1W.23.333
2: Amik prospect
3: SW1/4 23 T23N R1W 36°12'12"N 106°55'07"W
4: Regina 7-1/2 (Abiquiu) Elevation 7,60 ft
5: Monero Field
6: coal
9: Menefee Formation
10: On west side of Nacimiento fault. Dip of beds 60-79°E-NE.
12: MILS (1981); AML files (1982)

The data for calculating coal resources according to Wood and others (1983) has been entered on the form shown below. Data contained in this appendix is non-confidential data and may or may not reflect the entire data set used to obtain the resource/reserve figures given in the text.

```
WELL NUMBER \\\\\\\\\\\\\\\\\\ COUNTY \\\\\\\\\\\\\\
QUADRANGLE \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
\\ 1/4 \\ 1/4 \\ 1/4 SEC \\ T \\\ R \\\ FIELD: \\\\\\\\\\\\\\\\\\\
FORMATION: \\\\\\\\\\\\\\\ COAL THICKNESS: \\\\ DEPTH: \\\\\\
ACRES: MEASURED \\\\\ INDICATED \\\\\\ INFERRED \\\\\\\
SOURCE: \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ Conf \
REC NUM: \\\\\ LAT-LONG \\\\\\\\-\\\\\\\\ MEMBER \\\\\\\\\\\\\
ZONE \\\\\\\\\\\\\\\\\\
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Explanation of form:

WELL NUMBER - Drill hole number or measured section number

COUNTY, QUADRANGLE, 1/4's, SEC., T. R. - Location of drill hole/measured section by county, quadrangle, quarters of a section, section, township and range.

FIELD - Coal field as defined by the text in which drill hole/measured section occurs.

FORMATION - Geologic formation containing the coal bed encountered in the drill hole/measured section.

COAL THICKNESS - Thickness of coal bed in feet.

DEPTH - Depth to top of the coal bed.

ACRES - The planimetered acres

MEASURED - 1/4 mi. circle from the drill hole/measured section

INDICATED - 3/4 mi. circle from the drill hole/measured section

INFERRED - 1 1/4 mi. circle from the drill hole/measured section

CONF. - Confidential or non-confidential status of the data

REC NUM - The record number in the NMBMMR data file.

LAT-LONG - Latitude and longitude of the drill hole/measured section

MEMBER - Member of the geologic formation in which the coal bed occurs.

ZONE - Zone of the geologic formation in which the coal bed occurs.

WELL NUMBER 860-b-245-oc COUNTY Bernalillo
QUADRANGLE Herrera
NW 1/4 NE 1/4 SE 1/4 SEC 9 T 11N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 2.2 DEPTH: 100.0
ACRES: MEASURED 50 INDICATED INFERRED 15721.0
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 351100N-1070246W MEMBER Gibson
ZONE

WELL NUMBER 860-b-249-oc COUNTY Bernalillo
QUADRANGLE Herrera
SW1/4 SW 1/4 SW 1/4 SEC 14 T11N R2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 1.2 DEPTH: 20.0
ACRES: MEASURED 54.0 INDICATED 340.0 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 350945N-1070125W MEMBER Gibson
ZONE

WELL NUMBER 860-b-249-oc COUNTY Bernalillo
QUADRANGLE Herrera
SW1/4 SW 1/4 SW 1/4 SEC 14 T11N R2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 2.6 DEPTH: 22.1
ACRES: MEASURED 54.0 INDICATED 340.0 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 350945N-1070125W MEMBER Gibson
ZONE

WELL NUMBER 860-b-248-oc COUNTY Bernalillo
QUADRANGLE Herrera
NE 1/4 NW 1/4 NE 1/4 SEC 27 T 11 N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 2.7 DEPTH: 40.0
ACRES: MEASURED 38 INDICATED 374 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 350843N -1070153W MEMBER Gibson
ZONE

WELL NUMBER 860-b-238-oc COUNTY Bernalillo
QUADRANGLE Canoncito School
SE 1/4 SW 1/4 NE 1/4 SEC 8 T 10N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 3.0 DEPTH: 60.0
ACRES: MEASURED 54 INDICATED 524.0 INFERRED 17414.0
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 350843N -1070153W MEMBER Gibson
ZONE

WELL NUMBER 860-b-237-oc COUNTY Bernalillo
QUADRANGLE Canoncito School
NE 1/4 NE 1/4 NW 1/4 SEC 8 T 10N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 2.3 DEPTH: 60.0
ACRES: MEASURED 46.0 INDICATED INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 350656N -1070423W MEMBER Gibson
ZONE

WELL NUMBER 860-b-246-oc COUNTY Bernalillo
QUADRANGLE Herrera
SW 1/4 NW 1/4 SE 1/4 SEC 9 T 11N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 2.2 DEPTH: 42.0
ACRES: MEASURED 50 INDICATED 668 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 351051N-1070308W MEMBER Gibson
ZONE

WELL NUMBER 860-b-246-oc COUNTY Bernalillo
QUADRANGLE Herrera
SW 1/4 NW 1/4 SE 1/4 SEC 9 T 11N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 1.8 DEPTH: 60.0
ACRES: MEASURED 50 INDICATED 668 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 351051N -1070308W MEMBER Gibson
ZONE

WELL NUMBER 860-b-239-oc COUNTY Bernalillo
QUADRANGLE Herrera
NE 1/4 NE 1/4 NE 1/4 SEC 27 T 11N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 1.5 DEPTH: 53.3
ACRES: MEASURED 108 INDICATED 610 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 350834N -1070134W MEMBER Gibson
ZONE

WELL NUMBER 860-b-239-oc COUNTY Bernalillo
QUADRANGLE Herrera
NE 1/4 NE 1/4 NE 1/4 SEC 27 T 11N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 3.8 DEPTH: 60.0
ACRES: MEASURED 108 INDICATED 610 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 350834N - 1070134W MEMBER Gibson
ZONE

WELL NUMBER 860-b-241-oc COUNTY Bernalillo
QUADRANGLE Herrera
NW 1/4 NW 1/4 SW 1/4 SEC 33 T 11N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 1.5 DEPTH: 30.0
ACRES: MEASURED 74.0 INDICATED 552.0 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG 350731N-1070339W MEMBER Gibson
ZONE

WELL NUMBER 860-b-242-oc COUNTY Bernalillo
QUADRANGLE Herrera
NE 1/4 NE 1/4 NE 1/4 SEC 29 T 11N R 2W FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 1.6 DEPTH: 50.0
ACRES: MEASURED 58.0 INDICATED 409.0 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG - MEMBER Gibson
ZONE

WELL NUMBER 860-b-271-oc COUNTY Sandoval
QUADRANGLE Sky Village NE
NE 1/4 SW 1/4 NE 1/4 SEC 3 T 14N R 1E FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 1.7 DEPTH: 45.0
ACRES: MEASURED 72.0 INDICATED 590.0 INFERRED 12740.0
SOURCE: Hunt,1936 Conf n
REC NUM: LAT-LONG 352809 -1064915 MEMBER Gibson
ZONE

WELL NUMBER 860-b-271-oc COUNTY Sandoval
QUADRANGLE Sky Village NE
NE 1/4 SE 1/4 NE 1/4 SEC 3 T 14N R 1E FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 7.5 DEPTH: 60.0
ACRES: MEASURED 72.0 INDICATED 590.0 INFERRED 12740.0
SOURCE: Hunt,1936 Conf n
REC NUM: LAT-LONG 352809 -1064915 MEMBER Gibson
ZONE

WELL NUMBER 860-b-273-oc COUNTY Sandoval
QUADRANGLE Sky Village NE
NW 1/4 NW 1/4 SW 1/4 SEC 1 T 14N R 1E FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 2.3 DEPTH: 60.0
ACRES: MEASURED 91.0 INDICATED 672 INFERRED
SOURCE: Hunt,1936 Conf n
REC NUM: LAT-LONG 352827 -1064752 MEMBER Gibson
ZONE

WELL NUMBER 860-b-276-oc COUNTY Sandoval
QUADRANGLE Sky Village NE
NW 1/4 NW 1/4 NE 1/4 SEC 6 T 14N R 2E FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 1.3 DEPTH: 60.0
ACRES: MEASURED 65.0 INDICATED 616.0 INFERRED
SOURCE: Hunt,1936 Conf n
REC NUM: LAT-LONG 352827 -1064610 MEMBER Gibson
ZONE

WELL NUMBER 860-b-275-oc COUNTY Sandoval
QUADRANGLE Sky Village NE
NE 1/4 NW 1/4 SW 1/4 SEC 6 T 14N R 2E FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 3.2 DEPTH: 60.0
ACRES: MEASURED 48.0 INDICATED 591 INFERRED
SOURCE: Hunt,1936 Conf n
REC NUM: LAT-LONG 382805 -1064637 MEMBER Gibson
ZONE

WELL NUMBER 860-b-261-oc COUNTY Sandoval
QUADRANGLE Sky Village NE
SE 1/4 SE 1/4 SE 1/4 SEC 18 T 14N R 1E FIELD: Rio Puerco
FORMATION: Crevasse COAL THICKNESS: 1.9 DEPTH: 100.0
ACRES: MEASURED 56 INDICATED 416 INFERRED 14948.0
SOURCE: Hunt,1936 Conf n
REC NUM: LAT-LONG 343508 -1075530 MEMBER Gibson
ZONE

WELL NUMBER 860c 154 COUNTY Sandoval
QUADRANGLE San Pablo
SW 1/4 SW 1/4 NE 1/4 SEC 4 T 19N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 5.3 DEPTH: 60.5
ACRES: MEASURED 25.0 INDICATED INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355213 -1065626 MEMBER
ZONE

WELL NUMBER 860c 156 COUNTY Sandoval
QUADRANGLE San Pablo (7.5')
SE 1/4 SW 1/4 NE 1/4 SEC 33 T 20N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 6.0 DEPTH: 103.8
ACRES: MEASURED 38.0 INDICATED INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355310 -1065623 MEMBER
ZONE

WELL NUMBER 860c 157 COUNTY Sandoval
QUADRANGLE San Pablo 7.5'
SW 1/4 NE 1/4 SW 1/4 SEC 26 T 20N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 2.3 DEPTH: 80.1
ACRES: MEASURED 26.0 INDICATED 490.0 INFERRED 16735.3
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355344 -1065453 MEMBER
ZONE

WELL NUMBER 860c 157 COUNTY Sandoval
QUADRANGLE San Pablo 7.5'
SW 1/4 NE 1/4 SW 1/4 SEC 26 T 20N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.1 DEPTH: 90.4
ACRES: MEASURED 26.0 INDICATED 490.0 INFERRED 16735.3
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355344 -1065453 MEMBER
ZONE

WELL NUMBER 860c 165 COUNTY Sandoval
QUADRANGLE La Ventana (7.5')
NE 1/4 NE 1/4 NE 1/4 SEC 10 T 18N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 2.4 DEPTH: 540
ACRES: MEASURED 110 INDICATED 416 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355045 -1065447 MEMBER
ZONE

WELL NUMBER 860c 165 COUNTY Sandoval
QUADRANGLE La Ventana (7.5')
NE 1/4 NE 1/4 NE 1/4 SEC 10 T 18N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 3.6 DEPTH: 589.3
ACRES: MEASURED 110 INDICATED 416 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355045 -1065447 MEMBER
ZONE

WELL NUMBER 860c 150 COUNTY Sandoval
QUADRANGLE La Ventana
NW 1/4 SE 1/4 NW 1/4 SEC 20 T 19N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.6 DEPTH: 100
ACRES: MEASURED 34.0 INDICATED 114.0 INFERRED 16676.3
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355203 -1065806 MEMBER
ZONE

WELL NUMBER 860c 150 COUNTY Sandoval
QUADRANGLE La Ventana
NW 1/4 SE 1/4 NW 1/4 SEC 20 T 19N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 119.1
ACRES: MEASURED 34.0 INDICATED 114.0 INFERRED 16676.3
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355203 -1065806 MEMBER
ZONE

WELL NUMBER 860c 150 COUNTY Sandoval
QUADRANGLE La Ventana
NW 1/4 SE 1/4 NW 1/4 SEC 20 T 19N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.5 DEPTH: 120.4
ACRES: MEASURED 34.0 INDICATED 114.0 INFERRED 16676.3
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355203 -1065806 MEMBER
ZONE

WELL NUMBER 860c 151 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NW 1/4 SW 1/4 SEC 16 T 19N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 0.8 DEPTH: 20.0
ACRES: MEASURED 8.0 INDICATED INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355024 -1065644 MEMBER
ZONE

WELL NUMBER 860c 151 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NW 1/4 SW 1/4 SEC 16 T 19N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 5.0 DEPTH: 22.8
ACRES: MEASURED 8.0 INDICATED INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355024 -1065644 MEMBER
ZONE

WELL NUMBER 860c 151 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NW 1/4 SW 1/4 SEC 16 T 19N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.0 DEPTH: 38.5
ACRES: MEASURED 8.0 INDICATED INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355024 -1065644 MEMBER
ZONE

WELL NUMBER 860c 151 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NW 1/4 SW 1/4 SEC 16 T 19N R 1 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 54.5
ACRES: MEASURED 8.0 INDICATED INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 355024 -1065644 MEMBER
ZONE

WELL NUMBER r-41 torreon COUNTY Sandoval
QUADRANGLE San Luis
1/4 SE 1/4 SW 1/4 SEC 13 T 17N R 3W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 2.2 DEPTH: 131.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED 16955.0
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354208 -1070642 MEMBER
ZONE

WELL NUMBER r-41 torreon COUNTY Sandoval
QUADRANGLE San Luis
1/4 SE 1/4 SW 1/4 SEC 13 T 17N R 3W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 2.2 DEPTH: 188.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED 16955.0
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354208 -1070642 MEMBER
ZONE

WELL NUMBER r-42 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empredrado
1/4 SW 1/4 NW 1/4 SEC 17 T 17N R 3W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 107.2
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354231 -1071039 MEMBER
ZONE

WELL NUMBER s 271v 8 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NW 1/4 SE 1/4 SEC 12 T 19N R 2W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 7.3 DEPTH: 967.2
ACRES: MEASURED 125.7 INDICATED 748.5 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 772 LAT-LONG 355113 -1065932 MEMBER
ZONE

WELL NUMBER s 28 COUNTY Sandoval
QUADRANGLE San Pablo
SW 1/4 SW 1/4 NE 1/4 SEC 7 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 5.8 DEPTH: 754.6
ACRES: MEASURED 125.7 INDICATED 534.2 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 773 LAT-LONG 355121 -1065832 MEMBER
ZONE

WELL NUMBER s 28 COUNTY Sandoval
QUADRANGLE San Pablo
SW 1/4 SW 1/4 NE 1/4 SEC 7 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 3.3 DEPTH: 762.9
ACRES: MEASURED 125.7 INDICATED 534.2 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 774 LAT-LONG 355121 -1065832 MEMBER
ZONE

WELL NUMBER s 30 COUNTY Sandoval
QUADRANGLE San Pablo
SW 1/4 SE 1/4 NE 1/4 SEC 8 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 10.0 DEPTH: 416.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 775 LAT-LONG 355122 -1065747 MEMBER
ZONE

WELL NUMBER s 32 COUNTY Sandoval
QUADRANGLE San Pablo
SE 1/4 SE 1/4 NE 1/4 SEC 8 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 10.0 DEPTH: 282.0
ACRES: MEASURED 95.0 INDICATED INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 776 LAT-LONG 355121 -1065703 MEMBER
ZONE

WELL NUMBER s 33 COUNTY Sandoval
QUADRANGLE San Pablo
NW 1/4 NE 1/4 SW 1/4 SEC 9 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 7.4 DEPTH: 78.0
ACRES: MEASURED 95.0 INDICATED 940.0 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 777 LAT-LONG 355120 -1065644 MEMBER
ZONE

WELL NUMBER s 34 COUNTY Sandoval
QUADRANGLE San Pablo
SW 1/4 SW 1/4 NE 1/4 SEC 18 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 6.5 DEPTH: 511.9
ACRES: MEASURED 125.7 INDICATED 789.3 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 778 LAT-LONG 355027 -1065834 MEMBER
ZONE

WELL NUMBER s 34 COUNTY Sandoval
QUADRANGLE San Pablo
SW 1/4 SW 1/4 NE 1/4 SEC 18 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 2.4 DEPTH: 522.2
ACRES: MEASURED 125.7 INDICATED 789.3 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 779 LAT-LONG 355027 -1065834 MEMBER
ZONE

WELL NUMBER s 35 COUNTY Sandoval
QUADRANGLE San Pablo
SW 1/4 SW 1/4 NE 1/4 SEC 6 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.9 DEPTH: 966.9
ACRES: MEASURED 124.6 INDICATED 549.1 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 780 LAT-LONG 355214 -1065835 MEMBER
ZONE

WELL NUMBER s 36 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NE 1/4 NW 1/4 SEC 6 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 13.0 DEPTH: 752.0
ACRES: MEASURED 124.6 INDICATED INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 781 LAT-LONG 355237 -1065839 MEMBER
ZONE

WELL NUMBER s 38 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NE 1/4 NE 1/4 SEC 6 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 7.1 DEPTH: 966.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 782 LAT-LONG 355236 -1065807 MEMBER
ZONE

WELL NUMBER s 40 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NE 1/4 NW 1/4 SEC 5 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 712.0
ACRES: MEASURED 125.7 INDICATED 633.6 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 783 LAT-LONG 355237 -1065736 MEMBER
ZONE

WELL NUMBER s 40 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NE 1/4 NW 1/4 SEC 5 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 718.0
ACRES: MEASURED 125.7 INDICATED 633.6 INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 784 LAT-LONG 355237 -1065736 MEMBER
ZONE

WELL NUMBER s 42 COUNTY Sandoval
QUADRANGLE San Pablo
NE 1/4 NE 1/4 NE 1/4 SEC 5 T 19N R 1W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 7.5 DEPTH: 472.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Ideal Basic, La Ventana Mine Plan, 1979 Conf
REC NUM: 785 LAT-LONG 355236 -1065702 MEMBER
ZONE

WELL NUMBER r-63 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NE 1/4 SW 1/4 SEC 4 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.2 DEPTH: 30.7
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354809 -1070923 MEMBER
ZONE

WELL NUMBER r-63 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NE 1/4 SW 1/4 SEC 4 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.2 DEPTH: 85.6
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354809 -1070923 MEMBER
ZONE

WELL NUMBER r-63 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NE 1/4 SW 1/4 SEC 4 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.7 DEPTH: 88.2
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354809 -1070923 MEMBER
ZONE

WELL NUMBER c-1 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NW 1/4 SW 1/4 SEC 20 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 46.7
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354537 -1071045 MEMBER
ZONE

WELL NUMBER c-1 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NW 1/4 SW 1/4 SEC 20 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.2 DEPTH: 57.7
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354537 -1071045 MEMBER
ZONE

WELL NUMBER c-1 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NW 1/4 SW 1/4 SEC 20 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.1 DEPTH: 67.2
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354537 -1071045 MEMBER
ZONE

WELL NUMBER c-1 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NW 1/4 SW 1/4 SEC 20 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 13.7 DEPTH: 154.8
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354537 -1071045 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 76.4
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.3 DEPTH: 81.1
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 93.5
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.3 DEPTH: 97.7
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 107.8
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.4 DEPTH: 130.0
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.4 DEPTH: 147.6
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 154.5
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 158.2
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 171.2
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER r-61 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SW 1/4 SE 1/4 SEC 21 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.2 DEPTH: 175.3
ACRES: MEASURED 115.0 INDICATED 892.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354522 -1070909 MEMBER
ZONE

WELL NUMBER torreon core h #4 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 29 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 165.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24123 Conf
REC NUM: LAT-LONG 354432 -1071030 MEMBER
ZONE

WELL NUMBER torreon core h #4 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 29 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 998.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24123 Conf
REC NUM: LAT-LONG 354432 -1071030 MEMBER
ZONE

WELL NUMBER torreon core h #4 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 29 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 1029.2
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24123 Conf
REC NUM: LAT-LONG 354432 -1071030 MEMBER
ZONE

WELL NUMBER ann # 4 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 33 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 922.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354409 -1070922 MEMBER
ZONE

WELL NUMBER ann # 4 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 33 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 935.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354409 -1070922 MEMBER
ZONE

WELL NUMBER torreon core h #7 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 34 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.5 DEPTH: 673.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354413 -1070816 MEMBER
ZONE

WELL NUMBER torreon core h #7 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 34 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.0 DEPTH: 740.
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354413 -1070816 MEMBER
ZONE

WELL NUMBER torreon core h #7 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 34 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.8 DEPTH: 790.
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354413 -1070816 MEMBER
ZONE

WELL NUMBER r-52 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NW 1/4 SW 1/4 SEC 11 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 57.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354717 -1071352 MEMBER
ZONE

WELL NUMBER r-52 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NW 1/4 SW 1/4 SEC 11 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 67.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354717 -1071352 MEMBER
ZONE

WELL NUMBER r-52 torreon COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 NW 1/4 SW 1/4 SEC 11 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 199.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354717 -1071352 MEMBER
ZONE

WELL NUMBER torreon #1 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.6 DEPTH: 468.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354600 -1071441 MEMBER
ZONE

WELL NUMBER torreon # 1 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.8 DEPTH: 1121.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354600 -1071441 MEMBER
ZONE

WELL NUMBER torreon #1 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 1162.5
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354600 -1071441 MEMBER
ZONE

WELL NUMBER torreon #1 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 1227.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354600 -1071441 MEMBER
ZONE

WELL NUMBER torreon #1 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 1/4 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.1 DEPTH: 1235.5
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354600 -1071441 MEMBER
ZONE

WELL NUMBER navajo #2 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SE 1/4 NE 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 238.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354549 -1071414 MEMBER
ZONE

WELL NUMBER navajo #2 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SE 1/4 NE 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.0 DEPTH: 469.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354549 -1071414 MEMBER
ZONE

WELL NUMBER navajo #2 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SE 1/4 NE 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 985.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354549 -1071414 MEMBER
ZONE

WELL NUMBER navajo #2 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SE 1/4 NE 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 5.0 DEPTH: 1048.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354549 -1071414 MEMBER
ZONE

WELL NUMBER navajo #2 COUNTY Sandoval
QUADRANGLE Wolf Stand
1/4 SE 1/4 NE 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 1113.0
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354549 -1071414 MEMBER
ZONE

WELL NUMBER torreon 1 reynolds COUNTY Sandoval
QUADRANGLE Wolf Stand
SW 1/4 SW 1/4 NE 1/4 SEC 21 T 18 R 3 FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 5.0 DEPTH: 48.0
ACRES: MEASURED 113.0 INDICATED INFERRED
SOURCE: NMBMMR Petroleum Library Log 24191 Conf n
REC NUM: LAT-LONG 354542 -1070903 MEMBER
ZONE

WELL NUMBER torreon 1 reynolds COUNTY Sandoval
QUADRANGLE Wolf Stand
SW 1/4 SW 1/4 NE 1/4 SEC 21 T 18 R 3 FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 117.0
ACRES: MEASURED 113.0 INDICATED INFERRED
SOURCE: NMBMMR Petroleum Library Log 24191 Conf
REC NUM: LAT-LONG 354542 -1070903 MEMBER
ZONE

WELL NUMBER torreon 1 reynolds COUNTY Sandoval
QUADRANGLE Wolf Stand
SW 1/4 SW 1/4 NE 1/4 SEC 21 T 18 R 3 FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 199.0
ACRES: MEASURED 113.0 INDICATED INFERRED
SOURCE: NMBMMR Petroleum Library Log 24191 Conf
REC NUM: LAT-LONG 354542 -1070903 MEMBER
ZONE

WELL NUMBER torreon 1 reynolds COUNTY Sandoval
QUADRANGLE Wolf Stand
SW 1/4 SW 1/4 NE 1/4 SEC 21 T 18 R 3 FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.0 DEPTH: 278.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24191 Conf
REC NUM: LAT-LONG 354542 -1070903 MEMBER
ZONE

WELL NUMBER torreon 1 reynolds COUNTY Sandoval
QUADRANGLE Wolf Stand
SW 1/4 SW 1/4 NE 1/4 SEC 21 T 18 R 3 FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 289.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24191 Conf
REC NUM: LAT-LONG 354542 -1070903 MEMBER
ZONE

WELL NUMBER torreon 1 reynolds COUNTY Sandoval
QUADRANGLE Wolf Stand
SW 1/4 SW 1/4 NE 1/4 SEC 21 T 18 R 3 FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.0 DEPTH: 438.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24191 Conf
REC NUM: LAT-LONG 354542 -1070903 MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 261.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.7 DEPTH: 269.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 897.8
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 1062.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.2 DEPTH: 1106.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.2 DEPTH: 1118.8
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.5 DEPTH: 1126.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.4 DEPTH: 1146.2
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state # COUNTY 1 Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.2 DEPTH: 1155.3
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 1172.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER ff kelly state #1 COUNTY Sandoval
QUADRANGLE Tinian
NE 1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 1176.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER john toledo # 2 COUNTY Sandoval
QUADRANGLE Tinian
NW 1/4 SE 1/4 SW 1/4 SEC 7 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 216.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354755 -1071813 MEMBER
ZONE

WELL NUMBER john toledo # 2 COUNTY Sandoval
QUADRANGLE Tinian
NW 1/4 SE 1/4 SW 1/4 SEC 7 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.8 DEPTH: 410.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354755 -1071813 MEMBER
ZONE

WELL NUMBER john toledo # 2 COUNTY Sandoval
QUADRANGLE Tinian
NW 1/4 SE 1/4 SW 1/4 SEC 7 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.9 DEPTH: 420.8
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354755 -1071813 MEMBER
ZONE

WELL NUMBER john toledo # 2 COUNTY Sandoval
QUADRANGLE Tinian
NW 1/4 SE 1/4 SW 1/4 SEC 7 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.7 DEPTH: 523.9
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354755 -1071813 MEMBER
ZONE

WELL NUMBER john toledo # 2 COUNTY Sandoval
QUADRANGLE Tinian
NW 1/4 SE 1/4 SW 1/4 SEC 7 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 590.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354755 -1071813 MEMBER
ZONE

WELL NUMBER john toledo # 2 COUNTY Sandoval
QUADRANGLE Tinian
NW 1/4 SE 1/4 SW 1/4 SEC 7 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.3 DEPTH: 594.7
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354755 -1071813 MEMBER
ZONE

WELL NUMBER john toledo # 2 COUNTY Sandoval
QUADRANGLE Tinian
NW 1/4 SE 1/4 SW 1/4 SEC 7 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.4 DEPTH: 596.6
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354755 -1071813 MEMBER
ZONE

WELL NUMBER c-2 COUNTY Sandoval
QUADRANGLE Tinian
1/4 SE 1/4 NE 1/4 SEC 18 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.6 DEPTH: 117.1
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354736 -1071735 MEMBER
ZONE

WELL NUMBER c-2 COUNTY Sandoval
QUADRANGLE Tinian
1/4 SE 1/4 NE 1/4 SEC 18 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 119.8
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354736 -1071735 MEMBER
ZONE

WELL NUMBER navajo 22-4 COUNTY Sandoval
QUADRANGLE Tinian
SW 1/4 NW 1/4 SW 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.5 DEPTH: 280.5
ACRES: MEASURED 125.7 INDICATED 636.7 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354623 -1071512 MEMBER
ZONE

WELL NUMBER navajo 22-4 COUNTY Sandoval
QUADRANGLE Tinian
SW 1/4 NW 1/4 SW 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 457.0
ACRES: MEASURED 125.7 INDICATED 636.7 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354623 -1071512 MEMBER
ZONE

WELL NUMBER navajo 22-4 COUNTY Sandoval
QUADRANGLE Tinian
SW 1/4 NW 1/4 SW 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 918.0
ACRES: MEASURED 125.7 INDICATED 636.7 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354623 -1071512 MEMBER
ZONE

WELL NUMBER navajo 22-4 COUNTY Sandoval
QUADRANGLE Tinian
SW 1/4 NW 1/4 SW 1/4 SEC 22 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 1041.8
ACRES: MEASURED 125.7 INDICATED 636.7 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354623 -1071512 MEMBER
ZONE

WELL NUMBER larrazola 27-1 fed COUNTY Sandoval
QUADRANGLE Tinian
1/4 1/4 1/4 SEC 27 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 492.0
ACRES: MEASURED 125.7 INDICATED 942.0 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354606 -1071410 MEMBER
ZONE

WELL NUMBER larrazola 27-1 fed COUNTY Sandoval
QUADRANGLE Tinian
1/4 1/4 1/4 SEC 27 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 761.0
ACRES: MEASURED 125.7 INDICATED 942.0 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354606 -1071410 MEMBER
ZONE

WELL NUMBER r-53 COUNTY Sandoval
QUADRANGLE Tinian
1/4 NE 1/4 NE 1/4 SEC 28 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 38.2
ACRES: MEASURED 125.7 INDICATED 782.5 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354550 -1071522 MEMBER
ZONE

WELL NUMBER r-53 COUNTY Sandoval
QUADRANGLE Tinian
1/4 NE 1/4 NE 1/4 SEC 28 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.2 DEPTH: 56.4
ACRES: MEASURED 125.7 INDICATED 782.5 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354550 -1071522 MEMBER
ZONE

WELL NUMBER r-53 COUNTY Sandoval
QUADRANGLE Tinian
1/4 NE 1/4 NE 1/4 SEC 28 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.4 DEPTH: 70.6
ACRES: MEASURED 125.7 INDICATED 782.5 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354550 -1071522 MEMBER
ZONE

WELL NUMBER r-51 COUNTY Sandoval
QUADRANGLE Tinian
1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.3 DEPTH: 26.8
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354509 -1071645 MEMBER
ZONE

WELL NUMBER r-51 COUNTY Sandoval
QUADRANGLE Tinian
1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.3 DEPTH: 131.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354509 -1071645 MEMBER
ZONE

WELL NUMBER r-51 COUNTY Sandoval
QUADRANGLE Tinian
1/4 NW 1/4 NE 1/4 SEC 32 T 18N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.5 DEPTH: 135.6
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354509 -1071645 MEMBER
ZONE

WELL NUMBER 109 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NW 1/4 NW 1/4 NE 1/4 SEC 27 T 18N R 2 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.7 DEPTH: 89.8
ACRES: MEASURED 51.0 INDICATED 222.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354635 -1070159 MEMBER
ZONE

WELL NUMBER 109 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NW 1/4 NW 1/4 NE 1/4 SEC 27 T 18N R 2 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 4.5 DEPTH: 109.5
ACRES: MEASURED 51.0 INDICATED 222.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354505 -1070159 MEMBER
ZONE

WELL NUMBER 111 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NW 1/4 SEC 14 T 18N R 2 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 330.0
ACRES: MEASURED 30.0 INDICATED 66.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354635 -1070128 MEMBER
ZONE

WELL NUMBER 111 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NW 1/4 SEC 14 T 18N R 2 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 3.8 DEPTH: 331.7
ACRES: MEASURED 30.0 INDICATED 66.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354635 -1070128 MEMBER
ZONE

WELL NUMBER 143 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NW 1/4 SEC 36 T 19N R 2 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 120.0
ACRES: MEASURED 38.0 INDICATED 311.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354911 -1070564 MEMBER
ZONE

WELL NUMBER 143 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NW 1/4 SEC 36 T 19N R 2 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.8 DEPTH: 123.7
ACRES: MEASURED 38.0 INDICATED 311.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354911 -1070534 MEMBER
ZONE

WELL NUMBER 95 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
SW 1/4 SE 1/4 SE 1/4 SEC 6 T 18N R 2W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 60.1
ACRES: MEASURED 10.0 INDICATED 250.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354752 -1070455 MEMBER
ZONE

WELL NUMBER 99 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 SW 1/4 SEC 16 T 18N R 2W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 2.9 DEPTH: 198.4
ACRES: MEASURED 36.0 INDICATED 270.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354615 -1070323 MEMBER
ZONE

WELL NUMBER 103 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
SE 1/4 NW 1/4 NW 1/4 SEC 33 T 18N R 2 W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 2.9 DEPTH: 220.0
ACRES: MEASURED 45.0 INDICATED 359.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354409 -1070326 MEMBER
ZONE

WELL NUMBER 103 860c COUNTY Sandoval
QUADRANGLE Headcut Reservoir
SE 1/4 NW 1/4 NW 1/4 SEC 33 T 18N R 2W FIELD: La Ventana
FORMATION: Menefee COAL THICKNESS: 1.8 DEPTH: 246.7
ACRES: MEASURED 45.0 INDICATED 359.0 INFERRED
SOURCE: Dane, 1936 Conf
REC NUM: LAT-LONG 354409 -1070326 MEMBER
ZONE

WELL NUMBER Sandoval fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 1/4 1/4 SEC 24 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 601.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER Sandoval fed. #1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 1/4 1/4 SEC 24 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 637.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER Sandoval fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 1/4 1/4 SEC 24 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 874.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER Sandoval fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 1/4 1/4 SEC 24 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 976.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER Sandoval fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 1/4 1/4 SEC 24 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 1010.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER Sandoval fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 1/4 1/4 SEC 24 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 1049.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER r-62 torreon COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 NW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.9 DEPTH: 119.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354736 -1070707 MEMBER
ZONE

WELL NUMBER r-62 torreon COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 NW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.4 DEPTH: 130.6
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354736 -1070707 MEMBER
ZONE

WELL NUMBER r-62 torreon COUNTY Sandoval
QUADRANGLE Headcut Reservoir
1/4 NW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.4 DEPTH: 248.6
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354736 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 273.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 273.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 306.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 310.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.0 DEPTH: 318.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.8 DEPTH: 356.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 551.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 556.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.0 DEPTH: 1280.
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER San Luis fed. # 1 COUNTY Sandoval
QUADRANGLE Headcut Reservoir
NE 1/4 SW 1/4 NE 1/4 SEC 11 T 18N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 1379.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354729 -1070707 MEMBER
ZONE

WELL NUMBER torreon core h #2 COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SE 1/4 NW 1/4 SEC 5 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 5.0 DEPTH: 647.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24132 Conf n
REC NUM: LAT-LONG 354401 -1081032 MEMBER
ZONE

WELL NUMBER torreon core h #2 COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SE 1/4 NW 1/4 SEC 5 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 706.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24132 Conf
REC NUM: LAT-LONG 354401 -1081032 MEMBER
ZONE

WELL NUMBER torreon core h #2 COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SE 1/4 NW 1/4 SEC 5 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 808.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24132 Conf
REC NUM: LAT-LONG 354401 -1081032 MEMBER
ZONE

WELL NUMBER torreon core h #2 COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SE 1/4 NW 1/4 SEC 5 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 818.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24132 Conf
REC NUM: LAT-LONG 354401 -1081032 MEMBER
ZONE

WELL NUMBER torreon core h #2 COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SE 1/4 NW 1/4 SEC 5 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 7.0 DEPTH: 845.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: NMBMMR Petroleum Library Log 24132 Conf
REC NUM: LAT-LONG 354401 -1081032 MEMBER
ZONE

WELL NUMBER c-3 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SW 1/4 NE 1/4 SEC 29 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 107.8
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354052 -1071021 MEMBER
ZONE

WELL NUMBER c-3 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SW 1/4 NE 1/4 SEC 29 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.5 DEPTH: 112.6
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354052 -1071021 MEMBER
ZONE

WELL NUMBER c-3 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SW 1/4 NE 1/4 SEC 29 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.3 DEPTH: 135.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354052 -1071021 MEMBER
ZONE

WELL NUMBER c-3 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SW 1/4 NE 1/4 SEC 29 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 221.30
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354052 -1071021 MEMBER
ZONE

WELL NUMBER r-33 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SW 1/4 NW 1/4 SEC 31 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.5 DEPTH: 82.4
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353952 -1071140 MEMBER
ZONE

WELL NUMBER r-33 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 SW 1/4 NW 1/4 SEC 31 T 17N R 3W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 6.0 DEPTH: 89.7
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353952 -1071140 MEMBER
ZONE

WELL NUMBER r-32 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 NW 1/4 SE 1/4 SEC 23 T 17N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 141.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354135 -1071306 MEMBER
ZONE

WELL NUMBER r-32 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 NW 1/4 SE 1/4 SEC 23 T 17N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.2 DEPTH: 193.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354135 -1071306 MEMBER
ZONE

WELL NUMBER r-32 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 NW 1/4 SE 1/4 SEC 23 T 17N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.2 DEPTH: 211.9
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354135 -1071306 MEMBER
ZONE

WELL NUMBER r-32 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empedrado
1/4 NW 1/4 SE 1/4 SEC 23 T 17N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 5.0 DEPTH: 223.9
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354135 -1071306 MEMBER
ZONE

WELL NUMBER c-4 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empredrado
1/4 SE 1/4 NW 1/4 SEC 27 T 17N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.2 DEPTH: 103.3
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354052 -1070911 MEMBER
ZONE

WELL NUMBER c-4 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empredrado
1/4 SE 1/4 NW 1/4 SEC 27 T 17N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 1.9 DEPTH: 112.1
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost,1979 Conf
REC NUM: LAT-LONG 354052 -1070911 MEMBER
ZONE

WELL NUMBER c-4 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empredrado
1/4 SE 1/4 NW 1/4 SEC 27 T 17N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 151.6
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354052 -1070911 MEMBER
ZONE

WELL NUMBER c-4 torreon COUNTY Sandoval
QUADRANGLE Arroyo Empradrado
1/4 SE 1/4 NW 1/4 SEC 27 T 17N R 4W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.0 DEPTH: 171.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 354052 -1070911 MEMBER
ZONE

WELL NUMBER 42b COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa (7.5')
SW 1/4 NE 1/4 SE 1/4 SEC 7 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 6.5 DEPTH: 37.8
ACRES: MEASURED 126.0 INDICATED 819.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355337 -1071701 MEMBER
ZONE

WELL NUMBER 42b COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa (7.5')
SW 1/4 NE 1/4 SE 1/4 SEC 7 T 19N R 14W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.5 DEPTH: 47.5
ACRES: MEASURED 126.0 INDICATED 819. INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355337 -1071701 MEMBER
ZONE

WELL NUMBER 15 COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa (7.5')
NW 1/4 NW 1/4 NW 1/4 SEC 9 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 3.4 DEPTH: 95.2
ACRES: MEASURED 126.0 INDICATED 830.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355414 -1071738 MEMBER
ZONE

WELL NUMBER 15 COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa
NW 1/4 NW 1/4 NW 1/4 SEC 9 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 6.2 DEPTH: 99.0
ACRES: MEASURED 126.0 INDICATED 833.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355414 -1071738 MEMBER
ZONE

WELL NUMBER 19 COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa (7.5')
NE 1/4 NE 1/4 NE 1/4 SEC 9 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 1.1 DEPTH: 65.3
ACRES: MEASURED 126.0 INDICATED 833. INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355416 -1071454 MEMBER
ZONE

WELL NUMBER 19 COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa (7.5')
NE 1/4 NE 1/4 NE 1/4 SEC 9 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.5 DEPTH: 66.9
ACRES: MEASURED 126.0 INDICATED 833.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355416 -1071454 MEMBER
ZONE

WELL NUMBER 19 COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa (7.5')
NE 1/4 NE 1/4 NE 1/4 SEC 9 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.9 DEPTH: 69.6
ACRES: MEASURED 126.0 INDICATED 833.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355416 -1071454 MEMBER
ZONE

WELL NUMBER 19 COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa
NE 1/4 NE 1/4 NE 1/4 SEC 9 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 3.9 DEPTH: 72.7
ACRES: MEASURED 126.0 INDICATED 833.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355416 -1071454 MEMBER
ZONE

WELL NUMBER 7-1 COUNTY Sandoval
QUADRANGLE Ojo Encino Mesa (7.5')
NW 1/4 NE 1/4 NW 1/4 SEC 7 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.0 DEPTH: 49.0
ACRES: MEASURED 126.0 INDICATED 842.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355414 -1071738 MEMBER
ZONE

WELL NUMBER 6 COUNTY Sandoval
QUADRANGLE Johnson Trading Post
SE 1/4 NW 1/4 SE 1/4 SEC 6 T 19N R 3w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 3.5 DEPTH: 53.5
ACRES: MEASURED 126.0 INDICATED 816.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355445 -1071054 MEMBER
ZONE

WELL NUMBER 8-3 COUNTY Sandoval
QUADRANGLE Johnson Trading Post
SW 1/4 NW 1/4 NW 1/4 SEC 8 T 19N R 3w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 3.4 DEPTH: 67.7
ACRES: MEASURED 120.0 INDICATED INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355422 -1071033 MEMBER
ZONE

WELL NUMBER 8-1 COUNTY Sandoval
QUADRANGLE Johnson Trading Post
NE 1/4 NE 1/4 SW 1/4 SEC 8 T 19N R 3w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.8 DEPTH: 43.6
ACRES: MEASURED 120.0 INDICATED 704.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355408 -1071002 MEMBER
ZONE

WELL NUMBER 8-2 COUNTY Sandoval
QUADRANGLE Johnson Trading Post
NE 1/4 NW 1/4 NE 1/4 SEC 8 T 19N R 3w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 4.1 DEPTH: 112.6
ACRES: MEASURED 126.0 INDICATED INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355433 -1070946 MEMBER
ZONE

WELL NUMBER 11-1 COUNTY Sandoval
QUADRANGLE Johnson Trading Post
SE 1/4 SE 1/4 SE 1/4 SEC 11 T 19N R 4w FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.4 DEPTH: 34.8
ACRES: MEASURED 126.0 INDICATED 1005.0 INFERRED
SOURCE: BLM dead lease files Farmington Conf
REC NUM: LAT-LONG 355343 -1071240 MEMBER
ZONE

WELL NUMBER oem 28-1 COUNTY McKinley
QUADRANGLE Ojo Encino Mesa
SE 1/4 SE 1/4 SE 1/4 SEC 28 T 20N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 3.0 DEPTH: 301.1
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Jentgen and Fassett, 1977 Conf n
REC NUM: 376 LAT-LONG 355605 -1072112 MEMBER
ZONE

WELL NUMBER oem 28-1 COUNTY McKinley
QUADRANGLE Ojo Encino Mesa
SE 1/4 SE 1/4 SE 1/4 SEC 28 T 20N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 16.5 DEPTH: 385.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Jentgen and Fassett, 1977 Conf n
REC NUM: LAT-LONG 355605 -1072112 MEMBER
ZONE

WELL NUMBER usgs-2 COUNTY san juan
QUADRANGLE Ojo Encino Mesa
1/4 1/4 c 1/4 SEC 15 T 20N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.0 DEPTH: 53.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 416 LAT-LONG 355914 -1072047 MEMBER
ZONE

WELL NUMBER usgs-3 COUNTY San Juan
QUADRANGLE Ojo Encino Mesa
NE 1/4 NE 1/4 SW 1/4 SEC 23 T 20N R 6W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.0 DEPTH: 222.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 417 LAT-LONG - MEMBER
ZONE

WELL NUMBER dhoe-3 COUNTY San Juan
QUADRANGLE Ojo Encino Mesa
SW 1/4 SE 1/4 SW 1/4 SEC 34 T 20N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 2.3 DEPTH: 19.7
ACRES: MEASURED 125.7 INDICATED 699.3 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 451 LAT-LONG 355510 -1072054 MEMBER
ZONE

WELL NUMBER dhoe-3 COUNTY San Juan
QUADRANGLE Ojo Encino Mesa
SW 1/4 SE 1/4 SW 1/4 SEC 34 T 20N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 18.0 DEPTH: 77.2
ACRES: MEASURED 125.7 INDICATED 699.3 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 452 LAT-LONG 355510 -1072054 MEMBER
ZONE

WELL NUMBER dhoe-3 COUNTY San Juan
QUADRANGLE Ojo Encino Mesa
SW 1/4 SW 1/4 SW 1/4 SEC 34 T 20N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 1.4 DEPTH: 122.9
ACRES: MEASURED 125.7 INDICATED 699.30 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 453 LAT-LONG 355510 -1072054 MEMBER
ZONE

WELL NUMBER dhoe-3 COUNTY San Juan
QUADRANGLE Ojo Encino Mesa
SW 1/4 SE 1/4 SW 1/4 SEC 34 T 20N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 1.5 DEPTH: 130.0
ACRES: MEASURED 125.7 INDICATED 699.3 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 454 LAT-LONG 355510 -1072054 MEMBER
ZONE

WELL NUMBER dhoe-4 COUNTY San Juan
QUADRANGLE Ojo Encino Mesa
NW 1/4 NE 1/4 NE 1/4 SEC 3 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 1.2 DEPTH: 32.5
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 455 LAT-LONG 355507 -1072016 MEMBER
ZONE

WELL NUMBER dhoe-4 COUNTY San Juan
QUADRANGLE Ojo Encino Mesa
NW 1/4 NE 1/4 NE 1/4 SEC 3 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 16.8 DEPTH: 46.6
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: mf1249 Conf
REC NUM: 456 LAT-LONG 355507 -1072016 MEMBER
ZONE

WELL NUMBER dhoe-4 COUNTY San Juan
QUADRANGLE Ojo Encino Mesa
NW 1/4 NE 1/4 NE 1/4 SEC 3 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 1.5 DEPTH: 113.2
ACRES: MEASURED 125.7 INDICATED INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 457 LAT-LONG 355507 -1072016 MEMBER
ZONE

WELL NUMBER dhoe 5 COUNTY San Juan
QUADRANGLE Star Lake
SE 1/4 NW 1/4 NE 1/4 SEC 5 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 6.0 DEPTH: 27.5
ACRES: MEASURED 125.7 INDICATED 732.6 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 418 LAT-LONG 355745 -1072226 MEMBER
ZONE

WELL NUMBER dhoe 5 COUNTY San Juan
QUADRANGLE Star Lake
SE 1/4 NW 1/4 NE 1/4 SEC 5 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 1.7 DEPTH: 59.4
ACRES: MEASURED 125.7 INDICATED 732.6 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 419 LAT-LONG 3557456 -1072226 MEMBER
ZONE

WELL NUMBER dhoe 5 COUNTY San Juan
QUADRANGLE Star Lake
SE 1/4 NW 1/4 NE 1/4 SEC 5 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 21.7 DEPTH: 158.7
ACRES: MEASURED 125.7 INDICATED 732.6 INFERRED
SOURCE: Scott, Mytton, and Schneider, 1980 Conf
REC NUM: 420 LAT-LONG 355745 -1072226 MEMBER
ZONE

WELL NUMBER dhoe-1a COUNTY San Juan
QUADRANGLE Star Lake
NW 1/4 NW 1/4 NW 1/4 SEC 7 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 1.4 DEPTH: 42.6
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED 16097.0
SOURCE: Conf
REC NUM: 437 LAT-LONG 355653 -1072420 MEMBER
ZONE

WELL NUMBER dhoe-1a COUNTY San Juan
QUADRANGLE Star Lake
NW 1/4 NW 1/4 NW 1/4 SEC 7 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 13.5 DEPTH: 48.1
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED 16097.0
SOURCE: Conf
REC NUM: 438 LAT-LONG 355653 -1072420 MEMBER
ZONE

WELL NUMBER dhoe-1a COUNTY San Juan
QUADRANGLE Star Lake
NW 1/4 NW 1/4 NW 1/4 SEC 7 T 19N R 5W FIELD: Star Lake
FORMATION: Fruitland COAL THICKNESS: 15.1 DEPTH: 101.2
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED 16097.0
SOURCE: Conf
REC NUM: 439 LAT-LONG 355653 -1072420 MEMBER
ZONE

WELL NUMBER r-13 torreon COUNTY McKinley
QUADRANGLE Cerro Parido
1/4 SW 1/4 NW 1/4 SEC 26 T 16N R 5W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 2.0 DEPTH: 34.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353532 -1072031 MEMBER
ZONE

WELL NUMBER r-13 torreon COUNTY McKinley
QUADRANGLE Cerro Parido
1/4 SW 1/4 NW 1/4 SEC 26 T 16N R 5W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 1.9 DEPTH: 36.7
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353532 -1072031 MEMBER
ZONE

WELL NUMBER r-13 torreon COUNTY McKinley
QUADRANGLE Cerro Parido
1/4 SW 1/4 NW 1/4 SEC 26 T 16N R 5W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 2.1 DEPTH: 51.1
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353532 -1072031 MEMBER
ZONE

WELL NUMBER r-11 torreon COUNTY McKinley
QUADRANGLE Mesa Cortada
1/4 SE 1/4 NW 1/4 SEC 29 T 16N R 5W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 23.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353529 -1072322 MEMBER
ZONE

WELL NUMBER r-11 torreon COUNTY McKinley
QUADRANGLE Mesa Cortada
1/4 SE 1/4 NW 1/4 SEC 29 T 16N R 5W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 28.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353529 -1072322 MEMBER
ZONE

WELL NUMBER ic-11 COUNTY McKinley
QUADRANGLE Mesa Cortada
1/4 SW 1/4 NW 1/4 SEC 32 T 16N R 5W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 1.8 DEPTH: 64.2
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353426 -1072345 MEMBER
ZONE

WELL NUMBER ic-11 COUNTY McKinley
QUADRANGLE Mesa Cortada
1/4 SW 1/4 NW 1/4 SEC 32 T 16N R 5W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 1.3 DEPTH: 90.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353426 -1072345 MEMBER
ZONE

WELL NUMBER ic-11 COUNTY McKinley
QUADRANGLE Mesa Cortada
1/4 SW 1/4 NW 1/4 SEC 32 T 16N R 5W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 2.5 DEPTH: 98.8
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf
REC NUM: LAT-LONG 353426 -1072345 MEMBER
ZONE

WELL NUMBER 157-9-1 COUNTY McKinley
QUADRANGLE El Dado
NW 1/4 SW 1/4 SW 1/4 SEC 9 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 56.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Shomaker, Beaumont, and Kottlowski, 1971 Conf
REC NUM: 3 LAT-LONG 353228 -1073528 MEMBER
ZONE

WELL NUMBER 157-9-1 COUNTY McKinley
QUADRANGLE El Dado
NW 1/4 SW 1/4 SW 1/4 SEC 9 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 93.8
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Shomaker, Beaumont, and Kottlowski, 1971 Conf
REC NUM: 4 LAT-LONG 353228 -1073528 MEMBER
ZONE

WELL NUMBER 157-9-1 COUNTY McKinley
QUADRANGLE El Dado
NW 1/4 SW 1/4 SW 1/4 SEC 9 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 1.5 DEPTH: 98.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Shomaker, Beaumont, and Kottlowski, 1971 Conf
REC NUM: 5 LAT-LONG 353228 -1073528 MEMBER
ZONE

WELL NUMBER 30-2 COUNTY McKinley
QUADRANGLE El Dado
SW 1/4 NE 1/4 NE 1/4 SEC 30 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 6.4 DEPTH: 82.2
ACRES: MEASURED 126.0 INDICATED 860.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353022 -1073649 MEMBER
ZONE

WELL NUMBER 30-2 COUNTY McKinley
QUADRANGLE El Dado
SW 1/4 NE 1/4 NE 1/4 SEC 30 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 8.6 DEPTH: 126.4
ACRES: MEASURED 126.0 INDICATED 860.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353022 -1073649 MEMBER
ZONE

WELL NUMBER 20-4 COUNTY McKinley
QUADRANGLE El Dado
NE 1/4 SW 1/4 SE 1/4 SEC 20 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 8.7 DEPTH: 131.5
ACRES: MEASURED 126.0 INDICATED 623.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353043 -1073552 MEMBER
ZONE

WELL NUMBER 20-4 COUNTY McKinley
QUADRANGLE El Dado
NE 1/4 SW 1/4 SE 1/4 SEC 20 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 5.4 DEPTH: 174.0
ACRES: MEASURED 126.0 INDICATED 623.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353043 -1073552 MEMBER
ZONE

WELL NUMBER 18-1 COUNTY McKinley
QUADRANGLE El Dado
SE 1/4 NW 1/4 NW 1/4 SEC 18 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 4.8 DEPTH: 165.1
ACRES: MEASURED 126.0 INDICATED 907.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353204 -1073724 MEMBER
ZONE

WELL NUMBER 18-1 COUNTY McKinley
QUADRANGLE El Dado
SE 1/4 NW 1/4 NW 1/4 SEC 18 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 2.1 DEPTH: 176.1
ACRES: MEASURED 126.0 INDICATED 907.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353204 -1073724 MEMBER
ZONE

WELL NUMBER 18-1 COUNTY McKinley
QUADRANGLE El Dado
SE 1/4 NW 1/4 NW 1/4 SEC 18 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 10.4 DEPTH: 193.2
ACRES: MEASURED 126.0 INDICATED 907.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353204 -1073724 MEMBER
ZONE

WELL NUMBER 18-1 COUNTY McKinley
QUADRANGLE El Dado
SW 1/4 NW 1/4 NW 1/4 SEC 18 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 4.6 DEPTH: 209.9
ACRES: MEASURED 126.0 INDICATED 907.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353204 -1073724 MEMBER
ZONE

WELL NUMBER 34-1 COUNTY McKinley
QUADRANGLE El Dado
NE 1/4 SW 1/4 NW 1/4 SEC 34 T 16N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 3.8 DEPTH: 30.1
ACRES: MEASURED 126.0 INDICATED 907.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353440 -1073419 MEMBER
ZONE

WELL NUMBER 34-1 COUNTY McKinley
QUADRANGLE El Dado
NE 1/4 SE 1/4 NW 1/4 SEC 34 T 16N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 2.3 DEPTH: 134.4
ACRES: MEASURED 136.0 INDICATED 907.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353440 -1073419 MEMBER
ZONE

WELL NUMBER 34-1 COUNTY McKinley
QUADRANGLE El Dado
NE 1/4 SW 1/4 NW 1/4 SEC 34 T 16N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 9.6 DEPTH: 142.0
ACRES: MEASURED 126.0 INDICATED 907.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353440 -1073419 MEMBER
ZONE

WELL NUMBER 4-1 COUNTY McKinley
QUADRANGLE El Dado
NE 1/4 SE 1/4 NE 1/4 SEC 4 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 11.2 DEPTH: 188.0
ACRES: MEASURED 126.0 INDICATED 907.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353346 -1073432 MEMBER
ZONE

WELL NUMBER 28-1 COUNTY McKinley
QUADRANGLE El Dado
NW 1/4 SE 1/4 NW 1/4 SEC 28 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 2.3 DEPTH: 147.3
ACRES: MEASURED 126.0 INDICATED 827.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353012 -1073508 MEMBER
ZONE

WELL NUMBER 28-1 COUNTY McKinley
QUADRANGLE El Dado
NW 1/4 SE 1/4 NW 1/4 SEC 28 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 10.1 DEPTH: 186.1
ACRES: MEASURED 126.0 INDICATED 827.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353012 -1073508 MEMBER
ZONE

WELL NUMBER 28-1 COUNTY McKinley
QUADRANGLE El Dado
NW 1/4 SE 1/4 NW 1/4 SEC 28 T 15N R 7W FIELD: San Mateo
FORMATION: Menefee COAL THICKNESS: 10.4 DEPTH: 202.0
ACRES: MEASURED 126.0 INDICATED 827.0 INFERRED
SOURCE: U.S.G.S. drilling Conf
REC NUM: LAT-LONG 353012 -1073508 MEMBER
ZONE

WELL NUMBER Glasebrook #1 COUNTY McKinley
QUADRANGLE Tinian
NW 1/4 SE 1/4 SE 1/4 SEC 25 T 18N R 5W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 931.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354519 -1071841 MEMBER
ZONE

WELL NUMBER Glasebrook #1 COUNTY McKinley
QUADRANGLE Tinian
NW 1/4 SE 1/4 SE 1/4 SEC 25 T 18N R 5W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 4.0 DEPTH: 1073.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354519 -1071841 MEMBER
ZONE

WELL NUMBER Glasebrook #1 COUNTY McKinley
QUADRANGLE Tinian
NW 1/4 SE 1/4 SE 1/4 SEC 25 T 18N R 5W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 1401.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354519 -1071841 MEMBER
ZONE

WELL NUMBER Glasebrook #1 COUNTY McKinley
QUADRANGLE Tinian
NW 1/4 SE 1/4 SE 1/4 SEC 25 T 18N R 5W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 1473.5
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354519 -1071841 MEMBER
ZONE

WELL NUMBER Glasebrook #1 COUNTY McKinley
QUADRANGLE Tinian
NW 1/4 SE 1/4 SE 1/4 SEC 25 T 18N R 5W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.0 DEPTH: 1491.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354519 -1071841 MEMBER
ZONE

WELL NUMBER Glasebrook #1 COUNTY McKinley
QUADRANGLE Tinian
NW 1/4 SE 1/4 SE 1/4 SEC 25 T 18N R 5W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.5 DEPTH: 1497.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED
SOURCE: Tabet and Frost, 1979 Conf n
REC NUM: LAT-LONG 354519 -1071841 MEMBER
ZONE

WELL NUMBER cc-26 COUNTY McKinley
QUADRANGLE Rincon Marquez
SW 1/4 NE 1/4 SE 1/4 SEC 21 T 18N R 6W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 06.0 DEPTH: 1302.0
ACRES: MEASURED 125.7 INDICATED 1005.3 INFERRED 0000000
SOURCE: bendix Conf
REC NUM: 00000 LAT-LONG 354627 -1072818 MEMBER
ZONE

WELL NUMBER 51-860 c COUNTY McKinley
QUADRANGLE Rincon Marquez
NW 1/4 NE 1/4 SW 1/4 SEC 30 T 18N R 5W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 3.8 DEPTH: 134.3
ACRES: MEASURED 26.0 INDICATED 151.0 INFERRED 17082.0
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG - MEMBER
ZONE

WELL NUMBER 47-860 c COUNTY McKinley
QUADRANGLE Rincon Marquez
NW 1/4 NW 1/4 NE 1/4 SEC 19 T 18N R 5W FIELD: Chacra Mesa
FORMATION: Menefee COAL THICKNESS: 2.3 DEPTH: 242.6
ACRES: MEASURED 62.0 INDICATED 765.0 INFERRED
SOURCE: Hunt, 1936 Conf n
REC NUM: LAT-LONG - MEMBER
ZONE

Appendix 3 Coal Analyses Data

The analyses data for determining coal quality for the fields discussed in the text are entered on the form shown below. The data in Appendix 3 is only the non-confidential data and may or may not reflect the entire data set used for the coal quality figures used in the text.

```
SAMPLE NO. \\\\\\\\\\\\\\\\ DONE FOR \\\\\\\\\\\\\\\\
SAMPLE LOCATION: \\1/4, \\1/4, SEC. \\, T.\\\, R.\\\
FIELD: \\\\\\\\\\\  COUNTY:\\\\\\\\\\\\\\\\ QUAD:\\\\\\\\\\\\\\\\\
TYPE OF SAMPLE: \\\\\\\\\\\\  DEPTH INTERVAL \\\\\\\\\\\\\\\
FORMATION: \\\\\\\\\\\\\\  THICKNESS OF SEAM: \\\\\\\\\
PROXIMATE ANALYSIS (%)
  MOISTURE:\\\\\\    ASH:\\\\\  VOLATILE MATTER: \\\\\
  FIXED CARBON: \\\\\

ULTIMATE ANALYSIS(%)
  MOISTURE: \\\\\   CARBON: \\\\\   HYDROGEN: \\\\\   NITROGEN: \\\\\
  SULFUR: \\\\\   ASH: \\\\\   OXYGEN: \\\\\

BTU: \\\\\\\\\\\\ FORMS OF SULFUR (%) ORG:\\\\ PYR: \\\\ SULFATE: \\\

FUSION TEMPERATURE OF ASH (F)  REDUCING      OXIDIZING
  INITIAL DEFORMATION:          \\\\\\\       \\\\\\\\
  SOFTENING                     \\\\\\\       \\\\\\\\
  HEMISPHERICAL                 \\\\\\\       \\\\\\\\
  FLUID                         \\\\\\\       \\\\\\\\ Conf \
LAT-LONG: \\\\\\\\-\\\\\\\\ MEM: \\\\\\\\\\\\\\\ ZNE: \\\\\\\\\\\\\\\
HGI:\\\\\ EQ MOIST:\\\\\ FSI:\\\ DATE REC:\\/\\/\\ COMPL:\\/\\/\\
```

Explanation of form:

SAMPLE NO. - Number assigned by the original source to the coal sample analyzed.

DONE FOR - Source of sample or analyses.

SAMPLE LOCATION - Location by quarters of a section, section, township and range.

FIELD - Coal field the coal sample is from.

COUNTY and QUAD - County and quadrangle the coal sample is from.

TYPE OF SAMPLE - The type of sample if known, such as core, cuttings, or tipple.

DEPTH INTERVAL - Interval analyzed

FORMATION - Geologic formation in which coal sample occurs.

THICKNESS OF SEAM - Thickness of coal bed analyzed.

PROXIMATE ANALYSES - Elements of the proximate analysis on an as received basis by percent.

ULTIMATE ANALYSES - Elements of the ultimate analysis on an as received basis by percent.

BTU - Heating value per ton

FORMS OF SULFUR (by percent) - Organic Sulfur, Pyritic Sulfur, and Sulfate

FUSION TEMPERATURE of ash in degrees Farenheit - Temperature at different stages under reducing and oxidizing conditions.

LAT - LONG - Latitude and Longitude of sample point.

MEM - Member of the geologic formation in which the sample occurs.

ZNE - Zone of the geologic formation in which the sample occurs.

HGI - Hardgrove Grindability Index

EQ. MOISTURE - Equilibrium Moisture

FSI - Free Swelling Index

DATE RECEIVED - If known, the date (day/month/year) the sample was received by the lab.

COMPL - If known, the date (day/month/year) the analyses on the sample were completed by the lab.

SAMPLE NO. 12650 DONE FOR Holmes Mine- Ellis, 1936
SAMPLE LOCATION: 1/4, SW1/4, SEC. 6 , T.10N, R.6E
FIELD: Tijeras COUNTY:Bernalillo QUAD:Sedillo
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Mesaverde THICKNESS OF SEAM: 27 inch
PROXIMATE ANALYSIS (%)
MOISTURE:1.6 ASH:31.1 VOLATILE MATTER: 31.1
FIXED CARBON: 36.2

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 3.2 ASH: OXYGEN:

BTU: 10050 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. USGS(d)190730,b DONE FOR NMBM (dt 42771)
SAMPLE LOCATION: 1/4, 1/4, SEC. 8 , T.10N, R.2W
FIELD: Tijeras COUNTY:Bernalillo QUAD:Canoncito School
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Mesaverde THICKNESS OF SEAM: 2.67
PROXIMATE ANALYSIS (%)
MOISTURE:9.6 ASH:7.6 VOLATILE MATTER: 37.5
FIXED CARBON: 45.3

ULTIMATE ANALYSIS(%)
MOISTURE: 7.28 CARBON: 59.97 HYDROGEN: 3.83 NITROGEN: 1.21
SULFUR: 0.9 ASH: 7.79 OXYGEN: 19.08

BTU: 9361 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE LOCATION: 1/4, NE1/4, SEC. 18, T.10N, R. 2W
FIELD: Rio Puerco COUNTY: Bernalillo QUAD: Canoncito School
TYPE OF SAMPLE: mine DEPTH INTERVAL 0.0
FORMATION: Crevasse THICKNESS OF SEAM: 3.8
PROXIMATE ANALYSIS (%)
MOISTURE: 16.45 ASH:6.15 VOLATILE MATTER: 37.92
FIXED CARBON: 39.48

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: .94 ASH: OXYGEN:

BTU: 12690 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. a47085 DONE FOR Ellis, 1936
SAMPLE LOCATION: NW1/4, SW1/4, SEC. 31, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:La Ventana
TYPE OF SAMPLE: mine DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:15.8 ASH:5.9 VOLATILE MATTER: 34.5
FIXED CARBON: 43.8

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.6 ASH: OXYGEN:

BTU: 10900 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING 2340
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. a46366(USBM 569) DONE FOR Ellis, 1936
SAMPLE LOCATION: NW1/4, SW1/4, SEC. 31, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:La Ventana
TYPE OF SAMPLE: mine DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:15.7 ASH:7.2 VOLATILE MATTER: 32.0
FIXED CARBON: 45.1

ULTIMATE ANALYSIS(%)
MOISTURE: 15.7 CARBON: 61.5 HYDROGEN: 6.2 NITROGEN: 1.2
SULFUR: 0.6 ASH: 7.2 OXYGEN: 23.3

BTU: 10790 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING 2340
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. a47084(USBM569)   DONE FOR   Ellis, 1936
SAMPLE LOCATION: SW1/4, SW1/4, SEC. 26, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval   QUAD:La Ventana
TYPE OF SAMPLE: mine DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM: 4 3"

PROXIMATE ANALYSIS (%)
MOISTURE:18.2   ASH:6.6   VOLATILE MATTER: 34.4
FIXED CARBON: 40.8

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.9   ASH: OXYGEN:

BTU: 10280   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING   2110
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. a23139(USBM 569)   DONE FOR Anderson Mine-Ellis, 1936
SAMPLE LOCATION: 1/4, SE1/4, SEC. 35, T.19N, R.2W
FIELD: chacra mesa COUNTY:Sandoval   QUAD:Headcut Reservoir
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee   THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:16.3   ASH:7.3   VOLATILE MATTER: 32.6
FIXED CARBON: 43.8

ULTIMATE ANALYSIS(%)
MOISTURE: 16.3   CARBON: 60.0 HYDROGEN: 5.9   NITROGEN: 1.1
SULFUR: 1.3   ASH: 7.3   OXYGEN: 24.4

BTU: 10430   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. a60026(USBM 569) DONE FOR Rio Puerco Mine-Ellis, 1936
SAMPLE LOCATION: 1/4, SE1/4, SEC. 19, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: mine DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:12.1 ASH:7.6 VOLATILE MATTER: 35.8
FIXED CARBON: 44.5

ULTIMATE ANALYSIS(%)
MOISTURE: 12.1 CARBON: 61.1 HYDROGEN: 6.2 NITROGEN: 1.1
SULFUR: 2.8 ASH: 7.6 OXYGEN: 21.2

BTU: 10940 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. a64268(USBM 569) DONE FOR Anderson Mine-Ellis, 1936
SAMPLE LOCATION: NW1/4, SE1/4, SEC. 35, T.19N, R.2W
FIELD: La Ventana COUNTY:Sandoval QUAD:Headcut Reservoir

TYPE OF SAMPLE: mine DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:20.0 ASH:4.9 VOLATILE MATTER: 32.5
FIXED CARBON: 42.6

ULTIMATE ANALYSIS(%)
MOISTURE: 20.0 CARBON: 58.6 HYDROGEN: 6.4 NITROGEN: 1.1
SULFUR: 0.7 ASH: 4.9 OXYGEN: 28.3

BTU: 10240 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING 2340
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. a75538(USBM 569)   DONE FOR Anderson Mine-Ellis, 1936
SAMPLE LOCATION: 1/4, SE1/4, SEC. 35, T.19N, R.2W
FIELD: La Ventana   COUNTY:Sandoval   QUAD:Headcut Reservoir
TYPE OF SAMPLE: DEPTH INTERVAL 2.0-7.1
FORMATION: Menefee   THICKNESS OF SEAM: 5.1

PROXIMATE ANALYSIS (%)
MOISTURE:18.3   ASH:4.8   VOLATILE MATTER: 33.9
FIXED CARBON: 43.0

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.7   ASH: OXYGEN:

BTU: 10630   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F)   REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. a75539(USBM 569)   DONE FOR Anderson Mine-Ellis,1936
SAMPLE LOCATION: 1/4, SE1/4, SEC. 35, T.19N, R.2W
FIELD: chacra   COUNTY:Sandoval   QUAD:Headcut Reservoir
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee   THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:19.1   ASH:6.2   VOLATILE MATTER: 34.0
FIXED CARBON: 40.7

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.6   ASH: OXYGEN:

BTU: 10210   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F)   REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. a46367(USBM 569)   DONE FOR Anderson Mine-Ellis,1936
SAMPLE LOCATION: 1/4, SE1/4, SEC. 35, T.19N, R.2W
FIELD: chacra mesa   COUNTY:Sandoval   QUAD:Headcut Reservoir
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee   THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:14.8   ASH:9.9   VOLATILE MATTER: 33.9
FIXED CARBON: 41.4

ULTIMATE ANALYSIS(%)
MOISTURE: 14.8   CARBON: 52.8   HYDROGEN: 5.5   NITROGEN: 1.1
SULFUR: 1.2   ASH: 9.9   OXYGEN: 29.5

BTU: 8910   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F)   REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. a23137(USBM 569)   DONE FOR McDonald Mine-Ellis,1936
SAMPLE LOCATION: 1/4, NE1/4, SEC. 4 , T.19N, R.1W
FIELD: La Ventana   COUNTY:Sandoval   QUAD:La Ventana
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee   THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:17.7   ASH:4.8   VOLATILE MATTER: 35.0
FIXED CARBON: 42.5

ULTIMATE ANALYSIS(%)
MOISTURE: 17.7   CARBON: 59.4   HYDROGEN: 6.1   NITROGEN: 1.0
SULFUR: 2.1   ASH: 44.8   OXYGEN: 26.6

BTU: 10310   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F)   REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. 96547(USBM 569)   DONE FOR Mitchell Mine-Ellis,1936
SAMPLE LOCATION: 1/4,   1/4, SEC. 29, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval   QUAD:La Ventana
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:22.1   ASH:4.5   VOLATILE MATTER: 35.7
FIXED CARBON: 37.7

ULTIMATE ANALYSIS(%)
MOISTURE: 22.1   CARBON: 53.2 HYDROGEN: 5.7   NITROGEN: 1.2
SULFUR: 0.7   ASH: 4.5   OXYGEN: 34.7

BTU: 8790   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. 141   DONE FOR Anderson Ellis, 1936
SAMPLE LOCATION: 1/4,   1/4, SEC. 35, T.19N, R.2W
FIELD: La Ventana   COUNTY:Sandoval   QUAD:Headcut Reservoir
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee   THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:16.1   ASH:13.4 VOLATILE MATTER: 38.2
FIXED CARBON: 48.4

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.6   ASH: OXYGEN:

BTU: 9880   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. 142 DONE FOR San Juan Ellis, 1936
SAMPLE LOCATION: 1/4, 1/4, SEC. 31, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:La Ventana
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:11.1 ASH:8.3 VOLATILE MATTER: 40.0
FIXED CARBON: 51.7

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.6 ASH: OXYGEN:

BTU: 11180 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 143 DONE FOR San Juan- Ellis, 1936
SAMPLE LOCATION: 1/4, 1/4, SEC. 31, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:La Ventana
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:10.6 ASH:8.5 VOLATILE MATTER: 40.0
FIXED CARBON: 51.5

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.6 ASH: OXYGEN:

BTU: 11300 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 144 DONE FOR San Juan- Ellis, 1936
SAMPLE LOCATION: 1/4, 1/4, SEC. 31, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:La Ventana
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:16.5 ASH:11.9 VOLATILE MATTER: 39.6
FIXED CARBON: 48.5

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.0 ASH: OXYGEN:

BTU: 10120 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 145 DONE FOR San Juan- Ellis, 1936
SAMPLE LOCATION: 1/4, 1/4, SEC. 31, T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:La Ventana
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:14.0 ASH:10.4 VOLATILE MATTER: 37.6
FIXED CARBON: 52.0

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.7 ASH: OXYGEN:

BTU: 10660 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. usgs(d)190729 DONE FOR (dt 420772)
SAMPLE LOCATION: 1/4, 1/4, SEC. 36, T.11N, R.2W
FIELD: rio puerco COUNTY:Sandoval QUAD:herrera
TYPE OF SAMPLE: DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:9.4 ASH:10.0 VOLATILE MATTER: 37.6
FIXED CARBON: 43.0

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.5 ASH: OXYGEN:

BTU: 9200 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 2 wiseman ranch DONE FOR
SAMPLE LOCATION: 1/4, 1/4, SEC. 3 , T.18N, R.2W
FIELD: chacra mesa COUNTY:Sandoval QUAD:Headcut Reservoir
TYPE OF SAMPLE: as recvd DEPTH INTERVAL 79-81
FORMATION: Menefee THICKNESS OF SEAM: 6

PROXIMATE ANALYSIS (%)
MOISTURE:9.22 ASH:13.6 VOLATILE MATTER: 44.19
FIXED CARBON: 32.99

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 5.17 ASH: OXYGEN:

BTU: 10742 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 1 wiseman ranch   DONE FOR
SAMPLE LOCATION: 1/4,   1/4, SEC. 10, T.18N, R.2W
FIELD: chacra mesa COUNTY:Sandoval   QUAD:Headcut Reservoir
TYPE OF SAMPLE: as recvd   DEPTH INTERVAL 21.5-23.5
FORMATION: Menefee   THICKNESS OF SEAM: 2

PROXIMATE ANALYSIS (%)
MOISTURE:10.14   ASH:12.9 VOLATILE MATTER: 52.38
FIXED CARBON: 24.5

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.67   ASH: OXYGEN:

BTU: 10174   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. 2 wiseman ranch   DONE FOR
SAMPLE LOCATION: 1/4,   1/4, SEC. 3 , T.18N, R.2W
FIELD: chacra mesa COUNTY:Sandoval   QUAD:Headcut Reservoir
TYPE OF SAMPLE: as recvd   DEPTH INTERVAL 81-83
FORMATION: Menefee   THICKNESS OF SEAM: 2

PROXIMATE ANALYSIS (%)
MOISTURE:10.86   ASH:4.75 VOLATILE MATTER: 56.17
FIXED CARBON: 28.23

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.85   ASH: OXYGEN:

BTU: 11475   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf
LAT-LONG: -   MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /   COMPL: / /

SAMPLE NO. 2 wiseman ranch DONE FOR
SAMPLE LOCATION: 1/4, 1/4, SEC. 3 , T.18N, R.2W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Headcut Reservoir
TYPE OF SAMPLE: as recvd DEPTH INTERVAL 83-85.25
FORMATION: Menefee THICKNESS OF SEAM: 2.25

PROXIMATE ANALYSIS (%)
MOISTURE:9.95 ASH:13.6 VOLATILE MATTER: 55.91
FIXED CARBON: 31.67

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.72 ASH: OXYGEN:

BTU: 11714 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. wiseman ranch DONE FOR
SAMPLE LOCATION: 1/4, 1/4, SEC. 10, T.18N, R.2W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Headcut Reservoir
TYPE OF SAMPLE: as recvd DEPTH INTERVAL 23.5-25.5
FORMATION: Menefee THICKNESS OF SEAM: 2

PROXIMATE ANALYSIS (%)
MOISTURE:9.91 ASH:14.6 VOLATILE MATTER: 49.51
FIXED CARBON: 26.03

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.67 ASH: OXYGEN:

BTU: 9823 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. wiseman ranch DONE FOR
SAMPLE LOCATION: 1/4, 1/4, SEC. 10, T.18N, R.2W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Headcut Reservoir
TYPE OF SAMPLE: as rcvd DEPTH INTERVAL 57.66-59.5
FORMATION: Menefee THICKNESS OF SEAM: 1.84

PROXIMATE ANALYSIS (%)
MOISTURE:13.1 ASH:1.3 VOLATILE MATTER: 44.5
FIXED CARBON: 41.07

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.57 ASH: OXYGEN:

BTU: 9823 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. wiseman ranch DONE FOR
SAMPLE LOCATION: 1/4, 1/4, SEC. 10, T.18N, R.2W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Headcut Reservoir
TYPE OF SAMPLE: DEPTH INTERVAL 61.33-63.42
FORMATION: Menefee THICKNESS OF SEAM: 2.09

PROXIMATE ANALYSIS (%)
MOISTURE:11.82 ASH:4.29 VOLATILE MATTER: 44.99
FIXED CARBON: 38.9

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.65 ASH: OXYGEN:

BTU: 11446 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 16172-7 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 16, T.17N, R.2W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Luis
TYPE OF SAMPLE: core DEPTH INTERVAL 44.0-46.0
FORMATION: Menefee THICKNESS OF SEAM: 2.0

PROXIMATE ANALYSIS (%)
MOISTURE:13.99 ASH:13.7 VOLATILE MATTER: 34.55
FIXED CARBON: 37.79

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.55 ASH: OXYGEN:

BTU: 10052 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 16172-7 DONE FOR Arroyo #1 Mine
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 16, T.17N, R.2W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Luis
TYPE OF SAMPLE: core DEPTH INTERVAL 42.0-44.0
FORMATION: Menefee THICKNESS OF SEAM: 2.0

PROXIMATE ANALYSIS (%)
MOISTURE:16.65 ASH:8.3 VOLATILE MATTER: 33.96
FIXED CARBON: 41.11

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.59 ASH: OXYGEN:

BTU: 10508 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 16172-5 DONE FOR Arroyo #1 Mine
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 16, T.17N, R.2W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Luis
TYPE OF SAMPLE: core DEPTH INTERVAL 46.0-49.0
FORMATION: Menefee THICKNESS OF SEAM: 3.0

PROXIMATE ANALYSIS (%)
MOISTURE:13.8 ASH:14.7 VOLATILE MATTER: 34.76
FIXED CARBON: 36.77

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.28 ASH: OXYGEN:

BTU: 9973 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-9 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: NW1/4, NE1/4, SEC. 17, T.20N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:15.42 ASH:7.32 VOLATILE MATTER: 34.61
FIXED CARBON: 42.66

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.71 ASH: OXYGEN:

BTU: 10514 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-8 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: SE1/4, NW1/4, SEC. 8 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL 440.0-450.0
FORMATION: Menefee THICKNESS OF SEAM: 10.0
PROXIMATE ANALYSIS (%)
MOISTURE:19.03 ASH:5.17 VOLATILE MATTER: 32.46
FIXED CARBON: 43.34

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.33 ASH: OXYGEN:

BTU: 10358 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-7 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:15.12 ASH:7.54 VOLATILE MATTER: 34.72
FIXED CARBON: 42.62

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.04 ASH: OXYGEN:

BTU: 10611 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-6 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 6 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL 667.0-674.1
FORMATION: Menefee THICKNESS OF SEAM: 7.1

PROXIMATE ANALYSIS (%)
MOISTURE:17.69 ASH:6.5 VOLATILE MATTER: 32.65
FIXED CARBON: 43.15

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 0.83 ASH: OXYGEN:

BTU: 10486 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-10 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: SE1/4, NE1/4, SEC. 9 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL 282.0-292.0
FORMATION: Menefee THICKNESS OF SEAM: 10.0

PROXIMATE ANALYSIS (%)
MOISTURE:17.97 ASH:7.14 VOLATILE MATTER: 34.06
FIXED CARBON: 40.83

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.11 ASH: OXYGEN:

BTU: 10178 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-14 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: SW1/4, NW1/4, SEC. 8 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL 698-708
FORMATION: Menefee THICKNESS OF SEAM: 10.0

PROXIMATE ANALYSIS (%)
MOISTURE:13.99 ASH:6.96 VOLATILE MATTER: 35.83
FIXED CARBON: 43.22

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.86 ASH: OXYGEN:

BTU: 10922 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-5 DONE FOR Ideal Basic
SAMPLE LOCATION: NW1/4, NE1/4, SEC. 5 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL 725.5-739
FORMATION: Menefee THICKNESS OF SEAM: 13.5

PROXIMATE ANALYSIS (%)
MOISTURE:13.18 ASH:34.0 VOLATILE MATTER: 26.06
FIXED CARBON: 26.73

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.29 ASH: OXYGEN:

BTU: 7132 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-4 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 5 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL 321.0-331.0
FORMATION: Menefee THICKNESS OF SEAM: 10.0

PROXIMATE ANALYSIS (%)
MOISTURE:17.59 ASH:9.36 VOLATILE MATTER: 32.89
FIXED CARBON: 40.15

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.67 ASH: OXYGEN:

BTU: 9872 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-3 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: NE1/4, SE1/4, SEC. 5 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL 331.0-341.0
FORMATION: Menefee THICKNESS OF SEAM: 10.0

PROXIMATE ANALYSIS (%)
MOISTURE:19.44 ASH:8.5 VOLATILE MATTER: 32.49
FIXED CARBON: 39.57

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.13 ASH: OXYGEN:

BTU: 9715 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-2 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: SW1/4, NE1/4, SEC. 5 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:13.59 ASH:25.0 VOLATILE MATTER: 29.52
FIXED CARBON: 31.87

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.26 ASH: OXYGEN:

BTU: 8438 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 77-1 DONE FOR Ideal Basic, 1979
SAMPLE LOCATION: SE1/4, NE1/4, SEC. 6 , T.19N, R.1W
FIELD: La Ventana COUNTY:Sandoval QUAD:San Pablo
TYPE OF SAMPLE: core DEPTH INTERVAL
FORMATION: Menefee THICKNESS OF SEAM:

PROXIMATE ANALYSIS (%)
MOISTURE:12.72 ASH:10.2 VOLATILE MATTER: 34.63
FIXED CARBON: 42.47

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: HYDROGEN: NITROGEN:
SULFUR: 1.25 ASH: OXYGEN:

BTU: 10717 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. anderson mine DONE FOR USBM
SAMPLE LOCATION: 1/4, 1/4, SEC. 35, T.19N, R. 2W
FIELD: La Ventana COUNTY: Sandoval QUAD: Headcut Reservoir
TYPE OF SAMPLE: mine DEPTH INTERVAL 0.0
FORMATION: Menefee THICKNESS OF SEAM: 9.0

PROXIMATE ANALYSIS (%)
MOISTURE: 13.1 ASH:10.1 VOLATILE MATTER: 34.6
FIXED CARBON: 42.2

ULTIMATE ANALYSIS(%)
MOISTURE: 13.1 CARBON: 59.3 HYDROGEN: 5.7 NITROGEN: 1.2
SULFUR: .7 ASH: 10.1 OXYGEN: 23.0

BTU: 10400 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. Tonapah DONE FOR USBM
SAMPLE LOCATION: 1/4, 1/4, SEC. 26, T.18N, R. 2W
FIELD: La Ventana COUNTY: Sandoval QUAD:Headcut Reservoir
TYPE OF SAMPLE: mine DEPTH INTERVAL 0.0
FORMATION: Menefee THICKNESS OF SEAM: 7.0

PROXIMATE ANALYSIS (%)
MOISTURE: 12.0 ASH: 8.1 VOLATILE MATTER: 36.0
FIXED CARBON: 43.9

ULTIMATE ANALYSIS(%)
MOISTURE: 12.0 CARBON: 62.5 HYDROGEN: 5.8 NITROGEN: 1.2
SULFUR: .5 ASH: 8.1 OXYGEN: 21.9

BTU: 11010 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. Peacock Mine DONE FOR USBM
SAMPLE LOCATION: 1/4, 1/4, SEC. 2, T.18N, R. 2W
FIELD: La Ventana COUNTY: Sandoval QUAD: Headcut Reservoir
TYPE OF SAMPLE: mine DEPTH INTERVAL 0.0
FORMATION: Crevasse THICKNESS OF SEAM: 7.5

PROXIMATE ANALYSIS (%)
MOISTURE: 12.6 ASH:10.3 VOLATILE MATTER: 34.6
FIXED CARBON: 42.5

ULTIMATE ANALYSIS(%)
MOISTURE: 12.6 CARBON: 59.1 HYDROGEN: 5.7 NITROGEN: 1.2
SULFUR: .7 ASH: 10.3 OXYGEN: 23.0

BTU: 10390 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. San Ysidro DONE FOR USBM
SAMPLE LOCATION: SE1/4, SW1/4, SEC. 8, T.14N, R. 1E
FIELD: Rio Puerco COUNTY: Sandoval QUAD: Sky Village NE
TYPE OF SAMPLE: mine DEPTH INTERVAL 0.0
FORMATION: Crevasse THICKNESS OF SEAM: 5.0

PROXIMATE ANALYSIS (%)
MOISTURE: 16.5 ASH: 9.5 VOLATILE MATTER: 34.6
FIXED CARBON: 39.6

ULTIMATE ANALYSIS(%)
MOISTURE: 16.5 CARBON: 55.9 HYDROGEN: 5.8 NITROGEN: 1.0
SULFUR: .4 ASH: 9.5 OXYGEN: 27.4

BTU: 9640 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. cl-4649 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 20, T.18N, R.3W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Wolf Stand
TYPE OF SAMPLE: core DEPTH INTERVAL 46.0-49.0
FORMATION: Menefee THICKNESS OF SEAM: 3.0
PROXIMATE ANALYSIS (%)
MOISTURE:11.3 ASH:8.1 VOLATILE MATTER: 38.3
FIXED CARBON: 42.3

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 62.0 HYDROGEN: 4.5 NITROGEN: 1.4
SULFUR: 0.7 ASH: 8.1 OXYGEN: 12.0

BTU: 11030.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 354632 -1071058 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. cl-5760 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 20, T.18N, R.3W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Wolf Stand
TYPE OF SAMPLE: core DEPTH INTERVAL 57.0 - 60.0
FORMATION: Menefee THICKNESS OF SEAM: 3.0
PROXIMATE ANALYSIS (%)
MOISTURE:11.5 ASH:16.0 VOLATILE MATTER: 34.6
FIXED CARBON: 37.9

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 55.6 HYDROGEN: 3.8 NITROGEN: 1.2
SULFUR: 2.5 ASH: 16.0 OXYGEN: 9.6

BTU: 9858.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 354632 -1071058 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. cl - 6769 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 20, T.18N, R.3W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Wolf Stand
TYPE OF SAMPLE: core DEPTH INTERVAL 67.0-69.0
FORMATION: Menefee THICKNESS OF SEAM: 2.0
PROXIMATE ANALYSIS (%)
MOISTURE:10.4 ASH:24.4 VOLATILE MATTER: 32.2
FIXED CARBON: 32.9

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 49.4 HYDROGEN: 3.5 NITROGEN: 1.1
SULFUR: 2.2 ASH: 24.4 OXYGEN: 9.0

BTU: 8596.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 354632 -1071058 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. cl-154158 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 20, T.18N, R.3W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Wolf Stand
TYPE OF SAMPLE: core DEPTH INTERVAL 154.0-158.0
FORMATION: Menefee THICKNESS OF SEAM: 4.0
PROXIMATE ANALYSIS (%)
MOISTURE:11.1 ASH:6.2 VOLATILE MATTER: 36.8
FIXED CARBON: 45.9

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 65.2 HYDROGEN: 4.4 NITROGEN: 1.4
SULFUR: 0.5 ASH: 6.2 OXYGEN: 11.2

BTU: 11357.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 354632 -1071058 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. cl-158164 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 20, T.18N, R.3W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Wolf Stand
TYPE OF SAMPLE: core DEPTH INTERVAL 158.0-164.0
FORMATION: Menefee THICKNESS OF SEAM: 6.0
PROXIMATE ANALYSIS (%)
MOISTURE:13.6 ASH:3.2 VOLATILE MATTER: 36.6
FIXED CARBON: 46.5

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 66.8 HYDROGEN: 4.3 NITROGEN: 1.4
SULFUR: 0.4 ASH: 3.2 OXYGEN: 10.2

BTU: 11542.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 354632 -1071058 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. cl-164168 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 20, T.18N, R.3W
FIELD: Chacra Mesa COUNTY:Sandoval QUAD:Wolf Stand
TYPE OF SAMPLE: core DEPTH INTERVAL 164.0-168.0
FORMATION: Menefee THICKNESS OF SEAM: 4.0
PROXIMATE ANALYSIS (%)
MOISTURE:12.3 ASH:4.9 VOLATILE MATTER: 36.5
FIXED CARBON: 46.3

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 65.7 HYDROGEN: 3.8 NITROGEN: 1.4
SULFUR: 0.4 ASH: 4.9 OXYGEN: 11.5

BTU: 11423.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 354632 -1071058 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. c3-221-224   DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 29, T.17N, R.3W
FIELD: La Ventana COUNTY:Sandoval QUAD:Arroyo Empredrado
TYPE OF SAMPLE: core   DEPTH INTERVAL 221.0-224.
FORMATION: Menefee   THICKNESS OF SEAM: 3.0
PROXIMATE ANALYSIS (%)
MOISTURE:6.7   ASH:8.7   VOLATILE MATTER: 36.4
FIXED CARBON: 48.2

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 67.4   HYDROGEN: 4.7   NITROGEN: 1.3
SULFUR: 0.7   ASH: 8.7   OXYGEN: 10.5

BTU: 11828.0   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf n
LAT-LONG: 354037 -1071040 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. c4-171-175   DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 27, T.17N, R.4W
FIELD: La Ventana COUNTY:Sandoval QUAD:Arroyo Empredrado
TYPE OF SAMPLE: core   DEPTH INTERVAL 171.0-175.0
FORMATION: Menefee   THICKNESS OF SEAM: 4.0
PROXIMATE ANALYSIS (%)
MOISTURE:9.6   ASH:9.8   VOLATILE MATTER: 35.0
FIXED CARBON: 45.6

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 64.6   HYDROGEN: 4.4   NITROGEN: 1.4
SULFUR: 0.4   ASH: 9.8   OXYGEN: 9.8

BTU: 11270.0   FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING   OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID   Conf n
LAT-LONG: 354127 -1071507 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. r33-8085 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 31, T.17N, R.3W
FIELD: La Ventana COUNTY:Sandoval QUAD:Arroyo Empredrado
TYPE OF SAMPLE: cuttings DEPTH INTERVAL 80.0-85.0
FORMATION: Menefee THICKNESS OF SEAM: 5.0
PROXIMATE ANALYSIS (%)
MOISTURE:4.6 ASH:15.9 VOLATILE MATTER: 36.6
FIXED CARBON: 42.9

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 62.4 HYDROGEN: 4.5 NITROGEN: 1.3
SULFUR: 0.8 ASH: 15.9 OXYGEN: 10.5

BTU: 10927.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 353939 -1071202 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. c5-1418 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 5 , T.16N, R.4W
FIELD: San Mateo COUNTY:Sandoval QUAD:Canada Calladita
TYPE OF SAMPLE: core DEPTH INTERVAL 14.0-18.0
FORMATION: Menefee THICKNESS OF SEAM: 2.0
PROXIMATE ANALYSIS (%)
MOISTURE:7.5 ASH:31.3 VOLATILE MATTER: 29.4
FIXED CARBON: 31.8

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 44.6 HYDROGEN: 3.0 NITROGEN: 1.0
SULFUR: 0.4 ASH: 31.3 OXYGEN: 12.2

BTU: 7405.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 353901 -1071713 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. c5-9799 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 5 , T.16N, R.4W
FIELD: San Mateo COUNTY:Sandoval QUAD:Canada Calladita
TYPE OF SAMPLE: core DEPTH INTERVAL 97.0-99.0
FORMATION: Menefee THICKNESS OF SEAM: 2.0
PROXIMATE ANALYSIS (%)
MOISTURE:6.9 ASH:33.8 VOLATILE MATTER: 28.7
FIXED CARBON: 30.6

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 46.6 HYDROGEN: 3.7 NITROGEN: 1.1
SULFUR: 0.5 ASH: 33.8 OXYGEN: 7.4

BTU: 8244.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 353901 -1071713 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. c5-123127 DONE FOR Tabet and Frost, 1979
SAMPLE LOCATION: 1/4, 1/4, SEC. 5 , T.16N, R.4W
FIELD: San Mateo COUNTY:Sandoval QUAD:Canada Calladita
TYPE OF SAMPLE: core DEPTH INTERVAL 123.0-127
FORMATION: Menefee THICKNESS OF SEAM: 4.0
PROXIMATE ANALYSIS (%)
MOISTURE:7.9 ASH:11.4 VOLATILE MATTER: 35.2
FIXED CARBON: 45.5

ULTIMATE ANALYSIS(%)
MOISTURE: CARBON: 63.8 HYDROGEN: 5.3 NITROGEN: 1.1
SULFUR: 0.7 ASH: 11.4 OXYGEN: 17.7

BTU: 11412.0 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf n
LAT-LONG: 353901 -1071713 MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / /79 COMPL: / /

SAMPLE NO. dc-2 k-57022 DONE FOR NMBMMR
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 11, T.18N, R.5W
FIELD: Chacra Mesa COUNTY:McKinley QUAD:Tinian
TYPE OF SAMPLE: core DEPTH INTERVAL 691.1-694.8
FORMATION: Menefee THICKNESS OF SEAM: 3.7
PROXIMATE ANALYSIS (%)
MOISTURE:12.0 ASH:14.0 VOLATILE MATTER: 34.1
FIXED CARBON: 39.9

ULTIMATE ANALYSIS(%)
MOISTURE: 12.0 CARBON: 59.3 HYDROGEN: 5.6 NITROGEN: 1.2
SULFUR: 0.3 ASH: 14.0 OXYGEN: 19.6

BTU: 10410 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. dc-2 k-57023 DONE FOR NMBMMR
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 11, T.18N, R.5W
FIELD: Chacra Mesa COUNTY:McKinley QUAD:Tinian
TYPE OF SAMPLE: core DEPTH INTERVAL 696.29-702.85
FORMATION: Menefee THICKNESS OF SEAM: 6.56
PROXIMATE ANALYSIS (%)
MOISTURE:13.0 ASH:18.5 VOLATILE MATTER: 34.7
FIXED CARBON: 33.8

ULTIMATE ANALYSIS(%)
MOISTURE: 13.0 CARBON: 55.8 HYDROGEN: 5.3 NITROGEN: 1.1
SULFUR: 0.3 ASH: 18.5 OXYGEN: 19.0

BTU: 9550 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F) REDUCING OXIDIZING
INITIAL DEFORMATION:
SOFTENING
HEMISPHERICAL
FLUID Conf
LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. dc-2 k-57024 DONE FOR NMBMMR
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 11, T.18N, R.5W
FIELD: Chacra Mesa COUNTY:McKinley QUAD:Tinian
TYPE OF SAMPLE: core DEPTH INTERVAL 734.45-737.65
FORMATION: Menefee THICKNESS OF SEAM: 3.2
PROXIMATE ANALYSIS (%)
MOISTURE:11.0 ASH:19.5 VOLATILE MATTER: 34.4
FIXED CARBON: 35.1

ULTIMATE ANALYSIS(%)
MOISTURE: 11.0 CARBON: 55.5 HYDROGEN: 5.2 NITROGEN: 1.2
SULFUR: 0.4 ASH: 19.5 OXYGEN: 18.2

BTU: 9800 FORMS OF SULFUR (%) ORG: PYR: SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:		
SOFTENING		
HEMISPHERICAL		
FLUID		Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-4-1c DONE FOR USGS
SAMPLE LOCATION: SE1/4, NE1/4, SEC. 4, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 188.-199.2
FORMATION: Menefee THICKNESS OF SEAM: 11.2
PROXIMATE ANALYSIS (%)
MOISTURE: 14.04 ASH:16.0 VOLATILE MATTER: 34.78
FIXED CARBON: 35.21

ULTIMATE ANALYSIS(%)
MOISTURE: 14.04 CARBON: 54.18 HYDROGEN: 4.2 NITROGEN: .98
SULFUR: 1.12 ASH: 15.97 OXYGEN: 9.48

BTU: 9832 FORMS OF SULFUR (%) ORG: .66 PYR: .46 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2650	2700
SOFTENING	2700	2700
HEMISPHERICAL	2700	2700
FLUID	2700	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-18-1c DONE FOR USGS
SAMPLE LOCATION: NW1/4, NW1/4, SEC. 18, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 165.1-169.9
FORMATION: Menefee THICKNESS OF SEAM: 4.8
PROXIMATE ANALYSIS (%)
MOISTURE: 15.86 ASH:4.57 VOLATILE MATTER: 37.82
FIXED CARBON: 41.75

ULTIMATE ANALYSIS(%)
MOISTURE: 15.86 CARBON: 62.89 HYDROGEN: 4.81 NITROGEN: 1.02
SULFUR: .34 ASH: 4.57 OXYGEN: 10.48

BTU: 11236 FORMS OF SULFUR (%) ORG: .31 PYR: .03 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2060	2150
SOFTENING	2130	2270
HEMISPHERICAL	2270	2340
FLUID	2410	2540 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-18-1c DONE FOR USGS
SAMPLE LOCATION: NW1/4, NW1/4, SEC. 18, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 176.1-178.2
FORMATION: Menefee THICKNESS OF SEAM: 2.1
PROXIMATE ANALYSIS (%)
MOISTURE: 15.9 ASH:8.11 VOLATILE MATTER: 36.58
FIXED CARBON: 39.41

ULTIMATE ANALYSIS(%)
MOISTURE: 15.90 CARBON: 59.76 HYDROGEN: 4.4 NITROGEN: .97
SULFUR: .41 ASH: 8.11 OXYGEN: 10.42

BTU: 10591 FORMS OF SULFUR (%) ORG: .35 PYR: .06 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2360	2420
SOFTENING	2400	2490
HEMISPHERICAL	2450	2550
FLUID	2540	2590 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-18-1c DONE FOR USGS
SAMPLE LOCATION: NW1/4, NW1/4, SEC. 18, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 193.2-203.6
FORMATION: Menefee THICKNESS OF SEAM: 10.3
PROXIMATE ANALYSIS (%)
MOISTURE: 15.61 ASH:16.4 VOLATILE MATTER: 33.23
FIXED CARBON: 34.77

ULTIMATE ANALYSIS(%)
MOISTURE: 15.61 CARBON: 52.33 HYDROGEN: 4.22 NITROGEN: .99
SULFUR: .73 ASH: 16.39 OXYGEN: 9.7

BTU: 9382 FORMS OF SULFUR (%) ORG: .5 PYR: .23 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2700	2700
SOFTENING	2700	2700
HEMISPHERICAL	2700	2700
FLUID	2700	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-18-1c DONE FOR USGS
SAMPLE LOCATION: NW1/4, NW1/4, SEC. 18, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 209.9-214.5
FORMATION: Menefee THICKNESS OF SEAM: 4.6
PROXIMATE ANALYSIS (%)
MOISTURE: 15.71 ASH:15.1 VOLATILE MATTER: 33.69
FIXED CARBON: 35.49

ULTIMATE ANALYSIS(%)
MOISTURE: 15.71 CARBON: 54.16 HYDROGEN: 3.98 NITROGEN: 1.00
SULFUR: .89 ASH: 15.11 OXYGEN: 9.14

BTU: 9560 FORMS OF SULFUR (%) ORG: .65 PYR: .24 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2390	2440
SOFTENING	2460	2520
HEMISPHERICAL	2520	2560
FLUID	2680	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-20-4c DONE FOR USGS
SAMPLE LOCATION: SW1/4, SE1/4, SEC. 20, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 131.5-140.2
FORMATION: Menefee THICKNESS OF SEAM: 8.7
PROXIMATE ANALYSIS (%)
MOISTURE: 16.87 ASH:14.2 VOLATILE MATTER: 33.55
FIXED CARBON: 35.35

ULTIMATE ANALYSIS(%)
MOISTURE: 16.87 CARBON: 53.44 HYDROGEN: 3.87 NITROGEN: 1.00
SULFUR: 1.04 ASH: 14.23 OXYGEN: 9.54

BTU: 9495 FORMS OF SULFUR (%) ORG: .69 PYR: .35 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2380	2425
SOFTENING	2420	2480
HEMISPHERICAL	2500	2530
FLUID	2550	2650 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-20-4c DONE FOR USGS
SAMPLE LOCATION: SW1/4, SE1/4, SEC. 20, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 174.0-179.4
FORMATION: Menefee THICKNESS OF SEAM: 5.4
PROXIMATE ANALYSIS (%)
MOISTURE: 16.71 ASH:10.3 VOLATILE MATTER: 35.22
FIXED CARBON: 37.78

ULTIMATE ANALYSIS(%)
MOISTURE: 16.71 CARBON: 56.87 HYDROGEN: 4.25 NITROGEN: 1.02
SULFUR: 1.23 ASH: 10.29 OXYGEN: 9.61

BTU: 10191 FORMS OF SULFUR (%) ORG: .65 PYR: .58 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2330	2530
SOFTENING	2420	2600
HEMISPHERICAL	2490	2630
FLUID	2650	2690 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-28-1c DONE FOR USGS
SAMPLE LOCATION: SE1/4, NW1/4, SEC. 28, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 148.4-150.3
FORMATION: Menefee THICKNESS OF SEAM: 1.9
PROXIMATE ANALYSIS (%)
MOISTURE: 16.42 ASH:12.0 VOLATILE MATTER: 34.06
FIXED CARBON: 37.51

ULTIMATE ANALYSIS(%)
MOISTURE: 16.42 CARBON: 56.57 HYDROGEN: 4.32 NITROGEN: .99
SULFUR: .46 ASH: 12.01 OXYGEN: 9.22

BTU: 10061 FORMS OF SULFUR (%) ORG: .38 PYR: .08 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2380	2460
SOFTENING	2510	2580
HEMISPHERICAL	2600	2610
FLUID	2700	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-28-1c DONE FOR USGS
SAMPLE LOCATION: SE1/4, NW1/4, SEC. 28, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 186.1-196.2
FORMATION: Menefee THICKNESS OF SEAM: 10.1
PROXIMATE ANALYSIS (%)
MOISTURE: 17.94 ASH:13.1 VOLATILE MATTER: 33.65
FIXED CARBON: 35.33

ULTIMATE ANALYSIS(%)
MOISTURE: 17.94 CARBON: 53.59 HYDROGEN: 3.99 NITROGEN: .99
SULFUR: .81 ASH: 13.08 OXYGEN: 9.6

BTU: 9617 FORMS OF SULFUR (%) ORG: .51 PYR: .30 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2700	2700
SOFTENING	2700	2700
HEMISPHERICAL	2700	2700
FLUID	2700	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-28-1c DONE FOR USGS
SAMPLE LOCATION: SE1/4, NW1/4, SEC. 28, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 197.3-199.6
FORMATION: Menefee THICKNESS OF SEAM: 2.6
PROXIMATE ANALYSIS (%)
MOISTURE: 16.27 ASH:5.69 VOLATILE MATTER: 39.93
FIXED CARBON: 38.11

ULTIMATE ANALYSIS(%)
MOISTURE: 16.27 CARBON: 61.86 HYDROGEN: 4.76 NITROGEN: 1.02
SULFUR: .74 ASH: 5.69 OXYGEN: 9.65

BTU: 11200 FORMS OF SULFUR (%) ORG: .41 PYR: .33 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2140	2210
SOFTENING	2170	2260
HEMISPHERICAL	2210	2290
FLUID	2270	2370 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-28-1c DONE FOR USGS
SAMPLE LOCATION: SE1/4, NW1/4, SEC. 28, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 201.95-212.4
FORMATION: Menefee THICKNESS OF SEAM: 10.5
PROXIMATE ANALYSIS (%)
MOISTURE: 16.26 ASH:15.3 VOLATILE MATTER: 33.05
FIXED CARBON: 35.38

ULTIMATE ANALYSIS(%)
MOISTURE: 16.26 CARBON: 52.97 HYDROGEN: 3.98 NITROGEN: 1.00
SULFUR: .49 ASH: 15.31 OXYGEN: 9.98

BTU: 9484 FORMS OF SULFUR (%) ORG: .39 PYR: .10 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2700	2700
SOFTENING	2700	2700
HEMISPHERICAL	2700	2700
FLUID	2700	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-30-2c DONE FOR USGS
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 30, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 82.2-88.6
FORMATION: Menefee THICKNESS OF SEAM: 6.4
PROXIMATE ANALYSIS (%)
MOISTURE: 14.39 ASH:13.0 VOLATILE MATTER: 35.78
FIXED CARBON: 36.81

ULTIMATE ANALYSIS(%)
MOISTURE: 14.39 CARBON: 66.22 HYDROGEN: 5.13 NITROGEN: 1.17
SULFUR: 1.07 ASH: 13.02 OXYGEN: 9.58

BTU: 10105 FORMS OF SULFUR (%) ORG: .56 PYR: .36 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2440	2480
SOFTENING	2480	2510
HEMISPHERICAL	2530	2560
FLUID	2670	2690 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 15-7-30-2c DONE FOR USGS
SAMPLE LOCATION: NE1/4, NE1/4, SEC. 30, T.15N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 126.4-135.0
FORMATION: Menefee THICKNESS OF SEAM: 8.6
PROXIMATE ANALYSIS (%)
MOISTURE: 14.62 ASH:18.1 VOLATILE MATTER: 32.51
FIXED CARBON: 34.80

ULTIMATE ANALYSIS(%)
MOISTURE: 14.62 CARBON: 52.06 HYDROGEN: 4.01 NITROGEN: .97
SULFUR: .55 ASH: 18.07 OXYGEN: 9.71

BTU: 9329 FORMS OF SULFUR (%) ORG: .48 PYR: .07 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2700	2700
SOFTENING	2700	2700
HEMISPHERICAL	2700	2700
FLUID	2700	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 16-7-34-1c DONE FOR USGS
SAMPLE LOCATION: SW1/4, NW1/4, SEC. 34, T.16N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 30.1-33.9
FORMATION: Menefee THICKNESS OF SEAM: 3.8
PROXIMATE ANALYSIS (%)
MOISTURE: 17.85 ASH: 7.0 VOLATILE MATTER: 30.27
FIXED CARBON: 44.86

ULTIMATE ANALYSIS(%)
MOISTURE: 17.85 CARBON: 58.93 HYDROGEN: 4.08 NITROGEN: .99
SULFUR: .42 ASH: 7.02 OXYGEN: 10.7

BTU: 10298 FORMS OF SULFUR (%) ORG: .35 PYR: .05 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2290	2310
SOFTENING	2330	2470
HEMISPHERICAL	2490	2590
FLUID	2580	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 16-7-34-1c DONE FOR USGS
SAMPLE LOCATION: SW1/4, NW1/4, SEC. 34, T.16N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 134.4-136.7
FORMATION: Menefee THICKNESS OF SEAM: 2.3
PROXIMATE ANALYSIS (%)
MOISTURE: 15.14 ASH:23.4 VOLATILE MATTER: 31.17
FIXED CARBON: 30.31

ULTIMATE ANALYSIS(%)
MOISTURE: 15.14 CARBON: 47.69 HYDROGEN: 3.73 NITROGEN: .92
SULFUR: .45 ASH: 23.38 OXYGEN: 8.69

BTU: 8476 FORMS OF SULFUR (%) ORG: .37 PYR: .08 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2580	2680
SOFTENING	2650	2700
HEMISPHERICAL	2700	2700
FLUID	2700	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

SAMPLE NO. 16-7-34-1c DONE FOR USGS
SAMPLE LOCATION: SW1/4, NW1/4, SEC. 34, T.16N, R. 7W
FIELD: San Mateo COUNTY: McKinley QUAD: El Dado
TYPE OF SAMPLE: core DEPTH INTERVAL 142.0-151.6
FORMATION: Menefee THICKNESS OF SEAM: 9.6
PROXIMATE ANALYSIS (%)
MOISTURE: 15.33 ASH:15.0 VOLATILE MATTER: 34.38
FIXED CARBON: 35.28

ULTIMATE ANALYSIS(%)
MOISTURE: 15.33 CARBON: 53.93 HYDROGEN: 4.08 NITROGEN: 1.02
SULFUR: 1.14 ASH: 15.01 OXYGEN: 9.47

BTU: 9584 FORMS OF SULFUR (%) ORG: .62 PYR: .52 SULFATE:

FUSION TEMPERATURE OF ASH (F)	REDUCING	OXIDIZING
INITIAL DEFORMATION:	2610	2700
SOFTENING	2700	2700
HEMISPHERICAL	2700	2700
FLUID	2700	2700 Conf

LAT-LONG: - MEM: ZNE:
HGI: EQ MOIST: FSI: DATE REC: / / COMPL: / /

APPENDIX 4

Geochemical anomalies from NURE data

INTRODUCTION

The following list provides details of geochemical anomalies outlined on Figure 20 of this report (letters following $1^{o}x2^{o}$ quadrangle name correspond to letters on Fig. 20). These anomalies are considered to have some economic implications, but do not necessarily represent economic mineralization. All will require follow up studies to be clearly understood and verified.

EXPLANATION

Each anomaly is described by fourteen different categories and comments, which are listed below.

1. Quadrangle ($1^{o}x2^{o}$)/Anomaly Number
2. County
3. Author
4. Date
5. Location (mining district, latitude, longitude)
6. Anomalous elements and sample media (strong anomalies underlined).
7. Aeroradiometric features
8. Aeromagnetic features
9. Structural features
10. Host Rock (Formation name and age)
11. Type of mineralization
12. References
13. Comments (origin, economic significance)
14. Recommendations

1. Socorro-A (anomaly "A", Fig. 20)
2. Valencia and Bernalillo
3. R. M. Chamberlin
4. 9/12/84
5. West flank northern Manzano Mountains, Hell Canyon district; $34^{o}47'$ to $34^{o}57'$, $106^{o}26'$ to $106^{o}30'$.
6. U 5-25 ppb in groundwaters. U/Th>0.5 and Zn 100-200 ppm in stream sediments. Higher Zn values associated with above, average Fe 3-5%, Co 10-20 ppm, and Cu 20-35 ppm.
7. Two aeroradiometric uranium (eU) anomalies occur in Precambrian metamorphic terrane northeast of, and upslope from, uranium groundwater anomalies (Fig. 18).
8. At west end of coincident magnetic and gravity high; interpreted as a largely concealed greenstone belt (Fig. 19).
9. Manzano uplift locally defines east margin of the Rio Grande rift. Complex deformation of Precambrian rocks.
10. Precambrian metasedimentary and metavolcanic rocks.
11. Hydromorphic uranium anomaly is apparently emanating from an unidentified type of uranium mineralization in the metamorphic terrane; one possibility would be a metamorphosed sandstone-type uranium deposit associated with a late Proterozoic marine-nonmarine transition zone. Weak zinc anomaly may represent a subtle hydromorphic anomaly derived from weathering of base-metal sulfide mineralization in adjacent greenstone terrane.
12. Fulp and others, 1982; Myers and McKay, 1971; Elston, 1967.
13. Fulp and others (1982) indicate a high potential for gold-

silver deposits and massive sulfide deposits in the Hell Canyon greenstone. The geophysically defined concealed portion of this greenstone belt should be a favorable area for base and precious metal exploration. Significant uranium mineralization may occur peripherally to the greenstone belt.

14. Detailed geophysical surveys over the concealed portion of the greenstone belt might indicate areas of significant mineralization below the thin cover of Paleozoic rocks.

1. Albuquerque-B (anomaly "B", Fig. 20)
2. Bernalillo
3. R. M. Chamberlin
4. 9/12/84
5. Tijeras Canyon area of Sandia Mountains, Tijeras Canyon district; 35°4' to 35°7', 106°23' to 106°28'.
6. Two groundwater samples with Cu = 75 ppb and Ni = 224 ppb. Stream sediments contain Ag 5-25 ppm, Cu 50-60 ppm, Zn 100-200 ppm, Mn 1000-1500 ppm, Sc 20-30 ppm, Ti 10,000-20,000 ppm, Fe 10-15%, Mg 2-3%, Li 100-200 ppm, Ce 200-300 ppm, Hf 100-200 ppm, and U 5-20 ppm.
7. One eU anomaly associated with Sandia granite (Fig. 18).
8. Near south end of large magnetic high which appears to define the Sandia uplift and underlying Sandia granite. Northeast trending linear magnetic anomaly defines major shear zone--Tijeras lineament.
9. Sandia uplift locally defines east margin of Rio Grande rift. Tijeras lineament is of Precambrian ancestry, rejuvenated in part during Laramide and late Cenozoic.
10. Precambrian metamorphic and granitic rocks; some vein mineralization cuts late Paleozoic sedimentary rocks.
11. Detrital base metal (Cu, Zn) and precious metal (Ag) anomalies are most likely associated with mafic metaigneous rocks (high in Fe, Mg, Ti, Mn, Sc) of Precambrian age, and may represent massive-sulfide type mineralization. Lithophile elements (U, Ce, Hf, Li) are most likely from the Sandia granite and associated pegmatites. No hydromorphic

indication of uranium mineralization in the area (U/Th ratios are normal, 0.28-0.38).

12. Fulp and others, 1982; Elston, 1967.

13. Multiple ages and types of mineralization seem likely. Precambrian base and precious metal mineralization considered to be of high economic potential. Post-Paleozoic mineralization may be related to a sedimentary hydrothermal system driven by radiogenic heat in the Sandia granite.

14. Well known mining district. Detailed geophysical surveys might indicate concealed mineralization, especially along main segment of Tijeras lineament.

1. Albuquerque-C

2. Bernalillo and Sandoval

3. R. M. Chamberlin

4. 9/12/84

5. Eastern dip slope of Sandia Mountains near Palomas Peak and Tecolote Peak; 35°11' to 35°14', 106°24' to 106°25'.

6. Two stream sediment samples near Palomas and Tecolote peaks contain 20 and 26% Ca, in association with low concentrations of Mg 0.4-0.5% and low Al 2.1-2.3%. Ca-Mg ratio greater than 50:1.

7. Madera Limestone distinctly low in eU, eTh, eK

8. East flank of magnetic high that defines the Sandia uplift.

9. Dip slope to east, north-trending normal faults.

10. Probable source of high Ca is the Pennsylvanian Madera Limestone.

11. Marine high-calcium limestone.

12. Elston (1967, pl. 2)

13. Indicated high-calicum limestone may be suitable for manufacture of cement, but area is relatively isolated and away from major transportation routes (eg. I-40).

14. May warrant additional field work and economic evaluation.

1. Albuquerque-D

2. Bernalillo and Sandoval

3. R. M. Chamberlin

4. 9/12/84

5. West flank of Sandia Mountains below Sandia Crest and La Luz mine (Placitas district); 35°13' to 35°14', 106°29'.

6. In two stream sediment samples: Th 40-50 ppm, U 10-15 ppm, K 1.0-1.5%, Ag 5-50 ppm, Bi 10-20 ppm, Cd 5-10 ppm, Cu 50-100 ppm, Fe 10-12%, Mn 1000-2000 ppm, Sc 10-20 ppm, V 200-500 ppm, W 40-50 ppm, Hf 200-300 ppm, and Ce 200-300 ppm. Other stream sediments along western foot of Sandia Mountains contain Th 20-60 ppm, U 6-15 ppm, and K 1.0-2.1%. Normal U-Th ratios = 0.15 to 0.35.

7. Sandia granite has a strong aeroradiometric signature indicative of high concentrations of K, U, Th (strongest anomalies at north end).

8. The Sandia uplift and underlying Sandia granite are outlined by a large north-trending magnetic high.

9. Sandia uplift locally defines east margin of Rio Grande rift.

10. Precambrian granitic rocks, hydrothermal veins cut Pennsylvanian sedimentary rocks.

11. High U, Th, Hf, and Ce most likely represent significant magmatic concentrations of refractory accessory minerals (zircon, monazite) in the Sandia granite. Metal anomalies (Ag, Cu, Cd, Bi, Fe, Mn, and W) are most likely derived from hydrothermal veins in vicinity of the La Luz mine.

12. Elston, 1967; Fehn and others, 1978; Cathles, 1981.

13. When covered by a thick sedimentary blanket in late Paleozoic and Mesozoic time, the Sandia granite may have generated sufficient heat (by radioactive decay) to drive a low-temperature sedimentary hydrothermal system (eg. Mississippi valley-type mineralization).

14. Radioelement distribution in the Sandia granite and possible ties to Pb-Zn-Ba-F mineralization in the Placitas district warrant further study.

1. Albuquerque-E

2. Sandoval

3. R. M. Chamberlin

4. 9/12/84

5. Broad piedmont on northwest flank of Sandia Mountains, Placitas district; 35°18' to 35°25', 106°19' to 106°31'.

6. Two slightly acidic groundwater samples carry anomalous Pb >5000 ppb, Co >200 ppb, and Ca >500,000 ppb. Stream sediment samples in the area from Arroyo Agua Sarca to Arroyo de San Francisco contain anomalous Ba 1000-1500 ppm, Pb 50-200 ppm, Zn 100-200 ppm, Ag 5-10 ppm, W 20 ppm, Ni 50-100 ppm, and V 100-200 ppm.

7. One eU anomaly occurs near exposures of Galisto Formation faulted against Santa Fe Group; no apparent relationship to Placitas district mineralization.

8. A bulbous magnetic low which wraps around the north end of the Sandia uplift is generally coincident with the Placitas district.

9. Major northeast and north-trending rift faults drop Paleozoic-Tertiary rocks down against the north flank of the Sandia uplift. Northeast-trending faults may be reactivated basement structures.

10. Precambrian granitic and metamorphic rocks, and late Paleozoic sedimentary rocks.

11. Polymetallic hydrothermal veins.

12. Elston, 1967.

13. Barite-lead-zinc mineralization may be of sedimentary

hydrothermal origin and related to radiogenic heat in the Sandia granite.

14. A magnetically defined margin of the Sandia granite, which is covered by Paleozoic sedimentary rocks (about 5 miles southeast of Placitas), should be evaluated for potential concealed Placitas-type deposits.

1. Albuquerque-F
2. Sandoval
3. R. M. Chamberlin
4. 9/12/84
5. Borrego Canyon area near south margin of Jemez Mountains, 34°35' to 34°36', 106°33'.
6. Two stream sediments of rhyolitic character (1.6-2.7% K) contain anomalous concentrations of Li 80-120 ppm, Cs 20-50 ppm, Ba 1000 ppm, and Sb 9 ppm. Ca/Na ratios = 1.6-2.0.
7. Several eU anomalies in basin east of Borrego Canyon.
8. South of a north-east-trending magnetic and gravity linear that defines the northwest margin of the Albuquerque Basin (Figs. 18-19).
9. Numerous north-trending rift faults.
10. Late Tertiary Cochiti Formation.
11. Hydrothermally altered ash beds(?) in lower Cochiti Formation.
12. R. L. Smith and others, 1970.
13. Altered ash beds might contain valuable clay minerals, bentonite or zeolites. However, Ca/Na ratios in the stream sediments do not favor the presence of high value soda-rich zeolites or bentonites.
14. Ash beds could be examined for altered zones and sampled to determine mineralogy and chemistry of alteration products.

1. Albuquerque-G

2. Sandoval

3. R. M. Chamberlin

4. 9/12/84

5. Peralta Canyon-Bland Canyon area, Bland district, southeast flank of Jemez Mountains, 35°40' to 35°45', 106°25' to 106°28'.

6. Stream sediment samples contain Au 0.5 ppm, Ag 6 ppm, Mn 800-1300 ppm, Cl 100-600 ppm, and Zn 100-130 ppm. These samples also contain above average values of U, Be, Ta, and Ce, which is a common association in sediments derived from the Bandalier Tuff.

7. Adjacent exposures of the Bandalier Tuff exhibit high aeroradiometric signatures for K, eTh, and eU. No eU anomalies (>3 standard deviations) in vicinity.

8. In zone of high-frequency high-amplitude magnetic anomalies that probably reflect magnetically variable flows, intrusions, and possibly hydrothermal alteration. Adjacent to northeast-trending gravity and magnetic linears that define the southeast flank of Jemez volcanic field.

9. District occurs along northeast-trending intrusive belt of Late Cenozoic age (Fig. 19). The intrusions probably rose along a deep penetrating shear zone of Precambrian ancestry.

10. Volcanic and intrusive rocks of the Bland district, undivided; Late Cenozoic (ca. 5-13 m.y. old).

11. Epithermal quartz veins carrying gold, silver, and base metals. Multiple ages of mineralization and hydrothermal

alteration are likely. All pre-Bandalier Tuff rocks exhibit pervasive propylitic alteration.

12. Elston, 1967; R. L. Smith and others, 1970.

13. Bland-type gold deposits may lie concealed below the Bandelier Tuff on downdropped blocks south and east of the district.

11. Hydrothermal waters are spatially associated with fault zones, such as the main ring fracture zone and an axial graben.

12. Callender and others, 1983; Keller and Cordell, 1983; Cordell, 1983.

13. High Fe and Mn contents indicate geothermal waters are generally anoxic, acidic waters probably represent shallow mixing of H_2S bearing thermal waters with oxygenated meteoric waters. Geophysical data suggest that the greatest fracture density (i.e. permeability) and highest degree of hydrothermal alteration occur on the southwest flank of the caldera.

14. Deep geothermal test wells on the southwest flank of the caldera might resolve the problem of insufficient steam capacity for a generating plant.

1. Albuquerque-I
2. Sandoval and Rio Arriba
3. R. M. Chamberlin
4. 9/12/84
5. Northwest perimeter of the Valles caldera, Nacimiento copper-uranium district; 35°57' to 36°06', 106°38' to 106°57'
6. U 2-60 ppb, and Mo 10-25 ppb in southeasterly to southwesterly flowing groundwaters and surface waters. Associated with Cu 60-575 ppm, U 5-11 ppm, and Mn 900-1200 ppm in stream sediments.
7. Three eU anomalies are associated with exposures of Cutler Formation.
8. Large amplitude magnetic anomalies reflect shallow magnetic basement rocks (Precambrian).
9. Lies on north end of Nacimiento uplift between San Juan basin and Valles caldera. Magnetic and gravity gradients indicate NE and NNW striking fault zones in basement rocks.
10. Agua Zarca member of the Chinle Formation (Triassic), and Cutler Formation (Permian).
11. Sandstone copper-uranium deposits.
12. Elston, 1967 and Woodward, 1984.
13. These U and Mo anomalies in oxidizing groundwaters on the northwest flank of the Valles caldera contrast with Fe and Mn-rich thermal waters (reducing) within the caldera. An inferred redox boundary between these groundwater regimes, in the zone of mixing (Trainer, 1975), could precipitate uranium and molybdenum to form small secondary deposits.

14. More work in this area could improve our understanding of uranium mobility in hydrothermal systems.

1. Albuquerque-J
2. Santa Fe, Los Alamos, and outlier of Sandoval County
3. R. M. Chamberlin
4. 12/12/84
5. Los Alamos-White Rock area, no mining districts or mineral occurrences in area, 35°48' to 35°54', 106°11' to 106°14' (isolated Pb anomaly at 35°54', 106°19')
6. Stream sediments in Los Alamos Canyon south to Ancho Canyon contain anomalous Cl 300-550 ppm, Mn 800-1300 ppm, Zn 100-220 ppm and Pb 45-55 ppm; three samples within this group also contain anomalous Ag 6 ppm, Au 0.19 ppm, and Cu 74 ppm.
7. Generally high levels of eU, eTh and eK reflect the rhyolitic composition of the Bandalier Tuff.
8. Broad low amplitude magnetic anomalies indicate thick basin fills underlie area of geochemical anomaly.
9. Lies east of the Parajito fault zone, which separates thick volcanic section (on west) from thin Bandalier Tuff over thick basin fill (to east).
10. Stream sediments are mostly derived from the Bandalier Tuff, which is geochemically distinct in its above average concentrations of U >5 ppm, Be >5 ppm, Th >20 ppm, Li >50 ppm, La >100 ppm, Ce >100 ppm, Sm >10 ppm, and Ta >2 ppm. Source of base and precious metals is uncertain.
11. Telethermal veins would be possible, but are presently not recognized here.
12. R. L. Smith and others, 1970.
13. Anomalous values of Cl, Mn, and Zn probably reflect a broad

low temperature geothermal system surrounding the Valles caldera. Cu, Ag, and Au anomalies may reflect presently unrecognized epithermal mineralization in the area, or they may reflect contamination of stream beds with scientific waste materials.

14. Additional field work should be done to determine the source of the precious metals and copper. If contamination is indicated, then the area should be sampled and analysed for significant levels of toxic elements (e.g. As, Se, Pu).

1. Albuquerque-L
2. Sandoval
3. R. M. Chamberlin
4. 12/12/84
5. Fenton Lake area (western perimeter of Valles Caldera); 35°50' to 35°57', 106°41' to 106°47'.
6. Cl 350-800 ppm, Mn 800-2500 ppm, and Zn 150-400 ppm, in stream sediments.
7. One eU anomaly in area, probably related to Bandalier Tuff.
8. Low frequency high amplitude magnetic anomalies indicate magnetic basement rocks (Precambrian) lie at shallow depth.
9. Anomaly lies on central portion of the Nacimiento uplift. Gravity and aeromagnetic maps indicate a concealed NNW-trending fault zone here.
10. Bandalier Tuff and/or underlying Abo Formation. Stream sediments mostly derived from Bandalier Tuff.
11. Telethermal veins possible, but not recognized at present. Might be related to sandstone copper deposits in Abo Formation.
12. R. L. Smith and others, 1970.
13. Anomalies probably reflect a broad low temperature geothermal system surrounding the Valles Caldera.
14. High contrast of Zn and Mn anomalies suggest significnt vein mineralization in area. Additional field work along trend of conealed fault zone seems appropriate.

1. Albuquerque/Aztec-M
2. Sandoval, McKinley
3. R. M. Chamberlin
4. 12/12/84
5. Arcuate belt coincident with Nacimiento Formation west of Cuba; belt spproximately 4 miles wide and over 32 miles long. North margin passes through 106°57'--36°01', 107°10'--35°58' and 107°30'--36°03'; south margin passes through 106°57'--35°58', 107°10'--35°55', and 107°30'--36°00'.
6. Numerous stream sediment samples contain anomalous Ba 1000-3500 ppm, in association with above average Na 10,000-20,000 ppm, Sm 5-10 ppm, and Eu 2-4 ppm and in association with below average Mg 1500-4000 ppm. Above average K >20,000 ppm, locally indicates the Nacimiento Formation is feldspathic or arkosic.
7. Two eU anomalies occur in San Jose Formation, on flanks of a small oil pool; both just north of the Ba anomaly belt.
8. Broad low-amplitude magnetic anomalies indicate magnetic basement is covered by thick sedimentary fill of the San Juan Basin. Gravity and magnetic contours reflect ENE-trending structures in basement rocks; basin appears to be deepening rapidly to northwest in this area.
9. Belt lies near southeast flank of the Eocene San Juan Basin as defined by the San Jose Formation. East end of belt truncated by Nacimiento uplift.
10. Ba-rich belt follows exposures of the Nacimiento Formation

of Paleocene age.

11. Type of mineralization is uncertain, may represent widespread sedimentary hydrothermal mineralization of transmissive zones in the Nacimiento Formation.

12. Dane and Bachman, 1965.

13. Ba anomaly may reflect widespread sedimentary hydrothermal mineralization of early Tertiary age in response to continued filling of the San Juan Basin. This would have caused accelerated compaction of deep strata and stratafugic expulsion of deep basin brines.

14. Additional field work seems warranted to determine the type of Ba mineralization and evaluate the potential for stratiform barite deposits, if indicated.

1. Albuquerque/Aztec-N

2. Sandoval, McKinley

3. R. M. Chamberlin

4. 12/12/84

5. Arcuate belt coincident with Fruitland and Kirtland formations, about 20 mi southwest of Cuba; belt approximately 4 mi wide and over 24 mi long. North margin grades into anomaly "M", which was described previously. South margin passes through 107°14'--35°51' and 107°30'--35°57'.

6. Numerous stream sediment samples contain anomalous Ba 1000-3000 ppm, Na 20,000-27,000 ppm, and Sr 500-1000 ppm. Anomaly "N" is similar to anomaly "M" in its association with above average Sm 5-8 ppm and Eu 2-4 ppm and depleted Mg 2000-5000 ppm.

7. No eU anomalies in area of anomaly.

8. Gravity and magnetic expression are same as anomaly "M".

9. Same structural setting as anomaly "M".

10. Belt of Ba, Na, and Sr anomalies follows exposures of Fruitland and Kirtland formations, west of 107°14'.

11. Same as anomaly "M".

12. Dane and Bachman, 1965; Northrop, 1959, reports barite nodules in the Fruitland Formation near Farmington.

13. See anomaly "M". Anomaly "N" may be truncated by an unconformity at the base of Ojo Alamo Formation; if so, then anomaly "N" would be older than the one in the Nacimiento Formation (anomaly "M").

14. Additional field work seems warranted to determine the type of mineralization and the potential for stratiform barite-celestite deposits and/or Na-rich clay minerals.

1. Albuquerque-P

2. Sandoval

3. R. M. Chamberlin

4. 12/12/84

5. Southeast margin of San Juan Basin, approximately 10 mi NW of San Ysidro, Collins mine area; from 106°53' to 106°58', and 35°38' to 35°40'.

6. Stream sediment samples contain anomalous Ba 2000-3000 ppm, U/Th = 0.5-0.8 and Cl = 1000 ppm. Nearby ground waters are slightly acidic, pH = 6.8-6.9 and contain anomalous U 5-6 ppb.

7. A strong eU anomaly is associated with the geochemical anomaly.

8. Low amplitude-low frequency magnetic anomalies indicate thick sedimentary section above magnetic basement.

9. Gravity map indicates NE-trending fault zone in subsurface, which lies on trend with NE trending faults exposed on the Nacimiento uplift and in Valles Caldera.

10. Anomaly is centered on exposures of the Morrison Formation of Jurassic age.

11. Uranium anomaly probably represents tabular uranium mineralization in sandstones of the Morrison Formation. The barium and chloride anomaly may represent superimposed hydrothermal mineralization associated with the major fault zone at depth.

12. Dane and Bachman, 1965; McLemore, 1983a, p. 71.

13. Past uranium production from the Morrison Formation at the

Collins mine demonstrates significant uranium potential in this area.

14. Additional field work seems warranted to determine the source of the Ba anomaly, since Ba is not commonly associated with sandstone uranium deposits. Northeast-trending structures in the area should be examined for possible barite mineralization.

1. Albuquerque-Q
2. Sandoval
3. R. M. Chamberlin
4. 12/12/84
5. Southwest flank of Nacimiento uplift, San Ysidro geothermal area; 35°32' to 35°35', 106°49' to 106°52'.
6. Saline (high conductivity = 9,000-14,000 μmhos/cm) geothermal waters (20-25°C), contain anomalous concentrations of Fe 2000-8000 ppb, Mn 1000-2000 ppb, Co 200-300 ppb, Cu 50-60 ppb, Pb 5000-8000 ppb, Ni 200-300 ppb, and Cr 100-200 ppb. Warmer waters are alkaline, and colder waters are slightly acidic. Thermal waters contain below average to slightly above average U 0.5-4 ppb. High Fe waters are lowest in U. Stream sediments in geothermal area contain anomalous Cl 400-1800 ppm.
7. One eU anomaly in Triassic Chinle exposures to north of goethermal area.
8. Major north-trending magnetic gradient defines west flank of Nacimiento uplift here; subtle NE-trending magnetic gradient intersects Nacimiento fault zone here.
9. South end of Nacimiento uplift (Laramide) appears to be downwarped by west flank of Albuquerque Basin (Rio Grande rift).
10. Surface exposures dominantly in Chinle Formation.
11. Low-temperature hydrothermal system related to deeply penetrating fault zones on west flank of Rio Grande rift.
12. Godwin and others, 1971; Renner and others, 1975.

13. Warm waters are probably upwelling along basement fracture zones that have been reactivated by crustal extension along the rift in Neogene time. Base metals probably derived from subsurface formations (Precambrian to late Paleozoic) or pre-existing mineralization.

14. Examining the area for potential base metal deposits seems warranted.

1. Albuquerque-R
2. Sandoval
3. R. M. Chamberlin
4. 12/12/84
5. Southwest flank of Nacimiento uplift, western periphery of San Ysidro geothermal area; 35°32' to 35°35', 106°52' to 106°53'.
6. Southerly flowing ground waters contain anomalous U 5-20 ppb and are generally saline (conductivity = 3000-13000 μmhos/cm). Very low concentrations of Fe (50-100 ppb) and Mn (10-30 ppb) indicate waters are oxidizing.
7. Aeroradiometric U anomalies occur to the north (Collins mine area) and east (Chinle Formation), both of which are up hydrologic gradient from this area.
8. Linear magnetic high defines west flank of Nacimiento uplift.
9. Southeasterly flow is general discharge direction from the San Juan Basin. Area lies near truncation of Nacimiento uplift by the Albuquerque Basin.
10. Wells collared in Chinle Formation.
11. Meteoric groundwater system.
12. Stone and others, 1983; Trainer, 1975.
13. Southwest flowing uranium-bearing waters are probably mixing with reducing geothermal waters of the San Ysidro area. Secondary uranium deposits may be forming at a redox boundary in this zone of mixing.
14. Detailed hydrologic and geochemical studies could provide

important data on how geochemically distinct groundwaters regimes react in a zone of mixing.

1. Albuquerque-S
2. Bernalillo
3. R. M. Chamberlin
4. 12/12/84
5. Drainage area of Canada de los Apaches, extension of KGRF #4; 35°03' to 35°12' and 107°02' to 107°8'
6. Very saline (conductivity = 2000-9000 μmhos/cm) thermal waters (22-26°C) contain anomalous concentrations of Pb 4000-6000 ppb, Zn 800-1100 ppb, Cu 40-100 ppb, Ni 100-600 ppb, Co 200-400 ppb, Cr 100-300 ppb, Ti 75-175 ppb, Ca 300,000-750,000 ppb Fe 1100 ppb, and Mn 700 ppb.
7. No eU anomalies in vicinity.
8. Lies in elliptical NW-trending aeromagnetic low.
9. At north termination of the Lucero uplift and west flank of Albuquerque Basin.
10. Wells are in upper Cretaceous Mesaverde Group and/or thin alluvium of Santa Fe Group(?).
11. Low temperature hydrothermal system. Thermal waters probably represent upwelling along deeply penetrating fault zone.
12. Hatton, 1977, 1980, 1981a, 1981b; Morgan and others, 1983.
13. Very saline thermal waters may represent a complex combination of oil-field brines and geothermal waters rising along deeply penetrating rift faults.
14. Area represents an extension of KGRF #4, which may be exploitable in the future as Albuquerque expands westward.

1. Albuquerque-T
2. Bernalillo and Cibola
3. R .M. Chamberlin
4. 12/12/84
5. Mesa Gigante-Arch Mesa area, east margin of the Grants uranium region; 35°02' to 35°10' and 107°02' to 107°12'.
6. Southeasterly flowing groundwaters contain anomalous uranium 5-12 ppb, and stream sediments exhibit anomalous U/Th 0.45-0.60. Adjacent geothermal waters contain 0.5-3 ppb U.
7. Several eU anomalies occur 15-20 mi west of the groundwater anomalies; in association with Jurassic rocks that crop out in the recharge area for the uraniferous groundwaters.
8. Anomalous area associated with NW-trending magnetic gradients.
9. Near north end of Lucero uplift and west flank of Albuquerque Basin.
10. Wells are apparently in Jurassic and late Cretaceous sedimentary rocks; sandstones and mudstones.
11. Texas-like uranium roll-front mineralization may be present in a zone of mixing of these SE flowing uraniferous groundwaters (represent recharge from Mt. Taylor area) with anoxic thermal waters of the Canada de los Apaches geothermal area (see Anomaly: Albuquerque-S).
12. Trainer, 1975.
13. Uraniferous waters have probably been flowing southeasterly from the Mt. Taylor recharge area since middle Pliocene time (3-5 m.y. ago). Fault zones, volcanic centers and potential geothermal systems have been active along the west margin of

the Albuquerque Basin since about 10 m.y. ago. Thus, this redox zone may have existed long enough (several million years) to produce significant secondary uranium deposits.

14. This area warrants additional evaluation for its uranium potential. Study of these geochemical groundwater regimes may improve our understanding of the origin of uranium deposits.

Appendix 5. Geothermal wells and springs in the northern Rio Puerco Resource Area, New Mexico. (Some geothermal wells are also included in Appendix 5.)

No. on Fig. **	Well, spring, or group of springs	Location1	Temperature °F	°C	Depth of well (ft)	Comments	References
	Jemez Mountains						
	Spring near Calaveras Canyon	20N.2E.27.222	106	41			Bliss (1983)
	Well	20N.2E.17	113	45	210		Swanberg and others (1980)
	San Antonio Hot Springs	20N.3E.29.123	105-130	41-54	—		Summers (1965a,b; 1976; 1979); Swanberg and others (1980); Goff and Sayer (1980); Bliss (1983)
	Well	20N.3E.30	97	36	160		Swanberg and others (1980)
2	Baca Land and Cattle Co. #2 Baca	20N.3E.34.420	500	260	5,658	1960 ftN, 1250 W of SE corner	Summers (1976), see Appendix 6
7	Union Oil #7 Baca	20N.3E.26.111	—	—	5,532	completed as a temperature observation well	See Appendix 6 .
	Alamo Canyon Spring	20N.3E.35	>90				Summers (1965a)
	Union Oil #1 Alamo Canyon	20N.3E.35			7,400	observation well	See Appendix 6
	Westates Petroleum Co. #1 Bond et al.	20N.3E.35.412	400+	204	3,675	plugged	Summers (1965a,b)
8	Union Oil #8 Baca	20N.3E.35.430	—	—	4,384	completed as a temperature observation well	Summers (1976); See Appendix 6
	San Antonio Warm Springs	20N.4E.7.333	99-101	37-38	—	hot water supply	Summers (1965a,b; 1976; 1979); Swanberg and others (1980); Bliss (1983)
	Fenton Hill GT-1	19N.2E.1.400	212	100	2,575		See Appendix 6; Turner and Kues (1978); Swanberg and others (1980)
	Fenton Hill EE-1	19N.2E.13	386	197	10,053		See Appendix 6; Smith and Ponder (1982)
	Fenton Hill EE-2	19N.2E.13	621	327			See Appendix 6; Smith and Ponder (1982)
	Fenton Hill EE-3	19N.2E.13	—	—	13,933		See Appendix 6; Smith and Ponder (1982)
	Fenton Hill GT-2	19N.2E.13.200	385	196	9,619		See Appendix 6; Cosner and Apps (1978); Bliss (1983); Swanberg and others (1980)
16	Union Oil #16 Baca	19N.3E.1			7,002		See Appendix 6
21	Union Geothermal of New Mexico #21 Baca	19N.3E.1			3,000		See Appendix 6
1	Baca Land and Cattle Co. #1 Baca	19N.3E.3.100			2,560	plugged; 1,500 ft S, 1,450 ft E of NW corner	Summers (1976); see Appendix 6
3	Baca Land and Cattle Co. #3 Baca	19N.3E.3			2,200	discharged steam and hot water; 1,450 ft S, 1,600 ft E of NW corner	Summers (1976); see Appendix 6
	Sulfur Springs	19N.3E.3.143	92-193	23-89	—	used for swimming pools and baths	Swanberg and others (1980); Summers (1965a, 1976, 1979); White and others (1963); Bliss (1983)
6	Union Oil #6 Baca	19N.3E.11			4,810	completed as temperature observation well	See Appendix 6
10	Union Oil #10 Baca	19N.3E.11.300			6,001	production zone damaged, remedial work planned, observation well	See Appendix 6
15	Union Oil #15 Baca	19N.3E.11			5,505		See Appendix 6
18	Union Oil #18 Baca	19N.3E.11			5,250		See Appendix 6
19	Union Oil #19 Baca	19N.3E.11.242			5,610		NMBMMR files, see Appendix 6
23	Union Geothermal of New Mexico #23 Baca	19N.3E.11			5,746		See Appendix 6
24	Union Geothermal of New Mexico #24 Baca	19N.3E.11			9,500		See Appendix 6
11	Union Oil Baca #11	19N.3E.12	330	165	6,929	basis of discovery announcement	Cooper and Apps (1978); Bliss (1983)
4	Baca Land and Cattle Co. #4 Baca	19N.3E.12.200	545	285	5,048	dry steam	See Appendix 6
5	Union Oil #5 Baca	19N.3E.12.400			6,973	disposal well for water produced while testing	See Appendix 6
13	Union Oil #13 Baca	19N.3E.12			8,228		See Appendix 6
17	Union Geothermal of New Mexico #17 Baca	19N.3E.12.112			6,254		NMBMMR files
20	Union Geothermal of New Mexico #20 Baca	19N.3E.12			6,374	observation well	See Appendix 6
22	Union Geothermal of New Mexico #22 Baca	19N.3E.12			6,485	observation well	See Appendix 6
5A	Union Oil of California #5-A Baca	19N.3E.13			6,973	service well	See Appendix 6
9	Union Oil #9 Baca	19N.3E.14			5,303	plugged	See Appendix 6
12	Union Oil #12 Baca	19N.3E.14			9,212	observation well, redrilled to 10,637	See Appendix 6
14	Union Oil #14 Baca	19N.3E.14			6,824		See Appendix 6
	Spence Springs	19N.3E.28.310	102-111	39-45	—		Goff and Sayer (1980); Bliss (1983); Swanberg and others (1980)
	Little Spence Springs	19N.3E.28	94	34	—		Goff and Sayer (1980); Bliss (1983)
	Grotto Spring	18N.2E.13	100				Goff and Sayer (1980); Bliss (1983)
	Soda Dam Springs	18N.2E.14.422	110-118	46-48	—		Summers (1965a,b; 1976, 1979); Goff and Sayer (1980); Bliss (1983)
	Buddhist Springs	18N.2E.23	120-128		—		Goff and others (1981); Bliss (1983)
	Jemez Springs	18N.2E.23	114-169	45-76	—	used as bath house, green house, and space heating	Swanberg and others (1980); Goff and others (1981); Summers (1965a,b)
	Jemez Springs Well	18N.2E.23	134	68	824	space heatiang	Bliss (1983); see Appendix 6
	McCauley Spring	18N.3E.4.322	88-98		—		Goff and Sayer (1980); Swanberg and others (1980); Summers (1965a,b)

Appendix 5. Geothermal wells and springs in the northern Rio Puerco Resource Area, New Mexico. (Some geothermal wells are also included in Appendix 5.)

No. on Fig. **	Well, spring, or group of springs	Location[1]	Temperature °F	°C	Depth of well (ft)	Comments	References
	San Ysidro						
	San Ysidro Warm Springs	15N.1E.3,9,10, 16,21	68	20	—		Swanberg and others (1980); Summers (1965b)
	Phillips Springs	15N.1E.5.140	70	21	—		Renick (1931); Bliss (1983)
	San Ysidro Hot Springs	15N.1E.8.110	85	29	—		Swanberg and others (1980); Summers (1965b)
	Spring	15N.1E.10	73.4	23	—		Swanberg and others (1980)
	Kaseman No. 1 (Santo Ranch)	16N.1E.7.100	115	46	550	plugged	See Appendix 6; Renick (1931); Summers (1976); Bliss (1983)
	Indian Springs	16N.2E.29.142	95-128		—		Swanberg and others (1980); Summers (1965a,b; 1976); Bliss (1983)
	Spring	16N.1W.1	129	54	—		Bliss (1983)
	Kaseman No. 2 (Santo Ranch)	16N.1W.1.421	128-180	53-82	2,008	drilled and abandoned	Summers (1965a,b; 1976); Bliss (1983); Swanberg and others (1980)
	Rio Grande rift						
	Shell #1 Santa Fe	13N.3E.8.	236	113	—	bottom hole temperature	Grant (1982)
	Well	13N.3E.18	90	32	—		Swanberg and others (1980)
	Spring	13N.4E.36.323	68	20	—		Summers (1965b); Swanberg and others (1980)
	West Mesa Well No. 1	10N.2E.20	90	32	1,148	city water well	Swanberg and others (1980); Grant (1982); Summers (1979)
	Alamos Spring	10N.3W.26.333	72	22	—		Swanberg and others (1980)
	Shell No. 1 Laguna	9N.1W.8	247	119	11,115		Swanberg and others (1980); Grant (1982)
	Clear Water Spring	9N.4E.24.100	70	21	—		Swanberg and others (1980); Summers (1965b)
	Shell #2 Isleta	8N.2E.16	434	223	21,266		Grant (1982)
	TransOcean #1 Isleta	8N.3E.8	235	113	10,378		Grant (1982)
	Shell #1 Isleta	7N.2E.7	375	191	16,346		Grant (1982)
	San Juan Basin						
	Well	23N.4W.33	109	43	2,402	bottom hole temperature	Swanberg and others (1980)
	Well	23N.6W.28	151	66	2,802	bottom hole temperature	Swanberg and others (1980)
	Well	22N.6W.19	154	68	2,047	bottom hole temperature	Swanberg and others (1980)
	Well	21N.5W.33	142	61	4,154	bottom hole temperature	Swanberg and others (1980)
	Well	21N.6W.6	145	63	4,449	bottom hole temperature	Swanberg and others (1980)
	Well	19N.4W.9	90	32	997	bottom hole temperature	Swanberg and others (1980)
	Well	18N.4W.15	154	68	4,610	bottom hole temperature	Swanberg and others (1980)
	Well	18N.4W.22	154	68	4,610	bottom hole temperature	Swanberg and others (1980)
	Well	18N.4W.26	90	32	1,200	bottom hole temperature	Swanberg and others (1980)
	Well	18N.4W.32	86	30	1,135	bottom hole temperature	Swanberg and others (1980)

[1] Location given by township, range, section, and quarter-quarter-quarter section as explained in text.

APPENDIX 6 -- OIL AND GAS TESTS

Appendix 6 is a list of oil and gas tests and geothermal tests in the Rio Puerco Resource Area. Data included are the operator, well number, lease name, and location. Well location is specified by section, township, range, and county; location within sections is specified by footage from the section boundary lines. Also listed are completion date (month and year), total depth, and completed status. Abbreviations for completed status are: D&A = dry and abandoned, GTW = geothermal well, HDR-H = hot dry rock hydrothermal well, OBS = geothermal observation well, SWD = salt-water disposal well, S = suspended operations. Other abbreviations are: OWWO = old well worked over, OWPA = old well plugged and abandoned, OWDD = old well drilled deeper, DST = drill-stem test, BOPD = bbls oil per day, BWPD = bbls water per day, MCFGPD = thousand ft^3 gas per day, BO = bbls oil, MCF = thousand ft^3, abd = abandoned, IP = initial potential, IPF = initial potential flowing, IPP = initial potential pumping, IPS = initial potential swabbing, IPCAOF = initial potential calculated open flow, SI = shut in, TSTM = too small to measure. Also listed are the producing unit, the depth interval of production, and the initial potential. Cumulative oil and gas production to December 31, 1982 is given if available; production data for individual wells are not always available because leases have changed ownership in many cases, resulting in different operator names throughout the history of the lease. The oil gravity is given, if known. Field names of producing wells and reported shows in nonproductive wells are listed.

Most data listed in this appendix were obtained from files of the New Mexico Library of Subsurface Data which is located in the New Mexico Bureau of Mines and Mineral Resources. These data were supplemented by data obtained from the computerized well listing of the American Petroleum Institute, which is published by Petroleum Information Corporation. Other sources of data are cited in the appendix.

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Shell Oil Co. No. 2 Isleta	2200 FNL, 600 FWL 16-8N-2E Bernalillo	5/80	21,266	D&A					
Transocean Oil Co. No. 1 Isleta	1650 FSL, 330 FEL 8-8N-3E Bernalillo	11/78	10,378	D&A					gas shows in Cretaceous rocks (Black, 1982)
Norins Realty Co. No. 1 Pajarito Grant	279 FNL, 2284 FEL 22-9N-1E Bernalillo	6/33	5,104	D&A					
Norins Realty Co. No. 2 Pajarito Grant	179 FNL, 2409 FEL 22-9N-1E Bernalillo	8/33	385	D&A					
Norins Realty Co. No. 3 Pajarito Grant	175 FNL, 2400 FEL 22-9N-1E Bernalillo	4/41	2,780	D&A					
Shell Oil Co. No 1 Laguna-Wilson Trust	2080 FNL, 1780 FWL 8-9N-1W Bernalillo	12/72	11,115	D&A					Gas shows, depth unreported (Black, 1982)
F.H. Carpenter No. 1 Atrisco Grant	660 FSL, 660 FEL 28-10N-1E Bernalillo	9/48	6,652	D&A					oil show from 3350-3360 ft
Royal Boyd No. 1 Wright	12-10N-5E Bernalillo	7/47	1,135	D&A					
L.O. Hickerson No. 2 Wright	12-10N-5E Bernalillo	-/48	1,510	D&A					
Royal Davis et al No. 1 Wright	12-10N-5E Bernalillo	7/46	1,470	D&A					
Peter Siemens & Boyds No. 1 Wright	1650 FNL, 1650 FWL 12-10N-5E Bernalillo	-/47	1,121	D&A					gas show from 293-305 ft. Gas show at 480 ft in Dakota.
Southern Union Prod. Co. No. 1 Tijeras Canyon Unit	1200 FSL, 900 FWL 12-10N-5E Bernalillo	3/64	1,903	D&A					
Southern Union Prod. Co. No. 2 Tijeras Canyon Unit	2587 FNL, 900 FWL 12-10N-5E Bernalillo	4/64	2,179	D&A					
Southern Union Prod. Co. No. 3 Tijeras Canyon Unit	985 FNL, 902 FWL 12-10N-5E Bernalillo	5/64	2,228	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Shell Oil Co. No. 1-24 W. Mesa Federal	1520 FNL, 1000 FEL 24-11N-1E Bernalillo	8/82	19,375	D&A					Gas shows in Point Lookout from 16,816 to 16,878 ft, in Hosta from 17,097 to 17,175 ft in Dakota from 19,090 to 19,132 ft.
Norins Realty Co. No. 2 Fee	1245 FNL, 1050 FWL 19-11N-4E Bernalillo	7/40	5,024	D&A					CO_2 show reported by Black (1982)
Norins Realty Co. No. 1 North Albuquerque Acres	1145 FNL, 2340 FWL 19-11N-4E Bernalillo	7/35	573	D&A					
Northern Minerals No. 2 Drought Booth	740 FNL, 570 FWL 2-15N-6W McKinley	12/72	2,542	D&A					
Andro-Eidal Co. No. 3 Drought Booth	804 FSL, 1601 FEL 4-15N-6W McKinley	7/56	751	D&A					
Roy Eidal No. 4-K-5 1-C-Grant	2062 FSL, 2500 FWL 4-15N-6W McKinley	8/69	755	D&A					
Roy Eidal No. 1 Canoncito	2475 FSL, 2145 FEL 4-15N-6W McKinley	11/55	815	D&A					oil show at 700 ft
Roy Eidal No. 5X 1-C-Grant	2512 FSL, 2067 FWL 4-15N-6W McKinley	10/69	763+	D&A					
Roy Eidal No. 6 1-C-Grant	1575 FSL, 2500 FWL 4-15N-6W McKinley	10/69	765	D&A					
Roy Eidal No. 77 1-C-Grant	835 FSL, 950 FEL 4-15N-6W McKinley	10/69	768+	D&A					
Midwest Refining No. 1 Chaves Grant	NE/4 NE/4 4-15N-6W McKinley	9/23	2,156	D&A					oil show at 725 ft
Roy Eidal No. 72 1-C-Grant	1575 FSL, 2072 FWL 4-15N-6W McKinley	11/69	755	D&A					
Miles Production No. 1 Thomas Drought	330 FNL, 660 FEL 4-15N-6W McKinley	11/78	3,060	oil	Hospah 728-750 IPP 8 BOPD + 52 BWPD	0 BO abd 1978		Undesignated Hospah	
Northern Minerals No. 3 Drought-Booth	1700 FNL, 2100 FEL 4-15N-6W McKinley	7/73	2,926	D&A					
Northern Minerals No. 3-Y Drought-Booth	1701 FNL, 2120 FEL 4-15N-6W McKinley	8/73	760	D&A					
Prairie Oil & Gas No. 1 Jones	375 FEL, 1390 FSL 4-15N-6W McKinley	9/26	1,772	D&A					oil show at 880 ft
Richfield Oil Co. No. 1 Drought	2310 FNL, 2310 FWL 4-15N-6W McKinley	8/46	7,143	D&A					
Richfield Oil Co. No. 1 Ignacio Chavez Grant	2310 FSL, 2310 FEL 4-15N-6W McKinley	8/45	1,600	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
William M. Kaiser No. 1 Sarcio	330 FNL, 330 FWL 9-15N-6W McKinley	7/78	775	D&A					
T.L. Morris No. 1 T.L. Morris	330 FSL, 330 FEL 2-16N-5W McKinley	7/82	1,400	D&A					
Hughes & Hughes No. 1 Federal Tract 16	1980 FSL, 698 FWL 8-16N-5W McKinley	7/66	1,610	D&A					
T.L. Morris No. 1 J. Scott	660 FSL, 660 FEL 8-16N-5W McKinley	11/81	1,300	D&A					
T.L. Morris No. 1 Tressa	660 FNL, 1980 FWL 11-16N-5W McKinley	6/81	1,150	D&A					
El Pam Co. Inc. No. 1 Emily	660 FNL, 2070 FEL 11-16N-5W McKinley	10/65	1,421	D&A					
El Pam Co. Inc. No. 2 Emily	990 FSL, 2310 FWL 11-16N-5W McKinley	12/65	1,265	D&A					
Hughes & Hughes No. 1 Federal Tract 21	638 FSL, 1980 FEL 11-16N-5W McKinley	7/66	1,367	D&A					
Union Oil Co. of California No. 1 M-11-Chico Federal	660 FSL, 660 FWL 11-16N-5W McKinley	11/72	2,655	D&A					
Hughes & Hughes No. 2 Federal Tract 15	660 FSL, 1980 FEL 16-16N-5W McKinley	7/66	1,340	D&A					
T.L. Morris No. 1 Lana	330 FNL, 990 FEL 16-16N-5W McKinley	11/81	550	D&A					
Basin Natural No. 1 Woodward	1650 FSL, 1650 FEL 19-16N-5W McKinley	4/57	1,315	D&A					
T.L. Morris No. 1 Gap	990 FSL, 2310 FWL 19-16N-5W McKinley	-/81	1,225	Suspended operations					
Hughes & Hughes No. 1 Federal Tract 17	1850 FNL, 1810 FWL 25-16N-5W McKinley	7/66	2,512	D&A					
Capitol Oil & Gas No. 2 T. Drought	330 FSL, 660 FEL 33-16N-6W McKinley	4/82	806	oil	Hospah 778-781 IPP 3 BOPD + 11 BWPD	0 BO	33	Undesignated Hospah	
Northern Minerals No. 1 Drought-Booth	1870 FSL, 750 FEL 33-16N-6W McKinley	12/72	2,146	D&A					
Andro-Eidal No. 2 Drought-Booth	330 FSL, 990 FEL 33-16N-6W McKinley	4/56	754	D&A					

Operator, well number, and lease	Location (section-township-range, county)	pletion date (month/year)	Total depth (ft)	Completed Status	Producing un depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Albuquerque Associated No. 1 Vigil 'J'	1980 FSL, 2015 FEL 14-12N-6E, Sandoval	5/54	1,038	D&A					oil show in Pennsylvanian at 870 ft
Leonard No. 1 Leonard	330 FSL, 1430 FWL 18-12N-2W Sandoval	-/25	501	D&A					
McCroden No. 1 McCroden	330 FNL, 330 FWL 20-12N-2W Sandoval	----	501	D&A					
Siemens & Boyd No. 1 Dave Armijo	660 FSL, 1980 FWL 1-12N-3W Sandoval	5/41	800	D&A					gas show at 500 ft oil show at 685 ft
F.B. Umbarger No. 1 Armijo	990 FNL, 952 FWL 1-12N-3W Sandoval	12/45	1,000	D&A					oil show at 1,000 ft
Michael P. Grace No. 1 Sandy	660 FSL, 1980 FEL 21-12N-3W Sandoval	3/73	1,500	D&A					
Shell Oil Co. No. 3 Santa Fe	1652 FSL, 2310 FEL 28-13N-1E Sandoval	6/76	10,276	D&A					minor gas show, depth unreported
Shell Oil Co. No. 1 Santa Fe	1500 FSL, 1070 FWL 18-13N-3E Sandoval	8/72	11,045	D&A					oil & gas shows in Cretaceous, Dakota
Pelto Oil No. 1 Harmon	990 FSL, 1650 FWL 18-13N-6E Sandoval	4/81	1,398	D&A					
Pelto Oil No. 2-Harmon-Tejon	990 FSL, 1640 FWL 18-13N-6E Sandoval	4/81	347	D&A					
Helton Engineering & Geological Services No. 3 Diamond Trail Ranch-Brent	2550 FNL, 2200 FEL 19-13N-6E Sandoval	5/78	2,070	D&A					
Helton Engineering & Geological Services No. 5 Diamond Trail Ranch-Brent	1800 FNL, 2600 FEL 19-13N-6E Sandoval	7/78	765	D&A					
Helton Engineering & Geological Services No. 1 Diamond Trail Ranch-Brent	1100 FSL, 80 FWL 29-13N-6E Sandoval	5/78	1,874	D&A					
Colorado Plateau Geological Services; Trans-Ocean Oil No. 1 Federal-Bicentennial Freedom	990 FNL, 500 FEL 35-13N-6E Sandoval	9/76	1,415	D&A					
Colorado Plateau Geological Services; Trans-Ocean Oil No. 2 Federal-Bicentennial Freedom	1217 FNL, 463 FEL 35-13N-6E Sandoval	11/76	1,411	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Colorado Plateau Geological Services; Trans-Ocean Oil No. 3 Federal-Bicentennial Freedom	1122 FNL, 341 FEL 35-13N-6E Sandoval	9/76	1,112	D&A					
Colorado Plateau Geological Services; Trans-Ocean Oil No. 4 Federal-Bicentennial Freedom	1330 FNL, 560 FEL 35-13N-6E Sandoval	12/76	1,403	D&A					
Texaco, Inc. No. 1 Howard Major	2040 FNL, 680 FWL 10-13N-3W Sandoval	6/64	6,387	D&A					slight gas show in Madera by DST from 5540-5660 ft.
Continental No. 1 Evans	2010 FNL, 330 FEL 2-13N-4W Sandoval	12/35	6,220	D&A					gas show in Permian at 2900 ft oil & gas show in Permian at 3280 ft
Tejon Oil & Development No. 1	7-14N-6E Sandoval	7/14	1,850	D&A					oil show from 1000 to 1087 ft
Pelto Oil No. 1 Blackshare-Federal	1980 FSL, 990 FEL 35-14N-6E Sandoval	7/81	7,025	D&A					
Humble Oil & Refining Co. No. 1 Santa Fe Pacific 'B'	660 FNL, 510 FWL 20-14N-1W Sandoval	2/54	6,016	D&A					
Gas Co. of New Mexico No. 7-B San Ysidro	903 FSL, 1907 FWL 20-15N-1E Sandoval	10/79	230	D&A					
Gas Co. of New Mexico No. 7-A San Ysidro	1007 FSL, 2526 FWL 20-15N-1E Sandoval	10/79	190	D&A					
Gas Co. of New Mexico No. 5-C San Ysidro	553 FSL, 1723 FWL 20-15N-1E Sandoval	10/79	230	D&A					
Gas Co. of New Mexico No. 5-B San Ysidro	404 FSL, 2080 FWL 20-15N-1E Sandoval	10/79	215	D&A					
Gas Co. of New Mexico No. 5-A San Ysidro	404 FSL, 2380 FWL 20-15N-1E Sandoval	10/79	200	D&A					
Gas Co. of New Mexico No. 7-C San Ysidro	911 FSL, 1316 FWL 20-15N-1E Sandoval	10/79	240	D&A					
Gas Co. of New Mexico No. 4-C San Ysidro	2023 FSL, 1550 FWL 20-15N-1E Sandoval	10/79	230	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Southern Union Gas Co. No. 1-13 San Ysidro	1300 FSL, 550 FWL 17-15N-1E Sandoval	7/75	2,459	Gas storage					
Southern Union Gas Co. No. 1-17 San Ysidro	800 FNL, 300 FEL 18-15N-1E Sandoval	7/75	2,328	Gas storage					
Southern Union Gas Co. No. 1-15 San Ysidro	1908 FNL, 618 FEL 19-15N-1E Sandoval	7/75	2,730	Gas storage					
Gas Co. of New Mexico No. 1-14 San Ysidro	654 FSL, 300 FEL 19-15N-1E Sandoval	6/75	2,515	Gas storage					
Cosmo Oil Co. No. 1 Hart	1980 FNL, 660 FWL 20-15N-1E Sandoval	3/54	275	D&A					
Southern Union Prod. No. 1 San Ysidro (owwo)	990 FSL, 990 FWL 20-15N-1E Sandoval	11/71	6,190	Gas storage					
Southern Union No. 2 San Ysidro	2380 FNL, 1730 FWL 20-15N-1E Sandoval	1/72	3,396	Gas storage					
Southern Union No. 4 San Ysidro	2015 FSL, 1785 FWL 20-15N-1E Sandoval	2/72	2,475	Gas storage					
Gas Company of New Mexico No. 8 San Ysidro	504 FSL, 2080 FWL 20-15N-1E Sandoval	9/79	2,455	Gas storage					
Gas Company of New Mexico No. 4-B San Ysidro	1891 FSL, 1912 FWL 20-15N-1E Sandoval	10/79	235	D&A					
Gas Company of New Mexico No. 2-A San Ysidro	2338 FNL, 2603 FEL 20-15N-1E Sandoval	10/79	195	D&A					
Gas Company of New Mexico No. 2-C San Ysidro	2536 FNL, 1549 FWL 20-15N-1E Sandoval	10/79	200	D&A					
Gas Company of New Mexico No. 2-B San Ysidro	2380 FNL, 1861 FWL 20-15N-1E Sandoval	10/79	230	D&A					
Gas Company of New Mexico No. 6-C San Ysidro	496 FNL, 1121 FWL 20-15N-1E Sandoval	10/79	195	D&A					
Gas Company of New Mexico No. 6-A San Ysidro	498 FNL, 2546 FWL 20-15N-1E Sandoval	10/79	190	D&A					
Gas Company of New Mexico No. 6-B San Ysidro	496 FNL, 1412 FWL 20-15N-1E Sandoval	10/79	205	D&A					
Anschutz & Guest No. 1 Tejon Sp. Grant	?-15N-5E Sandoval	-/31	550	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Cannedy & Larrazola No. 3 Odlum	990 FSL, 330 FEL 11-15N-1W Sandoval	7/55	402	D&A					oil show in Entrada
Avila Oil Corp. No. 1 Odlum	400 FNL, 760 FEL 15-15N-1W Sandoval	9/53	5,390	D&A					oil show in Entrada from side-wall cores from 869-934 ft
Avila Oil Corp. No. 2 Odlum	330 FNL, 660 FEL 15-15N-1W Sandoval	8/54	912	D&A					
George Senutovitch No. 1-XGS	740 FNL, 380 FWL 3-15N-3W Sandoval	8/62	550	D&A					
George Senutovitch No. 1 'JS'	740 FNL, 330 FWL 3-15N-3W Sandoval	11/61	920	D&A					
George Senutovitch No. 2 GS 'X'	590 FNL, 610 FWL 3-15N-3W Sandoval	10/62	1,300	D&A					oil show in Dakota from 1215-1250 ft
William M. Kaiser No. 1 Tilford	2090 FSL, 360 FWL 6-15N-3W Sandoval	12/78	418	D&A					
Houston Oil & Minerals No. 2 Booth Drought	990 FNL, 990 FEL 1-15N-4W Sandoval	4/77	6,921	D&A					
De Chaves No. 2 Kaseman (Zia Pueblo oil Test)	2600 FNL, 1150 FEL, 1-16N-1W Sandoval	-/26	2,008	D&A					CO_2 showing reported by Clark (1929)
Tidewater Associated No. 1 Espiritu Santo	2456 FSL, 1393 FEL 7-16N-1E Sandoval	1/49	2,560	D&A					
De Chaves No. 1 Kaseman	18-16N-1E Sandoval	-/26	550	D&A					
Albuquerque Oil and Gas No. 1 Government-Jemez	18-16N-1E Sandoval	4/28		D&A					
Kaseman No. 2 Santo Ranch	6-16N-1W Sandoval	12/56	2,008	D&A					
Albuquerque Nat. Gas Co. No. 1 Jemez	13-16N-1W Sandoval	-/25	600	D&A					
Enexco Oil Co. No. 1 Shirl	990 FNL, 990 FEL 9-16N-2W Sandoval	5/82	2,780	D&A					
Enexco Inc. No. 2 Shirl	2000 FNL, 990 FWL 10-16N-2W Sandoval	1/83	7,070	D&A					
Blair & Price No. 1 Goodener	1650 FSL, 990 FEL 34-16N-2W Sandoval	5/55	2,398	D&A					
Blair & Price No. 1 Jess York	1980 FSL, 1980 FEL 36-16N-2W Sandoval	5/55	1,759	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
T.L. Morris No. 1 Elaine	660 FSL, 660 FEL 1-16N-3W Sandoval	10/81	550	D&A					
T.L. Morris No. 1 Ruthie	330 FSL, 330 FEL 4-16N-3W Sandoval	10/81	600	D&A					
Abbott Brothers No. 1 Bennett	660 FSL, 660 FWL 17-16N-3W Sandoval	11/59	1,840	D&A					
T.L. Morris et al No. 1 Glen	330 FNL, 660 FEL 26-16N-3W Sandoval	10/81	650	D&A					
T.L. Morris No. 1 Chace	330 FNL, 2310 FWL 35-16N-3W Sandoval	10/81	200	D&A					
Manco Chico No. 1 Chico Arroyo	660 FNL, 660 FEL 6-16N-4W Sandoval	7/70	1,202	D&A					
Hughes & Hughes No. 1 Ann Pickard Tract 20	330 FNL, 330 FEL 8-16N-4W Sandoval	6/66	1,221	D&A					
Noel Reynolds No. 1 Bosco	1980 FSL, 1980 FWL 11-16N-4W Sandoval	4/80	1,050	D&A					
Hubbell Drlg No. 1 Hubbell-15	388 FSL, 476 FEL 15-16N-4W Sandoval	10/80	212	D&A					
T.L. Morris et al No. 1 Blanco	330 FNL, 1980 FWL 20-16N-4W Sandoval	10/81	400	D&A					
T.L. Morris et al No. 1 Lynn Cheryl	330 FSL, 880 FWL 22-16N-4W Sandoval	10/81	325	D&A					
Blair & Price No. 1 McKensie	1650 FSL, 840 FEL 32-17N-1W Sandoval	5/55	1,055	D&A					
Hanson Oil No. 3 Candy Butte	660 FNL, 660 FWL 8-17N-2W Sandoval	7/80	4,000	D&A					
Jack N. Blair No. 1 Cheney	1650 FSL, 1650 FEL 25-17N-2W Sandoval	4/55	2,390	D&A					oil show at 1150 ft; oil show in Dakota at 1440 ft
H.B. Browning No. 1 Browning	990 FSL, 2310 FWL 2-17N-3W Sandoval	7/66	1,703	D&A					
Gola Oil Co. No. 1 Gola	2310 FNL, 1470 FWL 4-17N-3W Sandoval	10/65	410	D&A					oil shows from 64-74, 90-98, 140-150, 195-202, 312-334, 340-350 ft
Gola Oil Co. No. 2 Gola	1650 FNL, 1550 FWL 4-17N-3W Sandoval	10/65	380	D&A					oil shows from 58-71, 198-212, 316-355 ft
Gola Oil Co. No. 3 Gola	2310 FNL, 1010 FWL 4-17N-3W Sandoval	10/65	421	D&A					oil shows from 75-78, 344-372, 387-403 ft

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Gola Oil Co. No. 4 Gola	1890 FNL, 1100 FWL 4-17N-3W Sandoval	10/65	390	D&A					oil show from 322-366 ft
Gola Oil Co. No. 6 Gola	2234 FNL, 1790 FWL 4-17N-3W Sandoval	10/65	410	D&A					oil shows from 68-82, 98-110, 196-206, 316-340 ft
Gola Oil Co. No. 5 Gola	1883 FNL, 1884 FWL 4-17N-3W Sandoval	10/65	410	D&A					oil shows from 95-102, 303-308, 341-370 ft
Charles Goad No. 8 Gola	1450 FNL, 1170 FWL 4-17N-3W Sandoval	-/75	4,075	D&A					
Tenneco Oil Co. No. 1 Torreon Core Hole	1650 FSL, 1650 FEL 5-17N-3W Sandoval	5/67	1,603	D&A					oil shows in Menefee core from 837-937 ft
Tenneco Oil Co. No. 2 Torreon Core Hole	1650 FNL, 1650 FWL 5-17N-3W Sandoval	5/67	987	D&A					
Brinkerhoff Drilling No. 1 Cabezon Government	660 FSL, 660 FWL 7-17N-3W Sandoval	5/63	7,975	D&A					
W.M. Galloway No. 4 'C&M'	1815 FSL, 2145 FEL 13-17N-3W Sandoval	9/69	320	D&A					
W.M. Galloway No. 1 'C&M'	1000 FSL, 2030 FEL 13-17N-3W Sandoval	9/69	320	D&A					
Kreatschman & Stowe No. 1 Federal 'C'	2000 FSL, 1980 FEL 13-17N-3W Sandoval	11/68	1,250	D&A					oil show in Menefee from 150-180 ft
Hanson Oil No. 4 Candy Butte	1980 FSL, 1780 FEL 14-17N-3W Sandoval	8/80	498	D&A					
Abbott Bros. No. 1 Bennett	660 FSL, 660 FWL 17-17N-3W Sandoval	11/59	1,835	D&A					
Kreatschman & Stowe No. 2 Federal 'B'	2000 FSL, 1620 FWL 22-17N-3W Sandoval	10/68	1,480	D&A					
Dave M. Thomas, Jr. No. 2 Cabezon Federal	1650 FNL, 990 FEL 23-17N-3W Sandoval	2/64	935	D&A					
Hanson Oil No. 5 Candy Butte	330 FNL, 2310 FEL 25-17N-3W Sandoval	7/81	3,478	D&A					
Hanson Oil No. 1 Candy Butte	660 FNL, 660 FNL 25-17N-3W Sandoval	8/81	3,558	D&A					
Hanson Oil No. 2 Candy Butte	660 FNL, 1980 FWL 25-17N-3W Sandoval	8/80	3,492	D&A					
Dave M. Thomas, Jr. No. 1 Cabezon Federal	560 FNL, 580 FEL 26-17N-3W Sandoval	2/64	820	D&A					
Shell Oil Co. No. 41-26 Wright	560 FNL, 600 FEL 26-17N-3W Sandoval	12/61	6,952	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Dome Petroleum No. 1 Dome Federal	1650 FNL, 2000 FEL 27-17N-3W Sandoval	4/80	3,446	D&A					
Dome Petroleum No. 2 Dome Federal	1980 FNL, 1980 FWL 27-17N-3W Sandoval	4/80	3,483	D&A					
Kreatschman & Stowe No. 1 Federal 'A'	800 FNL, 490 FWL 30-17N-3W Sandoval	10/68	1,280	D&A					
T.L. Morris et al No. 1 Betty	2310 FSL, 330 FEL 35-17N-3W Sandoval	10/81	401	D&A					
Gulf Oil No. 1 South Torreon-Federal	660 FNL, 1980 FEL 4-17N-4W Sandoval	5/78	4,400	D&A					
El Pam Co., Inc. No. 2 Loma	2310 FSL, 890 FEL 18-17N-4W Sandoval	11/65	505	D&A					
El Pam Co., Inc. No. 1 Loma	660 FSL, 2310 FEL 18-17N-4W Sandoval	11/65	445	D&A					
Curtis J. Little No. 1 Federal	2150 FSL, 760 FWL 29-17N-4W Sandoval	7/64	1959	D&A					
W. W. Holmes No. 1 Federal	565 FSL, 1020 FWL 29-17N-4W Sandoval	6/63	104	D&A					
William B. Martin, Jr. No. 6 Federal	360 FSL, 270 FWL 29-17N-4W Sandoval	9/79	120	D&A					
Refiners Petroleum No. 1 Cabezon	1980 FNL, 1980 FEL 29-17N-4W Sandoval	7/71	4,055	D&A					
Val. R. Reese No. 1 Cabezon	330 FSL, 835 FWL 29-17N-4W Sandoval	11/73	123	D&A					
William B. Martin, Jr. No. 7 Federal	480 FSL, 580 FWL 29-17N-4W Sandoval	9/79	115	D&A					
William B. Martin, Jr. No. 12 Federal	1170 FSL, 2230 FWL 29-17N-4W Sandoval	9/79	175	D&A					
William B. Martin, Jr. No. 8 Federal	915 FSL, 775 FWL 29-17N-4W Sandoval	9/79	100	D&A					
William B. Martin, Jr. No. 9 Federal	940 FSL, 1145 FWL 29-17N-4W Sandoval	9/79	160	D&A					
Val R. Reese No. 4 Cabezon	845 FSL, 1666 FWL 29-17N-4W Sandoval	11/73	180	D&A					
Val R. Reese No. 2 Cabezon	550 FSL, 1055 FWL 29-17N-4W Sandoval	11/73	111	D&A					oil show in Menefee in core from 98 to 107 ft

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
William B. Martin, Jr. No. 10 Federal	1015 FSL, 1445 FWL 29-17N-4W Sandoval	9/79	115	D&A					
Village of Jemez Springs No. 1 Jemez Springs	26-18N-2E Sandoval	6/79	824	GTW					
Harry Leonard et al No. 1 Catron	660 FSL, 1980 FWL 7-18N-1W Sandoval	11/25	2,003	D&A					
Late Oil Co. No. 1 Gulf-Federal	2230 FSL, 1880 FWL 28-18N-1W Sandoval	10/58	1,563	D&A					
Cities Service Oil Co. No. 1 Government	1557 FNL, 1726 FEL 30-18N-1W Sandoval	9/53	1,442	D&A					
Dakota Resources No. 34 Ross-Federal-13	660 FSL, 1980 FEL 13-18N-2W Sandoval	5/81	3,000	D&A					
John K. Petty No. 1 Delhi-Federal Goodner	1980 FNL, 1980 FEL 28-18N-2W Sandoval	4/62	1,130	D&A					
W.W. Holmes No. 1 Young-Federal	330 FSL, 990 FEL 3-18N-3W Sandoval	4/61	1,365	D&A					
Ed. Cannedy No. 1 Goodener (owwo)	1723 FNL, 1980 FWL 3-18N-3W Sandoval	8/57	1,303	D&A					
Chace Oil No. 1 Gold Creek	1850 FSL, 1850 FWL 7-18N-3W Sandoval	11/76	1,300	D&A					
W.W. Holmes No. 1 Anderson-Beard	1650 FSL, 990 FEL 10-18N-3W Sandoval	8/61	1,435	D&A					oil show in core in Mesa-verde from 805-818 ft
W.W. Holmes No. 1 Haley-Federal 'A'	2290 FNL, 2310 FWL 10-18N-3W Sandoval	7/59	1,495	D&A					
W.W. Holmes No. 2 Spencer-Federal	2310 FNL, 1650 FEL 10-18N-3W Sandoval	5/61	1,503	D&A					
W.W. Holmes No. 1 Spencer-Federal	2310 FNL, 330 FEL 10-18N-3W Sandoval	4/61	1,415	D&A					
Rijan Oil Co. No. 1 Spencer-Federal (owpa)	1650 FNL, 990 FWL 11-18N-3W Sandoval	10/68	1,145	D&A					recovered 41 BO from 1135-1142 ft in Mesaverde
W.W. Holmes No. 8 Spencer-Federal	990 FNL, 990 FWL 11-18N-3W Sandoval	5/61	1,447	D&A					
W.W. Holmes No. 6 Spencer-Federal	1650 FNL, 1650 FWL 11-18N-3W Sandoval	5/61	1,400	D&A					

Operator, well number, and lease	Location (section-township-range, county)	[illegible]letion [illegible]ate (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
W.W. Holmes No. 9 Spencer-Federal	1630 FNL, 660 FWL 11-18N-3W Sandoval	6/61	1,490	D&A					
Tesoro Petroleum No. 1 Federal San Luis	1980 FNL, 660 FWL 11-18N-3W Sandoval	12/72	4,920	D&A					
W.W. Holmes No. 11 Spencer-Federal	1945 FNL, 1140 FWL 11-18N-3W Sandoval	7/61	1,420	D&A					oil show in Mesaverde core from 1131-1150 ft
W.W. Spencer No. 5 Spencer-Federal	330 FNL, 2310 FWL 11-18N-3W Sandoval	7/61	1,490	D&A					
F.H. Gose & Carey Hiett No. 1 Gose & Hiett	330 FNL, 330 FWL 12-18N-3W Sandoval	11/55	1,647	D&A					slight oil show in Cretaceous from 855 to 870 ft
W.W. Holmes No. 1 Holmes-Federal	2310 FSL, 190 FEL 14-18N-3W Sandoval	4/61	1,250	D&A					
W.W. Holmes No. 1 Harvey-Federal	330 FNL, 1650 FEL 15-18N-3W Sandoval	6/61	1,505	D&A					
W.W. Holmes No. 1 Haley	367 FSL, 330 FEL 17-18N-3W Sandoval	6/59	1,510	D&A					
Hughes & Rollins No. 1 Rollins	1485 FNL, 1650 FEL 20-18N-3W Sandoval	11/61	1,392	D&A					oil shows at 850 ft, 1278 ft
Ed Cannedy No. 2 Gartner (OWPB)	1915 FNL, 509 FEL 21-18N-3W Sandoval	10/55	811	D&A			36.1		recovered 7 bbl oil
Francis L. Harvey No. 1-AX C.B. Harvey	1670 FSL, 2309 FEL 21-18N-3W Sandoval	7/63	730	D&A					oil show in Mesaverde core from 700-720 ft
Arwood Stowe No. 3 Gartner (OWPA)	2310 FNL, 990 FEL 21-18N-3W Sandoval	9/68	1,094	D&A					
Francis L. Harvey No. 5 Gartner-Ward	2475 FNL, 2310 FEL 21-18N-3W Sandoval	3/71	1,379	oil	Mesaverde 680-1378 IP 5BOPD	abd 1971	35	San Luis Mesaverde	
J.I. Harvey No. 1 Harvey-Federal 'A'	1670 FSL, 2294 FEL 21-18N-3W Sandoval	4/59	918	oil	Mesaverde IP 41 BOPD		35.3	San Luis Mesaverde	
Francis L. Harvey No. 4 C.B. Harvey 'A'	1691 FSL, 1701 FEL 21-18N-3W Sandoval	8/62	928	oil	Mesaverde IP 17 BOPD		36	San Luis Mesaverde	
Francis L. Harvey No. 1 Clyde Harvey-Federal	1520 FSL, 2340 FWL 21-18N-3W Sandoval	5/60	1,040	oil	Mancos 990-1000 IP 84 BOPD			undesignated Mancos	
Jenkins & McQueen No. 1 Gartner	660 FSL, 1980 FWL 21-18N-3W Sandoval	9/48	3,445	D&A					oil shows at 87, 1040-1045, 1275-1280 ft; gas shows from 1020-1030, 1160 ft
Francis L. Harvey No. 3 Harvey 'A'	1862 FSL, 2171 FEL 21-18N-3W Sandoval	1/61	935	oil	Mesaverde 908-935 IP 53 BOPD		36	San Luis Mesaverde	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
J.I. Harvey No. 2 Federal 'A'	660 FSL, 1984 FEL 21-18N-3W Sandoval	10/59	910	D&A					
J.I. Harvey No. 4 State	2310 FNL, 2310 FEL 21-18N-3W Sandoval	8/59	1,375	D&A					
Johney M. Myers No. 1 Federal	165 FSL, 1115 FWL 21-18N-3W Sandoval	3/62	920	D&A					
Johney M. Myers No. 1-X King	1125 FSL, 2475 FWL 21-18N-3W Sandoval	4/68	945	D&A					oil show in Menefee core from 890-945 ft
Myron T. King No. 1 King (OWPA)	1155 FSL, 2475 FWL 21-18N-3W Sandoval	4/68	926	oil	Mesaverde IP 2 BOPD			San Luis Mesaverde	
Francis L. Harvey No. 3 Harvey (OWPA)	1485 FSL, 1155 FWL 21-18N-3W Sandoval	2/61	1,000	oil	Mesaverde 658-668, 764-774 ft IP 12 BOPD	abandoned 1968		San Luis Mesaverde	
Petroleum Dev. Corp. No. 1 San Luis Federal (owwo)	1980 FSL, 2310 FEL 21-18N-3W Sandoval	5/74	4,661	D&A					
Noel Reynolds No. 1 Torreon	2330 FNL, 1980 FEL 21-18N-3W Sandoval	1/78	1,064	D&A					oil show Mesaverde in core from 825 to 845 ft
Rollins & Dodgen No. 1 Rollins-Dodgen	2475 FNL, 1155 FWL 21-18N-3W Sandoval	12/61	1,305	D&A					
Torreon Oil No. 1 San Luis-Federal	1650 FSL, 1980 FWL 21-18N-3W Sandoval	6/80	1,043	oil	Mesaverde 1002-1009 ft IPP 1 BOPD and 1 BWPD			San Luis Mesaverde	
Torreon Oil No. 2 San Luis-Federal	2278 FSL, 2296 FWL 21-18N-3W Sandoval	10/78	1,035	oil	Mesaverde 997-1006 ft			San Luis Mesaverde	
Torreon Oil No. 3 San Luis-Federal	2164 FSL, 1600 FEL 21-18N-3W Sandoval	8/78	606	oil	Mesaverde 556-581 ft IPP 9 BOPD	2,483 BO		San Luis Mesaverde	
Torreon Oil No. 4 San Luis-Federal	2490 FSL, 2310 FEL 21-18N-3W Sandoval	2/80	1,046	Injection well				San Luis Mesaverde	
Torreon Oil No. 5 San Luis-Federal	2490 FSL, 1470 FEL 21-18N-3W Sandoval	1/80	1,029	Injection well				San Luis Mesaverde	
F.B. Umbarger No. 1 Gartner	1980 FNL, 440 FEL 21-18N-3W Sandoval	5/50	1,287	D&A					
James P. Woosley No. 1 Federal	330 FSL, 990 FWL 21-18N-3W Sandoval	2/79	990	D&A					
G & R Oil Co. No. 1 Harvey	660 FNL, 330 FWL 22-18N-3W Sandoval	9/51	1,265	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Clyde B. Harvey No. 1 Federal (Smith)	2396 FNL, 280 FEL 22-18N-3W Sandoval	7/57	913	D&A					
Sun Oil No. 1 Sandoval-Federal	330 FNL, 2310 FWL 24-18N-3W Sandoval	7/71	8,750	D&A					
Drs. Ben Franklin & James J. Hamilton No. 2 Ben Franklin	330 FSL, 330 FEL 26-18N-3W Sandoval	11/66	1,264	D&A					
J.I. Harvey No. 1-E Clyde B. Harvey	1485 FNL, 165 FWL 27-18N-3W Sandoval	1/63	29	D&A					
El Pam Co., Inc. No. 1 Myra	330 FSL, 330 FWL 27-18N-3W Sandoval	11/65	500	D&A					
El Pam Co., Inc. No. 4 Myra	990 FSL, 330 FWL 27-18N-3W Sandoval	11/65	520	D&A					
El Pam Co., Inc. No. 2 Myra	330 FSL, 990 FWL 27-18N-3W Sandoval	8/66	520	D&A					
Buck Dodgen No. 2 Yah-Tah-Hay (CWPA)	495 FNL, 1485 FWL 28-18N-3W Sandoval	10/66	239	D&A					
W.W. Holmes No. 1 Holmes 'A'	660 FNL, 547 FEL 28-18N-3W Sandoval	3/61	1,272	D&A					oil stained Mesaverde core at 1150 ft
J.I. Harvey No. 1 Terry-Fedeal	500 FSL, 1100 FEL 28-18N-3W Sandoval	12/60	905	D&A					
J.I. Harvey No. 2 Harvey	805 FSL, 990 FEL 28-18N-3W Sandoval	10/63	25	D&A					
Keith L. Rising No. 1 Federal 28	165 FNL, 2145 FWL 28-18N-3W Sandoval	11/68	540	D&A					
Keith L. Rising No. 1 Federal (CWPA)	165 FNL, 1485 FWL 28-18N-3W Sandoval	5/68	220	D&A					recovered 2 BOPD from Menefee from 492-512 ft
W.W. Holmes No. 1 Rorex-Federal	660 FNL, 1980 FEL 28-18N-3W Sandoval	6/59	1,220	D&A					
J.W. Rollins-Dodgens No. 3 Rollins-Dodgen	495 FNL, 1155 FWL 28-18N-3W Sandoval	7/62	584	D&A					
J.W. Rollins-Dodgens No. 2 Rollins-Dodgen	165 FNL, 1155 FWL 28-18N-3W Sandoval	2/62	560	oil	Mesaverde, 517-522 ft 7 BOPD	2251 BO abd 1978	37.3	San Luis Mesaverde	
Keith L. Rising No. 2 Federal 28	495 FNL, 1815 FWL 28-18N-3W Sandoval	11/68	520	D&A					
El Pam Co., Inc. No. 3 Myra	660 FNL, 330 FEL 29-18N-3W Sandoval	11/65	935	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Tenneco Oil Co. No. 4 Torreon Core Hole	1630 FSL, 1555 FWL 29-18N-3W Sandoval	5/67	1,150	D&A					
Ellsberry & Kreatschman No. 16 Darla	1765 FNL, 1001 FEL 33-18N-3W Sandoval	8/76	335	oil	Mesaverde 260-335 ft IPF 2 BOPD + 6 BWPD	29 BO	40	San Luis Mesaverde, south	
Ellsberry & Kreatschman No. 18 E-K	655 FNL, 1652 FEL 33-18N-3W Sandoval	4/77	387	oil	Mesaverde 310-387 ft IPF 1 BOPD			San Luis Mesaverde, south	
Ellsberry & Kreatschman No. 17 E-K	621 FNL, 1988 FEL 33-18N-3W Sandoval	4/77	360	D&A					
Ellsberry & Kreatschman No. 15 E-K	1021 FNL, 1121 FEL 33-18N-3W Sandoval	4/77	362	D&A					
Ellsberry & Kreatschman No. 2 E-K-Ann	354 FNL, 420 FEL 33-18N-3W Sandoval	2/65	550	D&A					
Ellsberry & Kreatschman No. 11 E-K-Ann	330 FNL, 990 FEL 33-18N-3W Sandoval	10/65	1,010	D&A					
Ellsberry & Kreatschman No. 4 E-K-Ann	1029 FNL, 1020 FEL 33-18N-3W Sandoval	10/65	430	D&A					
Entrada Corp. No. 1 Federal	990 FNL, 990 FEL 33-18N-3W Sandoval	6/58	880	D&A					gas show in Mesa-verde from 720-755 ft, 804-813 ft
Ellsberry & Kreatschman No. 3 E-K-Darla	2310 FNL, 990 FEL 33-18N-3W Sandoval	10/65	450	D&A					
Ellsberry & Kreatschman No. 7 E-K-Darla	1347 FNL, 1166 FEL 33-18N-3W Sandoval	10/65	432	D&A					recovered 1/2 BOPD from Mesa-verde
Clyde B. Harvey No. 2 Torrejon Harvey	897 FNL, 573 FEL 33-18N-3W Sandoval	10/63	378	oil	Mesaverde IP 6 BOPD		38	San Luis Mesaverde, south	
J.I. Harvey No. 1 Federal	1650 FNL, 990 FEL 33-18N-3W Sandoval	10/59	353	oil	Mesaverde 340-353 IP 51 BOPD + 5 BWPD		35	San Luis Mesaverde, south	
J.I. Harvey No. 2-N Clyde B. Harvey	2145 FNL, 1485 FEL 33-18N-3W Sandoval	1/63	12	D&A					
Arwood H. Stowe No. 2 Federal	330 FNL, 330 FEL 33-18N-3W Sandoval	5/67	550	D&A					oil shows from 265-269, 275-285, 347-357, 390-399, 423-430 ft
Arwood H. Stowe No. 1 Federal	330 FNL, 330 FWL 33-18N-3W Sandoval	11/65	1,010	D&A					
Arwood H. Stowe No. 7 Ann	630 FNL, 990 FEL 33-18N-3W Sandoval	4/66	450	water					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Arwood H. Stowe No. 8 Federal	1980 FNL, 660 FEL 33-18N-3W Sandoval	11/65	410	D&A					
Levi A. Hughes No. 1 Hughes-Collins	2060 FSL, 1485 FEL 33-18N-3W Sandoval	10/61	1,094	D&A					
J.I. Harvey No. 2 Federal	1650 FNL, 1650 FEL 33-18N-3W Sandoval	9/59	820	D&A					oil show in Mancos core core from 375-385 ft
Arwood H. Stowe No. 3 Federal	994 FNL, 321 FEL 33-18N-3W	12/65	450	oil	Mesaverde 440-450 IP 1 BOPD			San Luis Mesaverde,	
Entrada Corp. No. 2 Federal	990 FNL, 915 FEL 33-18N-3W Sandoval	6/58	401	D&A				South	
Arwood H. Stowe No. 6 Ann	694 FNL, 667 FEL 33-18N-3W	10/65	410	oil	Mesaverde 320-360, 390-410 ft IP 1 BOPD			San Luis Mesaverde, south	
Arwood H. Stowe No. 9 Darla	1301 FNL, 824 FEL 33-18N-3W Sandoval	4/66	550	oil	Mesaverde 299-409 ft IP 1 BOPD			San Luis Mesaverde, south	
Arwood H. Stowe No. 10 Ann	660 FNL, 1650 FEL 33-18N-3W Sandoval	3/66	450	oil	Mesaverde 369-379 ft IP 15 BOPD			San Luis Mesaverde, south	
Arwood H. Stowe No. 14 Ann	660 FNL, 1980 FWL 33-18N-3W Sandoval	8/67	3,382	D&A					
Arwood H. Stowe No. 5 Federal	694 FNL, 667 FEL 33-18N-3W Sandoval	11/65	450	oil	Mesaverde 442-450 ft IPP 1 BOPD			San Luis Mesaverde, south	
El Pam Co., Inc. No. 1 Demas	330 FNL, 330 FWL 34-18N-3W Sandoval	11/65	550	D&A					
Tenneco Oil Co. No. 7 Torreon Core Hole	910 FNL, 1190 FWL 34-18N-3W Sandoval	8/67	1,150	D&A					oil shows in core from Menefee 312-432, 612-672 ft
Ruth Ross No. 2 South San Luis	976 FNL, 385 FWL 34-18N-3W Sandoval	2/82	400	D&A					
Public Petroleum Co. No. 1 Franklin	990 FSL, 1650 FWL 35-18N-3W Sandoval	5/66	520	D&A					
Theron J. Graves No. 2 John Toledo	790 FSL, 1780 FWL 7-18N-4W Sandoval	8/76	1,530	gas	Mesaverde 1442-1446 ft IPF 250 MCFGPD			undesignated Mesaverde	
Theron J. Graves No. 1 Federal	1450 FNL, 790 FEL 18-18N-4W Sandoval	1/76	3,023	D&A					
Theron J. Graves No. 1 Federal 'A'	1450 FNL, 770 FEL 18-18N-4W Sandoval	12/75	112	D&A					
Sunray DX Oil Co. No. 1 New Mexico Federal	1980 FSL, 1980 FEL 19-18N-4W Sandoval	11/62	4,080	D&A					
Eastland Oil No. 1 Petco Federal	1980 FNL, 330 FEL 19-18N-4W Sandoval	4/74	1,445	gas	Menefee 354-380 ft IPF 5 MCFGPD			undesignated Menefee	
Black Oil No. 1 Marlebru	990 FNL, 990 FEL 19-18N-4W	1/81	595	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Eastland Oil No. 1 Bennett Federal	695 FNL, 500 FWL 20-18N-4W Sandoval	4/74	330	gas	Menefee 312-330 ft IPF 10 MCFGPD			undesignated Menefee	
Ibex Partnership No. 1 Chorney 20 Federal	660 FNL, 510 FWL 20-18N-4W Sandoval	6/73	1,741	D&A					
Black Oil No. 1 Federal	750 FSL, 1735 FEL 20-18N-4W Sandoval	1/84	3,678	D&A					
O.A. Larrazolo No. 21-1 Navajo	660 FNL, 660 FEL 21-18N-4W Sandoval	3/59	1,215	D&A					
Albuquerque Associated No. 1 Navajo	1980 FSL, 660 FEL 22-18N-4W Sandoval	1/53	100	D&A					
Albuquerque Associated No. 1-X Navajo	2130 FSL, 680 FEL 22-18N-4W Sandoval	2/53	994	gas	Mesaverde 960-987 ft IPF 4,752 MCFGPD			undesignated Mesaverde	
Albuquerque Associated No. 2 Navajo	1830 FNL, 700 FEL 22-18N-4W Sandoval	4/53	3,784	D&A					gas show by DST from 965-985 ft; oil & gas show by DST from 1170-1369 ft
Filon Exploration No. 1 Navajo 22-A	330 FNL, 1650 FWL 22-18N-4W Sandoval	10/75	4,828	D&A					
Reynolds Mining Co. No. 1 Torreon	1980 FSL, 660 FWL 22-18N-4W Sandoval	2/56	7,520	D&A					gas show in Cretaceous by DST from 1025-1051 ft
D.A. Larrazolo No. 22-4 Navajo	660 FNL, 1980 FWL 22-18N-4W Sandoval	1/59	1,200	gas	Mesaverde 1056-1109 ft IP 300 MCFGPD			undesignated Mesaverde	
Theron Graves No. 3 Federal	1050 FNL, 1490 FEL 27-18N-4W Sandoval	9/75	1,400	D&A					
D.A. Larrazolo No. 27-1	660 FNL, 660 FEL 27-18N-4W Sandoval	6/59	1,200	D&A					slight gas show in Mesaverde
Keith L. Rising No. 1 Federal	660 FSL, 660 FWL 29-18N-4W Sandoval	7/66	1,400	D&A					
F.F. Kelly No. 1 State	660 FNL, 1980 FEL 32-18N-4W Sandoval	6/53	3,776	D&A					oil show by DST from 449-476 ft; slight oil & gas show by DST from 1048-1134 ft
LASL GT-1 Granite Test Hole	1389 FSL, 802 FEL 1-19N-2E Sandoval	6/72	2,575	HDR-H					
LASL No. GT-2 Fenton Hill	533 FNL, 465 FEL 13-19N-2E Sandoval	12/74	9,619	HDR-H					
LASL No. GT-2B Fenton Hill	533 FNL, 465 FEL 13-19N-2E Sandoval	-/78	8,900	HDR-H					
LASL No. 2 Energy Extraction	13-19N-2E Sandoval	-/79	15,292	HDR-H					
LASL	[illegible]	11/81	13,933	HDR-H					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
LASL No. EE-11 Energy Extraction	1500 FNL, 1464 FEL 13-19N-2E Sandoval	10/75	10,053	HDR-H					
Los Alamos Scientific Lab No. 1 EE	13-19N-2E Sandoval	7/77	10,060	D&A					
Los Alamos Scientific Lab No. 2-B G.T.	13-19N-2E Sandoval	7/77	8,884	D&A					
Union Geothermal of NM No. 21 Baca	60 FSL, 725 FWL 1-19N-3E Sandoval	10/80	3,000	GTW					
Union Oil of Calif. No. 16 Baca	1500 FSL, 2000 FEL 1-19N-3E Sandoval	8/75	7,002	GTW					
Baca Land & Cattle Co. No. 1 Baca	1500 FNL, 1450 FWL 3-19N-3E Sandoval	-/63	2,560	GTW					
Baca Land & Cattle Co. No. 3 Baca	1450 FNL, 1600 FWL 3-19N-3E Sandoval	7/64	2,200	GTW					
GRI Exp. & Dev. No. 23-4 Water Canyon	1500 FNL, 600 FWL 4-19N-3E Sandoval	4/82	6,890	D&A					
Union Geothermal of NM No. 19 Baca	3150 FSL, 250 FWL 11-19N-3E Sandoval	11/79	5,610	GTW					
Union Oil of Calif. No. 6 Baca	1000 FSL, 500 FEL 11-19N-3E Sandoval	4/75	4,810	GTW					
Union Oil of Calif. No. 10 Baca	500 FSL, 1650 FEL 11-19N-3E Sandoval	9/73	6,001	OBS					
Union Oil of Calif. No. 18 Baca	252 FSL, 1509 FEL 11-19N-3E Sandoval	3/79	5,250	GTW					
Union Oil of Calif. No. 15 Baca	1800 FNL, 150 FEL 11-19N-3E Sandoval	4/75	5,505	GTW					
Union Geothermal of NM No. 24 Baca	350 FSL, 350 FEL 11-19N-3E Sandoval	7/81	5,502	GTW					
Union Geothermal of NM No. 23 Baca	439 FSL, 1486 FEL 11-19N-3E Sandoval	7/81	5,746	Suspended operations					
Baca Land & Cattle Co. No. 4 Baca	900 FSL, 2050 FEL 12-19N-3E Sandoval	9/76	5,048	GTW					
Union Oil of Calif. No. 11 Baca	1750 FNL, 1100 FWL 12-19N-3E Sandoval	11/73	6,929	GTW					
Union Oil of Calif. No. 13 Baca	850 FNL, 1700 FEL 12-19N-3E Sandoval	10/74	8,228	GTW					
Union Geothermal of NM No. 20 Baca	1495 FNL, 1280 FWL 12-19N-3E Sandoval	8/80	6,374	OBS					
Union Geothermal of NM No. 22 Baca	770 FNL, 1300 FWL 12-19N-3E Sandoval	3/81	6,485	OBS					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Union Oil of Calif. No. 5-A Baca	2450 FSL, 450 FWL 13-19N-3E Sandoval	9/71	6,973	Service well					
Union Oil of Calif. No. 9 Baca	900 FNL, 2000 FEL 14-19N-3E Sandoval	11/72	5,303	GIW					
Union Oil of Calif. No. 12 Baca	950 FSL, 1650 FEL 14-19N-3E Sandoval	9/81	10,637	OBS					
Union Oil of Calif. No. 14 Baca	900 FNL, 2000 FEL 14-19N-3E Sandoval	2/75	6,824	Service well					
Benn-McKay No. 2-3 Benn-McKay	1190 FSL, 990 FEL 3-19N-1W Sandoval	12/64	1,758	D&A					oil and gas show in Dakota by DST from 1652-1702 ft
Amphora Oil & Gas No. 1 Hyder-Federal	2175 FSL, 930 FEL 4-19N-1W Sandoval	4/82	2,720	D&A					
Crane Drilling Co. No. 1-9 Benn-McKay	1080 FNL, 1940 FEL 9-19N-1W Sandoval	7/64	1,539	D&A					
Cities Service No. 10-1 New Mexico	660 FNL, 990 FEL 10-19N-1W Sandoval	4/63	1,589	D&A					
Nuclear Corp. of New Mexico No. 1 La Ventana	482 FSL, 408 FWL 14-19N-1W Sandoval	11/76	2,800	D&A					
Cities Service No. 15-1 New Mexico	1980 FSL, 1980 FWL 15-19N-1W Sandoval	4/63	1,503	D&A					
Reese & Van Dyke No. 1 Benn-McKay	940 FSL, 1565 FEL 21-19N-1W Sandoval	4/63	1,305	D&A					
Harry L. Bigbee No. 1 Federal '33'	1980 FSL, 660 FWL 33-19N-1W Sandoval	9/65	2,550	D&A					
Filon Exploration No. 1 Federal '30'	330 FNL, 1650 FEL 30-19N-2W Sandoval	7/76	5,376	D&A					
El Paso Natural Gas No. 1 Elliott State	1990 FNL, 1930 FWL 36-19N-2W Sandoval	10/53	8,254	D&A					oil stained Entrada core from 3860-3912 ft
Atlantic Refining Co. No. 2 Torreon	1693 FNL, 1980 FEL 3-19N-3W Sandoval	6/61	3,571	D&A					
Harry L. Bigbee No. 1-13 Torreon	2310 FSL, 990 FWL 13-19N-3W Sandoval	11/63	5,632	D&A					
Don C. Wiley No. 1 Beard	1980 FSL, 1650 FWL 14-19N-3W Sandoval	12/69	5,346	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Don C. Wiley No. 1 Federal-Media (owwo)	990 FSL, 660 FWL 14-19N-3W Sandoval	11/71	5,310	oil	Entrada 5252-5258 ft IP 220 BOPD + 9 BWRD		33	Media Entrada	
Don C. Wiley Fluid Power Pump Co. No. 4 Federal-Media	990 FSL, 1650 FWL 14-19N-3W Sandoval	7/69	5,344	oil	Entrada 5290-5296 ft IP 18 BOPD + 96 BWPD			Media Entrada	
Fluid Power Pump Co. No. 1 Fluid Power Pump Co.	1980 FSL, 330 FWL 14-19N-3W Sandoval	11/71	5,351	oil	Entrada 5206-5254 ft IPP 508 BOPD + 1,500 BWPD			Media Entrada	
Magnolia Petroleum Co. No. 1 Hutchinson-Federal	1980 FSL, 660 FWL 14-19N-3W Sandoval	11/53	9,684	oil	Entrada IPP 78.5 BOPD Gallup 3229-3254 ft IP 13.5 BOPD	18,111 BO abd 1958	33 39	Media Entrada undesignated Gallup	
Harry L. Bigbee No. 1 Medio	330 FSL, 2310 FEL 14-19N-3W Sandoval	8/62	5,351	D&A					oil and gas show in Gallup by DST from 2755-2970 ft
Magnolia Petroleum No. 1 Harvey 'E'	1980 FNL, 660 FWL 14-19N-3W Sandoval	3/54	5,292	D&A					oil show in Todilto by DST from 5217-5232 ft; oil stained core from 5232-5242 ft
Don C. Wiley; Fluid Power Pump Co. No. 1	1190 FSL, 660 FWL 14-19N-3W Sandoval	6/69	1,300	D&A					
Harry Bigbee No. 2 Medio	595 FSL, 2080 FEL 14-19N-3W Sandoval	11/62	3,131	oil	Gallup 2726-3131 ft IP 88 BOPD + 75 MCFGPD + 8 BWPD		37.8	Undesignated Gallup	
Magnolia Petroleum Co. No. 2 Hutchinson	1980 FSL, 660 FEL 15-19N-3W Sandoval	1/54	5,202	oil	Entrada IP 62 BOPD + 162 BWPD	107 BO abd 1958		Media Entrada	
Fluid Power Pump Co. No. 2 Fluid Power Pump	2310 FNL, 330 FEL 15-19N-3W Sandoval	3/72	5,300	D&A					
Fluid Power Pump Co. No. 4 Fluid Power Pump	990 FSL, 1650 FEL 15-19N-3W Sandoval	7/72	5,380	oil	Entrada 5284-5290 ft IPP 24 BOPD + 72 BWPD			Media Entrada	
Don C. Wiley No. 2 Federal-Media	940 FSL, 330 FEL 15-19N-3W Sandoval	6/69	5,280	oil	Entrada 5217-5226 ft IP 124 BOPD + 72 BWPD			Media Entrada	
Fluid Power Pump Co. No. 3 Fluid Power Pump	1650 FSL, 330 FEL 15-19N-3W Sandoval	4/72	5,320	oil	Entrada 5218-5240 ft IP 438 BOPD + 1,320 BWPD			Media Entrada	
Francis L. Harvey No. 1 C. Gonzales	1980 FSL, 660 FEL 16-19N-3W Sandoval	7/56	3,568	D&A					oil shows in Gallup
Don C. Wiley No. 3 Federal-Media	430 FNL, 1690 FEL 22-19N-3W Sandoval	6/69	5,343	oil	Gallup 2826-3019 ft IP 97 BOPD	3,425 BO abd		Media Gallup	oil show in Todilto and Entrada in core from 5272-5372 ft
Texaco No. 1 No. 1 Moore (OWPA)	330 FSL, 2310 FWL 22-19N-3W Sandoval	7/52	1,668	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Petro-Lewis No. 6-22 Boling-Federal	1650 FNL, 2310 FWL 22-19N-3W Sandoval	9/74	5,495	oil	Todilto-Entrada 5296-5313 ft IPP 677 BOPD	346,603 BO		Media Entrada, Southwest	
Fluid Power Pump Co. No. 5 Fluid Power Pump	400 FNL, 1980 FWL 22-19N-3W Sandoval	6/72	5,450	oil, converted to SWD	Entrada 5345-5376 ft IPP 480 BOPD + 1,440 BWPD	13,062 BO		Media Entrada, Southwest	
Petro-Lewis No. 8 Boling-Federal	990 FNL, 2160 FWL 22-19N-3W Sandoval	6/78	5,425	oil	Entrada 5306-5311 ft IPP 8 BOPD + 28 BWPD	75,160 BO	28	Media Entrada, Southwest	
U.S. Oil & Gas No. 2 Moore	660 FSL, 1980 FWL 22-19N-3W Sandoval	6/52	96	D&A					
Petro-Lewis 7-22 Miller-Federal	1335 FNL, 1980 FEL 22-19N-3W Sandoval	1/76	5,466	oil	Entrada 5295-5302 ft IPP 901 BOPD + 200 BWPD	300,985 BO		Media Entrada, Southwest	
Don C. Wiley; Fluid Power Pump Corp. No. 5 Federal-Media	1650 FNL, 660 FEL 22-19N-3W Sandoval	9/69	5,379	oil	Gallup 2784-3378 ft IP 5 BOPD	351 BO abd		Media Gallup	
Don C. Wiley et al. No. 6 Federal-Media	1590 FNL, 570 FEL 22-19N-3W Sandoval	12/69	2,100	D&A					
Petro-Lewis No. 7 Federal-Media (owwo)	1980 FNL, 1980 FEL 22-19N-3W Sandoval	8/73	3,445	oil	Gallup 2793-3262 ft IP 3 BOPD	20093 BO		Media Gallup	
Petro-Lewis No. 8 Federal-Media (owwo)	660 FNL, 660 FEL 22-19N-3W Sandoval	2/74	3,421	oil	Gallup 1681-3112 ft			Media Gallup	
Harry L. Bigbee No. 1 Flint	330 FNL, 2310 FEL 23-19N-3W Sandoval	11/62	3,369	oil	Gallup 2710-3369 ft IP 72 BOPD + 50 MCFGPD + 45 BWPD			Media Gallup	
Rijan Oil No. 1 P.L.R. Inc.	1650 FSL, 760 FWL 23-19N-3W Sandoval	6/77	3,259	oil	Gallup 2696-3178 ft IPP 15 BOPD	496 BO abd 1981	38	Media Gallup	
Rijan Oil No. 1-26 Federal	1980 FNL, 660 FEL 26-19N-3W Sandoval	2/79	5,325	D&A					
Rijan Oil No. 2-26 Federal	1650 FSL, 2310 FEL 26-19N-3W Sandoval	5/80	5,106	D&A					
Rijan Oil No. 3-26 Federal	2310 FNL, 2310 FWL 26-19N-3W Sandoval	5/80	225	D&A					
Rijan Oil No. 1-27 Federal	2310 FSL, 1650 FWL 27-19N-3W Sandoval	2/79	5,225	D&A					
Rijan Oil No. 2-27 Federal	2310 FSL, 990 FWL 27-19N-3W Sandoval	9/81	5,377	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity ^{O}API	Field name	Reported shows
Petro-Lewis No. 7-27 Federal	2210 FNL, 2065 FEL 27-19N-3W Sandoval	11/77	5,326	D&A					
Francis L. Harvey No. 1 F.H. Gose	750 FNL, 600 FEL 35-19N-3W Sandoval	9/56	3,171	D&A					
Filon Exploration No. 1 Federal '4'	1700 FSL, 2100 FEL 4-19N-4W Sandoval	12/75	5,802	D&A					oil show in Entrada by DST from 5577-5587 ft
Reese & Jones No. 1 Federal	660 FSL, 1980 FEL 4-19N-4W Sandoval	12/77	5,650	D&A					
Eastern Petroleum Co. No. 1 Federal-Silver	380 FNL, 330 FEL 6-19N-4W Sandoval	12/57	3,723	D&A					gas show, depth unreported
Eastern Petroleum Co. No. 1 Encino Wash	660 FSL, 660 FEL 7-19N-4W Sandoval	12/73	4,587	D&A					
Tesoro Petroleum No. 1 Encino	990 FNL, 790 FWL 8-19N-4W Sandoval	9/71	4,719	D&A					
Petro-Lewis No. 1 Federal 11-C	330 FSL, 330 FEL 11-19N-4W Sandoval	9/75	5,484	oil	Entrada 5476-5484 ft IPP 268 BOPD + 9 BWPD	208236 BO	33	Eagle Mesa Entrada	
Filon Exploration No. 2 Federal '11C'	460 FSL, 800 FEL 11-19N-4W Sandoval	10/75	3,700	SWD					
Jordan O & G No. 1 Federal 12	685 FSL, 330 FWL 12-19N-4W Sandoval	11/78	5,605	D&A					
Filon Exploration No. 1 Federal 12	460 FSL, 330 FWL 12-19N-4W Sandoval	8/75	5,735	oil	Entrada 5483-5493 ft IPP 97 BOPD + 4300 BWPD		32	Eagle Mesa Entrada	
Petro-Lewis No. 1 Navajo-13-C	430 FNL, 330 FWL 13-19N-4W Sandoval	10/75	5,670	oil	Morrison 5424-5432 ft Entrada 5432-5440 ft IPP 195 BOPD	251106 BO	32	Eagle Mesa	
Petro-Lewis No. 1 Navajo-14C	330 FNL, 330 FEL 14-19N-4W Sandoval	11/75	5,662	oil	Entrada 5442-5460 ft IPP 317 BOPD	459482 BO	32	Eagle Mesa Entrada	
Lowry et al No. 1 Renkoff 'D'	1980 FSL, 1980 FWL 17-19N-4W Sandoval	12/53	1,685	oil	Mesaverde 1672-1685 ft IP 58 BOPD	abandoned	35	Torreon Mesaverde	
W.C. Gilmore No. 1 Gilmore	2310 FSL, 2310 FEL 17-19N-4W Sandoval	7/57	1,761	D&A					
Ed Cannedy No. 3 Renkoff	1650 FSL, 1650 FWL 17-19N-4W Sandoval	8/57	1,657	D&A					oil shows from 1006-1017, 1653 ft in Mesaverde

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Lowry et al No. 1 Renkoff	720 FNL, 2040 FEL 17-19N-4W Sandoval	12/53	4,695	oil	Mesaverde 1672-1685 IPP 58 BOPD	abandoned 1954	35	Torreon Mesaverde	
Union Oil of Calif. No. 7 Baca	1850 FNL, 1900 FWL 26-20N-3E Sandoval	8/72	5,532	OBS					
Baca Land & Cattle Co. No. 2 Baca	1960 FSL, 1250 FEL 34-20N-3E Sandoval	10/64	5,658	GTW					
Union Oil of Calif. No. 1 Alamo Canyon	550 FSL, 1060 FEL 35-20N-3E Sandoval	9/79	7,400	OBS					
Union Oil of Calif. No. 8 Baca	1420 FSL, 2200 FWL 35-20N-3E Sandoval	9/72	4,384	GTW					
Westates Petroleum No. 1 Bond et al	660 FSL, 660 FEL 35-20N-3E Sandoval	7/60	3,675	D&A					
Ruth Ross No. 1 Cuba	1240 FNL, 1135 FWL 5-20N-1W Sandoval	10/81	305	D&A					
Nanco Inc. No. 18 Federal	1451 FNL, 1736 FWL 18-20N-1W Sandoval	5/82	400	D&A					
O.C. Shuck Drlg. Co. No. 1 Cordova	880 FNL, 330 FWL 21-20N-1W Sandoval	8/53	1,166	D&A					
T.H. Keaton No. 1 Cordova	730 FNL, 2310 FWL 21-20N-1W Sandoval	1/54	985	D&A					
Ruth Ross No. 1 Hope	2310 FNL, 823 FEL 26-20N-1W Sandoval	11/83	400	D&A					
Cotton Petroleum No. 27 Ross Federal '12'	1690 FNL, 400 FWL 27-20N-1W Sandoval	11/83	2,477	D&A					
Murray Drilling No. 1 Sandoval	775 FNL, 648 FWL 34-20N-1W Sandoval	6/82	400	D&A					
S.D. Johnson No. 1 Heller Est.	1980 FSL, 1980 FWL 34-20N-1W Sandoval	10/56	3,877	D&A					
Lewis Energy No. 1 Lewis 4-20-2	860 FSL, 1650 FWL 4-20N-2W Sandoval	1/82	4,300	oil	Mancos 3494-4300 IPF 120 BOPD + 180 BWPD	1,490 BO	39	Undesignated Mancos	
L.C. Energy No. 1 Federal	1850 FNL, 1850 FEL 7-20N-2W Sandoval	12/77	3,135	D&A					gas show in Point Lookout by DST from 2866-2886 ft
Filon Exploration No. 1 Federal '7'	2090 FSL, 365 FEL 7-20N-2W Sandoval	1/76	6,415	D&A					
A.N. Brown No. 1 Magnolia-Federal	1980 FSL, 660 FWL 8-20N-2W Sandoval	1/59	6,192	D&A					
Dome Petroleum No. 2 Dome-Federal	500 FSL, 2200 FWL 11-20N-2W Sandoval	3/80	6,179	D&A					oil show in Entrada by DST from 6018-6029 ft

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Filon Exploration No. 1 Federal 11-D	900 FSL, 2300 FWL 11-20N-2W Sandoval	6/76	6,307	D&A					oil show in Entrada by DST from 6019-6034 ft
Dome Petroleum No. 1 Dome Federal 14-20-2	2310 FSL, 1900 FWL 14-20N-2W Sandoval	4/80	6,172	D&A					oil show in Todilto Entrada by DST from 5918-5930 ft
Filon Exploration No. 1 Federal-18	2310 FNL, 2000 FEL 18-20N-2W Sandoval	10/75	6,069	D&A					oil show in Todilto-Entrada by DST from 6006-6020 ft
Filon Exploration No. 1 Federal-19	990 FSL, 1980 FWL 19-20N-2W Sandoval	7/75	6,158	D&A					oil show in Entrada by DST from 5890-5906 ft
Mayflower Oil & Gas Co. No. 1 Weil	1650 FSL, 660 FEL 23-20N-2W Sandoval	6/30	1,845	D&A					
Lewis Energy No. 2 Lewis	510 FSL, 565 FEL 1-20N-3W Sandoval	3/82	4,520	oil	Mancos 3920-4520 IPP 20 BOPD	2,252 BO abd 1982	38	Undesignated Mancos	
Horace F. McKay, Jr. No. 1 Pam	660 FNL, 660 FEL 3-20N-3W Sandoval	5/65	1,348	D&A					
Royal Development Co. No. 1-P Clary 'P'	660 FSL, 660 FEL 7-20N-3W Sandoval	3/54	3,291	D&A					
Samuel Gary Oil Producers No. 16 San Isidro '11'	600 FSL, 630 FEL 11-20N-3W Sandoval	10/83	4,195	oil	Mancos 3793-4188 IPF 500 BOPD		39	Undesignated Mancos	
Joe D. Farris No. 1 Elliot	660 FNL, 660 FEL 13-20N-3W Sandoval	3/57	5,380	D&A					
Samuel Gary Oil Producers No. 4 San Isidro '14'	660 FNL, 660 FWL 14-20N-3W Sandoval	3/84	4,300	oil	Gallup 4118-4132 IPF 120 BOPD + 53 MCFGPD		39	Undesignated Gallup	
Atlantic Refining Co. No. 3 Torreon	660 FNL, 660 FWL 15-20N-3W Sandoval	1/62	4,376	D&A					
Lewis Energy No. 1 San Isidro	660 FNL, 990 FWL 15-20N-3W Sandoval	10/81	4,350	oil	Gallup 3840-3920 ft IPP 8 BOPD + 50 MCFGPD	1,269 BO	39	Undesignated Gallup	
Pan American Petr. Corp. No. 1 Pan American 'C' USA	1980 FNL, 1980 FEL 17-20N-3W Sandoval	5/67	10,365	D&A					
Samuel Gary Oil Producers No. 18 San Isidro '18'	2015 FNL, 695 FEL 18-20N-3W Sandoval	3/84	4,736	oil	Gallup 4209-4241 ft IPF 27 BOPD + 59 MCFGPD		40	Undesignated Gallup	
Atlantic Refining Co. No. 1 Torreon	1980 FSL, 1980 FWL 27-20N-3W Sandoval	5/61	4,024	D&A					
Dome Petroleum No. 1 Dome Federal 33-20-3	2100 FNL, 2100 FWL 33-20N-3W Sandoval	5/80	6,030	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Reese & Jones No. 1 Nack-Federal	1980 FSL, 1980 FWL 36-20N-3W Sandoval	4/75	5,839	D&A					
Lewis Energy No. 1 Lopez	990 FSL, 990 FWL 8-20N-4W Sandoval	5/81	4,200	D&A					
Filon Exploration No. 1 Federal 11B	890 FNL, 1650 FEL 11-20N-4W Sandoval	1/76	6,626	D&A					
Lewis Energy No. 1 Penistaja	500 FNL, 750 FEL 11-20N-4W Sandoval	7/81	4,600	oil	Gallup 4380-4510 IPP 3 BOPD + 1 BWPD	611 BO abd 1982	37	Undesignated Gallup	
Michael P. Grace No. 1 Eagle Mesa	1768 FSL, 1768 FWL 26-20N-4W Sandoval	7/74	300	D&A					
Coleman Oil & Gas No. 1 Eagle Spring	800 FNL, 800 FEL 27-20N-4W Sandoval	9/81	600	D&A					
Robert L. Bayless No. 1 Eagle Spring	330 FSL, 330 FWL 32-20N-4W Sandoval	3/83	2,569	oil	Menefee 2346-2350 IPF 27 BOPD + 123 BWPD		41	Undesignated Menefee	
World Wide Exploration Consultants No. 1 Federal 33	660 FSL, 1650 FEL 33-20N-4W Sandoval	7/78	5,678	D&A					
Franklin Aston & Fair Inc. No. 1 Cuba	2310 FNL, 990 FWL 23-21N-1W Sandoval	3/74	5,790	D&A					
Nanco, Inc. No. 1 Martinez	2148 FNL, 1894 FWL 26-21N-1W Sandoval	3/81	9,510	D&A					
Nanco, Inc. No. 1 Federal-31	660 FNL, 1978 FWL 31-21N-1W Sandoval	1/78	622	D&A					
Benson Mineral Group No. 1 Federal 8-21-2	1750 FSL, 990 FEL 8-21N-2W Sandoval	2/82	6,500	D&A					
Benson Mineral Group No. 1 Federal 15-21-2	1090 FSL, 1160 FEL 15-21N-2W Sandoval	7/79	6,377	D&A					
Lewis Energy No. 1 Lewis 22	720 FSL, 660 FWL 22-21N-2W Sandoval	1/82	5,505	oil	Gallup 5198-5250 IPP 10 BOPD + 15 MCFGPD + 10 BWPD			Undesignated Gallup	
Sun Oil Co. No. 1 McElvain	1790 FNL, 225 FWL 23-21N-2W Sandoval	2/57	7,186	D&A					gas show in Point Lookout by DST from 3726-3772 ft
Michael P. Grace No. 1 Federal South Wash	800 FNL, 800 FEL 36-21N-2W Sandoval	7/74	250	D&A					
Corrine Grace No. 1 Divide	2020 FNL, 1720 FEL 3-21N-3W Sandoval	7/74	300	D&A					
Dugan Production No. 1 BR'S Stars	1560 FNL, 800 FEL 8-21N-3W Sandoval	2/83	2,400	D&A					
Corrine Grace No. 1 Union	800 FNL, 800 FEL 9-21N-3W Sandoval	7/74	301	D&A					

Operator, well number, and lease	Location (section-township-range, county)	[?]letion [?]ate (month/year)	Total depth (ft)	Completed Status	Producing unit[?] depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Union Texas Petroleum No. 1 Union Maid	590 FNL, 850 FEL 11-21N-3W Sandoval	4/79	6,970	D&A					oil show in Point Lookout by 4445-4519 ft
Corrine Grace No. 1 Taylor Ranch	660 FSL, 1980 FEL 14-21N-3W Sandoval	7/74	301	D&A					
Dugan Production No. 2 BR's stats	330 FSL, 500 FEL 17-21N-3W	12/83	5,550	oil	Gallup 5112-5461 IPS 30 BOPD + 30 MCFGPD + 60 BWPD		40	San Ysidro Mancos	
Corrine Grace No. 1 Pinon	1980 FNL, 660 FEL 20-21N-3W Sandoval	7/74	299	D&A					
Michael P. Grace No. 1 Sonny Boy	660 FNL, 1980 FWL 23-21N-3W Sandoval	7/74	300	D&A					
Michael P. Grace No. 1 El Ojo	400 FNL, 660 FWL 24-21N-3W Sandoval	7/74	2,235	D&A					
Guadalupe No. 1 Taylor Ranch Government	660 FNL, 660 FEL 26-21N-3W Sandoval	4/73	6,315	oil	Gallup 5782-5804 IPP 54 BOPD	285 BO abd 1974	39	Undesignated Gallup	
Lewis Energy No. 1 Lewis 28-21-3	660 FNL, 660 FWL 28-21N-3W Sandoval	11/81	4,760	oil	Mancos 4460-4760 IPP 27 BOPD + 40 MCFGPD + 25 BWPD	1,083 BO	38	San Ysidro Mancos	
Lewis Energy No. 1 Ceja Pelon-29	990 FSL, 990 FWL 29-21N-3W Sandoval	8/81	4,620	oil	Mancos 4507-4620 IPP 54 BOPD + 392 MCFGPD	7,863 BO	39	San Ysidro Mancos	
Lewis Energy No. 1 Lewis 30-21-3	990 FSL, 2115 FEL 30-21N-3W Sandoval	10/81	5,000	oil	Mancos 4640-4684 IPF 136 BOPD + 107 MCFGPD + 11 BWPD	6,506 BO	39	San Ysidro Mancos	
Lewis Energy No. 2 Lewis 30-21-3	1990 FNL, 660 FEL 30-21N-3W Sandoval	12/81	4,833	oil	Mancos-Gallup 4530-4833 IPF 82 BOPD + 162 MCFGPD + 20 BWPD	0 BO abd 1983	39	San Ysidro Mancos	
Brinkerhoff Drlg. Co. No. 1 Government White	388 FNL, 660 FWL 6-21N-4W Sandoval	7/58	6,382	D&A					
Skelly Oil Co. No. 1 R.C. White	1980 FNL, 1980 FWL 7-21N-4W Sandoval	11/56	6,428	D&A					oil and gas show in Point Lookout and Mancos by DST from 3952-4752 ft; gas show in Gallup core from 5202-5252 ft
Roy Furr No. 1 Sun-Federal	660 FSL, 660 FEL 14-21N-4W Sandoval	6/61	5,415	D&A					
Wexpro Inc. No. 1 Armijo Reservoir	1980 FSL, 1980 FWL 16-21N-4W Sandoval	10/81	4,350	gas	Pictured Cliffs 1744-1762 ft IPF 48 MCFGPD			Undesignated Pictured Cliffs	
Dugan Production No. 1 SIS	790 FNL, 1850 FWL [illegible] 21N-4W Sandoval	9/83	1,940	D&A					
San Juan Drilling No. 1 Vanderslice	990 FSL, 1090 FWL 21-21N-4W Sandoval	3/54	7,852	D&A					oil show in Todilto by DST from 7723-7755 ft; oil & gas show in Graneros by DSTA from 6554-6884 ft
Dugan Production No. 2 Husky	990 FNL, 990 FWL 25-21N-4W	12/83	5,307	oil	Gallup 4787-5215 IPS 28 BOPD +		40	San Ysidro Mancos	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Dugan Production Co. No. 1 Husky-Federal	1850 FNL, 790 FEL 34-21N-4W Sandoval	1/82	1,580	D&A					
Lewis Energy No. 1 Cejas Pelon	990 FSL, 980 FWL 35-21N-4W Sandoval	4/81	4,798	oil	Gallup 4380-4675 IPP 94 BOPD	1,030 BO		Undesignated Gallup	
Samuel Gary Oil Producers No. 36 Ceja Pelon D	880 FSL, 680 FEL 36-21N-4W Sandoval	10/83	4,950	oil	Mancos 4734-4764 IPF 20 BOPD			San Ysidro Mancos	
Sinclair Oil & Gas No. 1 Federal-Sandoval	660 FNL, 1980 FEL 3-21N-5W Sandoval	12/57	6,315	D&A					oil show in Point Lookout core from 3834-3842 ft; oil & gas show in Gallup core from 5050-5124 ft
Benson Mineral Group No. 1 Federal 10-21-5	1100 FNL, 1170 FWL 10-21N-5W Sandoval	7/78	2,275	D&A					
Northwest Exploration No. 25 Natani	850 FSL, 1850 FEL 18-21N-5W Sandoval	12/75	11,600	gas	Chacra 1566-1659 IPCAOF 370 MCFGPD			Rusty Chacra	
Union Oil of California No. Caldwell	657 FSL, 654 FWL 13-21N-5W Sandoval	5/71	12,000	D&A					oil & gas show in Point Lookout by DST from 3785-3830; slight oil show in Madera by DST from 11145-11270 ft
Dome Petroleum No. 1 Navajo Allotted	990 FSL, 2100 FEL 19-21N-5W Sandoval	1/78	6,840	D&A					
Dome Petroleum No. 1 Federal-22	660 FSL, 1650 FWL 22-21N-5W Sandoval	12/76	7,135	D&A					
Shell No. 1 Shell Pool Four	675 FSL, 650 FEL 22-21N-5W Sandoval	9/57	5,095	D&A					oil show in Cliff House by DST from 3686-3801 ft
James D. Hancock No. 1 Brown	990 FSL, 490 FWL 23-21N-5W Sandoval	6/51	5,623	D&A					
Benson Mineral Group No. 1 Federal 23-21-5	945 FSL, 910 FWL 23-21N-5W Sandoval	9/79	1,596	D&A					
Benson Mineral Group No. 1 Federal 28-21-5	1140 FSL, 1110 FEL 28-21N-5W Sandoval	8/79	1,012	D&A					
Reese & Roark, Inc. No. 1 Morrie	1990 FNL, 1730 FEL 31-21N-5W Sandoval	12/66	875	D&A					
Filon Exploration No. 1 Federal-33	1750 FSL, 2280 FWL 33-21N-5W Sandoval	7/75	6,561	D&A					oil show in Summerville-Entrada by DST from 6334-6347 ft
Filon Exploration No. 3 Federal-33	400 FSL, 1900 FWL 33-21N-5W Sandoval	11/75	6,387	D&A					oil show in Entrada by DST from 6294-6309 ft
Filon Exploration No. 2 Federal-33	330 FSL, 1650 FEL 33-21N-5W Sandoval	8/75	6,690	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Filon Exploration No. 4 Federal-33	2220 FSL, 2310 FWL 33-21N-5W Sandoval	11/75	6,605	D&A					
Filon Exploration No. 5 Filon-33	1650 FSL, 2310 FEL 33-21N-5W Sandoval	5/76	6,627	D&A					
James D. Hancock No. 1 Brown	990 FSL, 790 FWL 33-21N-5W Sandoval	6/51	5,623	D&A					
Shell No. 1 Shell-Hall	742 FSL, 1987 FWL 35-21N-5W Sandoval	5/57	5,681	D&A					
Northwest Exploration No. 14 Natani	850 FSL, 850 FEL 2-21N-6W Sandoval	9/82	1,945	gas	Chacra 1613-1710 IPF 2038 MCFGPD			Rusty Chacra	
Northwest Exploration No. 17 Natani	850 FNL, 1850 FWL 3-21N-6W Sandoval	9/82	1,900	gas	Chacra 1600-1707 IPCAOF 1437 MCFGPD			Rusty Chacra	
Dome Petroleum No. 1 Federal-3	660 FSL, 2310 FWL 3-21N-6W Sandoval	1/77	6,825	D&A					
Jack A. Cole No. 11 Alamos Canyon	860 FSL, 820 FWL 4-21N-6W Sandoval	4/81	1,600	gas	Chacra 1396-1431 IPF 272 MCFGPD			Rusty Chacra	
Jack A. Cole No. 6 Alamos Canyon	1010 FSL, 1010 FEL 6-21N-6W Sandoval	11/80	1,497	gas	Chacra 1304-1343 IPF 1025 MCFGPD			Rusty Chacra	
Jack A. Cole No. 9 Alamos Canyon	1870 FNL, 1520 FWL 6-21N-6W Sandoval	4/81	1,600	gas	Chacra 1426-1469 IPF 766 MCFGPD			Rusty Chacra	
Dome Petroleum No. 1 Dome-Alamos	1980 FSL, 900 FWL 6-21N-6W Sandoval	11/77	6,689	D&A					
Jack A. Cole No. 3 Alamos Canyon	1080 FNL, 1110 FEL 7-21N-6W Sandoval	7/80	1,534	gas	Chacra 1282-1312 IPF 425 MCFGPD			Rusty Chacra	
Jack A. Cole No. 7 Alamos Canyon	870 FNL, 1830 FWL 7-21N-6W Sandoval	11/80	1,500	gas	Chacra 1252-1304 IPF 880 MCFGPD			Rusty Chacra	
Jack A. Cole No. 2 Alamos Canyon	1120 FNL, 1110 FEL 8-21N-6W Sandoval	4/80	1,618	gas	Chacra 1353-1393 IPF 160 MCFGPD			Rusty Chacra	
Jack A. Cole No. 5 Alamos Canyon	1850 FSL, 790 FWL 9-21N-6W Sandoval	11/80	1,525	gas	Chacra 1326-1362 IPF 450 MCFGPD			Rusty Chacra	
Jack A. Cole No. 10 Alamos Canyon	945 FNL, 1650 FWL 9-21N-6W Sandoval	4/81	1,600	gas	Chacra 1382-1422 IPF 457 MCFGPD			Rusty Chacra	
Northwest Exploration No. 16 Natani	1070 FNL, 830 FEL 10-21N-6W Sandoval	9/82	1,788	gas	Chacra 1502-1584 IPF 1027 MCFGPD			Rusty Chacra	
Davis Oil No. 1-B Government-Locke	660 FSL, 660 FEL 10-21N-6W Sandoval	5/58	5,801	D&A					
Northwest Exploration No. 1 Natani	930 FSL, 1160 FEL 11-21N-6W Sandoval	9/79	3,630	gas	Chacra 1580-1662 IPF 559 MCFGPD			Rusty Chacra	
Northwest Exploration No. 2 Natani	1680 FNL, 1710 FWL 12-21N-6W Sandoval	2/80	1,950	gas	Chacra 1682-1752 IPF 688 MCFGPD			Rusty Chacra	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Northwest Exploration No. 6 Natani	1520 FNL, 1850 FEL 13-21N-6W Sandoval	9/82	1,930	gas	Chacra 1618-1716 IPCAOF 36 MCFGPD			Rusty Chacra	
Northwest Exploration No. 10 Natani	800 FNL, 1800 FWL 14-21N-6W Sandoval	9/82	1,788	gas	Chacra 1477-1571 IPCAOF 194 MCFGPD			Rusty Chacra	
Jack A. Cole No. 1 Alamos Canyon	1100 FNL, 1120 FWL 15-21N-6W Sandoval	7/80	1,615	gas	Chacra 1355-1403 IPF 380 MCFGPD			Rusty Chacra	
Jack A. Cole No. 4 Alamos Canyon	1110 FSL, 1120 FEL 21-21N-6W Sandoval	3/80	1,569	D&A					
Kinsley-Locke No. 1 Miles	990 FNL, 990 FEL 21-21N-6W Sandoval	2/53	3,530	D&A					oil show at 2400 ft
Dome Petroleum No. 1 Federal 24-21-6	330 FSL, 2310 FWL 24-21N-6W Sandoval	1/78	6,724	D&A					
Davis Oil Co. No. 1 Government Locke	660 FNL, 1980 FEL 32-21N-6W Sandoval	4/58	5,448	D&A					
Dome Petroleum No. 1 Dome-Federal 1-21-7	1540 FNL, 1050 FEL 1-21N-7W Sandoval	6/82	1,756	gas	Chacra 1562-1650 IPF 754 MCFGPD	2608 MCF		Rusty Chacra	
Hayes & VT Drilling No. 1 Duff-Federal	660 FSL, 1980 FWL 3-21N-7W Sandoval	7/57	5,568	D&A					oil show in Mancos core from 4224-4274 ft; oil & gas show in Sanostee core from 4330-4339 ft
Benson Mineral Group No. 1 Federal 4-21-7	1480 FSL, 870 FEL 4-21N-7W Sandoval	8/80	1,100	D&A					
Benson-Montin-Greer No. 1 Sandoval	660 FNL, 530 FEL 14-21N-7W Sandoval	9/57	5,480	D&A					oil stained Gallup core from 4268-4318 ft
Chace Investors-Joint Ventures No. 1 Rattlesnake-Federal	490 FNL, 330 FEL 19-21N-7W Sandoval	10/81	6,151	D&A					
Filon Exploration No. 1 Navajo 26	600 FSL, 1700 FWL 26-21N-7W Sandoval	4/76	6,225	D&A					
Davis Oil Co. No. 1 Government CO-OP	660 FNL, 660 FWL 20-21N-7W Sandoval	1/58	5,295	D&A					gas show in Gallup and Mancos by DST from 3984-4054 ft
Dome Petroleum No. 1 Dome-Navajo 29-21-7	660 FNL, 500 FWL 29-21N-7W Sandoval	4/80	6,196	oil	Entrada 5992-5998 IPP 5 BOPD + 360 BWPD		33	Undesignated Entrada	
Filon Exploration No. 1 Federal 29	2080 FNL, 2310 FEL 29-21N-7W Sandoval	9/75	6,251	D&A					
Dome Petroleum No. 1 Dome Navajo 30-21-7	810 FNL, 600 FEL 30-21N-7W Sandoval	11/80	6,132	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity ^{o}API	Field name	Reported shows
Coleman Oil & Gas No. 1 BOC	1570 FSL, 810 FWL 10-22N-1W Sandoval	6/81	2,395	D&A					
Ludwick Exploration No. 1-Y BOC	1605 FSL, 810 FWL 10-22N-1W Sandoval	8/81	3,190	D&A					
M.J. Florance No. 1 Florance-Humble	1650 FNL, 990 FWL 5-22N-2W Sandoval	9/60	3,900	D&A					
Jack A. Cole No. 1 Indian Bend-A	790 FNL, 1820 FWL 5-22N-2W Sandoval	5/82	3,040	gas	Pictured Cliffs 2952-2962 IPF 1756 MCFGPD	60862 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 2 Indian Bend-A	1520 FNL, 1520 FEL 5-22N-2W Sandoval	5/82	3,000	gas	Pictured Cliffs 2886-2911 IPF 2127 MCFGPD	69439 MCF		Ballard Pictured Cliffs	
Amoco Production No. 7 Jicarilla Tribal 358	1680 FSL, 940 FWL 5-22N-2W Sandoval	8/73	2,875	D&A					
Jack A. Cole No. 3 Indian Bend A	1850 FSL, 790 FEL 5-22N-2W Sandoval	8/83	2,915	gas	Pictured Cliffs 2813-2826 IPF 791 MCFGPD			Ballard Pictured Cliffs	
Amoco Production No. 3 Jicarilla Tribal 358	1790 FNL, 1190 FWL 6-22N-2W Sandoval	7/73	2,925	gas	Pictured Cliffs 2774-2810 IPF 1227 MCFGPD	199466 MCF		Ballard Pictured Cliffs	
Amoco Production No. 4 Jicarilla Tribal 358	1600 FSL, 1550 FEL 6-22N-2W Sandoval	7/73	2,961	gas	Pictured Cliffs 2781-2827 IPF 1134 MCFGPD	220327 MCF		Ballard Pictured Cliffs	
Amoco Production No. 6 Jicarilla Tribal 358	1830 FNL, 1490 FEL 6-22N-2W Sandoval	7/73	2,989	gas	Fruitland 2808-2820 Pictured Cliffs 2833-2861 IPF 440 MCFGPD	64597 MCF		Ballard Pictured Cliffs	
Pan American Petroleum No. 1 Jicarilla Tribal 358	870 FSL, 810 FWL 6-22N-2W Sandoval	8/69	2,900	gas	Pictured Cliffs 2746-2781 IPF 4612 MCFGPD	428877 MCF		Ballard Pictured Cliffs	
Amoco Production No. 5 Jicarilla Tribal 358	790 FNL, 1190 FEL 7-22N-2W Sandoval	6/73	2,891	gas	Pictured Cliffs 2704-2744 IPF 852 MCFGPD	193737 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 101 Chacon Amigos	1850 FSL, 790 FWL 7-22N-2W Sandoval	11/80	7,103	oil	Dakota 6858-6983 IPF 75 BOPD + 100 MCFGPD		44	Chacon Dakota	
Pan American Petroleum No. 2 Jicarilla 358	1850 FNL, 790 FWL 7-22N-2W Sandoval	12/69	2,809	D&A					
Amoco Production No. 9 Jicarilla Tribal 358	1650 FSL, 1650 FWL 8-22N-2W Sandoval	8/73	2,860	gas	Pictured Cliffs 2657-2710 IPF 456 MCFGPD	47751 MCF		Ballard Pictured Cliffs	
Amoco Production No. 8 Jicarilla Tribal 358	980 FNL, 1750 FWL 8-22N-2W Sandoval	8/73	2,850	gas	Pictured Cliffs 2669-2719 IPF 236 MCFGPD	38897 MCF		Ballard Pictured Cliffs	
Amoco Production No. 10 Jicarilla Tribal 358	840 FSL, 1610 FEL 8-22N-2W Sandoval	8/73	2,872	D&A					
Jicarilla Energy No. 3 Jeco 83A	2275 FNL, 800 FWL 18-22N-2W Sandoval	12/83	7,202	oil	Dakota 6866-6972 IPF 268 BOPD + 234 MCFGPD		40	Chacon Dakota	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Amoco Production No. 1 Jicarilla Tribal 359	820 FNL, 1150 FWL 19-22N-2W Sandoval	7/73	2,675	D&A					
Lynco Oil No. 1 Humble Dakota (owwo)	875 FNL, 910 FEL 21-22N-2W Sandoval	9/76	7,400	D&A					
Universal Resources No. 1 Jicarilla-28	1660 FSL, 1010 FWL 28-22N-2W Sandoval	11/76	7,320	D&A					oil show in Dakota core from 7053-7113 ft
Lloyd H. Smith No. 32-1 Jicarilla	2310 FNL, 2310 FWL 32-22N-2W Sandoval	6/55	8,036	D&A					gas show in Point Lookout by DST from 4616-4790. Gas show in Tocito by DST from 5870-6003 ft
Jack A. Cole No. 8 Chacon Amigos	1850 FNL, 1850 FEL 1-22N-3W Sandoval	4/82	7,194	oil	Dakota 6942-7051 IP 120 BOPD + 110 MCFGPD	7327 BO	44	Chacon Dakota	
Jack A. Cole No. 5 Chacon Amigos	790 FSL, 1850 FEL 1-22N-3W Sandoval	5/81	7,180	oil	Graneros-Dakota 6912-6948 IPF 180 BOPD + 100 MCFGPD	17831 BO	46	Chacon Dakota	
Merrion & Bayless No. 2 Bonanza	1850 FSL, 790 FWL 1-22N-3W Sandoval	1/81	7,210	oil	Dakota 6892-7014 IPF 356 BOPD + 416 MCFGPD + 62 BWPD	34966 BO	48	Chacon Dakota	
Merrion & Bayless No. 3 Bonanza	790 FNL, 790 FWL 1-22N-3W Sandoval	1/81	7,149	oil	Dakota 6897-7004 IPF 184 BOPD + 693 MCFGPD + 32 BWPD	33629 BO		Chacon Dakota	
Merrion & Bayless No. 1 Jicarilla	790 FNL, 1850 FWL 1-22N-3W Sandoval	2/69	2,815	gas	Pictured Cliffs 2661-2696 IPF 6123 MCFGPD	872720 MCF		Ballard Pictured Cliffs	
Merrion & Bayless No. 2 Jicarilla	1850 FSL, 1850 FWL 1-22N-3W Sandoval	6/69	2,824	D&A					
Pan American Petroleum No. 1 Jicarilla Tribal 360	1100 FNL, 1850 FEL 1-22N-3W Sandoval	6/69	2,850	gas	Pictured Cliffs 2695-2717 IP 2844 MCFGPD	404653 MCF		Ballard Pictured Cliffs	
Pan American Petroleum No. 2 Jicarilla Tribal 360	1850 FSL, 990 FEL 1-22N-3W Sandoval	6/69	2,900	gas	Pictured Cliffs 2729-2753 IP 2331 MCFGPD	272523 MCF		Ballard Pictured Cliffs	
Merrion Oil & Gas No. 8 Bonanza	1850 FSL, 1850 FWL 2-22N-3W Sandoval	9/82	7,050	oil	Graneros Dakota 6768-6971 IPF 71 BOPD + 250 MCFGPD	3836 BO	45	Chacon Dakota	
Jack A. Cole No. 1 Chacon Amigos	790 FNL, 1850 FEL 2-22N-3W Sandoval	6/80	7,165	oil	Dakota 6870-6984 IPF 70 BOPD + 350 MCFGPD	24193 BO		Chacon Dakota	
Jack A. Cole No. 2 Chacon Amigos	1850 FSL, 990 FEL 2-22N-3W Sandoval	10/80	7,090	oil	Graneros Dakota 6825-6943 IPF 120 BOPD + 175 MCFGPD	26736 BO	46	Chacon Dakota	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Merrion & Bayless No. 1 Bonanza (owwo)	990 FSL, 990 FEL 2-22N-3W Sandoval	9/68	7,327	gas	Dakota 6906-7136 IPF 2047 MCFGPD			Basin Dakota	
Pan American Petroleum No. 3 Jicarilla 360	790 FNL, 790 FEL 2-22N-3W Sandoval	8/69	2,790	gas	Pictured Cliffs 2658-2682 4930 MCFGPD	364004 MCF		Ballard Pictured Cliffs	
Chace Oil No. 10 Apache 54	1850 FSL, 990 FEL 3-22N-3W Sandoval	11/82	7,145	oil	Dakota 6770-6897 IPP 27 BOPD		43	Chacon Dakota	
Chace Oil No. 11 Apache 54	1850 FSL, 185 FWL 3-22N-3W Sandoval	8/82	7,141	oil	Tocito 6472-6484 Dakota 6759-6870 IPP 9 BOPD 115 MCFGPD + 30 BW	3470 BO	44	Chacon Dakota	
Chace Oil No. 1 Chace-Apache 54	900 FNL, 990 FEL 3-22-3W Sandoval	10/78	7,313	oil	Dakota 6836-6963 IPF 3 BOPD + 101 MCFGPD	9907 BO	47	Chacon Dakota	
Chace Oil No. 9 Chace-Apache 54	1000 FNL, 1850 FWL 3-22N-3W Sandoval	8/81	7,232	oil	Dakota 6872-6916 IPF 85 BOPD + 200 MCFGPD + 125 BWPD	9009 BO	44	Chacon Dakota	
Jack A. Cole No. 1 Apache Draw	790 FSL, 990 FEL 8-22N-3W Sandoval	12/78	2,450	D&A					
Aztec Energy No. 2 Jicarilla-O	790 FNL, 990 FEL 10-22N-3W Sandoval	4/82	6,850	oil	Dakota 6690-6710 IPP 168 BOPD + 150 MCFGPD	5126 BO		Chacon Dakota	
Aztec Energy No. 3 Jicarilla-O Contract 417	1705 FSL, 865 FEL 10-22N-3W Sandoval	9/82	6,860	oil	Dakota 6676-6786 IPP 48 BOPD 49 MCFGPD	2038 BO	43	Chacon-Dakota	
Supron Energy No. 1 Jicarillo-O	790 FSL, 790 FWL 10-22N-3W Sandoval	4/79	7,055	oil	Dakota 6632-6736 IPP 20 BOPD + 9 MCFGPD + 7 BWPD			Chacon-Dakota	
Aztec Energy No. 4 Jicarilla-O Contract 417	790 FNL, 1850 FWL 10-22N-3W Sandoval	6/83	6,860	oil	Dakota 6708-6812 IPP 20 BOPD +9 MCFGPD		45	Chacon-Dakota	
Caswell Silver No. 2 Jacarillo-74	990 FNL, 990 FEL 10-22N-3W Sandoval	3/56	2,610	D&A					
Jack A. Cole No. 7 Chacon Amigos	1850 FSL, 1850 FWL 11-22N-3W Sandoval	4/82	7,000	oil	Dakota 6754-6870 IPP 110 BOPD 254 MCFGPD	9012 BO	44	Chacon Dakota	
Jack A. Cole No. 6 Chacon Amigos	800 FNL, 1850 FWL 11-22N-3W Sandoval	6/81	7,017	oil	Dakota 6745-6783 IPF 150 BOPD + 175 MCFGPD	11148 BO	45	Chacon Dakota	
Merrion & Bayless No. 4 Bonanza	790 FNL, 790 FEL 11-22N-3W Sandoval	5/81	7,009	oil	Graneras-Dakota 6762-6868 IPF 528 BOPD + 428 MCFGPD + 40 BWPD	17019 BO	45	Chacon Dakota	
Merrion & Bayless No. 7 Bonanza	1850 FSL, 790 FEL 11-22N-3W Sandoval	10/81	7,035	oil	Graneras-Dakota 6792-6905 IPF 850 BOPD + 300 MCFGPD	21002 BO	45	Chacon Dakota	
Jack A. Cole No. 3 Chacon Amigos	1850 FNL, 990 FWL 12-22N-3W Sandoval	5/81	7,050	oil	Dakota 6756-6808 IPF 80 BOPD + 330 MCFGPD	26084 BO	46	Chacon Dakota	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Jack A. Cole No. 4 Chacon Amigos	1850 FSL, 1650 FWL 12-22N-3W Sandoval	5/81	7,005	oil	Dakota 6748-6802 IPF 225 BOPD + 100 MCFGPD	2731 BO	46	Chacon Dakota	
Merrion & Bayless No. 5 Bonanza	1850 FNL, 1850 FEL 12-22N-3W Sandoval	6/81	7,071	oil	Dakota 6818-6928 IPF 436 BOPD + 380 MCFGPD + 36 BWPD	29495 BO	45	Chacon Dakota	
Merrion & Bayless No. 6 Bonanza	790 FSL, 1850 FEL 12-22N-3W Sandoval	10/81	7,100	oil	Graneros-Dakota 6820-6929 IPF 285 BOPD + 250 MCFGPD	14507 BO	45	Chacon Dakota	
Jicarilla Energy No. 2 Jeco 83A	790 FNL, 2110 FWL 13-22N-3W Sandoval	12/83	7,100	oil	Dakota 6788-6918 IPF 198 BOPD + 168 MCFGPD + 100 BWPD		45	Chacon Dakota	
Jicarilla Energy No. 1 Jeco 83A	850 FNL, 800 FEL 14-22N-3W Sandoval	11/83	6,990	oil	Dakota 6702-6825 IPF 900 BOPD + 200 MCFGPD + 100 BWPD		46	Chacon Dakota	
Silver Caswell No. 1 Jicarilla 74	1125 FNL, 990 FWL 16-22N-3W Sandoval	2/56	2,540	D&A					
Jack A. Cole No. 1 Apache Wash	890 FNL, 990 FWL 16-22N-3W Sandoval	12/78	2,450	D&A					
Shar-Alan Oil No. 1 Jicarilla 'S' 138	1850 FSL, 990 FEL 21-22N-3W Sandoval	6/63	2,500	D&A					
Refiners Petroleum No. 1 Cuba Pan Am	990 FSL, 1650 FWL 24-22N-3W Sandoval	11/70	7,050	oil	Dakota 6786-6814 IP 255 BOPD + 50 BWPD	15777 BO abd 1976	42	Five Lakes Dakota	
Union Oil of California No. 1-C-25 Jicarilla-11	990 FNL, 1650 FWL 25-22N-3W Sandoval	2/71	6,910	oil	Dakota 6860-6870 IPP 138 BOPD	6641 BO abd 1973		Five Lakes Dakota	
Refiners Petroleum No. 1 Cuba Union	990 FNL, 990 FEL 25-22N-3W Sandoval	10/70	7,189	oil	Graneros-Dakota 6878-7110 IPF 387 BOPD + 54 BWPD	13296 BO abd 1976		Five Lakes Dakota	
Refiners Petroleum No. 2 Cuba Union	990 FNL, 990 FEL 26-22N-3W Sandoval	1/71	7,064	oil	Dakota 6794-6803 IPF 240 BOPD + 27 BWPD	5133 BO abd 1976	42	Five Lakes Dakota	
Tesoro Petroleum No. 2 Parley	2310 FNL, 2310 FWL 29-22N-3W Sandoval	1/72	4,374	oil	Menefee 4286-4294 IPF 306 BOPD + 336 MCFGPD	54792 BO		Parley Mesaverde	
Tenneco Oil No. 1-A Parley	330 FNL, 1980 FEL 29-22N-3W Sandoval	2/72	4,380	D&A					
Tesoro Petroleum No. 1 Parley	1850 FNL, 890 FEL 29-22N-3W Sandoval	10/71	7,730	oil	Menefee 4240-4270 IPF 366 BOPD 366 MCFGPD	30974 BO		Parley Mesaverde	small gas show in Dakota from 6728-6790 ft
Tenneco Oil No. 2-A Parley	660 FSL, 1980 FWL 29-22N-3W Sandoval	3/72	4,400	D&A					
Jack A. Cole No. 6 Apache Flats	990 FNL, 990 FWL 1-22N-4W Sandoval	7/76	2,610	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Caswell Silver No. 1 Jicarilla-75	990 FNL, 1650 FWL 1-22N-4W Sandoval	1/56	2,638	D&A					
Amoco Production No. 1 Jicarilla Tribal 376	990 FNL, 990 FEL 3-22N-4W Sandoval	7/73	2,575	D&A					
Merrion & Bayless No. 2 Jicarilla 376-2	790 FNL, 790 FWL 3-22N-4W Sandoval	9/75	2,375	D&A					
Skelly Oil Co. No. 1 Jicarilla 'E' (OWWO)	990 FNL, 990 FEL 8-22N-4W Sandoval	4/59	6,509	oil	Sanastee IP 32 BOPD	6096 BO abd 1959		Otero Sanastee	
Exeter Drilling Co. No. 1 Jicarilla Apache	660 FNL, 660 FWL 28-22N-4W Sandoval	7/61	6,398	D&A					
Fred Turner, Jr. No. 2 Jicarilla	1980 FNL, 1980 FEL 32-22N-4W Sandoval	6/56	4,404	oil	Point Lookout 4372-4398 IP 28 BOPD		38	Otero Point Lookout	
Humble Oil and Refining No. 1 Jicarilla 'B'	990 FNL, 990 FEL 1-22N-5W Sandoval	5/55	6,368	oil	Sanastee 5820-5840 IP 50 BOPD			Otero Sanastee	
Apache Corp. No. 1-7 Jair OCC-Eng. & Prod. Service 7/77	1980 FNL, 660 FEL 7-22N-5W Sandoval	12/71	5,500	oil	Menefee 3974-3990 IPP 220 BOPD + 132 MCFGPD	25097 BO		Venado Mesaverde	
Apache Corp. No. 1-8 Jair	1980 FSL, 660 FWL 8-22N-5W Sandoval	2/72	4,275	oil	Menefee 4082-4090 IPP 63 BOPD + 39 MCFGPD	25016 BO	48.9	Venado Mesaverde	
Warren Drilling No. 1 Littleton	660 FNL, 660 FWL 8-22N-5W Sandoval	8/71	6,623	oil	Mesaverde 4052-4093 IPP 75 BOPD + 300 BWPD	3983 BO abd 1973		Undesignated Mesaverde	
Woods Petroleum No. 11-1 Jicarilla	660 FSL, 660 FWL 11-22N-5W Sandoval	12/71	6,365	D&A					
Warren Drilling No. 1 Lanmon	660 FSL, 660 FEL 16-22N-5W Sandoval	10/70	6,450	D&A					
Benjamin Elenbogen No. 1 Jicarilla 388	790 FNL, 790 FEL 25-22N-5W Sandoval	8/68	1,950	D&A					
Union Oil of California No. 1-0-32 Jicarilla C	660 FSL, 1980 FEL 32-22N-5W Sandoval	1/73	6,330	D&A					
Tesoro Petroleum No. 1 El Stretcho	1750 FSL, 890 FWL 35-22N-5W Sandoval	9/71	6,319	D&A					
Sun Oil No. 1 El Paso Federal	660 FSL, 660 FWL 10-22N-6W Sandoval	12/72	12,321	D&A					gas show in Dakota from 6348-6405 ft
Tesoro Petroleum No. 1 Double Ought	1045 FSL, 1695 FWL 12-22N-6W Sandoval	9/72	6,605	oil	Gallup 5300-5365 IPP 25 BOPD + 3 BWPD			Undesignated Gallup	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Plymouth No. 1 Silver	790 FNL, 1850 FEL 14-22N-6W Sandoval	2/58	5,500	oil	Gallup 5293-5302 IP 62 BOPD		42	Undesignated Gallup	
Kirby Exploration No. 1 Chorney State	1625 FSL, 1750 FWL 16-22N-6W Sandoval	3/78	2,550	D&A					
Benson Mineral Group No. 1 Federal 17-22-6	970 FSL, 820 FWL 17-22N-6W Sandoval	9/79	2,220	gas	Chacra 1903-1954 IPF 21 MCFGPD			Rusty Chacra	
Benson Mineral Group No. 1 Navajo-18	790 FSL, 1810 FWL 18-22N-6W Sandoval	7/79	2,150	gas	Chacra 1820-1884 IPF 46 MCFGPD + 49 BWPD			Rusty Chacra	
Dome Petroleum No. 3 Dome Federal 18-22-6	1760 FNL, 980 FWL 18-22N-6W Sandoval	11/80	2,300	gas	Chacra 1874-1922 IPF 418 MCFGPD	4805 MCF		Rusty Chacra	
Dome Petroleum No. 2 Dome Navajo 18-22-6	1030 FSL, 1810 FEL 18-22N-6W Sandoval	11/80	2,295	gas	Chacra 1865-1948 IPF 329 MCFGPD	6336 MCF		Rusty Chacra	
Benson Mineral Group No. 1 Federal 19-22-6	1590 FNL, 1180 FEL 19-22N-6W Sandoval	7/79	2,010	gas	Chacra 1816-1854 IPF 75 MCFGPD + 68 BWPD			Rusty Chacra	
Dome Petroleum No. 1 Federal 19-22-6	810 FSL, 960 FWL 19-22N-6W Sandoval	6/79	2,040	gas	Chacra 1698-1805 IPF 359 MCFGPD	12952 MCF		Rusty Chacra	
Dome Petroleum No. 2 Dome Federal 20-22-6	810 FSL, 850 FEL 20-22N-6W Sandoval	10/80	2,350	gas	Chacra 1973-2013 IPF 1050 MCFGPD	13260 MCF		Rusty Chacra	
Dome Petroleum No. 3 Dome Federal 20-22-6	1850 FNL, 790 FWL 20-22N-6W Sandoval	11/80	2,275	gas	Chacra 1853-1883 IPF 688 MCFGPD	12246 MCF		Rusty Chacra	
Benson Mineral Group No. 1 Federal 20-22-6	1480 FSL, 1140 FWL 20-22N-6W Sandoval	9/78	2,100	gas	Chacra 1798-1848 IPF 576 MCFGPD			Rusty Chacra	
Robert L. Bayless No. 1 Glin Tomas	790 FSL, 1835 FWL 22-22N-6W Sandoval	2/83	5,484	oil	Gallup 5161-5226 IPS 44 BOPD + 36 MCFGPD + 28 BWPD			Undesignated Gallup	
Plymouth Oil Co. No. 1 Thomas	990 FSL, 990 FWL 22-22N-6W Sandoval	2/56	7,166	D&A					oil show in Menefee and Point Lookout by DST from 3918-3966 ft; oil show in Graneros and Dakota by DST from 6128-6160 ft
Engineering & Production Service No. 1 Tall Pine	1700 FSL, 1700 FEL 26-22N-6W Sandoval	6/76	4,199	gas	La Ventana 2066-2158 IPF 54 MCFGPD + 31 BWPD			Undesignated La Ventana	
Dome Petroleum No. 1 Dome Navajo	790 FSL, 820 FWL 27-22N-6W Sandoval	1/81	2,200	gas	Chacra 1770-1790 IPF 684 MCFGPD	12296 MCF		Rusty Chacra	
Kirby Exploration No. 1 Bradshaw-Federal	1190 FNL, 1450 FEL 27-22N-6W Sandoval	4/78	2,306	D&A					

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Benson Mineral Group No. 1 Federal 28-22-6	800 FNL, 860 FWL 28-22N-6W Sandoval	8/78	2,150	gas	Chacra 1834-2043 IPF 668 MCFGPD			Rusty Chacra	
Dome Petroleum No. 2 Dome Navajo 28-22-6	1780 FSL, 830 FEL 28-22N-6W Sandoval	10/80	2,219	gas	Chacra 1790-1860 IPF 918 MCFGPD	15566 MCF		Rusty Chacra	
Dome Petroleum No. 4 Dome Navajo 28-22-6	1720 FSL, 1640 FWL 28-22N-6W Sandoval	12/80	2,200	gas	Chacra 1734-1756 IPF 1429 MCFGPD	25560 MCF		Rusty Chacra	
Tesoro Petroleum No. 1 Navajo Allotted	790 FSL, 790 FEL 28-22N-6W Sandoval	1/74	6,090	D&A					
Benson Mineral Group No. 1 Federal 29-22-6	1670 FSL, 1170 FEL 29-22N-6W Sandoval	9/78	2,150	gas	Chacra 1727-1800 IPF 977 MCFGPD			Rusty Chacra	
Integrated Energy No. 2 Federal 29-22-6 (OWWO)	1580 FNL, 830 FWL 29-22N-6W Sandoval	9/82	1,960	gas	Chacra 1801-1850 IPF 1187 MCFGPD			Rusty Chacra	
Dome Petroleum No. 3 Dome Federal 29-22-6	1820 FNL, 850 FEL 29-22N-6W Sandoval	12/80	2,240	gas	Chacra 1830-1860 IPF 1265 MCFGPD	21203 MCF		Rusty Chacra	
Dome Petroleum No. 2 Federal 29-22-6	1610 FSL, 1840 FWL 29-22N-6W Sandoval	10/80	2,000	gas	Chacra 1790-1880 IPF 960 MCFGPD	16385 MCF		Rusty Chacra	
Dome Petroleum No. 1 Federal 30-22-6	1180 FNL, 1580 FWL 30-22N-6W Sandoval	4/79	2,030	gas	Chacra 1702-1789 IPF 415 MCFGPD	14572 MCF		Rusty Chacra	
Benson Mineral Group No. 1 Dome-Rusty 30-22-6	820 FNL, 1520 FEL 30-22N-6W Sandoval	6/78	2,093	gas	Chacra 1758-1854 IPF 1509 MCFGPD			Rusty Chacra	
Benson Mineral Group No. 1 Federal 31-22-6	1470 FSL, 1550 FEL 31-22N-6W Sandoval	4/79	1,800	gas	La Ventana 1552-1600 IPF 266 MCFGPD			Rusty Chacra	
Integrated Energy No. 1 State 32-22-6	1100 FNL, 1010 FWL 32-22N-6W Sandoval	3/82	1,850	gas	Chacra 1658-1752 IPF 1310 MCFGPD			Rusty Chacra	
Dome Petroleum No. 2 Dome-State 32-22-6	920 FNL, 810 FEL 32-22N-6W Sandoval	1/81	2,100	gas	Chacra 1620-1706 IPF 1819 MCFGPD	42561 MCF		Rusty Chacra	
Integrated Energy No. 2 State 32-22-6	1100 FNL, 1010 FWL 32-22N-6W Sandoval	3/82	1,850	gas	Chacra 1658-1752 IPF 1310 MCFGPD	4143 MCF		Rusty Chacra	
Dome Petroleum No. 1 Dome Navajo 33-22-6	790 FNL, 790 FEL 33-22N-6W Sandoval	11/82	1,950	gas	Chacra 1659-1747 IPF 1012 MCFGPD	3445 MCF		Rusty Chacra	
Dome Petroleum No. 2 Dome Navajo 33-22-6	875 FSL, 1650 FWL 33-22N-6W Sandoval	11/82	1,850	gas	Chacra 1636-1714 IPF 1305 MCFGPD	4586 MCF		Rusty Chacra	
Northwest Exploration No. 20 Natani	2035 FNL, 1105 FEL 34-22N-6W Sandoval	12/82	2,180	gas	Chacra 1862-1951 IPF 10 MCFGPD + 10 BWPD			Rusty Chacra	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Dome Petroleum No. 1 Dome Navajo 34-22-6	820 FNL, 1830 FWL 34-22N-6W Sandoval	1/81	2,300	gas	Chacra 1810-1894 IPF 1123 MCFGPD	20207 MCF		Rusty Chacra	
Dome Petroleum No. 1 Dome Navajo 35-22-6	1850 FNL, 1830 FWL 35-22N-6W Sandoval	2/81	2,450	gas	Chacra 1946-2034 IPF 136 MCFGPD			Rusty Chacra	
Benson Mineral Group No. 1 State 36-22-6	810 FSL, 800 FWL 36-22N-6W Sandoval	8/79	2,000	gas	Chacra 1795-1831 IPF 68 MCFGPD			Rusty Chacra	
E.B. Germany No. 1 Pettigrew	660 FSL, 660 FWL 1-22N-7W Sandoval	9/57	5,500	D&A					
Dome Petroleum No. 1 Dome Navajo 3-22-7	1660 FSL, 1980 FEL 3-22N-7W Sandoval	4/80	5,208	oil	Gallup 4980-5052 IPP 24 BOPD + 45 MCFGPD			Alamito Gallup	
R.E. Lauritsen No. 1-5 Federal	1520 FNL, 790 FEL 5-22N-7W Sandoval	9/82	1,975	gas	Chacra 1734-1778 IPF 233 MCFGPD			Rusty Chacra	
Benson Mineral Group No. 1 Federal 6-22-7	800 FSL, 1730 FEL 6-22N-7W Sandoval	8/79	100	D&A					
Benson Mineral Group No. 1 Navajo 9-22-7	1590 FNL, 1700 FWL 9-22N-7W Sandoval	11/78	1,975	gas	Chacra 1636-1743 IPF 18 MCFGPD + 30 BWPD			Rusty Chacra	
Beard Oil No. 1 Chacra	1070 FNL, 880 FWL 10-22N-7W Sandoval	1/78	2,105	gas	Chacra 1795-1902			Rusty Chacra	
Benson Mineral Group No. 1 Navajo 10-22-7	1180 FSL, 1790 FWL 10-22N-7W Sandoval	9/78	2,050	gas	Chacra 1706-1804 IPF 866 MCFGPD			Rusty Chacra	
Dome Petroleum No. 1 Dome Federal 10-22-7	1560 FNL, 860 FEL 10-22N-7W Sandoval	11/80	2,320	gas	Chacra 1868-1910 IPF 733 MCFGPD	13599 MCF		Rusty Chacra	
Chace Oil No. 2 Gulf-Federal	1860 FNL, 1780 FEL 11-22N-7W Sandoval	11/75	3,734	gas	La Ventana 1950-1988 IPF 700 MCFGPD	19477 MCF		Rusty Menefee	
Chace Oil No. 1 Rusty-Federal (owwo)	800 FSL, 800 FEL 11-22N-7W Sandoval	10/77	4,911	oil	Menefee 3383-3395 IPP 48 BOPD + 14 MCFGPD	8695 BO abd		Rusty Menefee	
				gas	Chacra 1901-1962 IPF 1051 MCFGPD	21340 MCF		Rusty Chacra	
Chace Oil No. 2 Gulf-Navajo	1150 FSL, 890 FWL 12-22N-7W Sandoval	6/80	3,986	gas	Chacra 1967-1991 IPF 227 MCFGPD + 3 BWPD	11315 MCF		Rusty Chacra	
Chace Oil No. 4 Rusty-Federal	800 FSL, 800 FWL 13-22N-7W Sandoval	10/75	1,974	gas	La Ventana 1758-1801 IPF 1423 MCFGPD	43492 MCF		Rusty Menefee	
Chace Oil No. 1 Gulf-Federal	500 FNL, 1800 FWL 13-22N-7W Sandoval	5/75	4,050	gas	Mesaverde 1969-2041 IPF 581 MCFGPD	24398 MCF		Rusty Chacra	
Chace Oil No. 3 Gulf-Federal	1650 FNL, 1955 FEL 13-22N-7W Sandoval	4/76	2,040	gas	Chacra 1943-1980 IPF 348 MCFGPD	34824 MCF		Rusty Chacra	
Chace Oil No. 2 Rusty-Federal	1850 FNL, 800 FEL 14-22N-7W Sandoval	4/75	3,886	gas	Mesaverde 1880-1884 IPF 460 MCFGPD	35954 MCF		Rusty Chacra	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Chace Oil No. 3 Rusty-Federal	800 FSL, 800 FEL 14-22N-7W Sandoval	9/75	3,697	gas	La Ventana 1762-1804 IPF 1472 MCFGPD	46299 MCF		Rusty Menefee	
Dome Petroleum No. 1 Dome Federal 15-22-7	900 FSL, 1190 FEL 15-22N-7W Sandoval	7/79	1,950	gas	Chacra 1708-1784 IPF 817 MCFGPD	19486 MCF		Rusty Chacra	
Claude Kennedy No. 1 Dana State	1710 FNL, 1710 FEL 16-22N-7W Sandoval	7/75	4,980	oil	Gallup 4786-4936 IPF 16 BOPD + 75 MCFGPD + 16 BWPD	34450 MCF + 1508 BO	37	Rusty Gallup	
Dome Petroleum No. 2 Dome Navajo 17-22-7	1820 FSL, 1570 FWL 17-22N-7W Sandoval	11/80	1,936	gas	Chacra 1484-1572 IPF 133 MCFGPD			Rusty Chacra	
Integrated Energy No. 1 Navajo 17-22-7	1660 FSL, 1060 FEL 17-22N-7W Sandoval	7/78	1,875	D&A					
Sinclair Oil & Gas No. 1 National Federal	660 FNL, 1980 FWL 19-22N-7W Sandoval	10/57	5,836	oil	Gallup 4552-4702 IP 24 BOPD			Undesignated Gallup	
Dome Petroleum No. 1 Navajo 20-22-7	1600 FNL, 990 FEL 20-22N-7W Sandoval	7/79	3,700	gas	Chacra 1487-1520 IPF 158 MCFGPD			Rusty Chacra	
Benson Mineral Group No. 1 Dome Rusty	790 FSL, 790 FEL 20-22N-7W Sandoval	8/78	2,150	gas	Chacra 1440-1600 IPF 482 MCFGPD			Rusty Chacra	
Beard Oil No. 2 Chacra	1160 FSL, 1600 FEL 21-22N-7W Sandoval	2/78	2,004	gas	Chacra 1466-1562			Rusty Chacra	
Benson Mineral Group No. 1 Navajo-21	1040 FNL, 1190 FEL 21-22N-7W Sandoval	6/78	1,882	gas	Chacra 1543-1640 IPF 581 MCFGPD			Rusty Chacra	
Chace Oil No. 5 Rusty-Navajo	790 FNL, 790 FEL 22-22N-7W Sandoval	2/77	1,950	gas	Chacra 1695-1918 IPF 796 MCFGPD + 2 BWPD	31069 MCF to 10/81		Rusty Chacra	
Chace Oil No.7 Rusty-Navajo	790 FSL, 1150 FWL 22-22N-7W Sandoval	7/77	2,015	gas	Chacra 1564-1812 IPF 686 MCFGPD	14468 MCF to 8/81		Rusty Chacra	
Dome Petroleum No. 1 Dome Navajo 22-22-7	790 FSL, 1095 FEL 22-22N-7W Sandoval	10/80	4,930	oil	Gallup 4610-4675 IPP 57 BOPD + 44 MCFGPD		38	Rusty Gallup	
Dome Petroleum No. 4 Dome-Tesoro-22	850 FNL, 1700 FWL 22-22N-7W Sandoval	4/81	5,000	oil	Gallup 4724-4824 IPP 11 BOPD + 240 MCFGPD		37	Rusty Gallup	
Chace Oil No. 1 Rusty-Navajo	800 FNL, 800 FEL 23-22N-7W Sandoval	1/76	1,020	D&A					
Chace Oil No. 1-X Rusty-Navajo	790 FNL, 800 FEL 23-22N-7W Sandoval	2/76	1,931	gas	Chacra 1667-1763 IPF 126 MCFGPD	55834 MCF		Rusty Chacra	
Chace Oil No. 3 Rusty-Navajo	1650 FSL, 1800 FWL 23-22N-7W Sandoval	8/76	1,808	gas	Chacra 1540-1743 IPF 272 MCFGPD	9365 MCF		Rusty Chacra	
Chace Oil No. 2 Rusty-Navajo	800 FNL, 1640 FWL 23-22N-7W Sandoval	2/76	2,000	gas	Chacra 1692-1776 IPF 116 MCFGPD	56999 MCF		Rusty Chacra	

Operator, well number, and lease	Location (section-township-range, county)	...etion ...ate (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Dome Petroleum No. 1 Tesoro 23-7	1670 FSL, 690 FWL 23-22N-7W Sandoval	11/80	4,807	oil	Gallup 4646-4712 IPF 60 BOPD + 40 MCFGPD		38	Rusty Gallup	
Northwest Petroleum No. 1-23 Sandoval 22-7	1980 FSL, 660 FEL 23-22N-7W Sandoval	9/57	5,975	oil	Gallup 4730-4742 IP 34 BOPD			Rusty Gallup	
Benson Mineral Group No. 1 Dome Rusty 24-22-7	1840 FSL, 1520 FEL 24-22N-7W Sandoval	6/78	2,000	gas	Chacra 1650-1699 IPF 631 MCFGPD			Rusty Chacra	
Integrated Energy No. Federal 25-27-7	1060 FNL, 1470 FEL 25-22N-7W Sandoval	9/82	1,770	gas	Chacra 1608-1688 IPF 236 MCFGPD	1360 MCF		Rusty Chacra	
Benson Mineral Group No. 1 Federal 26-22-7	790 FNL, 790 FEL 26-22N-7W Sandoval	9/78	1,820	gas	Chacra 1526-1730 IPF 544 MCFGPD			Rusty Chacra	
Chace Oil No. 4 Rusty-Navajo	1650 FNL, 1850 FWL 26-22N-7W Sandoval	10/76	1,808	gas	Chacra 1515-1731 IPF 468 MCFGPD	26285 MCF		Rusty Chacra	
Chace Oil No. 6 Rusty-Navajo	790 FNL, 1190 FEL 27-22N-7W Sandoval	1/78	1,920	gas	Chacra 1465-1572 IPF 272 MCFGPD	16302 MCF		Rusty Chacra	
Dome Petroleum No. 3 Dome-Tesoro 27-22-7	830 FNL, 790 FWL 27-22N-7W Sandoval	181	5,000	oil	Gallup 4592-4691 IPP 10 BOPD + 297 MCFGPD		39	Rusty Gallup	
Benson Mineral Group No. 1 Navajo-28	1600 FNL, 790 FEL 28-22N-7W Sandoval	6/78	1,800	D&A					
Dome Petroleum No. 2 Dome Navajo 28-22-7	1560 FSL, 910 FEL 28-22N-7W Sandoval	11/80	1,835	gas	Chacra 1342-1545 IPF 24 MCFGPD			Rusty Chacra	
Merrion & Bayless No. 2 Alemita	790 FNL, 1850 FWL 28-22N-7W Sandoval	11/78	1,648	D&A					
Basin Fuels No. 1 Mesa State 32	1520 FNL, 1685 FWL 32-22N-7W Sandoval	5/77	1,550	D&A					
Benson Mineral Group No. 1 Federal 33-22-7	790 FSL, 1020 FEL 33-22N-7W Sandoval	8/78	115	D&A					
Dome Petroleum No. 1 Dome Federal 34-22-7	1120 FNL, 1535 FEL 34-22N-7W Sandoval	11/80	1,879	gas	Chacra 1405-1470 IPF 26 MCFGPD			Rusty Chacra	
Northwest Prod. Corp. No. 2-35 Sandoval 22-7	660 FNL, 1980 FEL 35-22N-7W Sandoval	9/57	5,905	oil	Gallup 4672-4685 IP 49 BOPD		40	Undesignated Gallup	
Petro-Lewis No. 2 Duff B Federal	860 FSL, 790 FWL 19-23N-1W Sandoval	11/81	3,175	gas	Pictured Cliffs 2915-2985 IP 399 MCFGPD	5,885 MCFG		Blanco Pictured Cliffs, South	
Petro-Lewis No. 1 Federal 19	1600 FSL, 1600 FEL 19-23N-1W Sandoval	11/81	3,175	gas	Pictured Cliffs 2953-3016 IP 676 MCFGPD	20,382 MCFG		Blanco Pictured Cliffs, South	
Socony Mobil Oil Co. No. 1 Duff Federal 'B'	990 FNL, 990 FWL 19-23N-1W Sandoval	9/59	3,065	gas	Pictured Cliffs 2986-3007 IP 1110 MCFGPD	384,571 MCFG		Blanco Pictured Cliffs, South	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Shar-Alan Oil Co. No. 1 Trio Federal	660 FNL, 990 FWL 23-23N-1W Sandoval	4/63	3,875	D&A					
Texstar Petroleum Co. No. 1 Trio-Federal 'X'	670 FNL, 980 FWL 23-23N-1W Sandoval	9/63	5,015	D&A					
Southland Royalty No. 1 Don Evans	840 FNL, 1775 FEL 30-23N-1W Sandoval	1/80	3,147	gas	Pictured Cliffs 2999-3019 IPF 220 MCFGPD	12,709 MCFG		Blanco Pictured Cliffs, South	
Southland Royalty No. 1 Huber	1775 FNL, 1030 FWL 31-23N-1W Sandoval	11/80	2,968	gas	Pictured Cliffs 2765-2887 IPF 907 MCFGPD	14980 MCF		Blanco Pictured Cliffs, South	
Magnolia Petroleum No. 1 Jicarilla 'L'	990 FNL, 990 FWL 19-23N-2W Sandoval	10/58	3,250	gas	Pictured Cliffs 3118-3129 IP 708 MCFGPD	131611 MCF		Blanco Pictured Cliffs, South	
Mobil Prod. TX & NM No. 2 Jicarilla-L	990 FNL, 990 FWL 21-23N-2W Sandoval	10/83	8,620	D&A					
Sherman F. Wagenseller No. 1 Mobil-Apache-21	890 FNL, 990 FWL 21-23N-2W Sandoval	1/83	3,220	gas	Pictured Cliffs 3071-3104 IPF 863 MCFGPD			Blanco Pictured Cliffs, South	
El Paso Natural Gas No. 12 Jicarilla Contract-183	1630 FSL, 1630 FWL 22-23N-3W Sandoval	8/82	3,270	gas	Pictured Cliffs 3131-3210 IP SI Gas	32399 MCF		Ballard-Pictured Cliffs	
Shar-Alan Oil Co. No. 1 Jicarilla 'N' 163	790 FNL, 790 FEL 22-23N-2W Sandoval	11/65	3,112	gas	Pictured Cliffs 3034-3043 IP 2961 MCFGPD	abandoned 4/76		Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 2 Jicarilla 'N' 163 (owwo)	1850 FSL, 790 FEL 22-23N-2W Sandoval	11/68	3,128	gas	Pictured Cliffs 3011-3031 IPCAOF 2047 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 3 Jicarilla 'N' 63	1850 FNL, 1850 FEL 22-23N-2W Sandoval	11/68	3,100	gas	Pictured Cliffs 3028-3048 IPF 1695 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 4 Jicarilla 'N' 163	790 FNL, 1850 FWL 22-23N-2W Sandoval	8/66	3,070	gas	Pictured Cliffs 3012-3027 IP 3490 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 1 Jicarilla 'I' 163	790 FNL, 790 FEL 23-23N-2W Sandoval	11/62	3,125	gas	Pictured Cliffs 2986-3015 IP 1545 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 2 Jicarilla 'I' 163	1850 FSL, 790 FEL 23-23N-2W Sandoval	11/64	3,067	gas	Pictured Cliffs 3010-3024 IP 3495 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 3 Jicarilla 'I' 163	1850 FSL, 1850 FWL 23-23N-2W Sandoval	11/65	3,090	gas	Pictured Cliffs 3024-3040 IP 2566 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 4 Jicarilla 'I' 163	790 FNL, 1850 FWL 23-23N-2W Sandoval	10/64	3,087	gas	Pictured Cliffs 2980-3004 IP 3316 MCFGPD			Blanco Pictured Cliffs, South	
Merrion & Bayless No. 1 Badland Flats	1650 FSL, 990 FWL 24-23N-2W Sandoval	1/81	3,110	gas	Pictured Cliffs 2976-3006 IPF 963 MCFGPD	9516 MCF		Blanco Pictured Cliffs, South	
Merrion & Bayless No. 2 Badland Flats	990 FSL, 1850 FEL 24-23N-2W Sandoval	11/80	3,150	gas	Pictured Cliffs 2990-3036 IPF 770 MCFGPD	34662 MCF		Blanco Pictured Cliffs, South	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Shar-Alan Oil Co. No. 1 Jicarilla 'H' 163	990 FNL, 990 FEL 24-23N-2W Sandoval	6/62	3,105	gas	Pictured Cliffs 2960-2988 IP 1682 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 4 Jicarilla 'H' 163	790 FNL, 1720 FWL 24-23N-2W Sandoval	10/63	3,080	gas	Pictured Cliffs 2957-3025 IP 2178 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 4 Jicarilla 'T' 164	790 FNL, 790 FWL 25-23N-2W Sandoval	11/64	3,100	D&A					
Southland Royalty No. 1 Jicarilla-443	910 FNL, 870 FEL 26-23N-2W Sandoval	6/79	3,178	gas	Pictured Cliffs 2946-3046 IPF 1797 MCFGPD	174561 MCF		Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 1 Jicarilla 'P' 165	1850 FNL, 1450 FEL 27-23N-2W Sandoval	5/63	3,160	D&A					
Shar-Alan Oil Co. No. 3 Jicarilla 'R' 165	990 FNL, 1190 FWL 28-23N-2W Sandoval	12/64	3,180	gas	Pictured Cliffs 3082-3102 IP 1545 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 1 Jicarilla 'R' 166	1780 FSL, 990 FEL 29-23N-2W Sandoval	7/63	3,025	gas	Pictured Cliffs 2942-2958 IP 1291 MCFGPD			Blanco Pictured Cliffs, South	
Shar-Alan Oil Co. No. 2 Jicarilla 'R' 166	790 FNL, 1850 FEL 30-23N-2W Sandoval	6/64	3,100	D&A					
Tesoro Petroleum No. 1 Crosswise	790 FSL, 910 FWL 31-23N-2W Sandoval	7/72	7,435	oil	Dakota 7119-7129 IPP 32 BOPD	abandoned 2/77		Undesignated Dakota	small oil show in Point Lookout from 4903-4928 ft
Caswell Silver No. S-2 Jicarilla Apache	790 FNL, 790 FWL 19-23N-3W Sandoval	10/57	2,950	D&A					
H.K. Keesee No. 11 Cinco Diablos	1090 FSL, 790 FEL 19-23N-3W Sandoval	7/68	2,899	gas	Pictured Cliffs 2833-2843 IP 1105 MCFGPD	345505 MCF		Ballard Pictured Cliffs	
H.K. Keese No. 1 Keetom-Apache	790 FNL, 790 FEL 19-23N-3W Sandoval	4/69	3,030	gas	Pictured Cliffs 2937-2965 IPF 512 MCFGPD			Ballard Pictured Cliffs	
Chace Oil No. 3 Chace-Apache 15 (OWWO)	1850 FNL, 1850 FWL 20-23N-3W Sandoval	1/83	7,525	oil	Gallup 6052-6215 Tocito 6759-6876 Greenhorn 7055-7074 Dakota 7106-7224 IPP 13 BOPD + 8 MCFGPD + 1 BWPD	10733 BO	43	Chacon-Dakota	
Chace Oil No. 2 Chace Apache 15	1775 FSL, 990 FEL 20-23N-3W Sandoval	11/82	7,486	oil	Gallup 5994-6218 Tocito 6741-6874 Greenhorn 7092-7118 Dakota 7155-7276 IPP 60 BOPD + 100 MCFGPD + 20 BWPD		44	Chacon Dakota	
Chace Oil No. 1 Chace-Apache 15	790 FNL, 790 FEL 20-23N-3W Sandoval	6/77	7,650	oil	Dakota 7237-7365 IPP 63 BOPD	17486 BO		Chacon Dakota	
El Paso Natural Gas No. 1 Jicarilla-15	1700 FNL, 890 FEL 20-23N-3W Sandoval	6/77	3,080	gas	Pictured Cliffs 2967-3029 IPF 1791 MCFGPD	87293 MCF		Ballard Pictured Cliffs	
H.K. Keese No. 2 Margarite	970 FSL, 1650 FWL 20-23N-3W Sandoval	1/66	3,005	gas	Pictured Cliffs 2884-2898 IP 2506 MCFGPD	483405 MCF		Ballard Pictured Cliffs	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
M.J. Florance No. 1 Stromberg	1850 FSL, 1850 FEL 20-23N-3W Sandoval	12/58	3,000	gas	Pictured Cliffs 2952-2960 IP 2500 MCFGPD			Ballard Pictured Cliffs	
Caswell Silver No. 5-1 Jicarilla Contract 15	1650 FNL, 1450 FWL 20-23N-3W Sandoval	7/56	2,993	gas	Pictured Cliffs 2864-2932 IP 1462 MCFGPD			Ballard Pictured Cliffs	
El Paso Natural Gas No. 5 Jicarilla 183	905 FSL, 1170 FWL 21-23N-3W Sandoval	8/73	3,089	gas	Pictured Cliffs 2974-3028 IPF 2469 MCFGPD	320930 MCF		Ballard Pictured Cliffs	
El Paso Natural Gas No. 8 Jicarilla 183	865 FSL, 1610 FEL 21-23N-3W Sandoval	6/77	3,090	gas	Pictured Cliffs 3005-3072 IPF 480 MCFGPD	53097 MCF		Ballard Pictured Cliffs	
Odessa Natural Corp. No. 6 Chacon-Jicarilla-D	2310 FSL, 330 FEL 21-23N-3W Sandoval	12/76	7,636	oil	Dakota 7264-7398 IPF 50 BOPOD + 720 MCFGPD		46	Chacon Dakota	
Odessa Natural Corp. No. 7 Chacon-Jicarilla-D	330 FNL, 2310 FWL 21-23N-3W Sandoval	7/77	7,695	oil	Dakota 7308-7436 IPF 115 BOPD + 522 MCFGPD		46	Chacon Dakota	
Keese & Thomas No. 4 Chacon-Jicarilla	790 FNL, 1850 FWL 22-23N-3W Sandoval	8/73	3,287	gas	Pictured Cliffs 3118-3178 IPF 1756 MCFGPD	215233 MCF		Ballard Pictured Cliffs	
Odessa Natural Corp. No. 4 Chacon-Jicarilla-D	990 FNL, 1650 FWL 22-23N-3W Sandoval	7/76	7,722	oil	Dakota 7316-7438 IPF 60 BOOPD + 600 MCFGPD			Chacon Dakota	
Odessa Natural Corp. No. 5 Chacon-Jicarilla-D	2310 FSL, 330 FEL 22-23N-3W Sandoval	8/76	7,678	oil	Dakota 7315-7450 IPF 127 BCPD + 800 MCFGPD		49.5	Chacon Dakota	
El Paso Natural Gas No. 12 Jicarilla Contract 183	1630 FSL, 1630 FWL 22-23N-3W Sandoval	8/82	3,270	gas	shut in			Ballard Pictured Cliffs	
Dave M. Thomas, Jr. No. 8 Chacon-Jicarilla	790 FNL, 1850 FEL 22-23N-3W Sandoval	5/77	3,246	gas	Pictured Cliffs 3096-3160 IPF 3858 MCFGPD			Ballard Pictured Cliffs	
Odessa Natural Corp. No. 17 Chacon-Jicarilla-D	1850 FNL, 1850 FEL 22-23N-3W Sandoval	9/80	7,680	oil	Dakota 7283-7412 IPF 60 BOPD + 850 MCFGPD		46	Chacon Dakota	
Odessa Natural Corp. No. 18 Chacon-Jicarilla-D	1850 FSL, 1850 FWL 22-23N-3W Sandoval	9/80	7,710	oil	Dakota 7349-7479 IPF 80 BOPD + 650 MCFGPD		46	Chacon Dakota	
Keese & Thomas No. 5 Chacon-Jicarilla	1850 FNL, 790 FWL 23-23N-3W Sandoval	8/73	3,218	gas	Pictured Cliffs 3071-3130 IPF 1014 MCFGPD	178786 MCF		Ballard Pictured Cliffs	
Keese & Thomas No. 1 Chacon-Jicarilla Apacho-D	875 FNL, 1140 FEL 23-23N-3W Sandoval	9/74	7,683	oil	Dakota 7315-7345 IPF 95 BOPD + 55 MCFGPD	31376 BO	41.6	Chacon Dakota	
Odessa Natural Corp. No. 3 Chacon-Jicarilla-D	990 FNL, 990 FWL 23-23N-3W Sandoval	8/76	7,643	oil	Dakota 7262-7396 IPF 119 BOPD + 540 MCFGPD		46		

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Odessa Natural Corp. No. 13 Chacon-Jicarilla-D	790 FSL, 790 FWL 23-23N-3W Sandoval	7/79	7,711	oil	Dakota 7334-7468 IPF 140 BOPD + 680 MCFGPD		46	Chacon Dakota	
Dave M. Thomas, Jr. No. 7 Chacon-Jicarilla	1190 FSL, 1850 FEL 23-23N-3W Sandoval	5/77	3,310	gas	Pictured Cliffs 3193-3214 IPF 1484 MCFGPD	98594 MCF		Ballard Pictured Cliffs	
Dave M. Thomas, Jr. No. 9 Chacon-Jicarilla	1850 FSL, 1190 FWL 23-23N-3W Sandoval	5/77	3,300	gas	Pictured Cliffs 3186-3224 IPF 2992 MCFGPD	174923 MCF		Ballard Pictured Cliffs	
Dave M. Thomas, Jr. No. 9 Chacon-Jicarilla-Apache-D	790 FSL 1850 FEL 23-23N-3W Sandoval	6/80	7,705	oil	Dakota 7339-7472 IPF 190 BOPD + 150 MCFGPD	21285 BO	48	Chacon Dakota	
Jack A. Cole No. 4 Indian Bend	1800 FSL, 1800 FWL 25-23N-3W Sandoval	9/81	3,108	gas	Pictured Cliffs 2939-2964 IPF 1076 MCFGPD	52928 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 1 Indian Bend	1120 FNL, 1120 FWL 25-23N-3W Sandoval	9/81	3,208	gas	Pictured Cliffs 3068-3086 IPF 705 MCFGPD	32758 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 6 Indian Bend	1850 FNL, 1850 FEL 25-23N-3W Sandoval	10/81	3,067	gas	Pictured Cliffs 3001-3014 IPF 519 MCFGPD	20245 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 7 Indian Bend	1520 FSL, 1620 FEL 25-23N-3W Sandoval	10/81	3,025	gas	Pictured Cliffs 2928-2940 IPF 1076 MCFGPD	72374 MCF		Ballard Pictured Cliffs	
Dave M. Thomas, Jr. No. 104 Chacon-Jicarilla-Apache-D	790 FSL, 790 FWL 25-23N-3W Sandoval	5/79	7,555	oil	Dakota 7168-7304 IPF 100 BOPD + 200 MCFGPD	26569 BO	46	Chacon Dakota	
Dave M. Thomas, Jr. No. 107 Chacon-Jicarilla-Apache-D	990 FNL, 790 FWL 25-23N-3W Sandoval	9/79	7,681	oil	Dakota 7274-7407 IPF 90 BOPD + 50 MCFGPD	20634 BO	46	Chacon Dakota	
Jack A. Cole No. 2 Indian Bend	1100 FNL, 990 FEL 26-23N-3W Sandoval	9/81	3,300	gas	Pictured Cliffs 3186-3202 IPF 1076 MCFGPD	34876 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 3 Indian Bend	1000 FNL, 1850 FWL 26-23N-3W Sandoval	10/81	3,155	gas	Pictured Cliffs 3048-3060 IPF 643 MCFGPD	37921 MCF		Ballard Pictured Cliffs	
Benjamin Elenbogen No. 6 Jicarilla A-55	790 FSL, 790 FWL 26-23N-3W Sandoval	2/69	3,078	gas	Pictured Cliffs 2945-2957 IPF 1096 MCFGPD	54184 MCF t 9/76		Ballard Pictured Cliffs	
Benjamin Elenbogen No. 7 Jicarilla A-55	790 FSL, 1850 FEL 26-23N-3W Sandoval	2/69	3,115	gas	Pictured Cliffs 3012-3022 IPF 1401 MCFGPD	310067 MCF		Ballard Pictured Cliffs	
Caswell, Silver No. 1 Jicarilla 55	1650 FSL, 1650 FWL 26-23N-3W Sandoval	1/56	3,102	D&A					
Dave Thomas, Jr. No. 101 Chacon-Jicarilla-Apache-D	1850 FSL, 790 FWL 26-23N-3W Sandoval	11/78	7,590	oil	Dakota 7197-7334 IPF 90 BOPD + 820 MCFGPD	13968 BO	46	Chacon Dakota	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Dave M. Thomas, Jr. No. 102 Chacon-Jicarilla D	990 FNL, 800 FWL 26-23N-3W Sandoval	11/78	7,556	oil	Dakota 7222-7357 IPF 70 BOPD + 910 MCFGPD	20034 BO	46	Chacon Dakota	
Dave M. Thomas, Jr. No. 108 Chacon-Jicarilla-Apache D	1650 FNL, 1850 FEL 26-23N-3W Sandoval	6/80	7,659	oil	Dakota 7325-7461 IPF 150 BOPD + 225 MCFGPD	34937 BO	49	Chacon Dakota	
Dave M. Thomas, Jr. No. 109 Chacon-Jicarilla-Apache-D	1830 FSL, 1830 FEL 26-23N-3W Sandoval	9/80	7,628	oil	Dakota 7233-7369 IPF 75 BOPD + 125 MCFGPD	30547 BO	46	Chacon Dakota	
El Paso Natural Gas Co. No. 2 Jicarilla 183	1190 FSL, 990 FWL 27-23N-3W Sandoval	9/61	3,007	gas	Pictured Cliffs 2970-2998 IP 1515 MCFGPD	524444 MCF		Ballard Pictured Cliffs	
El Paso Natural Gas Co. No. 6 Jicarilla 183	800 FSL, 1760 FEL 27-23N-3W	8/73	2,981	gas	Pictured Cliffs 2870-2900 IPCAOF 3474 MCFGPD	309720 MCF		Ballard Pictured Cliffs	
Odessa Natural Corp. No. 9 Jicarilla-D	935 FNL, 1850 FWL 27-23N-3W Sandoval	4/78	7,682	oil	Dakota 7270-7400 IPF 78 BOPD + 930 MCFGPD			Chacon Dakota	
Odessa Natural Corp. No. 10 Jicarilla-D	1700 FSL, 790 FEL 27-23N-3W Sandoval	4/78	7,520	oil	Graneros-Dakota 7118-7248 IPF 75 BOPD + 800 MCFGPD			Chacon Dakota	
Odessa Natural Corp. No. 19 Chacon-Jicarilla 'D'	790 FNL, 990 FEL 27-23N-3W Sandoval	9/80	7,620	oil	Dakota 7252-7386 IPF 95 BOPD + 175 MCFGPD		47	Chacon Dakota	
Odessa Natural Corp. No. 20 Chacon-Jicarilla 'D'	1770 FSL, 1740 FWL 27-23N-3W Sandoval	6/80	7,570	oil	Dakota 7168-7290 IPF 28 BOPD + 300 MCFGPD		47	Chacon Dakota	
El Paso Natural Gas Co. No. 1 Jicarilla Contract. 183	1650 FNL, 990 FWL 28-23N-3W Sandoval	7/61	3,110	gas	Pictured Cliffs 3022-3054 IP 2424 MCFGPD	563308 MCF		Ballard Pictured Cliffs	
El Paso Natural Gas Co. No. 3 Jicarilla 183	1600 FSL, 990 FWL 28-23N-3W Sandoval	9/71	3,239	gas	Pictured Cliffs 3090-3106 IPF 763 MCFGPD	111028 MCF		Ballard Pictured Cliffs	
El Paso Natural Gas Co. No. 4 Jicarilla 183	1800 FSL, 1650 FEL 28-23N-3W Sandoval	9/71	3,199	gas	Pictured Cliffs 3080-3106 IPF 2294 MCFGPD	266638 MCF to 10/81		Ballard Pictured Cliffs	
El Paso Natural Gas Co. No. 7 Jicarilla 183	1485 FNL, 1775 FEL 28-23N-3W Sandoval	8/73	3,159	gas	Pictured Cliffs 3050-3076 IPF 998 MCFGPD	119310 MCF		Ballard Pictured Cliffs	
Odessa Natural No. 11 Chacon-Jicarilla-D	790 FNL, 790 FEL 28-23N-3W Sandoval	5/78	7,606	oil	Dakota 7244-7380 IPF 70 BOPD + 650 MCFGPD		46	Chacon Dakota	
Odessa Natural No. 12 Chacon-Jicarilla-D	1850 FSL, 790 FEL 28-23N-3W Sandoval	5/78	7,589	oil	Dakota 7223-7446 IPF 80 BOPD + 600 MCFGPD		46	Chacon Dakota	
El Paso Natural Gas No. 8 Stromberg	1800 FSL, 990 FEL 29-23N-3W Sandoval	9/71	3,163	gas	Pictured Cliffs 3037-3057 IPF 890 MCFGPD	174010 MCF		Ballard Pictured Cliffs	
M.J. Florance No. 2 Stromberg	1040 FNL, 790 FEL 29-23N-3W Sandoval	1/59	3,050	gas	Pictured Cliffs 2969-2988 IP 4500 MCFGPD			Ballard Pictured Cliffs	

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H.K. Keese No. 1 Cinco Diablos	970 FNL, 1850 FWL 29-23N-3W Sandoval	9/66	3,065	gas	Pictured Cliffs 2954-2966 IP 2333 MCFGPD	234455 MCF		Ballard Pictured Cliffs	
Reynolds Mining Corp. No. 1 Jicarilla	1030 FSL, 1030 FEL 29-23N-3W Sandoval	9/58	8,432	oil	Graneros 7260-7316 IP 200 BOPD	abandoned 1970	44	Undesignated Dakota	
Amerada Hess No. 1 Jicarilla Apache-L	800 FSL, 800 FEL 32-23N-3W Sandoval	6/78	7,476	D&A					
Reynolds Mining No. 1 D Jicarilla	790 FNL, 790 FWL 33-23N-3W Sandoval	2/56	7,190	D&A					
Chace Oil No. 5 Chace-Apache-54	790 FNL, 790 FEL 33-23N-3W Sandoval	11/79	7,525	D&A					
Florance, M.J. No. 7 Stromberg	790 FNL, 1850 FWL 33-23N-3W Sandoval	5/59	3,050	gas	Pictured Cliffs 2893-2897 IP 2000 MCFGPD			Ballard Pictured Cliffs	
Caswell Silver No. 1-33 Jicarilla	790 FNL, 990 FEL 33-23N-3W Sandoval	7/56	3,012	gas	Pictured Cliffs 2904-2924 IP 1460 MCFGPD			Ballard Pictured Cliffs	
Chace Oil No. 3 Chace Apache 54	990 FSL, 1850 FEL 34-23N-3W Sandoval	5/78	7,380	oil	Dakota 6910-7038 IPF 100 BOPD + 385 MCFGPD			Chacon Dakota	
Chace Oil No. 4 Chace Apache-54	990 FNL, 1650 FWL 34-23N-3W Sandoval	6/78	7,467	oil	Dakota 7070-7206 IP 64 BOPD + 473 MCFGPD		46	Chacon Dakota	
Chace Oil No. 7 Chace Apache-54	1850 FSL, 1850 FWL 34-23N-3W Sandoval	6/79	7,350	oil	Dakota 6960-7078 IPF 200 BOPD + 1500 MCFGPD		47	Chacon Dakota	
El Paso Natural Gas No. 9 Stromberg	1650 FSL, 1557 FEL 34-23N-3W Sandoval	9/72	2,887	gas	Pictured Cliffs 2742-2772 IPCAOF 313 MCFGPD	42125 MCF		Ballard Pictured Cliffs	
El Paso Natural Gas No. 10 Stromberg	1550 FSL, 1644 FWL 34-23N-3W Sandoval	8/72	2,940	D&A					
M.J. Florance No. 5 Stromberg	790 FNL, 790 FEL 34-23N-3W Sandoval	4/59	2,900	gas	Pictured Cliffs IP 3000 MCFGPD			Ballard Pictured Cliffs	
M.J. Florance No. 6X Stromberg	790 FNL, 1841 FWL 34-23N-3W Sandoval	10/60	1,999	D&A					
Florance, D.E. No. 6-Y Stromberg	790 FNL, 1650 FWL 34-23N-3W Sandoval	10/60	2,940	gas	Pictured Cliffs 2890-2896 IP 3724 MCFGPD			Ballard Pictured Cliffs	
Chace Oil No. 2 Jicarilla Apache 54 (owwo)	1850 FNL, 900 FEL 34-23N-3W Sandoval	4/77	7,328	oil	Dakota 6992-7122 IPF 60 BOPD + 500 MCFGPD + 50 BWPD		44	Chacon Dakota	
Caswell Silver No. 2 Jicarilla 55	990 FSL, 825 FWL 35-23N-3W Sandoval	4/56	2,868	gas	Pictured Cliffs IP 325 MCFGPD			Ballard Pictured Cliffs	
Dave M. Thomas, Jr. No. 103 Chacon Jicarilla Apache-D	790 FNL, 1850 FWL 35-23N-3W Sandoval	2/79	7,493	oil	Dakota 7099-7238 IPF 90 BOPD + 890 MCFGPD	13985 BO	46	Chacon Dakota	

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Dave M. Thomas, Jr. No. 110 Chacon Jicarilla Apache-D	790 FNL, 1850 FEL 35-23N-3W Sandoval	9/80	7,520	oil	Dakota 7163-7300 IPF 80 BOPD + 175 MCFGPD	39239 BO	46	Chacon Dakota	
Benjamin Elenbogen No. 1 Jicarilla A-55	1850 FNL, 790 FWL 35-23N-3W Sandoval	12/66	2,950	gas	Pictured Cliffs 2840-2860 IP 2188 MCFGPD	554892 MCF		Ballard Pictured Cliffs	
Benjamin Elenbogen No. 2 Jicarilla A-55	1800 FNL, 1850 FEL 35-23N-3W Sandoval	6/68	3,080	gas	Pictured Cliffs 2928-2944 IP 1954 MCFGPD			Ballard Pictured Cliffs	
Benjamin Elenbogen No. 3 Jicarilla A-55	1650 FSL, 1650 FEL 35-23N-3W Sandoval	7/69	2,950	gas	Pictured Cliffs 2758-2781 IPCAOF 6655 MCFGPD	303993 MCF		Ballard Pictured Cliffs	
Superior Oil No. 2 Chacon Dakota	1850 FSL, 980 FEL 35-23N-3W Sandoval	3/81	7,390	oil	Dakota 7052-7164 IPF 150 BOPD + 237 MCFGPD + 16 BWPD	21022 BO	44	Chacon Dakota	
Superior Oil No. 1 Jicarilla-55	1753 FSL, 1883 FWL 35-23N-3W Sandoval	2/81	7,335	oil	Dakota 6974-7105 IPF 44 BOPD + 500 MCFGPD + 2 BWPD	9833 BO		Chacon Dakota	
Jack A. Cole No. 5 Indian Bend	790 FNL, 1850 FWL 36-23N-3W Sandoval	10/81	2,975	gas	Pictured Cliffs 2877-2880 IPF 3239 MCFGPD	74283 MCF		Ballard Pictured Cliffs	
Dave M. Thomas, Jr. 111 Chacon Jicarilla Apache-D Contract 55-A	990 FSL, 1850 FEL 36-23N-3W Sandoval	9/82	7,264	oil	Dakota 6949-7060 IPF 190 BOPD + 150 MCFGPD	2913 BO	45	Chacon Dakota	
Dave M. Thomas, Jr. No. 106 Chacon Jicarilla Apache-D	1850 FSL, 980 FWL 36-23N-3W Sandoval	9/79	7,380	oil	Dakota 7016-7142 IPF 200 BOPD + 440 MCFGPD	37125 BO		Chacon Dakota	
Benjamin Elenbogen No. 3 Jicarilla A-55	1650 FSL, 990 FWL 36-23N-3W Sandoval	11/68	2,980	gas	Pictured Cliffs 2780-2792 IPAOF 10,321 MCFGPD			Ballard Pictured Cliffs	
Benjamin Elenbogen No. 4 Jicarilla 'A'-55	1650 FSL, 1850 FEL 36-23N-3W Sandoval	12/68	2,852	D&A					
Benjamin Elenbogen No. 5 Jicarilla 'A'-55	1850 FNL, 790 FWL 36-23N-3W Sandoval	12/68	2,936	D&A					
Jack A. Cole No. 8 Indian Bend	810 FNL, 820 FEL 36-23N-3W Sandoval	10/81	2,975	gas	Pictured Cliffs 2866-2880 IPF 1385 MCFGPD	98131 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 9 Indian Bend	1850 FSL, 790 FEL 36-23N-3W Sandoval	10/81	2,897	gas	Pictured Cliffs 2733-2779 IPF 396 MCFGPD	28922 MCF		Ballard Pictured Cliffs	
Dave M. Thomas, Jr. No. 105 Chacon-Jicarilla Apache-D	790 FNL, 790 FWL 36-23N-3W Sandoval	9/79	7,508	oil	Dakota 7142-7278 IPF 90 BOPD + 260 MCFGPD	24808 BO		Chacon Dakota	
Continental Oil No. 4 AXI Apache P	660 FNL, 660 FEL 19-23N-4W Sandoval	1/75	2,557	gas	Pictured Cliffs 2431-2460 IPF 588 MCFGPD	8357 MCF		Ballard Pictured Cliffs	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Silver Caswell No. 1 Jicarilla 45	1650 FNL, 990 FWL 19-23N-4W Sandoval	3/56	2,498	gas	Pictured Cliffs 2318-2333 IP 1900 MCFGPD			Ballard Pictured Cliffs	
Merrion & Bayless No. 3 Ponca	1850 FSL, 790 FEL 19-23N-4W Sandoval	8/81	2,525	gas	Pictured Cliffs 2394-2406 IPF 445 MCFGPD	29351 MCF		Ballard Pictured Cliffs	
Merrion & Bayless No. 4 Ponca	1850 FSL, 1180 FWL 19-23N-4W Sandoval	9/81	2,500	D&A					
Robert L. Bayless No. 5 AXI Apache-P	1850 FNL, 1660 FWL 20-23N-4W Sandoval	5/82	2,599	gas	Pictured Cliffs 2470-2482 IPF 310 MCFGPD	4257 MCF		Ballard Pictured Cliffs	
Merrion & Bayless No. 1 Ponca	790 FSL, 1850 FEL 20-23N-4W Sandoval	1/81	2,500	gas	Pictured Cliffs 2346-2361 IPF 605 MCFGPD	85829 MCF		Ballard Pictured Cliffs	
Merrion & Bayless No. 2 Ponca	790 FSL, 1850 FWL 20-23N-4W Sandoval	4/81	2,500	gas	Pictured Cliffs 2362-2372 IPF 259 MCFGPD	83609 MCF		Ballard Pictured Cliffs	
Robert L. Bayless No. 1 Jicarilla-393-B	790 FSL, 1850 FEL 21-23N-4W Sandoval	7/82	2,596	gas	Pictured Cliffs 2456-2473 IPF 935 MCFGPD	21613 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 1 Apache Flats	790 FSL, 990 FWL 21-23N-4W Sandoval	6/76	2,956	gas	Pictured Cliffs 2428-2455 IPF 811 MCFGPD	77801 MCF		Ballard Pictured Cliffs	
San Juan Drilling Co. No. 1 Vanderslice	990 FSL, 1090 FWL 21-23N-4W Sandoval	3/54	7,852	D&A					
Jack A. Cole No. 15 Apache Flats	1650 FNL, 990 FWL 22-23N-4W Sandoval	11/77	2,707	D&A					
Amoco Production No. 3 Jicarilla- Tribal 390	800 FNL, 850 FEL 24-23N-4W Sandoval	6/73	3,100	gas	Pictured Cliffs 2919-2938 IPF 1513 MCFGPD	154740 MCF		Ballard Pictured Cliffs	
Pan American Petroleum No. 1 Jicarillo-Tribal	990 FNL, 1650 FWL 24-23N-4W Sandoval	1/70	3,000	D&A					
Pan American Petroleum No. 2 Jicarillo-Tribal	1600 FSL, 800 FEL 24-23N-4W Sandoval	12/69	2,952	gas	Pictured Cliffs 2829-2852 IP 1740 MCFGPD	165527 MCF		Ballard Pictured Cliffs	
Southern Union Gas No. 1 Tribal	1650 FNL, 990 FEL 26-23N-4W Sandoval	2/51	2,722	D&A					
Robert L. Bayless No. 1 Jicarilla 390-B	1850 FSL, 790 FWL 26-23N-4W Sandoval	12/83	2,690	gas	Pictured Cliffs 2524-2583 IPF 742 MCFGPD			Ballard Pictured Cliffs	
Robert L. Bayless No. 1 Jicarilla-392-B	1850 FNL, 1850 FEL 27-23N-4W Sandoval	7/82	2,651	gas	Pictured Cliffs 2481-2500 IPF 851 MCFGPD	20515 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 8 Apache Flats	1710 FSL, 1010 FWL 27-23N-4W Sandoval	7/76	2,520	gas	Pictured Cliffs 2394-2415 IPF 739 MCFGPD	258683 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 13 Apache Flats	790 FSL, 1450 FEL 27-23N-4W Sandoval	10/76	2,580	gas	Pictured Cliffs 2488-2521 IPF 821 MCFGPD	22090 MCF		Ballard Pictured Cliffs	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Jack A. Cole No. 10 Apache Flats	1850 FNL, 790 FWL 27-23N-4W Sandoval	12/77	2,540	gas	Pictured Cliffs 2426-2473 IPF 1400 MCFGPD	121455 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 3 Apache Flats	1090 FSL, 1090 FWL 28-23N-4W Sandoval	5/77	2,361	gas	Pictured Cliffs 2262-2288 IPF 751 MCFGPD	41436 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 4 Apache Flats	1450 FNL, 1450 FWL 28-23N-4W Sandoval	5/77	2,438	gas	Pictured Cliffs 2328-2344 IPF 739 MCFGPD	320306 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 7 Apache Flats	990 FNL, 1450 FEL 28-23N-4W Sandoval	7/76	2,499	gas	Pictured Cliffs 2410-2446 IPF 750 MCFGPD	242555 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 11 Apache Flats	1450 FSL, 1450 FEL 28-23N-4W Sandoval	10/76	2,470	gas	Pictured Cliffs 2352-2404 IPF 1100 MCFGPD	238610 MCF		Ballard Pictured Cliffs	
Merrion & Bayless No. 3 Jicarilla-428	990 FSL, 990 FWL 29-23N-4W Sandoval	3/78	2,765	gas	Pictured Cliffs 2150-2162 Chacra 2614-2668 IPF 196 MCFGPD			Ballard Pictured Cliffs	
Merrion & Bayless No. 6 Jicarilla-428	790 FNL, 790 FEL 29-23N-4W Sandoval	5/78	2,430	gas	Pictured Cliffs 2290-2332 IPF 1500 MCFGPD	157843 MCF		Ballard Pictured Cliffs	
Benjamin Ellenbogen No. 1 Jicarilla-415	1190 FNL, 1190 FEL 30-23N-4W Sandoval	7/69	2,450	D&A					
Merrion & Bayless No. 7 Jicarilla-428	790 FSL, 1170 FWL 30-23N-4W Sandoval	5/78	2,320	gas	Pictured Cliffs 2164-2188 IPF 600 MCFGPD	39875 MCF		Ballard Pictured Cliffs	
Merrion & Bayless No. 9 Jicarilla-428	990 FSL, 1650 FEL 30-23N-4W Sandoval	12/79	2,280	gas	Pictured Cliffs 2170-2195			Ballard Pictured Cliffs	
Merrion & Bayless No. 5 Jicarilla 428	1070 FNL, 1050 FWL 31-23N-4W Sandoval	3/78	2,709	gas	Pictured Cliffs 2096-2124 La Ventana 2558-2584 IPF 112 MCFGPD			Ballard Pictured Cliffs	
Merrion & Bayless No. 1 Jicarilla 428-2	790 FNL, 790 FEL 31-23N-4W Sandoval	9/76	6,662	oil	Pictured Cliffs 2120-2160 IPF 312 MCFGPD Chacra 2594-2614 IPF 15 MCFGPD Mesaverde, Mancos, Gallup, Carlisle, Graneros, Dakota 5162-6375 IPF 38 BOPD + 70 MCFGPD			Chacon Dakota	
Merrion & Bayless No. 4 Jicarilla 428	990 FNL, 1650 FWL 32-23N-4W Sandoval	9/77	2,740	gas	Pictured Cliffs 2146-2180 La Ventana 2606-2636 IPF 589 MCFGPD	148317 MCF		Ballard Pictured Cliffs	
Merrion & Bayless No. 1 Jicarilla 428 (owwo)	1850 FNL, 1850 FEL 32-23N-4W Sandoval	4/75	2,700	gas	Pictured Cliffs 2262-2280 IPF 2200 MCFGPD	64780 MCF		Ballard Pictured Cliffs	
Fred Turner, Jr. No. 1 Jicarilla	990 FNL, 990 FEL 32-23N-4W Sandoval	1/55	4,417	oil	Point Lookout 4382-4394 IP 28 BOPD	11683 BO abd 1961	38	Otero Point Lookout	
Fred Turner, Jr. No. 2 Jicarilla	1980 FNL, 1980 FEL 32-23N-4W Sandoval	6/56	4,404	oil	Point Lookout 4372-4378 IPP 28 BOPD	7198 BO abd 1961	38	Otero Point Lookout	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Jack A. Cole No. 2 Apache Flats	1190 FSL, 790 FWL 33-23N-4W Sandoval	5/76	2,379	D&A					
Jack A. Cole No. 9 Apache Flats	790 FNL, 1850 FEL 33-23N-4W Sandoval	5/77	2,431	gas	Pictured Cliffs 2326-2346 IPF 727 MCFGPD	37819 MCF		Ballard Pictured Cliffs	
Magnolia Petroleum No. 1 Jicarilla	660 FNL, 660 FWL 33-23N-4W Sandoval	4/55	7,628	D&A					oil show in Point Lookout by DST from 4382-4425 ft; oil show in Todilto by DST from 7563-7578 ft
Merrion & Bayless No. 1 Jicarilla 392-1	1850 FNL, 790 FWL 33-23N-4W Sandoval	9/75	2,403	gas	Pictured Cliffs 2276-2337 IPCAOF 370 MCFGPD	100386 MCF		Ballard Pictured Cliffs	
Jack A. Cole No. 14 Apache Flats	790 FNL, 1850 FWL 34-23N-4W Sandoval	7/78	2,561	D&A					
Jack A. Cole No. 12 Apache Flats	1650 FNL, 790 FWL 35-23N-4W Sandoval	9/76	2,650	D&A					
Sunray Mid-Continent No. 1 N.M. Apache	790 FSL, 990 FWL 21-23N-5W Sandoval	12/58	6,601	gas	Dakota 6284-6432 IP 520 MCFGPD	abandoned 1974			
Merrion & Bayless No. 1 Jicarilla-A	960 FNL, 890 FWL 22-23N-5W Sandoval	7/71	2,150	D&A					
Merrion & Bayless No. 2 Jicarilla 429 (OWPA)	1650 FSL, 1650 FWL 23-23N-5W Sandoval	12/74	6,622	D&A					gas show in Pictured Cliffs by DST from 2090-2210 ft; gas show in Gallup by DST from 5390-5448 ft
B.A. Dodgen No. 1 Jicarilla Contract 399	1850 FSL, 1850 FWL 24-23N-5W Sandoval	7/68	2,280	D&A					small gas flow in Pictured Cliffs through perforations from 2230-2254 ft
Merrion & Bayless No. 3 Jicarilla-429	990 FNL, 990 FEL 24-23N-5W Sandoval	4/78	2,415	gas	Pictured Cliffs 2274-2286 IP TSTM			Ballard Pictured Cliffs	
Merrion & Bayless No. 1 Jicarilla-430	1650 FSL, 990 FEL 25-23N-5W Sandoval	11/78	2,365	D&A					
Merrion & Bayless No. 1-Y Jicarilla-430	1650 FSL, 940 FEL 25-23N-5W Sandoval	6/80	2,350	D&A					
Merrion & Bayless No. 3 Jicarilla-430	1850 FNL, 1850 FEL 25-23N-5W Sandoval	6/80	2,387	D&A					
Merrion Oil & Gas No. 5 Jicarilla Contract 430	1650 FNL, 790 FEL 35-23N-5W Sandoval	11/83	6,711	oil	Gallup 5338-5394 Sanastee 6072-6084 IPF 37 BOPD + 45 MCFGPD		45	Undesignated Gallup	
Humble Oil & Refining Co. No. 1 Jicarilla E	990 FSL, 990 FEL 36-23N-5W Sandoval	12/55	6,353	oil	Sanastee 5898-5912 IP 51 BOPD		45	Otero Sanastee	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Grace Petroleum No. 1 Grace Federal-19	900 FNL, 980 FWL 19-23N-6W Sandoval	9/80	5,665	oil	Gallup 5280-5452 IPF 12 BOPD + 10 MCFGPD	2209 BO	40	Lybrook Gallup	
Aztec Energy No. 1 Emily	1650 FSL, 940 FWL 20-23N-6W Sandoval	1/82	5,795	oil	Gallup 5394-5620 IPF 165 BOPD + 135 MCFGPD + 54 BWPD	5371 BO		Lybrook Gallup	
S.D. Johnson No. 1 Chapman (OWWO)	660 FSL, 1980 FWL 20-23N-6W Sandoval	12/63	5,700	oil	Gallup 5526-5616 IP 68 BOPD	37697 BO	40	Lybrook Gallup	
Dick Lauritsen No. 1 Gulf-Federal-24	920 FNL, 795 FWL 24-23N-6W Sandoval	4/83	7,081	oil	Gallup 5372-5776 IPP 25 BOPD + 75 MCFGPD + 5 BWPD		49	Counselors Gallup	
Sinclair Oil & Gas No. 1 Texas National Federal	660 FNL, 660 FEL 25-23N-6W Sandoval	12/57	6,600	D&A					oil recovered from Gallup through perforations from 5410-5430 ft
Dietrich Exploration No. 22 Federal-26	1650 FNL, 1650 FWL 26-23N-6W Sandoval	1/81	6,654	oil	Gallup 5269-5603 IPP 19 BOPD + 50 MCFGPD + 5 BWPD		36	Undesignated Gallup	
Dome Petroleum No. 1 Dome Federal 1-28-23	1660 FSL, 830 FEL 28-23N-6W Sandoval	6/80	5,764	oil	Gallup 5476-5694 IPP 15 BOPD + 47 MCFGPD		38	Undesignated Gallup	
Dome Petroleum No. 2 Dome-Federal	1940 FNL, 930 FEL 28-23N-6W Sandoval	6/80	5,770	oil	Gallup 5476-5694 IPP 15 BOPD + 47 MCFGPD			Undesignated Gallup	
Odessa Natural Corp. No. 1 Dome et al Federal-28	1800 FSL, 840 FEL 28-23N-6W Sandoval	7/78	2,838	D&A					gas show in Chacra from 2620-2714 ft. Flowed 23 MCFGPD.
Aztec Energy No. 3 Lu-Lu	660 FSL, 2090 FWL 29-23N-6W Sandoval	6/83	5,885	oil	Gallup 5210-5723 IPF 47 BOPD + 23 MCFGPD + 2 BWPD		43	Lybrook Gallup	
Aztec Energy No. 4 Lu-Lu	990 FSL, 990 FEL 29-23N-6W Sandoval	12/83	5,904	oil	Gallup 5237-5795 IPF 37 BOPD + 41 MCFGPD + 3 BWPD			Lybrook Gallup	
Aztec Energy No. 1 Lu-Lu	790 FNL, 950 FWL 29-23N-6W Sandoval	2/82	5,735	oil	Gallup 5355-5572 IPF 165 BOPD + 130 MCFGPD	6401 BO	41	Lybrook Gallup	
Noarko Resources No. 5 Lu-Lu	2310 FSL, 1650 FEL 29-23N-6W Sandoval	12/83	5,830	oil	Mancos 5143-5434 Gallup 5434-5662 IP 43 BOPD + 55 MCFGPD + 1 BWPD		42	Lybrook Gallup	
Aztec Energy No. 2 Lu-Lu	2140 FSL, 990 FWL 29-23N-6W Sandoval	11/82	5,777	oil	Gallup 5226-5649 IPF 69 BOPD + 278 MCFGPD	1117 BO	41	Lybrook Gallup	
Merrion Oil & Gas No. 1 Chapman-A	1790 FNL, 1830 FWL 29-23N-6W Sandoval	5/82	5,750	oil	Gallup 5131-5645 IPF 83 BOPD + 210 MCFGPD	2696 BO	45	Lybrook Gallup	
Union Texas Petroleum No. 1 Lybrook B	2206 FSL, 412 FEL 30-23N-6W Sandoval	2/84	6,735	oil	Gallup 5076-5628 Greenhorn 6227-6330 IPP 13 BOPD + 13 MCFGPD + 5 BWPD		41	Lybrook Gallup	
Tesoro Petroleum No. 1 Quinella	990 FNL, 990 FWL 31-23N-6W Sandoval	1/72	6,698	oil	Gallup 5470-5680 IPP 52 BOPD + 63 MCFGPD + 3 BWPD	abandoned 9/74			

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
Odessa Natural Corp. No. 1 Dome et al Federal-33	1800 FSL, 1650 FEL 33-34N-6W Sandoval	7/78	2,595	D&A					
Texas National Petroleum No. 1 Maddox F-A (OWWO)	660 FSL, 660 FWL 34-23N-6W Sandoval	8/56	5,515	oil	Gallup 5386-5414 IPP 17 BOPD	abandoned 8/59	39.5	Undesignated Gallup	
Brinkerhoff Drilling Co. No. 1 Warner Government	610 FNL, 790 FEL 35-23N-6W Sandoval	4/67	5,484	D&A					
Lobo Petroleum No. 1 Gulf State-36	850 FNL, 800 FEL 36-23N-6W Sandoval	11/82	5,605	oil	Gallup 5049-5470 IPF 35 BOPD + 150 MCFGPD + 25 BWPD			Undesignated Gallup	
BCO Inc. No. 22 Federal 'B'	2600 FSL, 660 FEL 22-23N-7W Sandoval	12/70	5,656	oil	Gallup 5383-5603 IPF 23 BOPD + 80 MCFGPD + 1 BWPD	7595 BO	40	Lybrook Gallup	
BCO Inc. No. 1-A Federal (OWDD)	1908 FNL, 701 FWL 23-23N-7W Sandoval	11/69	5,690	oil	Gallup 5382-5615 IPF 60 BOPD + 2 BWPD	12809 BO		Lybrook Gallup	
Texota Oil No. 1 Federal	1908 FNL, 701 FWL 23-23N-7W Sandoval	1/58	5,695	D&A					
Continental Oil No. 1 Federal-Rodgers	1980 FSL, 660 FWL 24-23N-7W Sandoval	1/57	6,659	oil	Gallup 5338-5500 IP 80 BOPD		40.2	Lybrook Gallup	
Dugan Production No. 1 Ballymaloe	890 FSL, 800 FWL 25-23N-7W Sandoval	12/81	2,875	gas	Chacra 2474-2492 IPF 102 MCFGPD			Undesignated Chacra	
Dugan Production No. 2 Ballymaloe	1840 FSL, 2280 FWL 25-23N-7W Sandoval	3/84	5,773	oil	Mancos 5175-5231 Gallup 5238-5706 IPS 160 BOPD + 80 MCFGPD		40	Lybrook Gallup	
Dugan Production No. 2 Kinsale	2170 FSL, 570 FEL 26-23N-7W Sandoval	6/83	5,698	oil	Gallup 5112-5615 IPS 72 BOPD + 88 MCFGPD			Lybrook Gallup	
Dugan Production No. 1 Kinsale	790 FSL, 790 FEL 26-23N-7W Sandoval	2/82	2,860	gas	Chacra 2442-2457 IPF 73 MCFGPD			Undesignated Chacra	
BCO Inc. No. 6 Federal 'B'	790 FSL, 990 FWL 27-23N-7W Sandoval	11/78	5,400	oil	Gallup 5042-5285 IPF 19 BOPD + 114 MCFGPD			Undesignated Chacra	
BCO Inc. No. 1 Federal (OWWO)	660 FSL, 660 FEL 31-23N-7W Sandoval	5/71	6,015	oil	Gallup 4706-4958 IPF 50 BOPD	8998 BO		Alamito Gallup	
BCO Inc. No. 2 Federal-C	2310 FSL, 790 FEL 31-23N-7W Sandoval	5/72	5,218	oil	Gallup 4800-5158 IPF 15 BOPD + 48 MCFGPD	7256 BO		Alamito Gallup	
BCO Inc. No. 4 Federal-I	1700 FNL, 950 FWL 33-23N-7W Sandoval	7/79	5,240	oil	Gallup 4858-5110 IPF 19 BOPD + 114 MCFGPD			Alamito Gallup	
BCO Inc. No. 3 Federal-I	990 FSL, 790 FWL 33-23N-7W Sandoval	8/79	5,158	oil	Gallup 4858-5110 IPF 19 BOPD + 114 MCFGPD		40	Alamito Gallup	

Operator, well number, and lease	Location (section-township-range, county)	Completion date (month/year)	Total depth (ft)	Completed Status	Producing unit, depth (ft) initial potential	Cumulative production	Oil gravity °API	Field name	Reported shows
BCO Inc. No. 2 Federal-'I'	1850 FSL, 990 FEL 33-23N-7W Sandoval	7/79	5,260	oil	Gallup 4894-5108 IPF 27 BOPD + 162 MCFGPD		42	Alamito Gallup	
BCO Inc. No. 1 Federal-I	1850 FNL, 1700 FEL 33-23N-7W Sandoval	7/79	5,306	oil	Gallup 4928-5144 IP 27 BOPD + 162 MCFGPD		42	Alamito Gallup	
BCO Inc. No. 4 Federal-B	1850 FSL, 880 FWL 34-23N-7W Sandoval	7/79	5,313	oil	Gallup 4932-5150 IPP 19 BOPD + 114 MCFGPD		42	Alamito Gallup	
BCO Inc. No. 3 Federal-B	1800 FSL, 1760 FEL 34-23N-7W Sandoval	11/78	5,404	oil	Gallup 5024-5246			Alamito Gallup	
BCO Inc. No. 2 Federal-B	1830 FNL, 1840 FEL 34-23N-7W Sandoval	10/78	5,402	oil	Gallup 5024-5274 IPF 27 BOPD + 108 MCFGPD			Alamito Gallup	
BCO Inc. No. 5 Federal-B	860 FNL, 790 FWL 34-23N-7W Sandoval	12/78	5,350	oil	Gallup 4978-5202			Alamito Gallup	

Appendix 7. Supplement to Mineral-Resource Potential Classification.

CLASSIFICATION OF MINERAL-RESOURCE POTENTIAL

This report	BLM Scheme (written commun.)*	Oak Ridge National Laboratory (Voelker and others, 1979)*	USGS (Brobst and Goudarzi, 1984)
High	H/C,D	4/3,4	substantiated
Moderate	M/C,D	3/3,4	probable
Low-moderate	L/B-D	2/1-4	----
Low	O/C,D	1/1-4	----
Very low	O/C,D	1/3,4	----
Unknown	M,H/A,B or ND	3,4/1,2	----
Not Determined	ND	----	

*See next page for definition of these classification schemes. OA, OB, LA, MA, and HA are not possible.

CLASSIFICATION OF MINERAL RESOURCES

USGS (USGS and USBM, 1976)	USDOE (U.S. DEPT. OF ENERGY, 1980)	Mineral-Resource Potential Classification
Identified	Reserves	
Demonstrated or proven	Inventory	
Measured		
Indicated		
Inferred	Resources	
Undiscovered	Probable	
Hypothetical	Possible	high / moderate
Speculative	Speculative	

Definition and comparison of BLM and Oak Ridge National Laboratory Duel Classification Schemes.

BLM (written commun.)	Oak Ridge National Laboratory (Voelker and others, 1979)
CLASSIFICATION	FAVORABILITY
O. The geologic and the inferred geologic processes do not indicate favorability for accumulation of mineral resources.	1. The lowest measure of favorability. The geology of the tract has none of the characteristics normally associated with the resource being evaluated. In fact, most of the geological characteristics identified may adversely affect the accumulation of significant amounts of the resource.
L. The geologic environment and the inferred geologic processes indicate low favorability for accumulation of mineral resources.	2. A lower intermediate level of favorability. Some of the broad geologic characteristics needed for the accumulation of a particular resource are present, but the more specific characteristics do not suggest significant accumulations of the resource or, at best, indicate only very scattered and relatively small accumulations.
M. The geologic environment, the inferred geologic process, the reported mineral occurrences or valid geochemical/geophysical anomaly indicate moderate favorability for accumulation of mineable mineral resources.	3. A higher intermediate level of favorability. A rating of 3 indicates the presence of many broad regional characteristics as well as a few of the more detailed features associated with the occurrence of a specific resource.
H. The geologic environment, the inferred geologic processes, the reported mineral occurrences, and/or valid geochemical and geophysical anomaly and the known mines or deposits indicate high favorability for accumulation of mineable mineral resources.	4. The highest level of favorability. The geology of the tract shows many regional and local characteristics that are known to be related to the occurrence of the resource being evaluated. Conversely, no adverse geologic characteristics can be identified.
LEVEL OF CONFIDENCE	CERTAINTY
A. The available data are either insufficient and/or cannot be considered as direct evidence to support or refute the possible existence of mineral resources within the respective area.	1. The lowest degree of certainty. No direct data (assays, analyses, or identification by other means) are available to indicate the presence of the resource, regardless of the geologic favorability, and any direct evidence that does not exist is so far away as to preclude extrapolation to the tract under consideration. Accordingly, the tract will be well outside any known resource district.
B. The available data provide indirect evidence to support or refute the possible existence of mineral resources.	2. A lower intermediate degree of certainty. As in the "1" certainty rating, no direct data supporting resource occurrence are known for the tract. However, the tract must lie within or close to a known resource district or near direct evidence of resource occurrence. Extrapolation from producing areas to the tract must, of course, be based on sound and reasonable inferences.
C. The available data provide direct evidence but are quantitatively minimal to support or refute the possible existence of mineral resources.	3. A higher intermediate degree of certainty. A certainty of 3 is assigned whenever all conditions in "2" are fulfilled and whenever there is at least one piece of direct evidence for resource occurrence within the tract (assays, and so on) or whenever extrapolation from producing areas to the tract seems stronger than for a "2" certainty in the opinion of the resource specialists.
D. The available data provide abundant direct and indirect evidence to support or refute the possible existence of mineral resources.	4. The highest degree of certainity. A 4 rating is assigned to tracts in a region of abundant resource exploration and exploitation. For example, a tract with existing mines or oil and gas wells would definitely be given a 4. However, data showing the absence of resources can also strengthen certainty. When used with a favorability of 1, a certainty of 4 indicates a high degree of assurance that the resource does not occur in the tract.

The highest level would be written H/D or 4/4 and the lowest level would be written O/D or 1/4

ARMS	Aerial Radiometric and Magnetic Survey
BLM	U.S. Bureau of Land Management
CRIB	Computerized Resource Information Bank
DMEA	Defense Minerals Exploration Administration
FLPMA	Federal Land Policy and Management Act
HSSR	Hydrogeochemical Stream-Sediment Reconnaissance
KGRA	Known Geothermal Resource Area
KGRF	Known Geothermal Resource Field
MILS	Mineral Industry Location Survey
NCRDS	National Coal Resource Data Systems
NMBM&MR	New Mexico Bureau of Mines and Mineral Resources
NURE	National Uranium Resource Evaluation
PRLA	Preference-Right Lease Application
RPRA	Rio Puerco Resource Area
USBM	U.S. Bureau of Mines
USGS	U.S. Geological Survey

EASTERN SAN JUAN BASIN / WESTERN NACIMIENTO MOUNTAINS

AGE	GP, FM, MEM.	THICK (FT)	DESCRIPTION
QUAT.		-	terrace, alluvial fan and bajada deposits of gravel, sand and mud
TERTIARY – EOC.	San Jose Fm.	0-2400	alluvial, mainly braided stream deposits of arkosic and conglomeratic sandstone and mudstone
TERTIARY – PALEOCENE	Nacimiento Fm.	0-900	black and gray mudstone with minor sandstone; meandering stream, floodplain and Lacustrine deposits
TERTIARY – PALEOCENE	Ojo Alamo Sandstone	0-100	coarse arkosic and conglomeratic sandstone; braided stream environment
UPPER CRETACEOUS	Kirtland Shale/ Fruitland Fm. UND.	0-600	mudstone, sandstone and coal; coastal plain meandering stream and overbank deposits
UPPER CRETACEOUS	Pictured Cliffs Sandstone	45-65	regressive, coastal marine sandstone with minor shale
UPPER CRETACEOUS	Lewis Shale	1500-2000	marine shale with minor siltstone and limestone
UPPER CRETACEOUS – MESAVERDE GP.	Cliff House Sandstone (La Ventana Tongue)	0-900	gray sandstone and shale; coastal marine deposits
UPPER CRETACEOUS – MESAVERDE GP.	Menefee Fm.	265-700	carbonaceous mudstone, sandstone and coal; coastal plain meandering stream and overbank deposits
UPPER CRETACEOUS – MESAVERDE GP.	Point Lookout Sandstone	40-275	gray sandstone with minor shale; regressive coastal marine deposits
UPPER CRETACEOUS	Mancos Shale	2000-2200	black to gray marine shale with limestone and siltstone
UPPER CRETACEOUS	Dakota Fm.	115-250	nearshore continental and marine sandstone and mudstone
UPPER JURASSIC	Morrison Fm.		
UPPER JURASSIC	Jackpile Sandstone	23-90	cross-bedded, white to yellow, subarkosic sandstone with minor mudstone; braided alluvial plain deposits
UPPER JURASSIC	Brushy Basin Shale Mem.	200-300	gray-green to red-brown mudstone with buff arkosic sandstone; meandering stream, floodplain and lacustrine deposits
UPPER JURASSIC	Westwater Canyon Mem.	65-225	buff arkosic sandstone with minor mudstone; braided alluvial plain deposits
UPPER JURASSIC	Recapture shale Mem.	250	red-brown to gray-green mudstone with buff to gray sandstone; braided and meandering alluvial plain deposits
UPPER JURASSIC	Todilto Fm.		
UPPER JURASSIC	Upper Gypsum Mem.	60-140	lacustrine gypsum
UPPER JURASSIC	Lower Limestone Mem.	5-35	lacustrine limestone
UPPER JURASSIC	Entrada Sandstone	150	reddish-orange, cross-bedded, eolian quartz sandstone with minor inter-bedded mudstone
UPPER TRIASSIC	Chinle Fm.		
UPPER TRIASSIC	Petrified Forest Mem.	450-710	red-brown, green-gray and purple silty shale and siltstone; meandering stream, floodplain and lacustrine deposits
UPPER TRIASSIC	Poleo Sandstone Lentil	0-160	yellow sandstone and conglomerate with minor mudstone; meandering alluvial plain deposits
UPPER TRIASSIC	Salitral Shale Mem.	100-330	red to gray mudstone with local sandstone; meandering alluvial plain deposits
UPPER TRIASSIC	Agua Zarca Sandstone	80-150	red to gray, cross-bedded, Lenticular sandstone with minor mudstone and conglomerate; meandering alluvial plain deposits
PERMIAN – GUAD.	San Andres Fm.	0-300	gray, shallow marine limestone, dolomite and shale
PERMIAN – GUAD.	Glorieta Sandstone	80-100	white, coastal marine, quartz sandstone
PERMIAN – LEONARD.	Yeso Fm.	60-300	tan-brown to light orange sandstone and mudstone with minor gypsum and carbonates; nearshore continental and marine deposits
PERMIAN – WOLF.	Abo Fm.	150-750	red sandstone and mudstone; continental deposits, predominantly fluvial
PENNSYLVANIAN – MAGDALENA GP.	Madera Fm.	0-2000	
PENNSYLVANIAN – MAGDALENA GP.	Upper Arkosic Mem.		red to brown arkosic sandstone and arenaceous limestone; continental and marine deposits
PENNSYLVANIAN – MAGDALENA GP.	Lower Limestone Mem.		marine cherty limestone and calcareous shale
PENNSYLVANIAN – MAGDALENA GP.	Sandia Fm.	0-280	coarse quartz sandstone, mudstone and argillaceous limestone; coastal marine and continental deposits
PENNSYLVANIAN	Osha Canyon Fm.	0-55	arenaceous limestone and calcareous shale; marine deposits
PENNSYLVANIAN	Log Springs Fm.	0-50	red mudstone and arkosic to conglomeratic sandstone; continental deposits
MISS.	Arroyo Peñasco Gp.	0-150	marine limestone, sandstone, dolomite and mudstone
P€			gneiss, schist, greenstone, granite and quartzite

SOUTHERN ESPAÑOLA BASIN / JEMEZ MOUNTAINS

AGE	GP, FM, MEM.	THICK (FT)	DESCRIPTION
TERTIARY – MIO.-PLIO.	Santa Fe Gp.		
TERTIARY – MIO.-PLIO.	Tesuque Fm.	0-9000	fanglomerates along with alluvial sandstone and mudstone; minor volcanics and volcaniclastics
TERTIARY – OLIG.	Espiñasco Fm.	0-1450	volcaniclastic breccia, conglomerate, sandstone and mudstone; intermediate volcanic flows and tuffs
TERTIARY – EOC.	Galisteo Fm.	0-1500	sandstone, mudstone and conglomerate; braided alluvial plain deposits
	↓ SAME AS ALBUQUERQUE BASIN ↓		

CENTRAL ALBUQUERQUE BASIN

AGE	GP, FM, MEM	THICK (FT)	DESCRIPTION
QUAT.	Ortiz Gravel	0-150	alluvial gravel and sand
TERTIARY – MIOCENE - PLIO.	Santa Fe Fm.	0-12,000	continental, mainly alluvial deposits
TERTIARY – MIOCENE - PLIO.	Ceja Mem.		buff to gray conglomerate and sandstone
TERTIARY – MIOCENE - PLIO.	Middle Red Mem.		reddish-brown sandstone, mudstone and conglomerate
TERTIARY – MIOCENE - PLIO.	Zia Sandstone Mem.		buff to gray sandstone, mudstone and conglomerate
TERTIARY – EOC.	Galisteo Fm.	0-3000	sandstone, mudstone and conglomerate; braided alluvial plain deposits
UPPER CRETACEOUS	Mesaverde Gp.	2000	coastal plain and nearshore marine sandstone, mudstone, coal
UPPER CRETACEOUS	Mancos Shale	900	gray to black marine shale
UPPER CRETACEOUS	Dakota Sandstone	100-200	coastal plain and nearshore marine sandstone and mudstone
UPPER JURASSIC	Morrison Fm.	500	sandstone, mudstone, conglomerate; fluvial and floodplain deposits
UPPER JURASSIC	Todilto Fm.	0-100	lacustrine gypsum and limestone
UPPER JURASSIC	Entrada Fm.	0-100	eolian sandstone
UPPER TRIASSIC	Chinle Fm.	1000	reddish-brown mudstone and minor sandstone; fluviatile, floodplain and Lacustrine deposits
UPPER TRIASSIC	Santa Rosa Fm.	150	red to gray sandstone and minor mudstone; meandering stream deposits
PERMIAN – GUADALUPIAN	Bernal Fm.	0-100	continental, red sandstone and siltstone; some limestone
PERMIAN – GUADALUPIAN	San Andres Limestone	200	gray to black shallow shelf marine limestone
PERMIAN – LEONARDIAN	Glorieta Sandstone	0-200	clear, white, coastal marine quartz sandstone
PERMIAN – LEONARDIAN	Yeso Fm.	500-1200	nearshore continental and marine, tan to orange-brown sandstone and mudstone with gypsum and limestone
PERMIAN – WOLFC.	Abo Fm.	800-900	continental, red sandstone and mudstone
PENNSYLVANIAN	Magdalena Gp.		
PENNSYLVANIAN	Madera Fm.	800-1200	marine limestone, shale and sandstone
PENNSYLVANIAN	Sandia Fm.	200-500	coastal marine and continental sandstone, shale, limestone and conglomerate
MISS.	Arroyo Peñasco Gp.	0-50	marine limestone and shale
P€			gneiss, schist, quartzite, greenstone, granite and metavolcanics

JEMEZ MOUNTAINS

AGE	GP, FM, MEM	THICK (FT)	DESCRIPTION
QUATERNARY – PLEISTOCENE – TEWA GROUP	Valles Rhyolite Fm.		
QUATERNARY – PLEISTOCENE – TEWA GROUP	Banco Bonito Mem.		porphyritic obsidian flow
QUATERNARY – PLEISTOCENE – TEWA GROUP	El Cajete Mem.		rhyolitic air-fall deposits
QUATERNARY – PLEISTOCENE – TEWA GROUP	Battleship Rock Mem.	0-390	rhyolite ash-flow tuff
QUATERNARY – PLEISTOCENE – TEWA GROUP	Valle Grande Mem.	-	rhyolite domes
QUATERNARY – PLEISTOCENE – TEWA GROUP	Redondo Creek Mem.	0-490	rhyolite domes, flows, tuffs and breccias
QUATERNARY – PLEISTOCENE – TEWA GROUP	Deer Canyon Mem.	0-100	rhyolite dome, flow and tuff
QUATERNARY – PLEISTOCENE – TEWA GROUP	Bandelier Tuff Fm.	(0-975)	felsic tuffs, intrusives
QUATERNARY – PLEISTOCENE – TEWA GROUP	Tshirege Mem.	0-223	pumice and welded tuff
QUATERNARY – PLEISTOCENE – TEWA GROUP	Cerro Toledo rhyolite	-	volcanic domes
QUATERNARY – PLEISTOCENE – TEWA GROUP	Cerro Rubio Quartz Latite	-	volcanic domes
QUATERNARY – PLEISTOCENE – TEWA GROUP	Otowi Mem.	0-26	pumice and tuff
TERTIARY – PLIOCENE	Puye Fm. (of Santa Fe Gp)	0-725	volcaniclastic & alluvial deposits associated with Polvadera Gp.
TERTIARY – PLIOCENE – POLVADERA GROUP	El Rechuelos Rhyolite	-	rhyolitic domes and extrusions
TERTIARY – PLIOCENE – POLVADERA GROUP	Tschicoma Fm.	0-2625	Latite, quartz latite and andesite flows; some tuffs
TERTIARY – PLIOCENE – POLVADERA GROUP	Lobato Basalt	0-460	basaltic lavas and cones
TERTIARY – PLIOCENE / MIOCENE	Cochiti Fm.		volcaniclastic & alluvial deposits associated with Keres Gp.
TERTIARY – MIOCENE – KERES GROUP	Bearhead Rhyolite	-	rhyolite tuffs, flows, domes and shallow intrusives
TERTIARY – MIOCENE – KERES GROUP	Paliza Canyon Fm.	0-2950	basaltic to intermediate flows, tuffs and breccias
TERTIARY – MIOCENE – KERES GROUP	Canovas Canyon Rhyolite	0-900	rhyolite flows, tuffs, domes and intrusives
TERTIARY – MIOCENE – KERES GROUP	Basalt of Chamisa Mesa	-	thin, multiple olivine basalt flows

HAGAN BASIN / SANDIA MOUNTAINS

AGE	GP, FM, MEMBER	THICK (FT)	DESCRIPTION
QUAT.			bajada, alluvial fan, terrace and bolson deposits of gravel, sand and mud
TERTIARY – Mio.-Plio.	Santa Fe Gp.	0-10,000	conglomerate, sandstone, mudstone; mainly alluvial deposits
TERTIARY – OLIG.	Españasco Fm.	1450	volcaniclastic breccia, conglomerate, sandstone, mudstone; intermediate volcanic flows and tuffs
TERTIARY – EOC.	Galisteo Fm.	850-4250	sandstone, mudstone and conglomerate; braided alluvial plain deposits
UPPER CRETACEOUS	Mesaverde Gp.	2000	coastal plain and nearshore marine sandstone, mudstone and coal
UPPER CRETACEOUS	Mancos Shale	1400-1500	gray to black, marine shale with minor siltstone and limestone
UPPER CRETACEOUS	Dakota Fm.	7-50	coastal plain and nearshore marine sandstone and mudstone
UPPER JURASSIC	Morrison Fm.	490-915	
UPPER JURASSIC	Jackpile Sandstone Mem.		sandstone with minor mudstone; braided alluvial plain deposits
UPPER JURASSIC	Brushy Basin Shale Mem.		meandering stream and floodplain deposits of mudstone and sandstone
UPPER JURASSIC	Westwater Canyon Mem.		braided alluvial plain deposits of arkosic sandstone and mudstone
UPPER JURASSIC	Recapture Shale Mem.		meandering alluvial plain deposits of sandstone and mudstone
UPPER JURASSIC	Todilto Fm.	55-200	
UPPER JURASSIC	Upper Gypsum Mem.		Lacustrine gypsum
UPPER JURASSIC	Lower Limestone Mem.		Lacustrine limestone
UPPER JURASSIC	Entrada Sandstone	60-120	eolian sandstone
UPPER TRIASSIC	Chinle Fm.	1300-1400	reddish-brown mudstone with minor sandstone; meandering stream, floodplain and Lacustrine deposits
UPPER TRIASSIC	Santa Rosa Fm.	100-400	light gray to brown sandstone with minor mudstone and conglomerate; meandering stream deposits
PERMIAN – GUADALUPIAN	Bernal Fm.	0-75	tan to brown sandstone, continental deposits
PERMIAN – GUADALUPIAN	San Andres Fm.	200	gray to black, shallow marine limestone
PERMIAN – GUADALUPIAN	Glorieta Sandstone	65-125	clean, white coastal marine quartz sandstone
PERMIAN – LEONARD.	Yeso Fm.	325-560	nearshore continental and marine; tan to orange-brown sandstone, mudstone, gypsum and limestone
PERMIAN – WOLF.	Abo Fm.	700-900	red sandstone and mudstone; continental deposits
PENNSYLVANIAN	Magdalena Gp.		
PENNSYLVANIAN	Madera Fm.	450-1400	marine limestone, shale and sandstone
PENNSYLVANIAN	Sandia Fm.	20-200	coastal marine and continental sandstone, mudstone, limestone and conglomerate
MISS.	Arroyo Peñasco Gp.	0-73	marine limestone, dolomite, sandstone and mudstone
P€			gneiss, schist, quartzite, granite and greenstone

Figure 10 - Stratigraphy of the Rio Puerco Resource Area

OF
211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 1
CHACO CANYON QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES
OF-211

Mapped, edited, and published by the Geological Survey

Compiled in 1976 from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1959–1967 See index for dates of individual maps

Partially revised from aerial photographs taken 1973–1976 and from other official sources. Revised information not field checked

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central and west zones. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Huerfano Trading Post NW–1966
2 Huerfano Trading Post–1967
3 Nageezi–1959
4 Gonzales Mesa–1963
5 Lapis Point–1963
6 Schmitz Ranch–1963
7 Ojito–1963
8 Huerfano Trading Post SW–1966
9 Blanco Trading Post–1966
10 Tafoya Canyon–1963
11 Otero Store–1963
12 Billy Rice Canyon–1963
13 Lindrith–1963
14 Pueblo Bonito NW–1966
15 Kimbeto–1967
16 Lybrook NW–1966
17 Lybrook–1966
18 Counselor–1966
19 Tancosa Windmill–1966
20 Five Lakes Canyon NW–1963
21 Five Lakes Canyon NE–1963
22 Pueblo Bonito–1966
23 Sargent Ranch–1966
24 Fire Rock Well–1966
25 Lybrook SE–1966
26 Mule Dam–1966
27 Deer Mesa–1966
28 Taylor Ranch–1963
29 Arroyo Chijuillita–1963

UTM GRID AND 1976 MAGNETIC NORTH DECLINATION AT CENTER OF MAP
GN MN 1°29' 27 MILS 12½° 222 MILS

SCALE 1:100 000
KILOMETERS
MILES
FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

NEW MEXICO
QUADRANGLE LOCATION

LEGEND
Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route
U.S. route
State route

MAP 1 - Metallic, uranium, barite, and fluorite occurrences, deposits, and mines in the Chaco Canyon 1:100,000 quadrangle, Northern Rio Puerco Resource Area

CHACO CANYON, NEW MEXICO
SW/4 AZTEC (NJ 13-10) 1 250 000-SCALE MAP
N3600–W10700/30x60
1976

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 2
ABIQUIU QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)
OF-211

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1953–1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13, Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Llaves–1955
2 Navajo Peak–1953
3 Alire–1953
4 Canjilon–1953
5 Magote Peak–1953
6 Valle Grande Peak–1953
7 La Madera–1953
8 Laguna Peak–1953
9 Echo Amphitheater–1953
10 Ghost Ranch–1953
11 Canjilon SE–1953
12 El Rito–1953
13 Ojo Caliente–1953
14 Regina–1963
15 Gallina–1963
16 Arroyo Del Agua–1953
17 Youngsville–1953
18 Cañones–1953
19 Abiquiu–1953
20 Medanales–1953
21 Lyden–1953
22 Cuba–1963
23 Nacimiento Peak–1963
24 Jarosa–1953
25 Cerro Del Grant–1953
26 Polvadera Peak–1953
27 Vallecitos–1953
28 Chili–1953
29 San Juan Pueblo–1953

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

ABIQUIU, NEW MEXICO
SE/4 AZTEC (NJ 13-10) 1:250 000-SCALE MAP
N3600–W10600/30x60
1978

MAP 2 - Metallic, uranium, barite, and fluorite occurrences, deposits, and mines in the Abiquiu 1:100,000 quadrangle, Northern Rio Puerco Resource Area

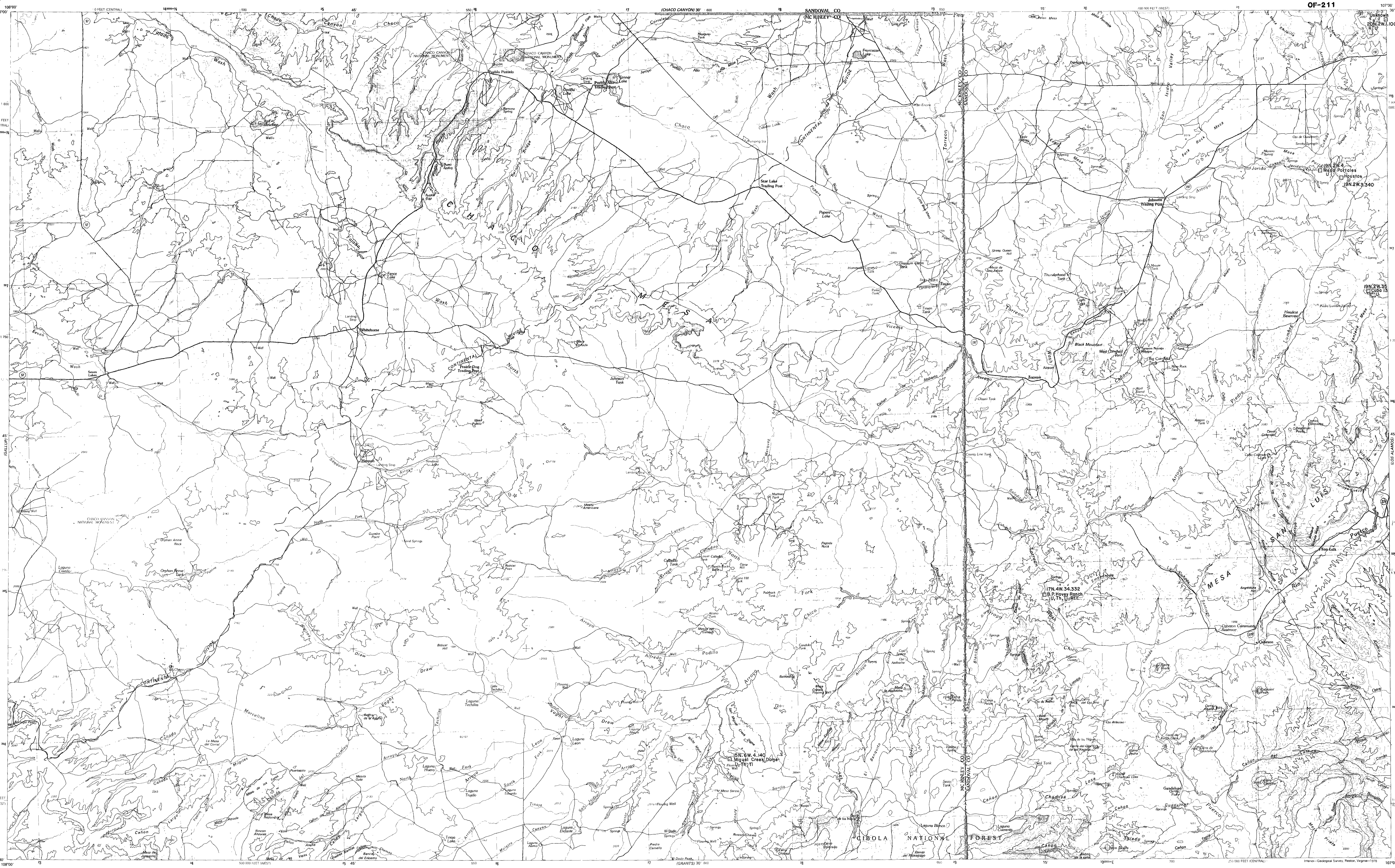
See map 1 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 3

CHACO MESA QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)

OF-211



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000-scale topographic maps dated 1960–1970. See index for dates of individual maps. Partially revised from aerial photographs taken 1974–76 and from other official sources. Revised information not field checked. Map edited 1977

Projection and 10 000-meter grid, zone 13 Universal Transverse Mercator. 50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

INDEX TO 1:24 000-SCALE MAPS

UTM GRID AND 1977 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

CONTOUR INTERVAL 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

LEGEND

ROAD CLASSIFICATION

CHACO MESA, NEW MEXICO
N3530-W10700/30x60
1977

MAP 3- Metallic, uranium, barite, and fluorite occurrences, deposits, and mines in the Chaco Mesa 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

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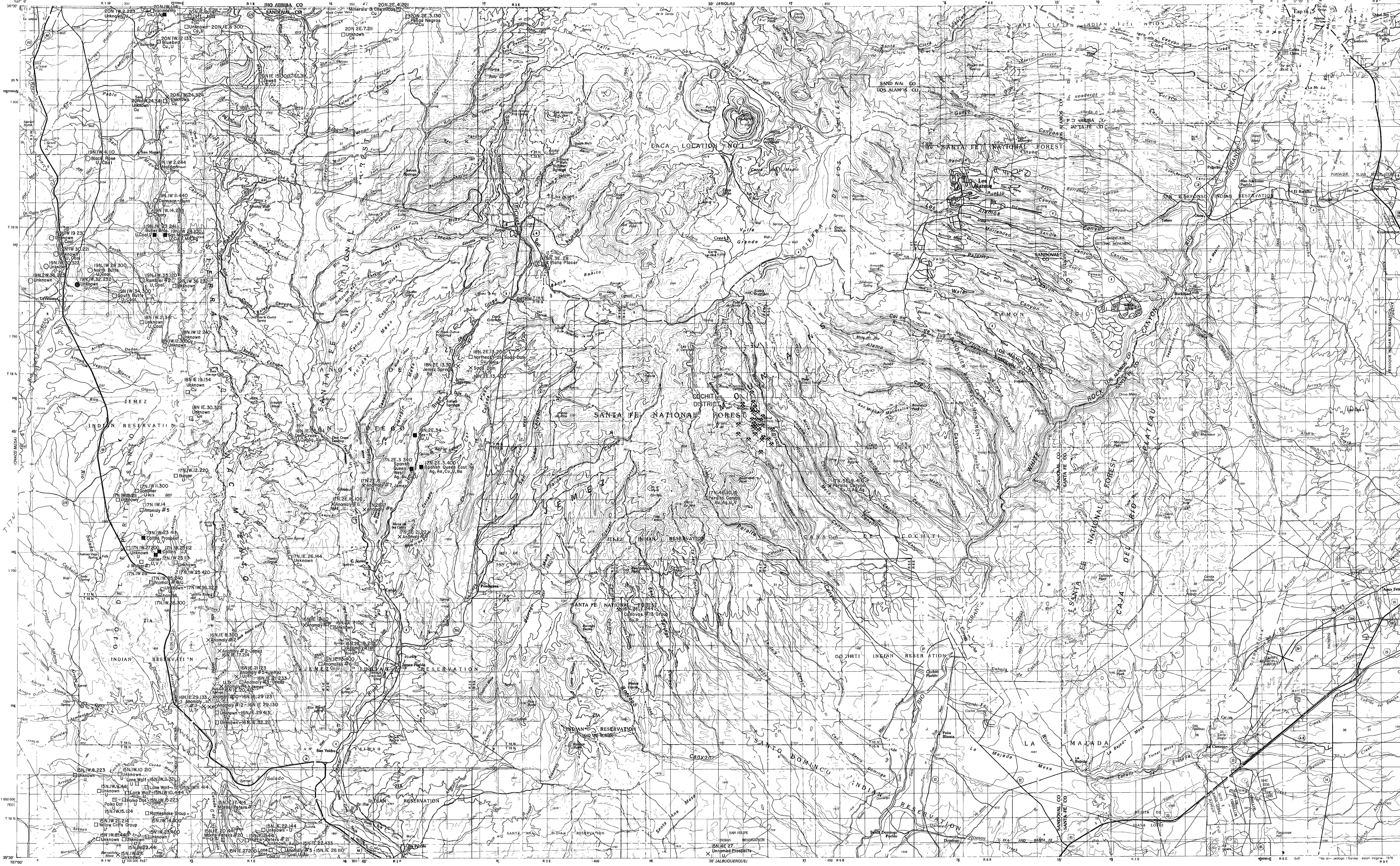
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 4
LOS ALAMOS QUADRANGLE
NEW MEXICO
OF-211



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Compiled from USGS 1:24 000-scale topographic maps dated 1951–1977. See index for dates of individual maps. Partially revised from aerial photographs taken 1974 and 1976 and from other official sources. Revised information not field checked. Map edited 1977

Projection and 1 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

MAP 4 - Metallic, uranium, barite, and fluorite occurrences, deposits, and mines in the Los Alamos 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

LOS ALAMOS NEW MEXICO

N3530-W10600/30x60

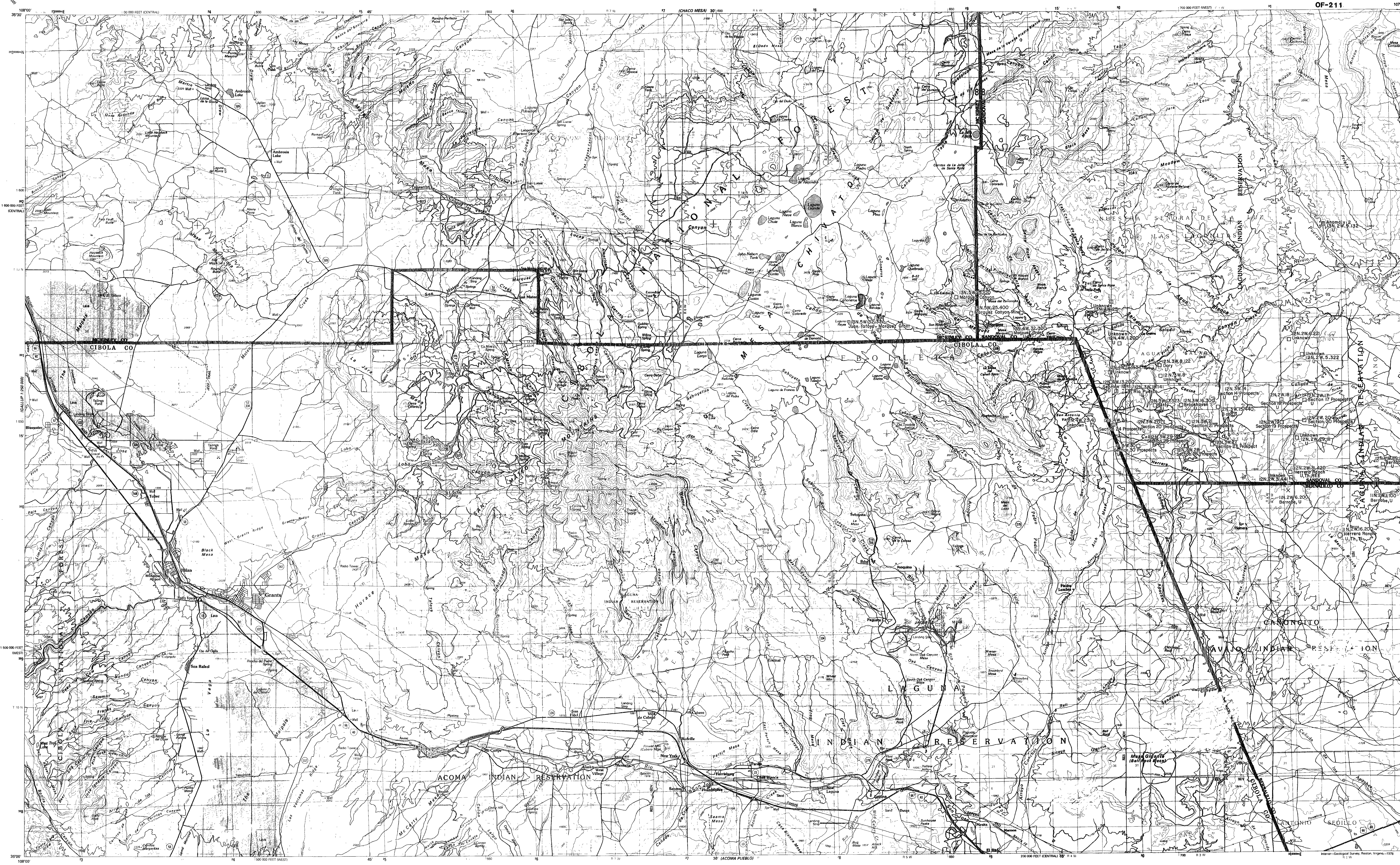
1978

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 5

GRANTS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)

OF-211



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 - scale topographic maps dated 1954 – 1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1973–75 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000 - meter grid, zone 13,
Universal Transverse Mercator
50 000 - foot grid ticks based on New Mexico coordinate system west and central zones. 1927 North American datum

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17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32

1 Goat Mountain–1957
2 Ambrosia Lake–1957
3 San Lucas Dam–1963
4 Cerro Alesna–1963
5 El Dado Mesa–1961
6 Laguna Seca–1961
7 Cerro Tinaja–1961
8 Casa Salazar–1961
9 Bluewater–1957 (Photorevised–1971)
10 Dos Lomas–1957
11 San Mateo–1963
12 Cerro Pelon–1963
13 Laguna Cañoneros–1961
14 Marquez–1961
15 La Gotera–1961
16 Puerco Dam–1961
17 Milan–1957 (Photorevised–1971)
18 Grants–1957 (Photorevised–1971)
19 Lobo Springs–1957
20 Mount Taylor–1957
21 Seboyeta–1957
22 Moquino–1957
23 Arch Mesa–1957
24 Herrera–1954
25 San Rafael–1957
26 Grants SE–1957 (Photorevised–1971)
27 Mc Cartys–1957 (Photorevised–1971)
28 Cubero–1957 (Photorevised–1971)
29 Laguna–1957 (Photorevised–1971)
30 Mesita–1957 (Photorevised–1971)
31 Mesa Gigante–1957
32 Cañoncito School–1954 (Photorevised–1971)

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

This map complies with national map accuracy standards
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092

NEW MEXICO
QUADRANGLE LOCATION

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

GRANTS, NEW MEXICO
SW/4 ALBUQUERQUE (NI 13-1) 1 250 000-SCALE MAP

N3500–W10700/30x60

1978

MAP 5 - Metallic, uranium, barite, and fluorite occurrences, deposits, and mines in the Grants 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 6
ALBUQUERQUE QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1961. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

Some grant boundaries adjacent to Rio Grande and Rio Puerco are omitted because of insufficient data

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Sky Village NW – 1960
2 Sky Village NE – 1960
3 Bernalillo NW – 1953
4 Santa Ana Pueblo – 1954
5 San Felipe Pueblo – 1954
6 San Felipe Pueblo NE – 1954
7 Madrid – 1961
8 Sky Village – 1954
9 Sky Village SE – 1954 (Photorevised – 1972)
10 Loma Machete – 1954 (Photorevised – 1972)
11 Bernalillo – 1954 (Photorevised – 1972)
12 Placitas – 1954
13 Haga – 1954
14 Benavidez Ranch – 1954
15 Volcano Ranch – 1954 (Photorevised – 1972)
16 Los Griegos – 1960 (Photorevised – 1972)
17 Alameda – 1960 (Photorevised – 1972)
18 Sandia Crest – 1961 (Photorevised – 1972)
19 Sandia Park – 1954
20 San Pedro – 1954
21 Edgewood – 1956
22 La Mesita Negra – 1954 (Photorevised – 1971)
23 La Mesita Negra SE – 1954 (Photorevised – 1973)
24 Albuquerque West – 1960 (Photorevised – 1972)
25 Albuquerque East – 1960 (Photorevised – 1972)
26 Tijeras – 1961 (Photorevised – 1972)
27 Sedillo – 1954
28 Edgewood – 1954

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

KILOMETERS

MILES

FEET

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

NEW MEXICO
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route · U.S. route · State route

ALBUQUERQUE, NEW MEXICO
SE/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP

N3500—W10600/30x60

1978

MAP 6 - Metallic, uranium, barite, and fluorite occurrences, deposits, and mines in the Albuquerque 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

OF 211

MAP 7

BELEN, NEW MEXICO
OF-211

30x60 MINUTE SERIES (TOPOGRAPHIC)

BELEN, NEW MEXICO
N3430-W10600/30x60
1979

MAP 7 - Metallic, uranium, barite, and fluorite occurrences, deposits, and mines in the Belen 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 8
CHACO CANYON QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES
OF-211

Mapped, edited, and published by the Geological Survey

Compiled in 1976 from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1959–1967. See index for dates of individual maps

Partially revised from aerial photographs taken 1973–1976 and from other official sources. Revised information not field checked

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central and west zones 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Huerfano Trading Post NW–1966
2 Huerfano Trading Post–1967
3 Nageezi–1959
4 Gonzales Mesa–1963
5 Lapis Point–1963
6 Schmitz Ranch–1963
7 Ojito–1963
8 Huerfano Trading Post SW–1966
9 Blanco Trading Post 1966
10 Tafoya Canyon 1963
11 Otero Store–1963
12 Billy Rice Canyon–1963
13 Lindrith–1963
14 Pueblo Bonito NW–1966
15 Kimbeto–1967
16 Lybrook NW–1966
17 Lybrook–1966
18 Counselor–1966
19 Tancosa Windmill–1966
20 Five Lakes Canyon NW–1963
21 Five Lakes Canyon–1963
22 Pueblo Bonito–1966
23 Sargent Ranch–1966
24 Fire Rock Well–1966
25 Lybrook SE–1966
26 Mule Dam–1966
27 Deer Mesa–1966
28 Taylor Ranch–1966
29 Arroyo Chijuilla–1966

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS

Resource Potential

- Low
- Unevaluated or Very Low

LEGEND

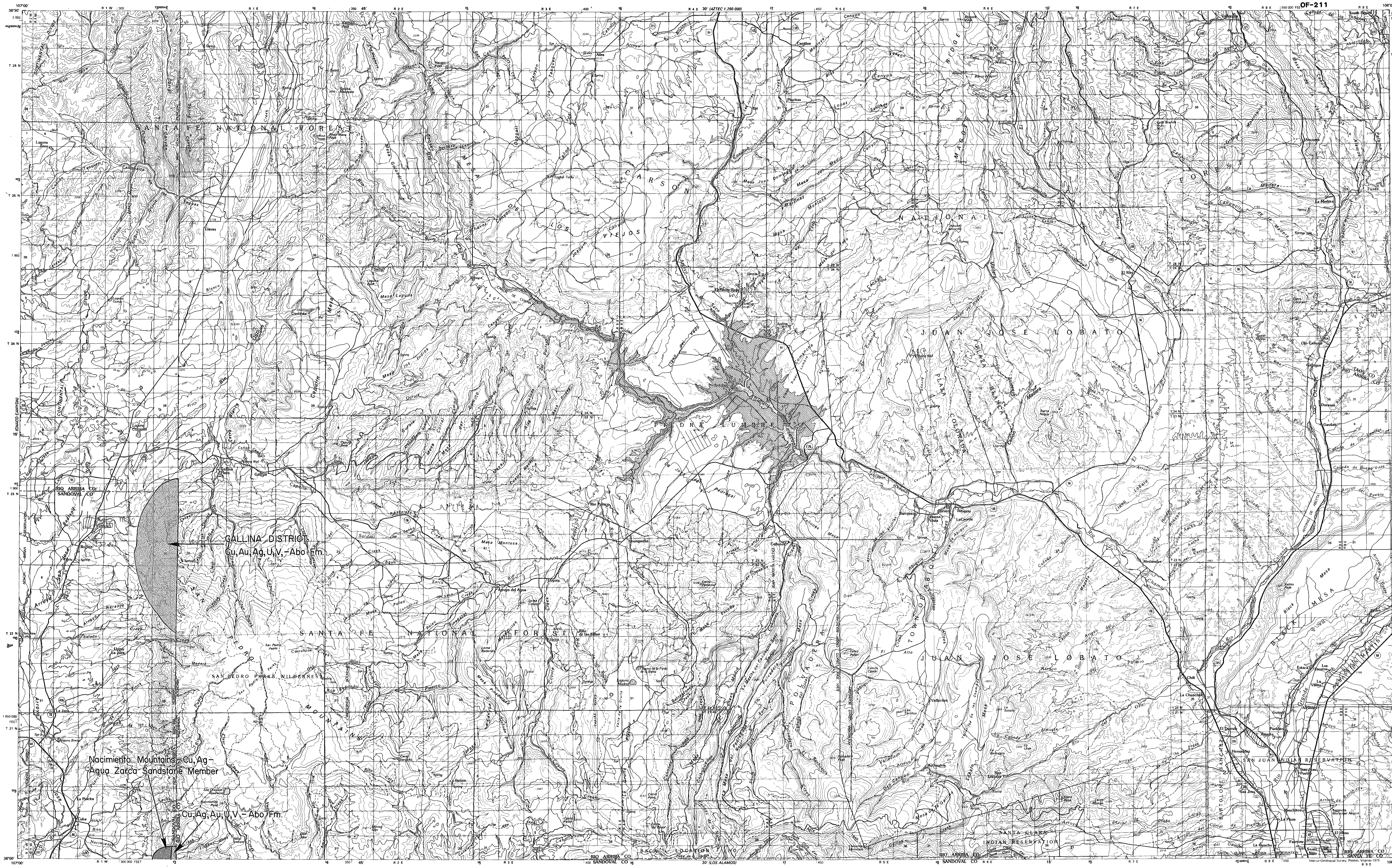
ROAD CLASSIFICATION

MAP 8- Mineral-resource potential of metals, uranium, barite, and fluorite in the Chaco Canyon 1:100,000 quadrangle, Northern Rio Puerco Resource Area

CHACO CANYON, NEW MEXICO
N3600-W10700/30x60
1976

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 9
ABIQUIU QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)
OF-211



MAP 9 - Mineral-resource potential of metals, uranium, barite, and fluorite in the Abiquiu 1:100,000 quadrangle, Northern Rio Puerco Resource Area

RESOURCE POTENTIAL

- moderate
- moderate to low
- unevaluated or very low

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1953–1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13.
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Llaves–1955	11 Canjilon SE–1953	21 Lyden–1953
2 Navajo Peak–1953	12 El Rito–1953	22 Cuba–1963
3 Alire–1953	13 Ojo Caliente–1953	23 Nacimiento Peak–1963
4 Canjilon–1953	14 Regina–1963	24 Jarosa–1953
5 Magote Peak–1953	15 Gallina–1963	25 Cerro Del Grant–1953
6 Valle Grande Peak–1953	16 Arroyo Del Agua–1953	26 Polvadera Peak–1953
7 La Madera–1953	17 Youngsville–1953	27 Vallecitos–1953
8 Laguna Peak–1953	18 Cañones–1953	28 Chili–1953
9 Echo Amphitheater–1953	19 Abiquiu–1953	29 San Juan Pueblo–1953
10 Ghost Ranch–1953	20 Medanales–1953	

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000
KILOMETERS
MILES
FEET

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route   U.S. route   State route

ABIQUIU, NEW MEXICO
SE/4 AZTEC (NJ 13-10) 1 250 000-SCALE MAP
N3600–W10600/30x60
1978

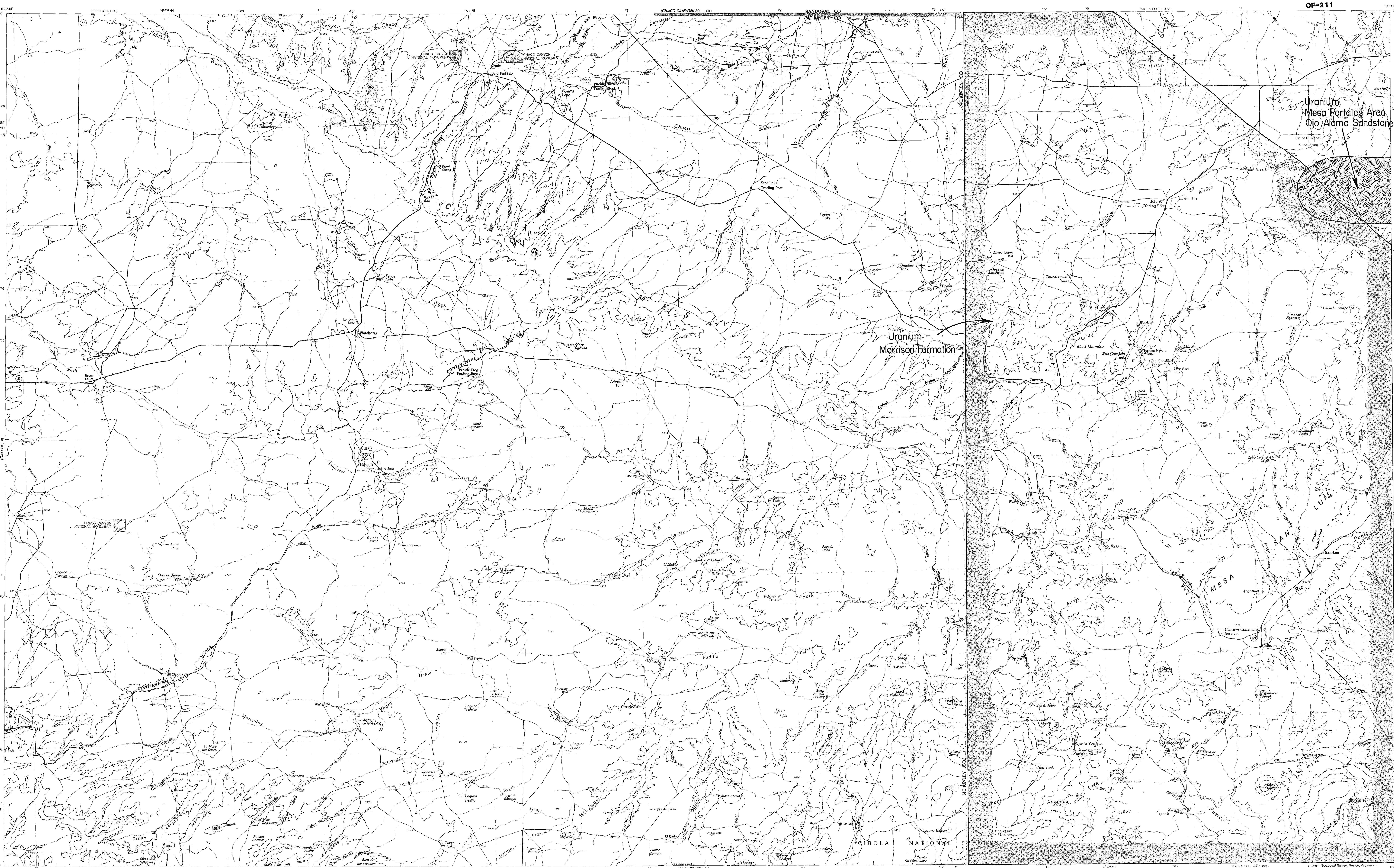
This map complies with national map accuracy standards
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 10

CHACO MESA QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)

OF-211



Resource Potential

- moderate to low
- low
- unevaluated or very low

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000-scale topographic maps dated 1960–1970. See index for dates of individual maps
Partially revised from aerial photographs taken 1974–76 and from other official sources. Revised information not field checked
Map edited 1977

Projection and 10 000-meter grid, zone 13 Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

INDEX TO 1:24 000-SCALE MAPS

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32

1 Seven Lakes NW–1970
2 Seven Lakes NE–1970
3 Pueblo Pintado–1961
4 Pueblo Alto Trading Post–1960
5 Star Lake–1961
6 Ojo Encino Mesa–1961
7 Johnson Trading Post–1961
8 Mesa Portales–1961
9 Seven Lakes–1970
10 Kin Nahzin Ruins–1970
11 Whitehorse–1961
12 Whitehorse Rincon–1961
13 Rincon Marquez–1961
14 Tinian–1961
15 Wolf Stand–1961
16 Headcut Reservoir–1961
17 Laguna Castilio–1963
18 Orphan Annie Rock–1963
19 Hospah–1961
20 Mesita Americana–1961
21 Mesita Del Gavilan–1961
22 Canada Calladita–1961
23 Arroyo Empedrado–1961
24 San Luis–1961
25 Borrego Pass–1963
26 Mesa De Los Toros–1963
27 Piedra De La Aguila–1961
28 El Dado–1961
29 Mesa Cortada–1961
30 Cerro Pando–1961
31 Guadalupe–1961
32 Cabezon Peak–1961

UTM GRID AND 1977 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

CONTOUR INTERVAL 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MAP 10 - Mineral-resource potential of metals, uranium, barite, and fluorite in the Chaco Mesa 1:100,000 quadrangle, Northern Rio Puerco Resource Area

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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

LEGEND

- Perennial stream, lake
- Intermittent stream, lake
- Village or locality
- Landmark structure
- Public park or recreation area
- Forest or game land area
- Other public area or Military or Indian reservation

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Street or unimproved road
- Trail

Interstate route   U S route   State route

CHACO MESA, NEW MEXICO
NW 4 ALBUQUERQUE (NI 13 1) 1 250 000-SCALE MAP

N3530–W10700/30x60

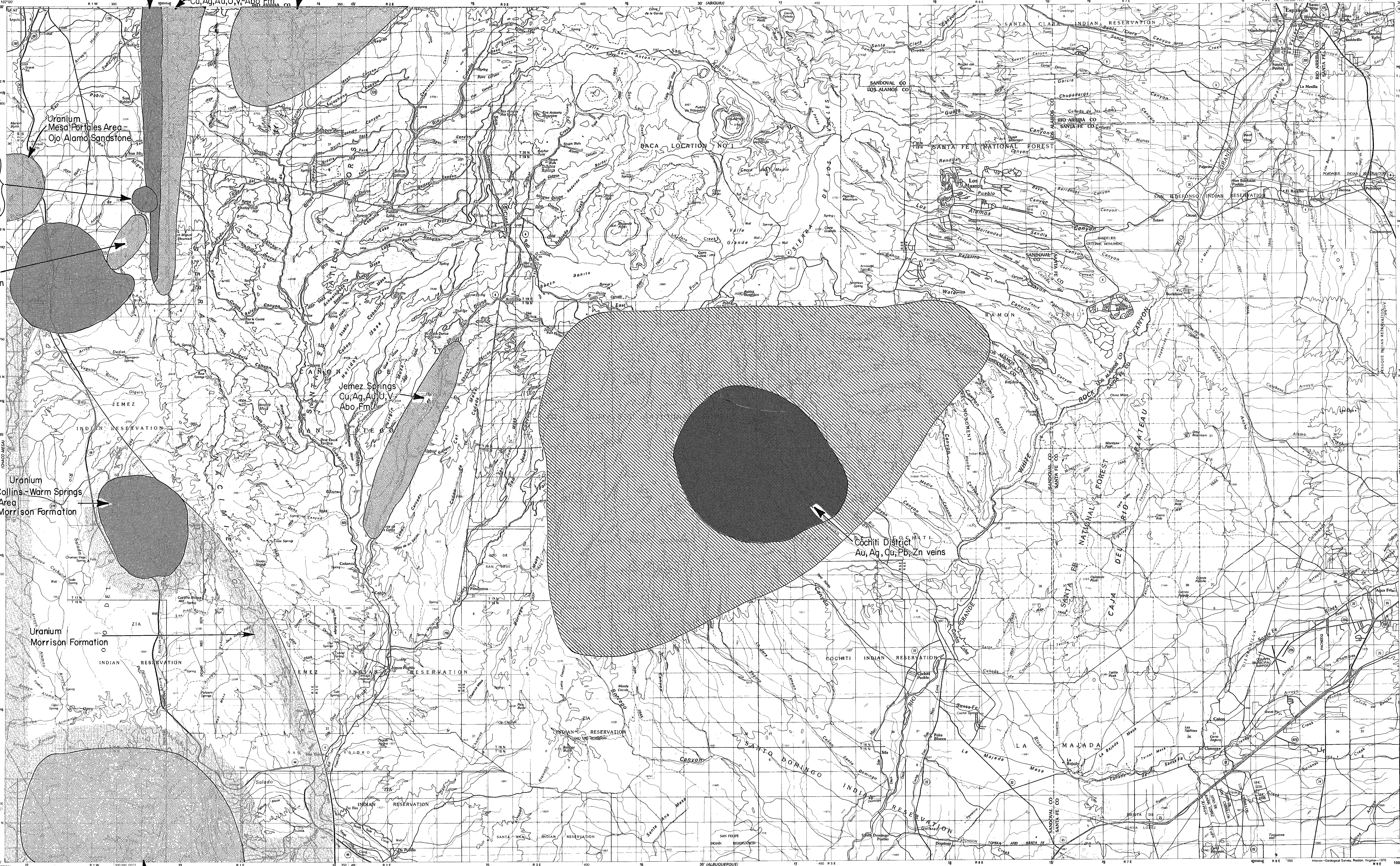
1977

OF
211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF-211 MAP 11

LOS ALAMOS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)



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Compiled from USGS 1:24 000-scale topographic maps dated 1951-1970. See index for dates of individual maps. Partially revised from aerial photographs taken 1974 and 1976 and from other official sources. Revised information not field checked. Map edited 1978

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator. 50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

INDEX TO 1:24 000-SCALE MAPS

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Resource Potential

- High
- Moderate
- Moderate to Low
- Low
- Unknown
- Unevaluated due to lack of useable data

QUADRANGLE LOCATION

LEGEND

ROAD CLASSIFICATION

LOS ALAMOS, NEW MEXICO

N3530-W10600/30x60

1978

MAP 11 - Mineral-resource potential of metals, uranium, barite, and fluorite in the Los Alamos 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
MAP 12 GRANTS QUADRANGLE OF-211

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 - scale topographic maps dated 1954 – 1963. See index for dates of individual maps. Partially revised from aerial photographs taken 1973–75 and other official sources. Revised information not field checked. Map edited 1978

Projection and 10 000 - meter grid, zone 13, Universal Transverse Mercator. 50 000 - foot grid ticks based on New Mexico coordinate system west and central zones. 1927 North American datum

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Resource Potential

- high
- moderate
- moderate to low
- low
- unevaluated or very low

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route — U.S. route — State route

MAP 12- Mineral-resource potential of metals, uranium, barite, and fluorite in the Grants 1:100,000 quadrangle, Northern Rio Puerco Resource Area

GRANTS, NEW MEXICO
SW/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP

N3500–W10700/30x60

1978

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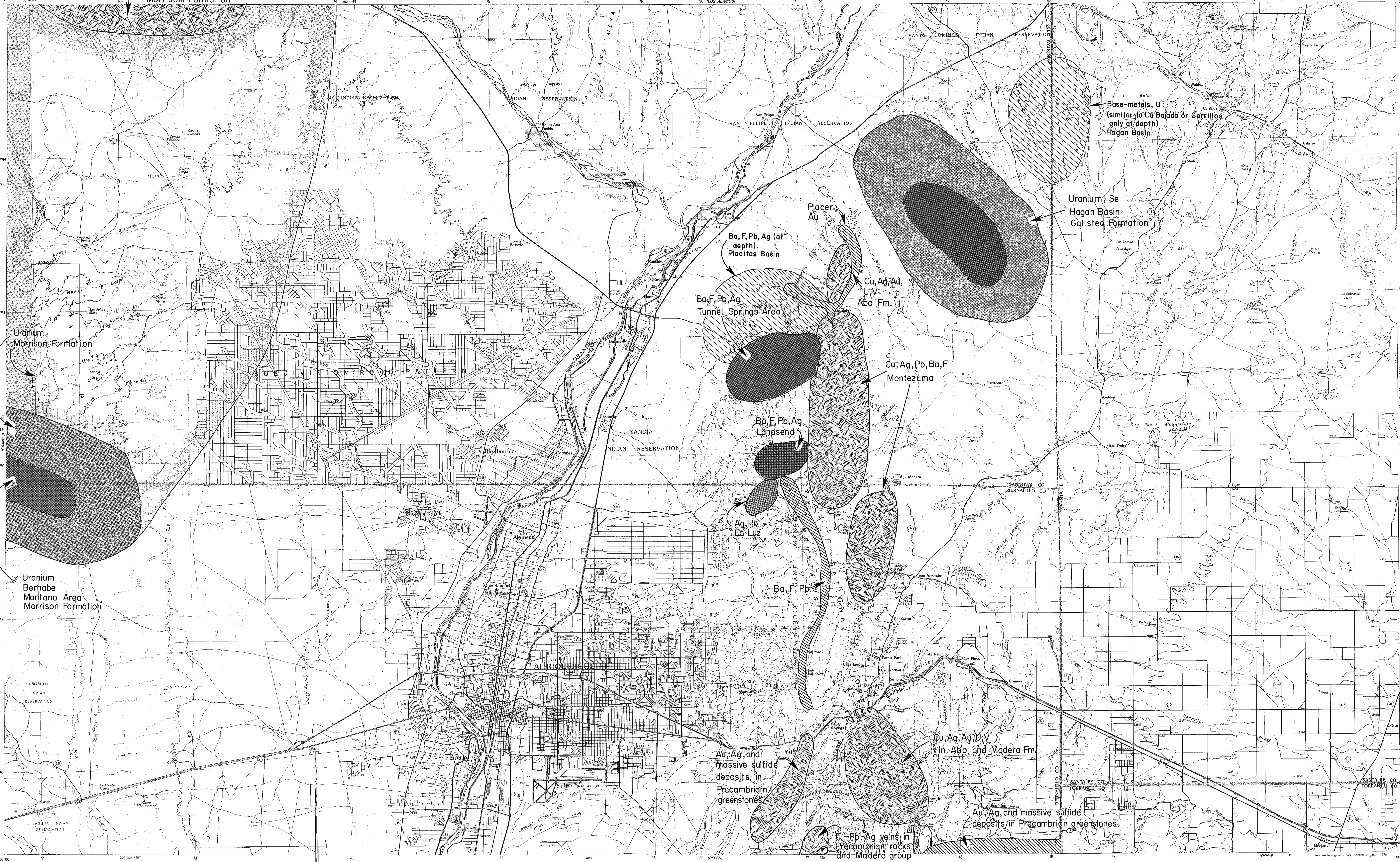
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ALBUQUERQUE QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1961. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

Some grant boundaries adjacent to Rio Grande and Rio Puerco are omitted because of insufficient data

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Resource Potential
- High
- Moderate
- Low to Moderate
- Low
- Unknown
- Unevaluated or Very Low

ALBUQUERQUE, NEW MEXICO
N3500—W10600/30x60
1978

MAP 13 - Mineral-resource potential of metals, uranium, barite, and fluorite in the Albuquerque 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

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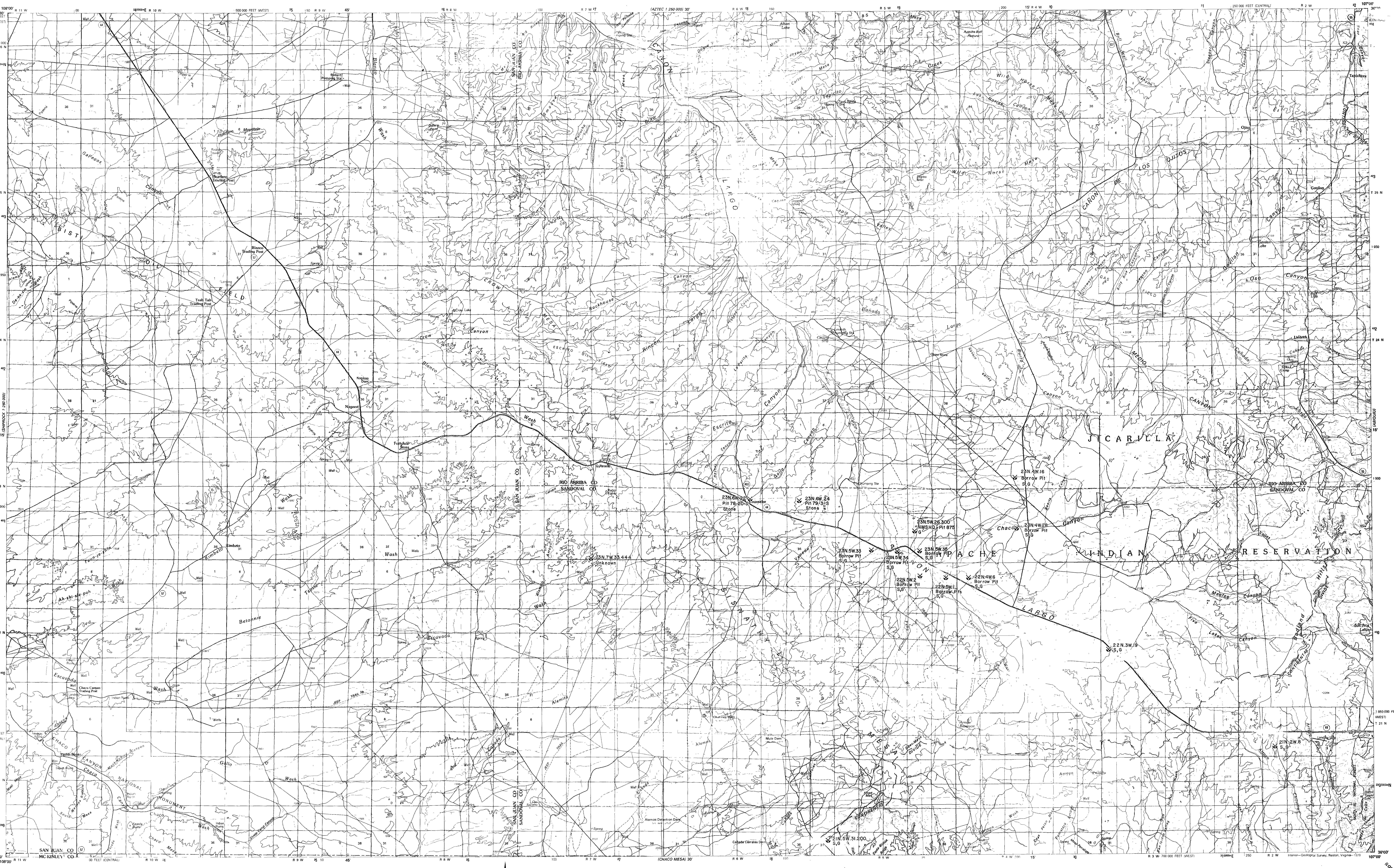
MAP 14 - Mineral-resource potential of metals, uranium, barite, and fluorite in the Belen 1:100,000 quadrangle, Northern Rio Puerco Resource Area

OF-211

MAP 15

CHACO CANYON QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



Mapped, edited, and published by the Geological Survey

Compiled in 1976 from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1959–1967. See index for dates of individual maps

Partially revised from aerial photographs taken 1973–1976 and from other official sources. Revised information not field checked

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central and west zones. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Huerfano Trading Post NW–1966
2 Huerfano Trading Post–1967
3 Nageezi–1959
4 Gonzales Mesa–1963
5 Lapis Point–1963
6 Schmitz Ranch–1963
7 Ojito–1963
8 Huerfano Trading Post SW–1966
9 Blanco Trading Post–1966
10 Tafoya Canyon–1963
11 Otero Store–1963
12 Billy Rice Canyon–1963
13 Lindrith–1963
14 Pueblo Bonito NW–1966
15 Kimbeto–1967
16 Lybrook NW–1966
17 Lybrook–1966
18 Counselor–1966
19 Tancosa Windmill–1966
20 Five Lakes Canyon NW–1963
21 Five Lakes Canyon NE–1963
22 Pueblo Bonito–1966
23 Sargent Ranch–1966
24 Fire Rock Well–1966
25 Lybrook SE–1966
26 Mule Dam–1966
27 Deer Mesa–1966
28 Taylor Ranch–1963
29 Arroyo Chijuillita–1963

SCALE 1:100,000

KILOMETERS

MILES

FEET

ELEVATIONS SHOWN IN METERS

NEW MEXICO

QUADRANGLE LOCATION

Material pit or quarry

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

CHACO CANYON, NEW MEXICO
SW/4 AZTEC (NJ 13-10) 1:250 000-SCALE MAP
N3600–W10700/30x60
1976

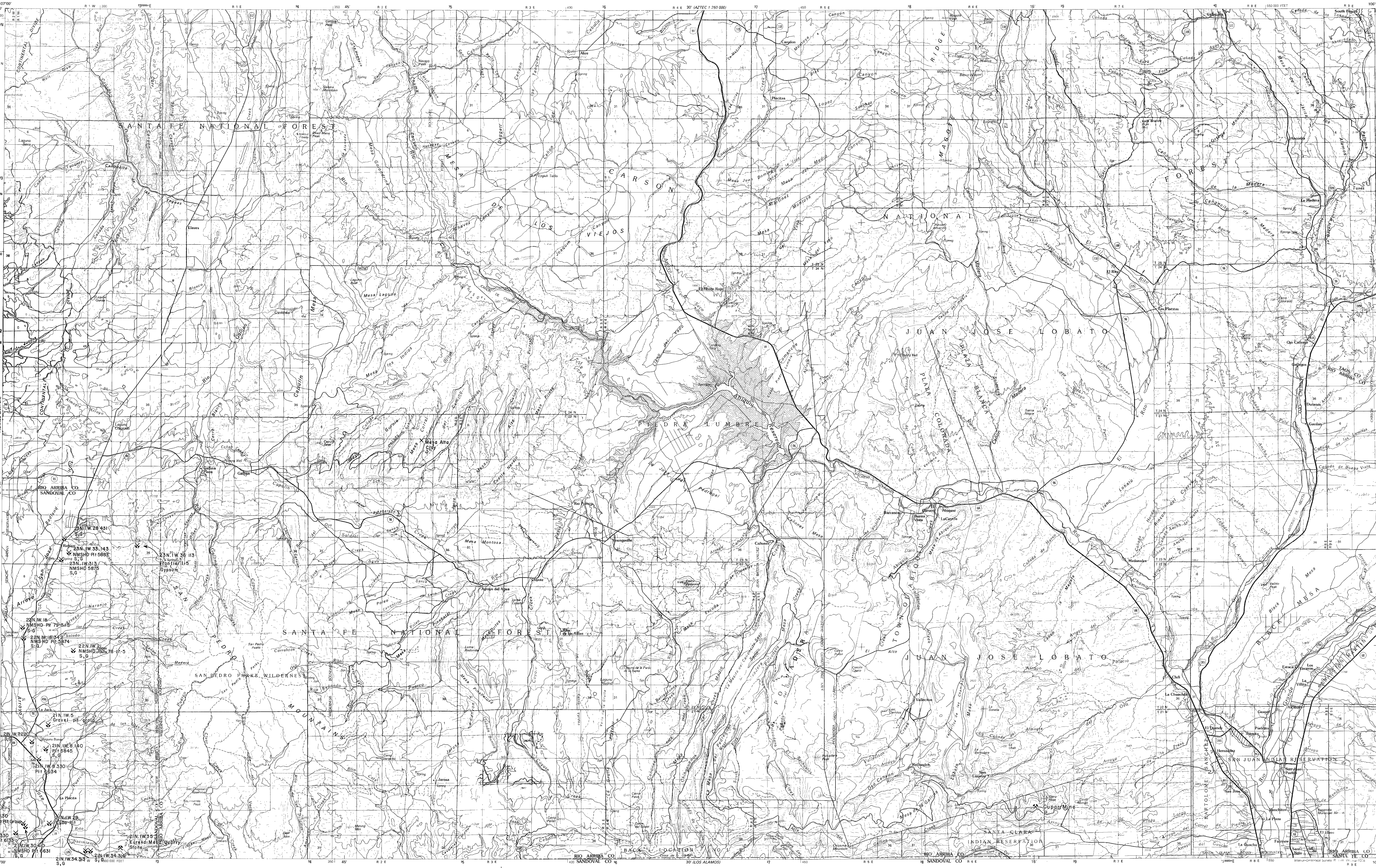
MAP 15 - Industrial materials occurrences, deposits, and mines in the Chaco Canyon 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 16
ABIQUIU QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1953–1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13, Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500–SCALE MAPS

1 Llaves–1955
2 Navajo Peak–1953
3 Alire–1953
4 Canjilon–1953
5 Magote Peak–1953
6 Valle Grande Peak–1953
7 La Madera–1953
8 Laguna Peak–1953
9 Echo Amphitheater–1953
10 Ghost Ranch–1953
11 Canjilon SE–1953
12 El Rito–1953
13 Ojo Caliente–1953
14 Regina–1963
15 Gallina–1963
16 Arroyo Del Agua–1953
17 Youngsville–1953
18 Cañones–1953
19 Abiquiu–1953
20 Medanales–1953
21 Lyden–1953
22 Cuba–1963
23 Nacimiento Peak–1963
24 Jarosa–1953
25 Cerro Del Grant–1953
26 Polvadera Peak–1953
27 Vallecitos–1953
28 Chili–1953
29 San Juan Pueblo–1953

SCALE 1:100,000

KILOMETERS

MILES

FEET

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

NEW MEXICO
QUADRANGLE LOCATION

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

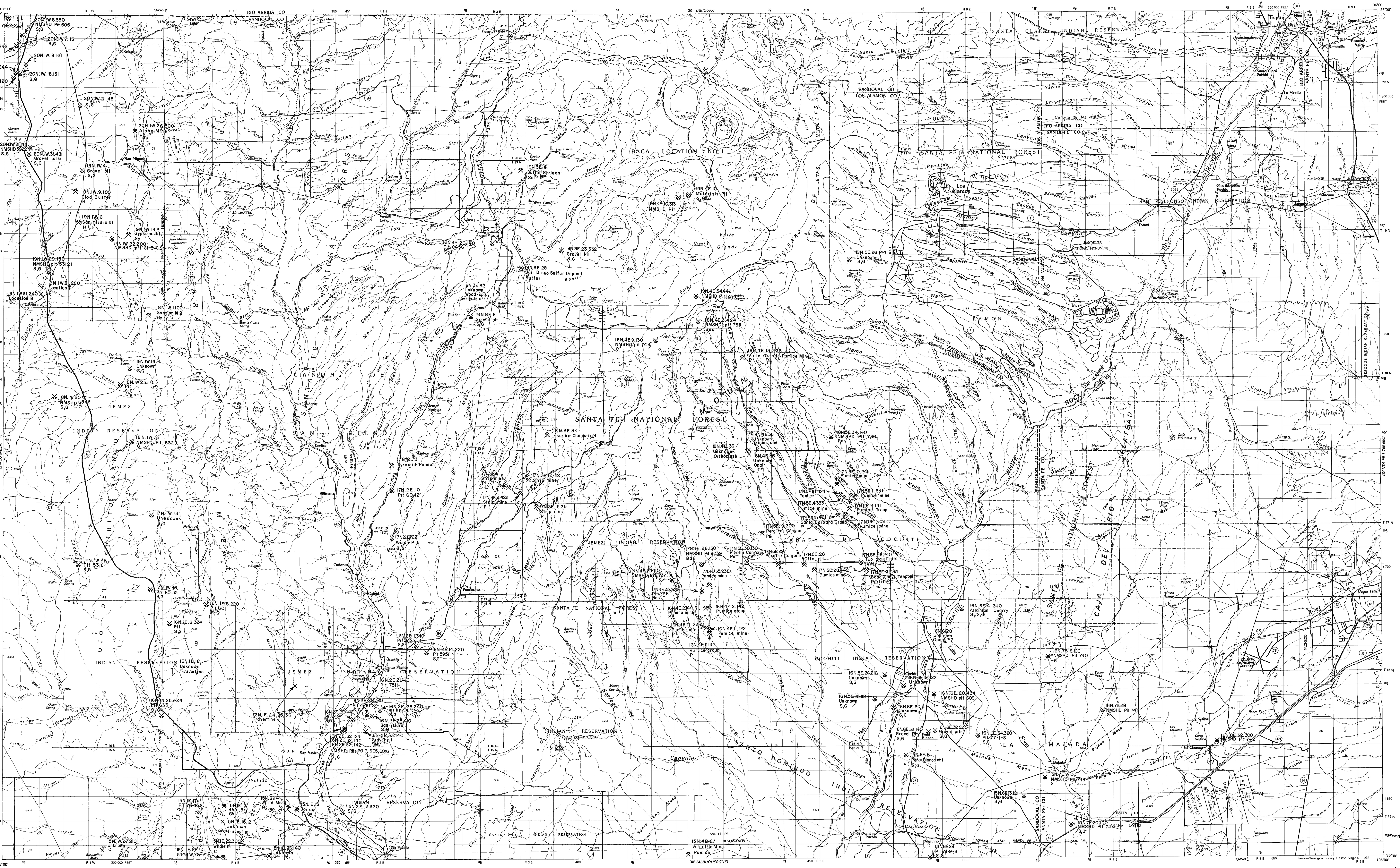
ABIQUIU, NEW MEXICO
SE/4 AZTEC (NJ 13-10) 1:250 000-SCALE MAP
N3600–W10600/30x60
1978

MAP 16 - Industrial materials occurrences, deposits, and mines in the Abiquiu 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF-211 MAP 17
LOS ALAMOS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)



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Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator. 50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS

LOS ALAMOS, NEW MEXICO

N3530-W10600/30x60

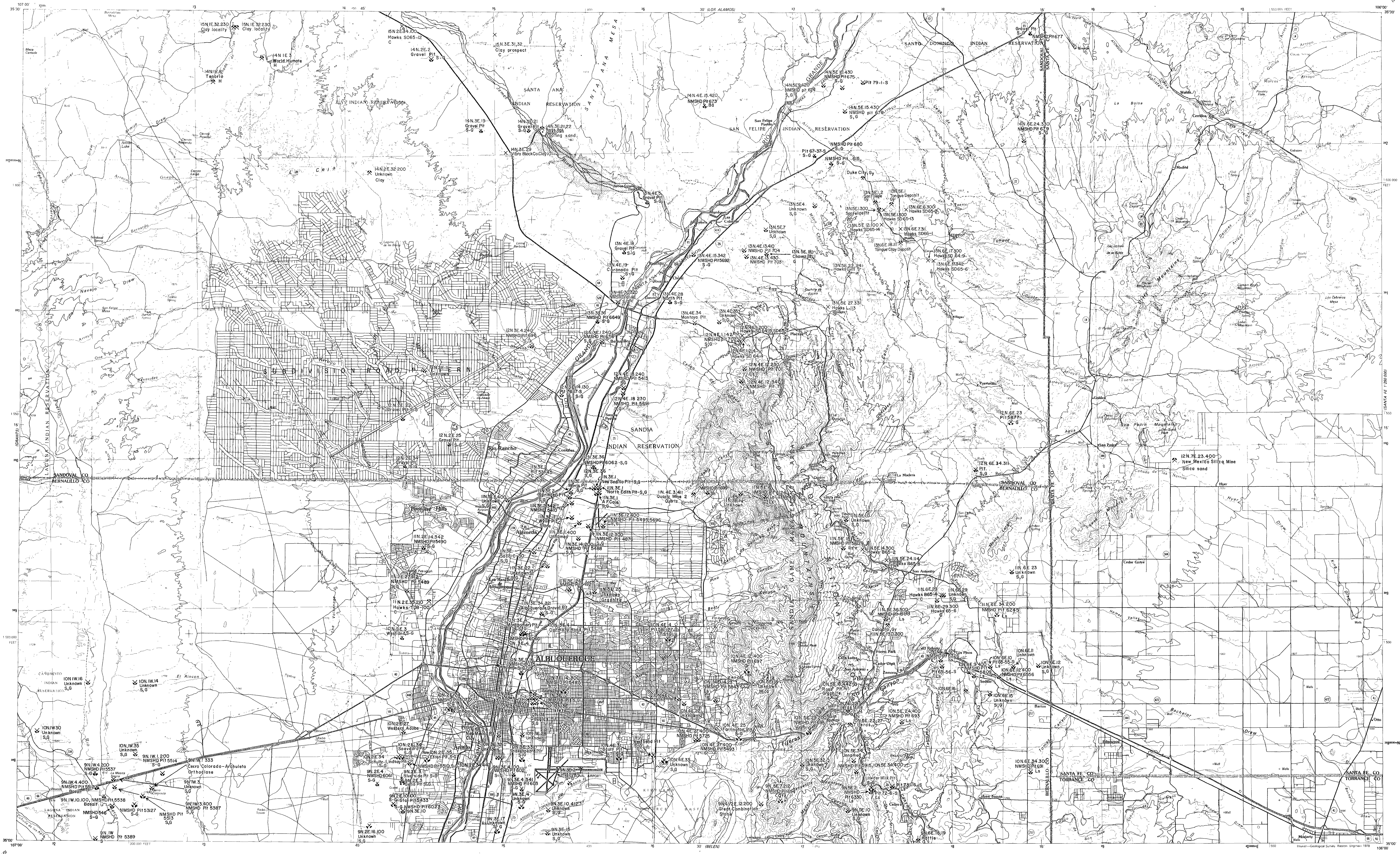
1978

MAP 17 - Industrial materials occurrences, deposits, and mines in the Los Alamos 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF-211
MAP 18
ALBUQUERQUE QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)



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Partially revised from aerial photographs taken 1975 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

Some grant boundaries adjacent to Rio Grande and Rio Puerco are omitted because of insufficient data

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route · U.S. route · State route

ALBUQUERQUE, NEW MEXICO
SE/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3500—W10600/30x60
1978

MAP 18 - Industrial materials occurrences, deposits, and mines in the Albuquerque 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 19
ACOMA PUEBLO QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)
OF-211

Produced by the Geological Survey
In cooperation with the Soil Conservation Service

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1964. See index for dates of individual maps
Partially revised from aerial photographs taken 1974–1975 and other source data. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13, Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

There may be private inholdings within the boundaries of the National or State reservations shown on this map

MAP INDEX

1 Arrosa Ranch–1961
2 Los Pilares–1961
3 Crow Point–1961
4 Acoma Pueblo–1961
5 South Butte–1960
6 Dough Mountain–1960 (Photorevised–1971)
7 South Garcia–1956
8 South Garcia–1954 (Photorevised–1971)
9 North Pasture–1961
10 Laguna Honda–1961
11 Blue Mesa–1961
12 East Mesa–1961
13 Marmon Ranch–1961
14 Cerro Verde–1960
15 South Garcia SE–1954
16 Sand Canyon–1964
17 Cebollita Peak–1964
18 Mecate Meadow–1964
19 Broom Mountain–1964
20 Cerro Del Oro–1964
21 Chicken Mountain–1964
22 Mesa Aparejo–1956
23 Bonnie Canyon–1964
24 Wild Horse Canyon–1964
25 Wiley Mesa–1964
26 Pueblo Viejo Mesa–1964
27 Field Ranch–1964
28 Puerto De Los Cavadores–1961

SCALE 1:100 000
KILOMETERS
MILES
FEET
ELEVATIONS SHOWN IN METERS

High potential

Moderate potential

Materials pit

NEW MEXICO
QUADRANGLE LOCATION

MAP 19 - Industrial materials occurrences, deposits, and mines and mineral-resource potential of nonmetallic minerals in the Acoma Pueblo 1:100,000 quadrangle, Northern Rio Puerco Resource Area

LEGEND

- Perennial stream, lake
- Intermittent stream, lake
- Village or locality
- Landmark structure
- Public park or recreation area
- Forest or game land area
- Other public area or Military or Indian reservation

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Street or other road
- Trail

Interstate route U.S. route State route

Interior—Geological Survey, Reston, Virginia—1979

ACOMA PUEBLO, NEW MEXICO
NW/4 SOCORRO (NI 13-4) 1:250 000-SCALE MAP
N3430–W10700/30x60
1978

OF-211

MAP 20

BELEN, NEW MEXICO

30x60 MINUTE SERIES (TOPOGRAPHIC)

BELEN, NEW MEXICO
N3430-W10600/30x60
1979

⚒ Mine with production

Material pit or quarry

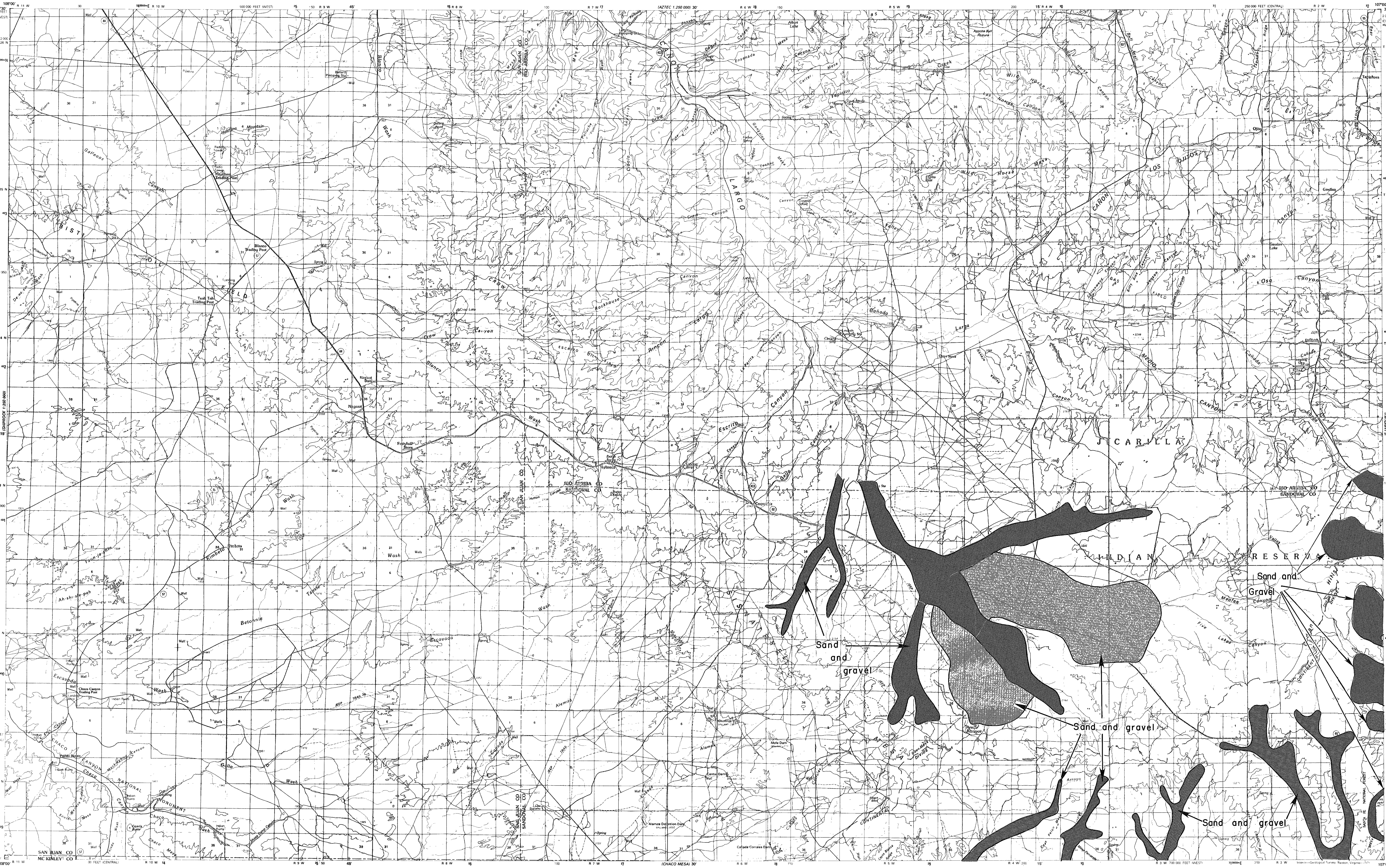
X Prospect

MAP 20 - Industrial materials occurrences, deposits, and mines in the Belen 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 1 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF-211 MAP 21
CHACO CANYON QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES



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Partially revised from aerial photographs taken 1973–1976 and from other official sources. Revised information not field checked

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central and west zones. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Huerfano Trading Post NW–1966
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7 Ojito–1963
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11 Otero Store–1963
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24 Fire Rock Well–1966
25 Lybrook SE–1966
26 Mule Dam–1966
27 Deer Mesa–1966
28 Taylor Ranch–1963
29 Arroyo Chijuilita–1963

UTM GRID AND 1976 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

Resource Potential

- High
- Moderate
- Unevaluated or Very Low

NEW MEXICO
QUADRANGLE LOCATION

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Military or Indian reservation

ROAD CLASSIFICATION

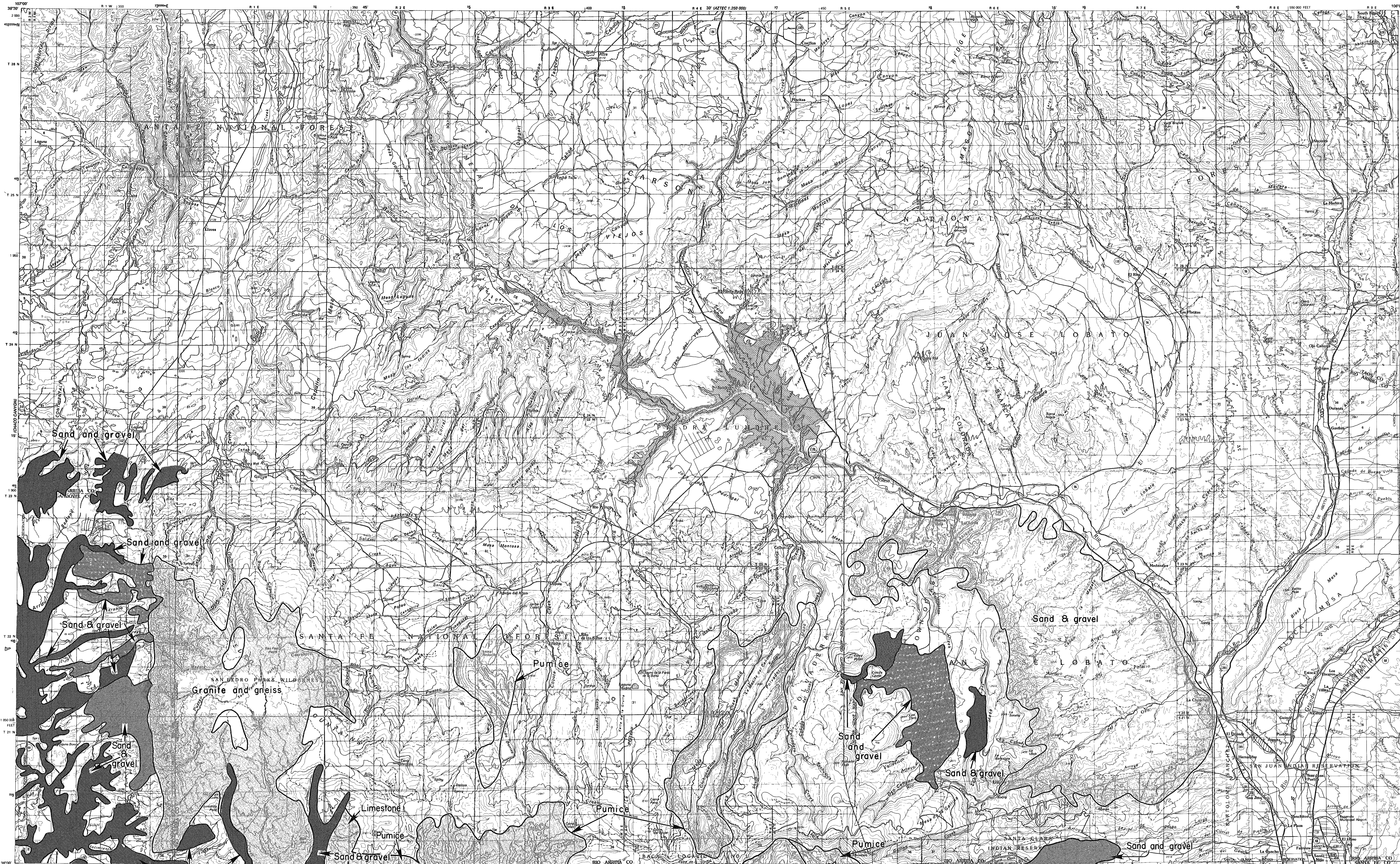
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

MAP 21 - Mineral-resource potential of industrial materials in the Chaco Canyon 1:100,000 quadrangle, Northern Rio Puerco Resource Area

CHACO CANYON, NEW MEXICO
SW/4 AZTEC (NJ 13-10) 1:250 000-SCALE MAP
N3600–W10700/30x60
1976

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF-211 MAP 22
ABIQUIU QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)



(CHACO MESA)

(SANTA FE 1:250 000)

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1953–1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13,
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

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18 Cañones–1953
19 Abiquiu–1953
20 Medanales–1953
21 Lyden–1953
22 Cuba–1963
23 Nacimiento Peak–1963
24 Jarosa–1953
25 Cerro Del Grant–1953
26 Polvadera Peak–1953
27 Vallecitos–1953
28 Chili–1953
29 San Juan Pueblo–1953

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

KILOMETERS

MILES

FEET

ELEVATIONS SHOWN IN METERS

NEW MEXICO

QUADRANGLE LOCATION

High potential

Moderate potential

Low potential

LEGEND

Perennial stream, lake

Intermittent stream, lake

Village or locality

Landmark structure

Public park or recreation area

Military or indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface

Secondary highway, hard surface

Light-duty road, hard or improved surface

Street or unimproved road

Trail

Interstate route U.S. route State route

MAP 22 - Mineral-resource potential of industrial materials in the Abiquiu 1:100,000 quadrangle, Northern Rio Puerco Resource Area

ABIQUIU, NEW MEXICO

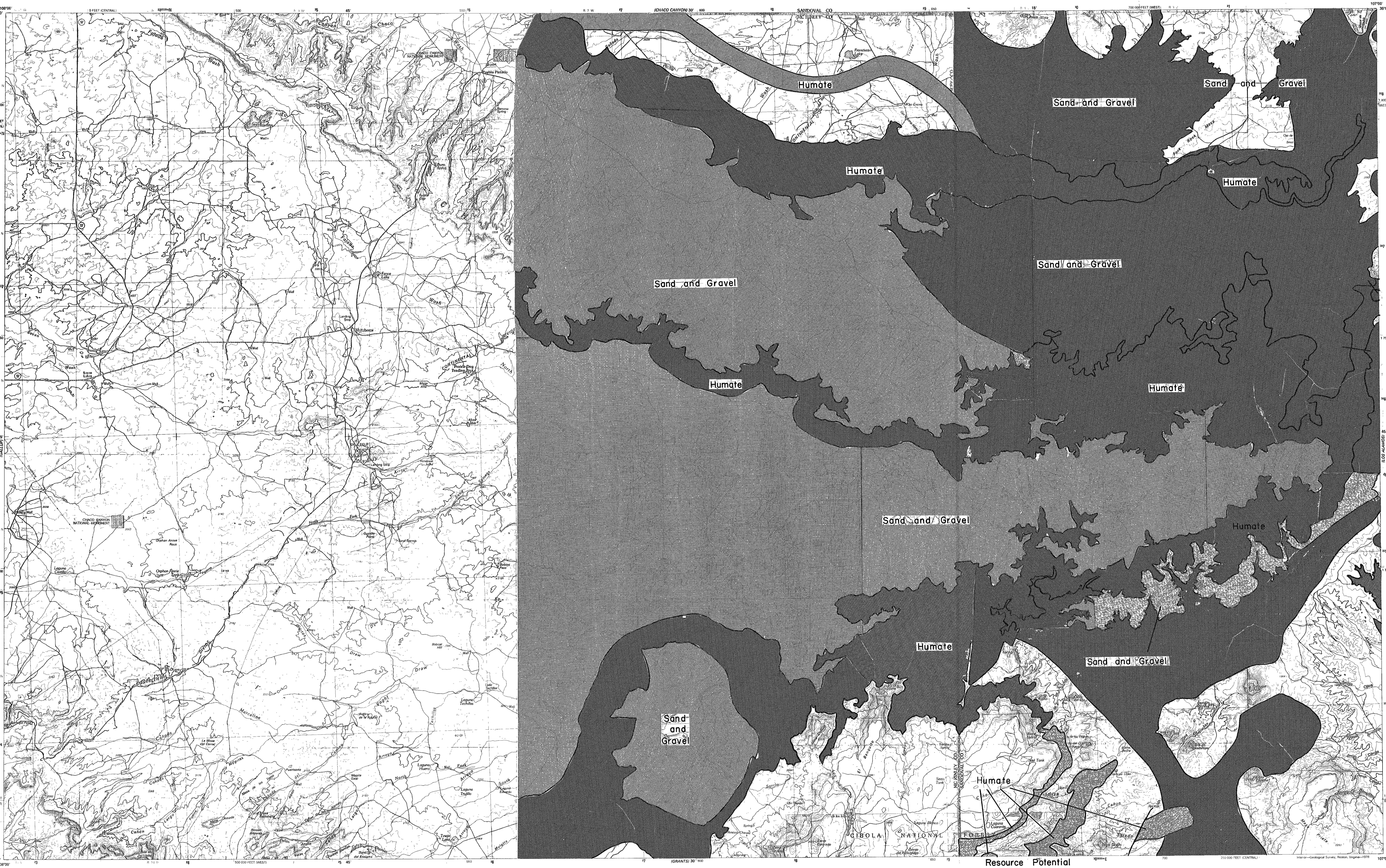
SE/4 AZTEC (NJ 13-10) 1 250 000-SCALE MAP

N3600–W10600/30x60

1978

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF 211 Map 23
CHACO MESA QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000-scale topographic maps dated 1960–1970. See index for dates of individual maps
Partially revised from aerial photographs taken 1974–76 and from other official sources. Revised information not field checked
Map edited 1977

Projection and 10 000-meter grid, zone 13 Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

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1 Seven Lakes NW–1970
2 Seven Lakes NE–1970
3 Pueblo Pintado–1961
4 Pueblo Alto Trading Post–1960
5 Star Lake–1961
6 Ojo Encino Mesa–1961
7 Johnson Trading Post–1961
8 Mesa Portales–1961
9 Seven Lakes–1970
10 Kin Nahzin Ruins–1970
11 Whitehorse–1961
12 Whitehorse Rincon–1961
13 Rincon Marquez–1961
14 Tinian–1961
15 Wolf Stand–1961
16 Headcut Reservoir–1961
17 Laguna Castillo–1963
18 Orphan Annie Rock–1963
19 Hospah–1961
20 Mesita Americana–1961
21 Mesita Del Gavilan–1961
22 Canada Calladita–1961
23 Arroyo Empedrado–1961
24 San Luis–1961
25 Borrego Pass–1963
26 Mesa De Los Toros–1963
27 Piedra De La Aguila–1961
28 El Dado–1961
29 Mesa Cortada–1961
30 Cerro Pardo–1961
31 Guadalupe–1961
32 Cabezon Peak–1961

UTM GRID AND 1977 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

CONTOUR INTERVAL 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Map 23– Mineral-resource potential of Industrial Minerals in the Chaco Mesa 1:100,000 quadrangle

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

NEW MEXICO
QUADRANGLE LOCATION

Resource Potential

- High
- Moderate
- Low to very low
- Unevaluated

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

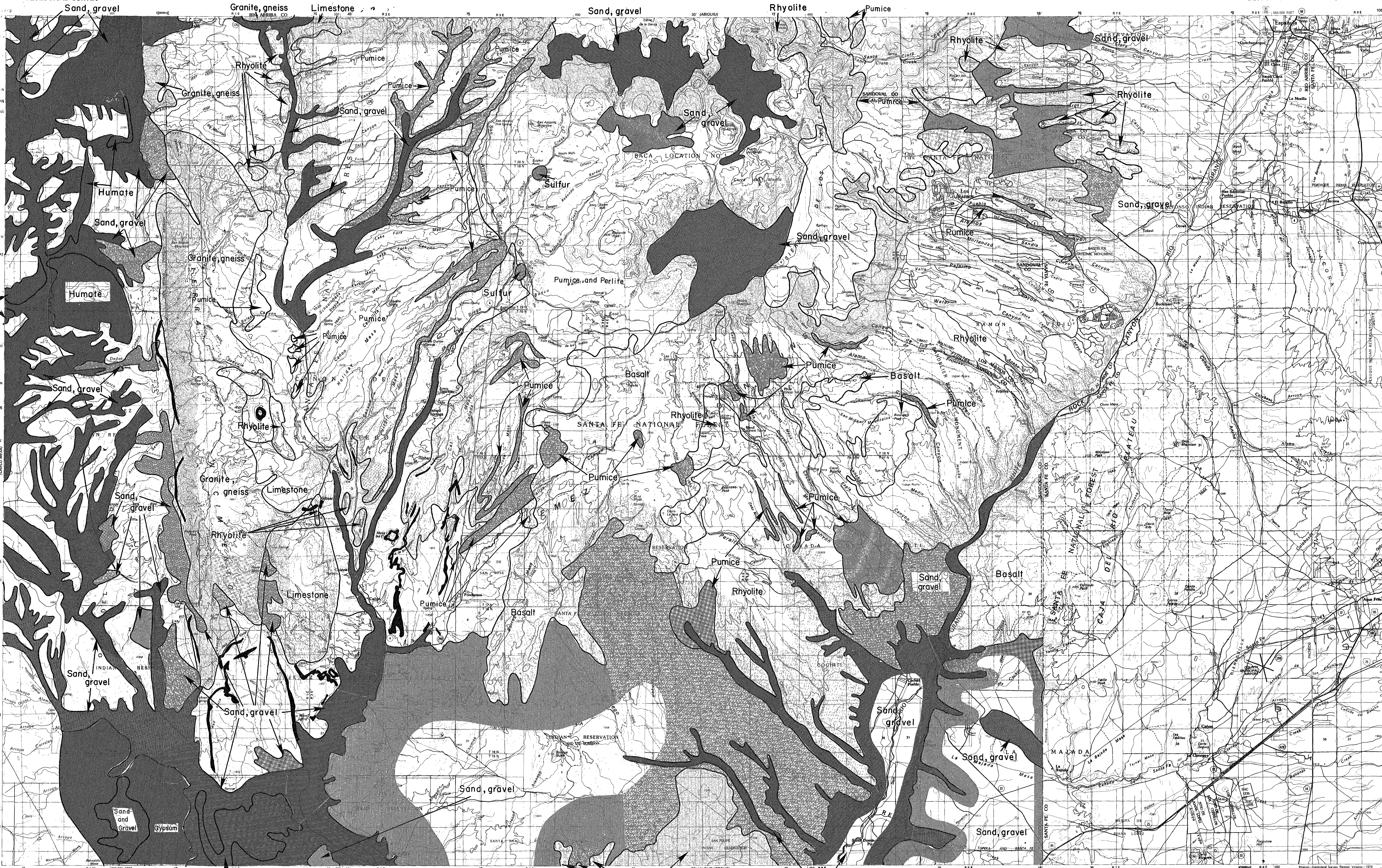
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route — U.S. route — State route

Interior—Geological Survey, Reston, Virginia—1978

CHACO MESA, NEW MEXICO
NW/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3530–W10700/30x60
1977

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF-211 Map 24
LOS ALAMOS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000-scale topographic maps dated 1951–1970. See index for dates of individual maps. Partially revised from aerial photographs taken 1974 and 1976 and from other official sources. Revised information not field checked. Map edited 1978

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator. 50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

INDEX TO 1:24 000-SCALE MAPS

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

QUADRANGLE LOCATION

Map 24- Mineral-resource potential of industrial materials in the Los Alamos 1:100,000 quadrangle, Northern Rio Puerco Resource Area

24

- High potential
- Moderate potential
- Low potential
- Glorieta Sandstone Low-moderate silica sand
- Very Low potential

LEGEND

ROAD CLASSIFICATION

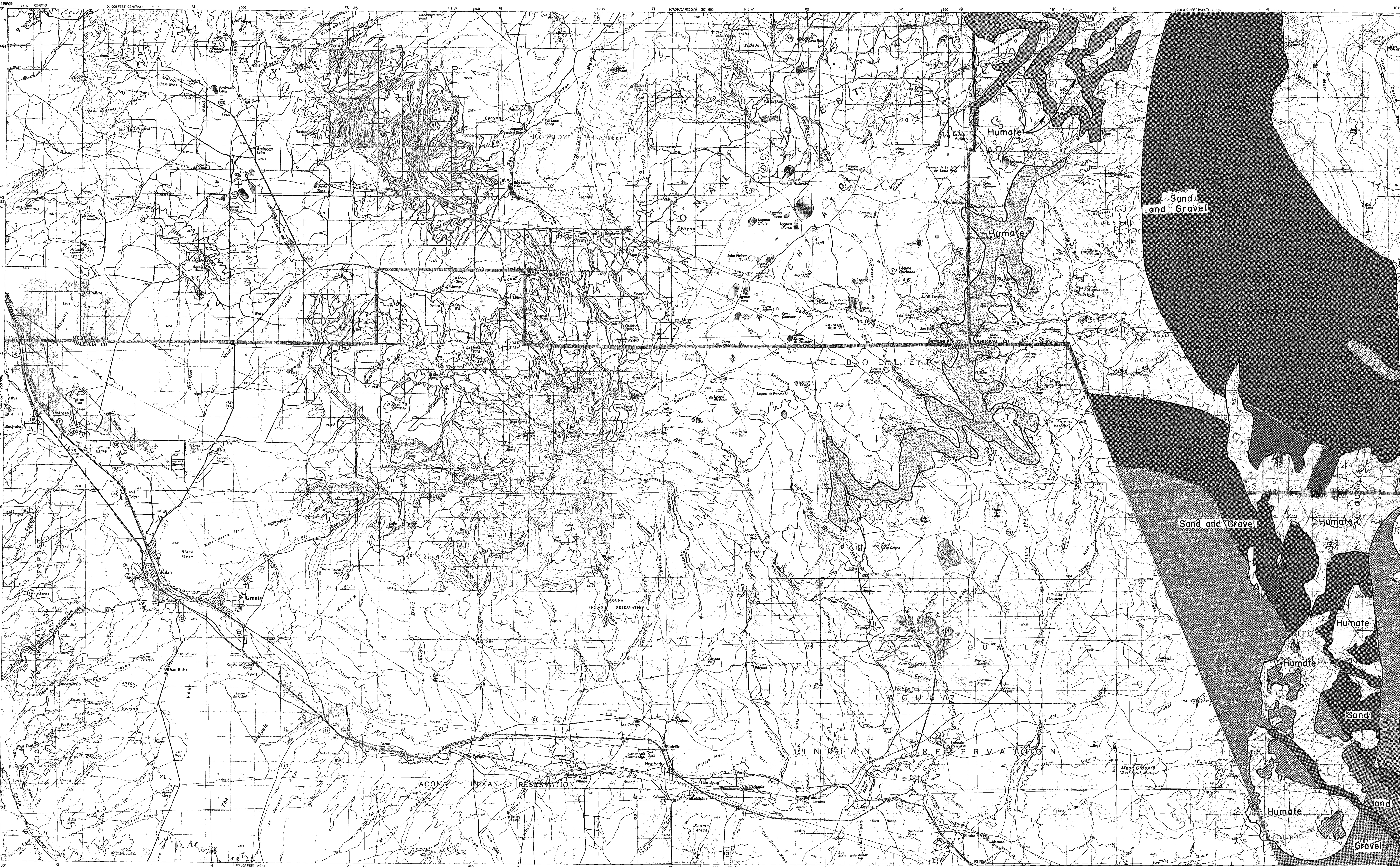
LOS ALAMOS, NEW MEXICO
N3530-W10600/30x60
1978

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF 211 Map 25

GRANTS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 - scale topographic maps dated 1954 - 1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1973–75 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000 - meter grid, zone 13, Universal Transverse Mercator
50 000 - foot grid ticks based on New Mexico coordinate system ...al zones. 1927 North American datum

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1 Goat Mountain–1957
2 Ambrosia Lake–1957
3 San Lucas Dam–1963
4 Cerro Alesna–1963
5 El Dado Mesa–1961
6 Laguna Seca–1961
7 Cerro Tinaja–1961
8 Casa Salazar–1961
9 Bluewater–1957 (Photorevised–1971)
10 Dos Lomas–1957
11 San Mateo–1963
12 Cerro Pelon–1963
13 Laguna Cañoneros–1961
14 Marquez–1961
15 La Gotera–1961
16 Puerco Dam–1961
17 Milan–1957 (Photorevised–1971)
18 Grants–1957 (Photorevised–1971)
19 Lobo Springs–1957
20 Mount Taylor–1957
21 Seboyeta–1957
22 Moquino–1957
23 Arch Mesa–1957
24 Herrera–1954
25 San Rafael–1957
26 Grants SE–1957 (Photorevised–1971)
27 Mc Cartys–1957 (Photorevised–1971)
28 Cubero–1957 (Photorevised–1971)
29 Laguna–1957 (Photorevised–1971)
30 Mesita–1957 (Photorevised–1971)
31 Mesa Gigante–1957
32 Cañoncito School–1954 (Photorevised–1971)

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

KILOMETERS
MILES
FEET

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

Resource Potential

- High
- Moderate
- Low to very low
- Unevaluated

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S route State route

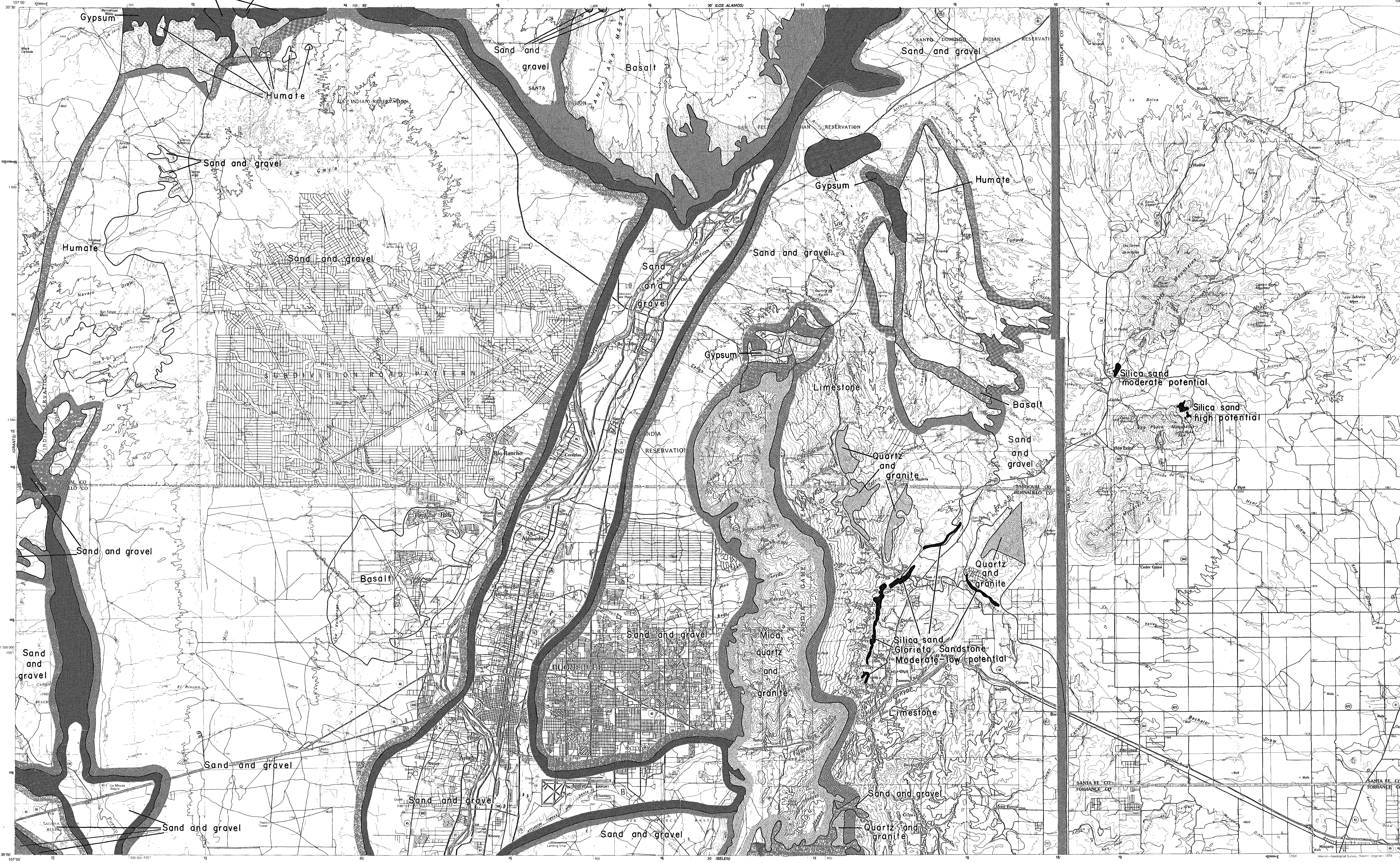
Interior—Geological Survey, Reston, Virginia—1978

Map 25- Mineral-resource potential of Industrial Minerals in the Grants 1:100,000 quadrangle

GRANTS, NEW MEXICO
SW/4 ALBUQUERQUE (NI 13) 1:250 000-SCALE MAP

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OF-211 MAP 26
ALBUQUERQUE QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1961. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

Some grant boundaries adjacent to Rio Grande and Rio Puerco are omitted because of insufficient data

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Sky Village NW - 1960
2 Sky Village NE - 1960
3 Bernalillo NW - 1953
4 Santa Ana Pueblo - 1954
5 San Felipe Pueblo - 1954
6 San Felipe Pueblo NE - 1954
7 Madrid - 1961
8 Sky Village - 1954
9 Sky Village SE - 1954 (Photorevised - 1972)
10 Loma Machete - 1954 (Photorevised - 1972)
Bernalillo - 1954 (Photorevised - 1972)
[illegible]
17 Alameda - 1960 (Photorevised - 1972)
18 Sandia Crest - 1961 (Photorevised - 1972)
19 Sandia Park - 1954
20 San Pedro - 1954
21 Edgewood - 1956
22 La Mesita Negra - 1954 (Photorevised - 1971)
23 La Mesita Negra SE - 1954 (Photorevised - 1973)
24 Albuquerque West - 1960 (Photorevised - 1972)
25 Albuquerque East - 1960

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS

MAP 26- Mineral-resource potential of industrial materials in the Albuquerque 1:100,000 quadrangle, Northern Rio Puerco Resource Area

High potential
Moderate potential
Moderate-low potential
Low potential
Glorieta Sandstone-silica sand
Very low potential

LEGEND

ROAD CLASSIFICATION

ALBUQUERQUE, NEW MEXICO

N3500—W10600/30x60

1978

OF-211

MAP 27

BELEN, NEW MEXICO

Resource Potential

- High
- Moderate
- Moderate-low
- Unevaluated or Very Low

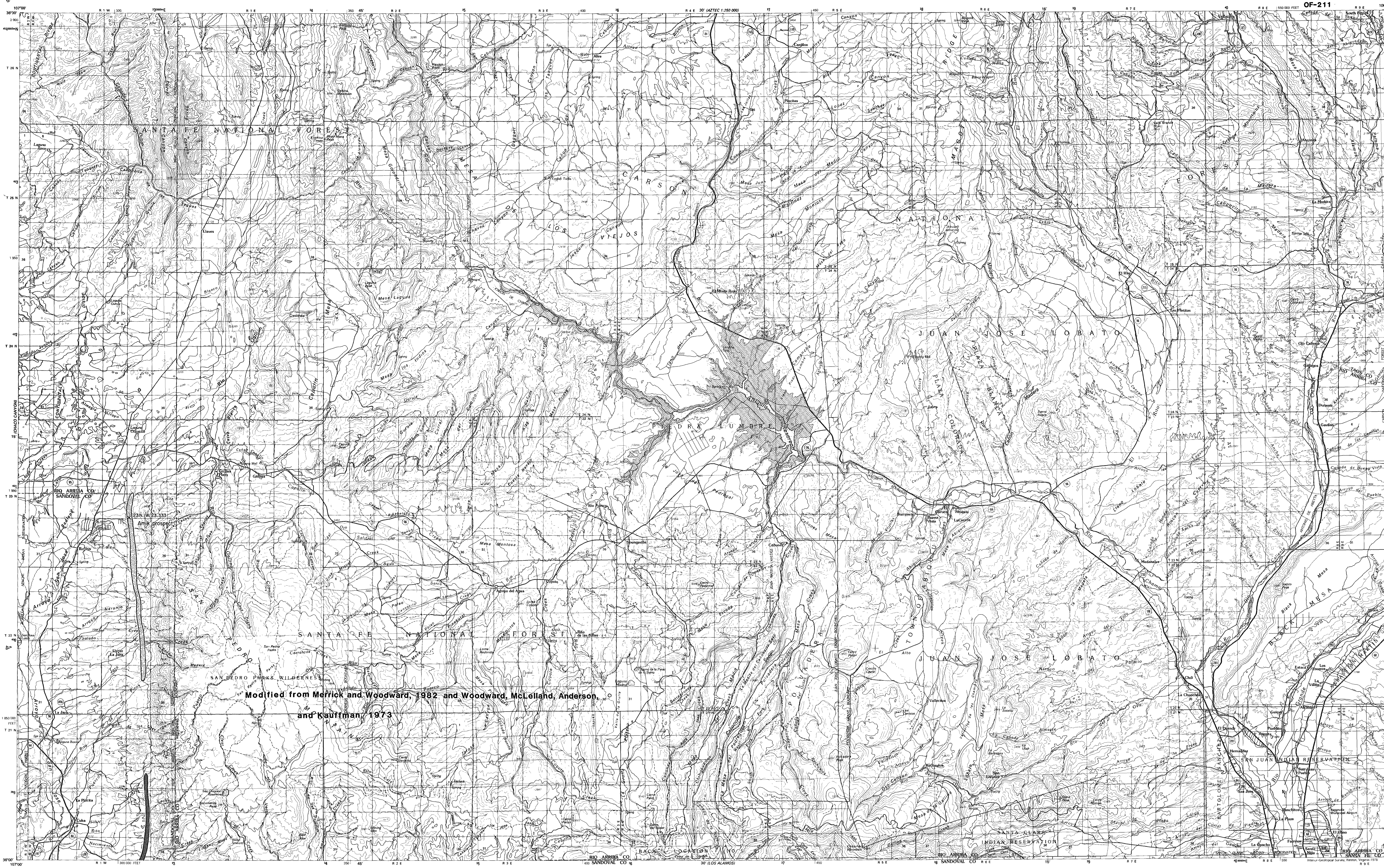
MAP 27 - Mineral-resource potential of industrial materials in the Belen 1:100,000 quadrangle, Northern Rio Puerco Resource Area

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 28

ABIQUIU QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)

OF-211



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Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1953–1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13.
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

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1 Llaves–1955
2 Navajo Peak–1953
3 Alire–1953
4 Canjilon–1953
5 Magote Peak–1953
6 Valle Grande Peak–1953
7 La Madera–1953
8 Laguna Peak–1953
9 Echo Amphitheater–1953
10 Ghost Ranch–1953
11 Canjilon SE–1953
12 El Rito–1953
13 Ojo Caliente–1953
14 Regina–1963
15 Gallina–1963
16 Arroyo Del Agua–1953
17 Youngsville–1953
18 Cañones–1953
19 Abiquiu–1953
20 Medanales–1953
21 Lyden–1953
22 Cuba–1963
23 Nacimiento Peak–1963
24 Jarosa–1953
25 Cerro Del Grant–1953
26 Polvadera Peak–1953
27 Vallecitos–1953
28 Chili–1953
29 San Juan Pueblo–1953

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP
GN MN 0°53′ 16 MILS 12½° 222 MILS

SCALE 1:100 000
KILOMETERS
MILES
FEET

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

× Prospect

high resource potential

moderate to low

NEW MEXICO
QUADRANGLE LOCATION

MAP 28 - Coal occurrences, deposits, and mines and resource potential in the Abiquiu 1:100,000 quadrangle, Northern Rio Puerco Resource Area

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

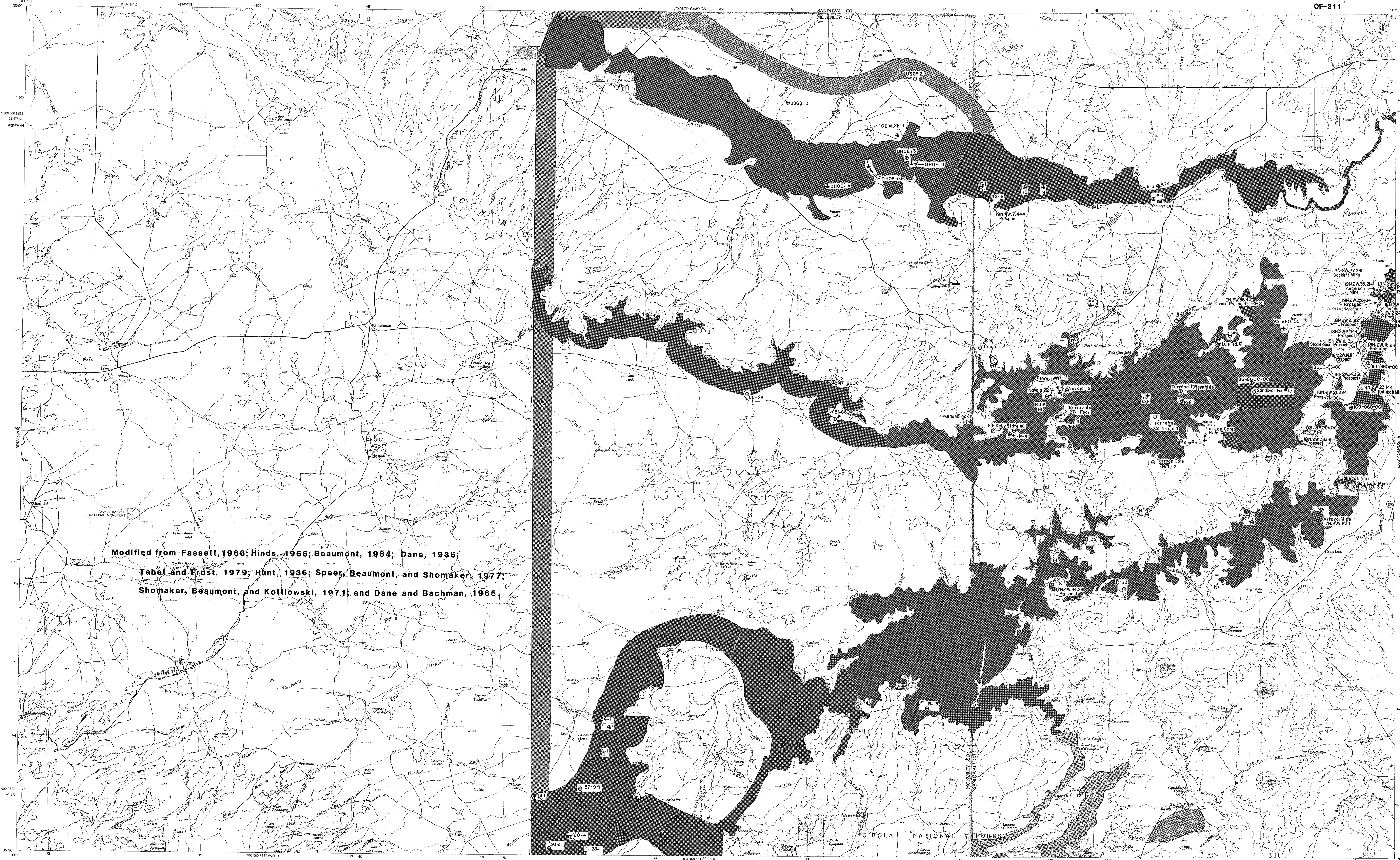
ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

ABIQUIU, NEW MEXICO
SE/4 AZTEC (NJ 13-10) 1 250 000-SCALE MAP
N3600–W10600/30x60
1978

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 29
CHACO MESA QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211



RESOURCE POTENTIAL

- High
- Very Low
- Moderate

- ⊕ Drill hole, measured section
- × Prospect
- ⚒ Mine

Mapped, edited, and published by the Geological Survey

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS

CHACO MESA, NEW MEXICO

1977

MAP 29 - Coal occurrences, deposits, and mines and resource potential in the Chaco Mesa 1:100,000 quadrangle, Northern Rio Puerco Resource Area

Fruitland outcrop/potential line from - Mineral Ownership and Geology of the Near-Surface Fruitland Coal Deposits in New Mexico Portion of the San Juan Basin

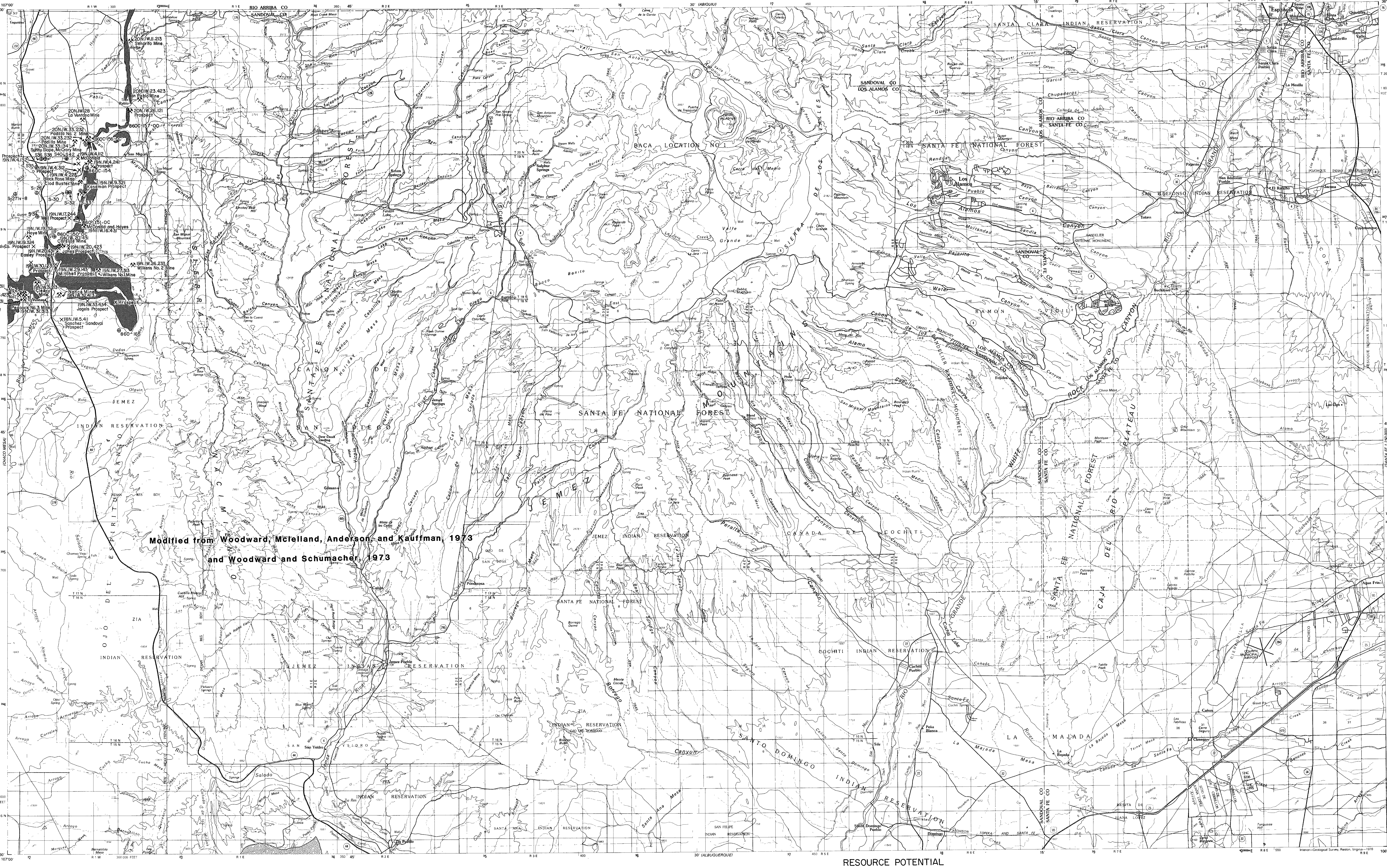
compiled by E.C. Beaumont, consulting Geologist, March 1984

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 30

LOS ALAMOS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)

OF-211



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Partially revised from aerial photographs taken 1974 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

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1 San Pablo–1970	17 Holy Ghost Spring–1969
2 Rancho del Chaparral–1970	18 Gilman–1970
3 Seven Springs–1970	19 Ponderosa–1970
4 Valle San Antonio–1970	20 Bear Springs Peak–1970
5 Valle Toledo–1952	21 Cañada–1953
6 Guaje Mountain–1952	22 Cochiti Dam–1953
7 Puye–1952	23 Montoso Peak–1952
8 Espanola–1953	24 Agua Fria–1951
9 La Ventana–1970	25 Ojito Spring–1969
10 San Miguel Mountain–1970	26 San Ysidro–1969
11 Jemez Springs–1970	27 Jemez Pueblo–1969
12 Redondo Peak–1970	28 Loma Creston–1970
13 Bland–1953	29 Santo Domingo Pueblo SW–1953
14 Frijoles–1952	30 Santo Domingo Pueblo–1953
15 White Rock–1952	31 Tetilla Peak–1953
16 Horcado Ranch–1953	32 Turquoise Hill–1952

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS

RESOURCE POTENTIAL

- High
- Moderate to low
- Very low
- Drill hole, measured section
- Prospect
- Mine

LEGEND

- Perennial stream, lake
- Intermittent stream, lake
- Village or locality
- Landmark structure
- Public park or recreation area
- Forest or game land area
- Other public area or Military or Indian reservation

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Street or unimproved road
- Trail
- Interstate route / U.S. route / State route

LOS ALAMOS, NEW MEXICO
NE/4 ALBUQUERQUE (NI 13-1) 1 250 000-SCALE MAP
N3530-W10600/30x60
1978

MAP 30- Coal occurrences, deposits, and mines and resource potential in the Los Alamos 1:100,000 quadrangle, Northern Rio Puerco Resource Area

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 31

GRANTS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)

OF-211

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 - scale topographic maps dated 1954 - 1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1973-75 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000 - meter grid, zone 13, Universal Transverse Mercator
50 000 - foot grid ticks based on New Mexico coordinate system west and central zones. 1927 North American datum

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1 Goat Mountain–1957
2 Ambrosia Lake–1957
3 San Lucas Dam–1963
4 Cerro Alesna–1963
5 El Dado Mesa–1961
6 Laguna Seca–1961
7 Cerro Tinaja–1961
8 Casa Salazar–1961
9 Bluewater–1957 (Photorevised–1971)
10 Dos Lomas–1957
11 San Mateo–1963
12 Cerro Pelon–1963
13 Laguna Cañoneros–1961
14 Marquez–1961
15 La Gotera–1961
16 Puerco Dam–1961
17 Milan–1957 (Photorevised–1971)
18 Grants–1957 (Photorevised–1971)
19 Lobo Springs–1957
20 Mount Taylor–1957
21 Seboyeta–1957
22 Moquino–1957
23 Arch Mesa–1957
24 Herrera–1954
25 San Rafael–1957
26 Grants SE–1957 (Photorevised–1971)
27 Mc Cartys–1957 (Photorevised–1971)
28 Cubero–1957 (Photorevised–1971)
29 Laguna–1957 (Photorevised–1971)
30 Mesita–1957 (Photorevised–1971)
31 Mesa Gigante–1957
32 Cañoncito School–1954 (Photorevised–1971)

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

⊕ Drill hole, measured section
× Prospect
⚒ Mine

Resource Potential
- Moderate
- Low
- Very Low

NEW MEXICO
QUADRANGLE LOCATION

MAP 31 - Coal occurrences, deposits, and mines and resource potential in the Grants 1:100,000 quadrangle, Northern Rio Puerco Resource Area

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

GRANTS, NEW MEXICO
SW/4 ALBUQUERQUE (NI 13-11) 1:250 000-SCALE MAP

N3500–W10700/30x60

1978

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 32
ALBUQUERQUE QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1961. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and 1976 and from other official sources Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

Some grant boundaries adjacent to Rio Grande and Rio Puerco are omitted because of insufficient data

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Sky Village NW – 1960
2 Sky Village NE – 1960
3 Bernalillo NW – 1953
4 Santa Ana Pueblo – 1954
5 San Felipe Pueblo – 1954
6 San Felipe Pueblo NE – 1954
7 Madrid – 1961
8 Sky Village – 1954
9 Sky Village SE – 1954 (Photorevised – 1972)
10 Loma Machete – 1954 (Photorevised – 1972)
11 Bernalillo – 1954 (Photorevised – 1972)
12 Placitas – 1954
13 Hagan – 1954
14 Benavidez Ranch – 1954
15 Volcano Ranch – 1954 (Photorevised – 1972)
16 Los Griegos – 1960 (Photorevised – 1972)
17 Alameda – 1960 (Photorevised – 1972)
18 Sandia Crest – 1961 (Photorevised – 1972)
19 Sandia Park – 1954
20 San Pedro – 1954
21 Edgewood – 1956
22 La Mesita Negra – 1954 (Photorevised – 1971)
23 La Mesita Negra SE – 1954 (Photorevised – 1973)
24 Albuquerque West – 1960 (Photorevised – 1972)
25 Albuquerque East – 1960 (Photorevised – 1972)
26 Tijeras – 1961 (Photorevised – 1972)
27 Sedillo – 1954
28 Edgewood – 1954

SCALE 1:100 000
KILOMETERS
MILES
FEET

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

⊕ Drill hole, measured section
× Prospect
⚒ Mine

NEW MEXICO
QUADRANGLE LOCATION

Resource Potential
- Moderate to Low
- Low
- Very Low

LEGEND

- Perennial stream, lake
- Intermittent stream, lake
- Village or locality
- Landmark structure
- Public park or recreation area
- Forest or game land area
- Other public area or Military or Indian reservation
- Built-up area

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Street or unimproved road
- Trail
- Interstate route
- U.S. route
- State route

MAP 32 - Coal occurrences, deposits, and mines and resource potential in the Albuquerque 1:100,000 quadrangle, Northern Rio Puerco Resource Area

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092

ALBUQUERQUE, NEW MEXICO
SE/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3500—W10600/30x60
1978

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 33

CHACO CANYON QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES

OF-211

Mapped, edited, and published by the Geological Survey

Compiled in 1976 from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1959–1967. See index for dates of individual maps

Partially revised from aerial photographs taken 1973–1976 and from other official sources. Revised information not field checked

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central and west zones. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

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1 Huerfano Trading Post NW–1966
2 Huerfano Trading Post–1967
3 Nageezi–1959
4 Gonzales Mesa–1963
5 Lapis Point–1963
6 Schmitz Ranch–1963
7 Ojito–1963
8 Huerfano Trading Post SW–1966
9 Blanco Trading Post–1966
10 Tafoya Canyon–1963
11 Otero Store–1963
12 Billy Rice Canyon–1963
13 Lindrith–1963
14 Pueblo Bonito NW–1966
15 Kimbeto–1967
16 Lybrook NW–1966
17 Lybrook–1966
18 Counselor–1966
19 Tancosa Windmill–1966
20 Five Lakes Canyon NW–1963
21 Five Lakes Canyon NE–1963
22 Pueblo Bonito–1966
23 Sargent Ranch–1966
24 Fire Rock Well–1966
25 Lybrook SE–1966
26 Mule Dam–1966
27 Deer Mesa–1966
28 Taylor Ranch–1963
29 Arroyo Chijuillita–1963

UTM GRID AND 1976 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

NEW MEXICO
QUADRANGLE LOCATION

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route
U.S. route
State route

CHACO CANYON, NEW MEXICO
SW/4 AZTEC (NJ 13-10) 1:250 000-SCALE MAP
N3600–W10700/30x60
1976

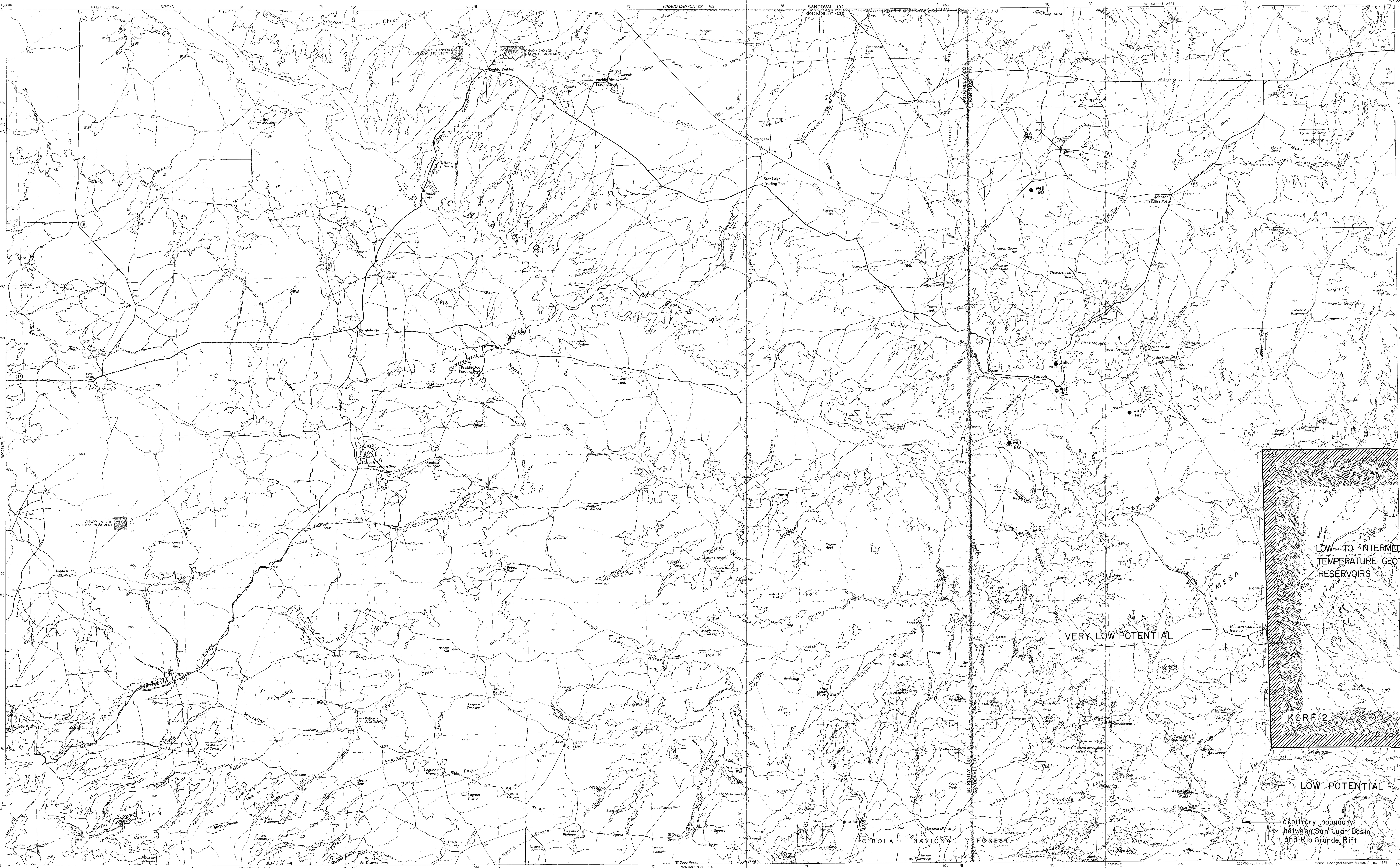
MAP 33 - Geothermal springs and wells, KGRA's, KGRF's and geothermal-resource potential in the Chaco Canyon 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See appendix 5 for details

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 34

CHACO MESA QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211



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Partially revised from aerial photographs taken 1974–76 and from other official sources. Revised information not field checked
Map edited 1977

Projection and 10 000-meter grid, zone 13 Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

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1 Seven Lakes NW–1970
2 Seven Lakes NE–1970
3 Pueblo Pintado–1961
4 Pueblo Alto Trading Post–1960
5 Star Lake–1961
6 Ojo Encino Mesa–1961
7 Johnson Trading Post–1961
8 Mesa Portales–1961
9 Seven Lakes–1970
10 Kin Nahzin Ruins–1970
11 Whitehorse–1961
12 Whitehorse Rincon–1961
13 Rincon Marquez–1961
14 Tinian–1961
15 Wolf Stand–1961
16 Headcut Reservoir–1961
17 Laguna Castillo–1963
18 Orphan Annie Rock–1963
19 Hospah–1961
20 Mesita Americana–1961
21 Mesita Del Gavilan–1961
22 Canada Calladita–1961
23 Arroyo Empedrado–1961
24 San Luis–1961
25 Borrego Pass–1963
26 Mesa De Los Toros–1963
27 Piedra De La Aguila–1961
28 El Dado–1961
29 Mesa Cortada–1961
30 Cerro Parido–1961
31 Guadalupe–1961
32 Cabezon Peak–1961

SCALE 1:100 000

KILOMETERS
MILES
FEET

ELEVATIONS SHOWN IN METERS

GEOTHERMAL- RESOURCE POTENTIAL

MODERATE TO LOW

KGRF (Known geothermal resource field - defined by State Land Office)

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route — U.S. route — State route

CHACO MESA, NEW MEXICO
NW/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3530–W10700/30x60
1977

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

MAP 34 - Geothermal springs and wells, KGRA's, KGRF's, and geothermal-resource potential in the Chaco Mesa 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See appendix 5 for details

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 35
LOS ALAMOS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)
OF-211

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Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

INDEX TO 1:24 000-SCALE MAPS

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

GEOTHERMAL-RESOURCE POTENTIAL

- HIGH
- MODERATE
- MODERATE TO LOW

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

- Hot spring, temperature in °F
- Steam or geothermal well, temperature in °F
- Plugged well
- Disposal well
- KGRA (Known geothermal resource area-defined by the U.S. Geological Survey)
- KGRF (Known geothermal resource field-defined by the State Land Office)

LEGEND

ROAD CLASSIFICATION

LOS ALAMOS, NEW MEXICO
N3530-W10600/30x60
1978

MAP 35 - Geothermal springs and wells, KGRA's, KGRF's, and geothermal-resource potential in the Los Alamos 1:100,000 quadrangle, Northern Rio Puerco Resource Area

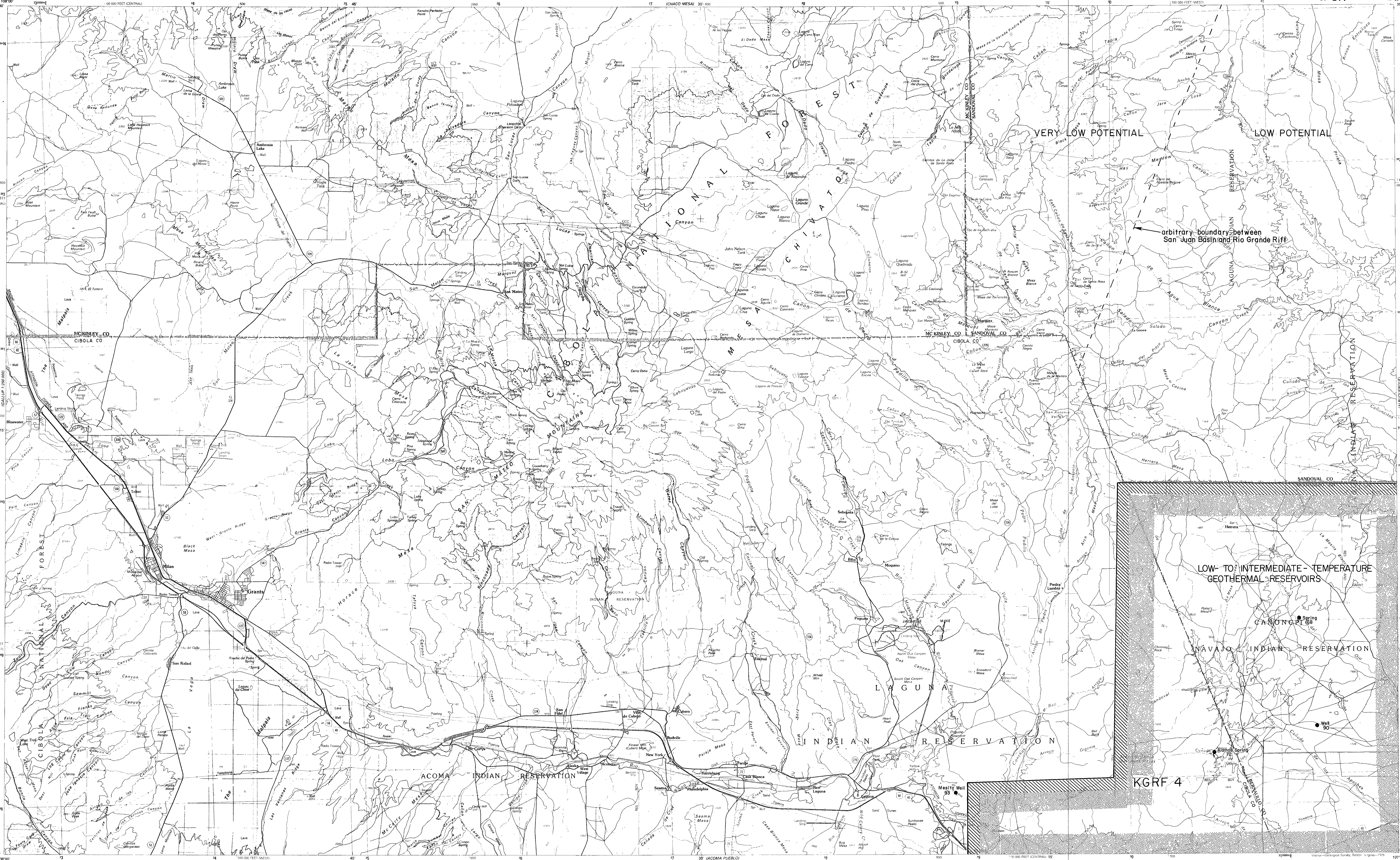
See appendix 5 for details

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 36

GRANTS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)

OF-211



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Map edited 1978

Projection and 10 000 - meter grid, zone 13,
Universal Transverse Mercator
50 000 - foot grid ticks based on New Mexico coordinate system west and central zones. 1927 North American datum

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1 Goat Mountain–1957
2 Ambrosia Lake–1957
3 San Lucas Dam–1963
4 Cerro Alesna–1963
5 El Dado Mesa–1961
6 Laguna Seca–1961
7 Cerro Tinaja–1961
8 Casa Salazar–1961
9 Bluewater–1957 (Photorevised–1971)
10 Dos Lomas–1957
11 San Mateo–1963
12 Cerro Pelon–1963
13 Laguna Cañoneros–1961
14 Marquez–1961
15 La Gotera–1961
16 Puerco Dam–1961
17 Milan–1957 (Photorevised–1971)
18 Grants–1957 (Photorevised–1971)
19 Lobo Springs–1957
20 Mount Taylor–1957
21 Seboyeta–1957
22 Moquino–1957
23 Arch Mesa–1957
24 Herrera–1954
25 San Rafael–1957
26 Grants SE–1957 (Photorevised–1971)
27 Mc Cartys–1957 (Photorevised–1971)
28 Cubero–1957 (Photorevised–1971)
29 Laguna–1957 (Photorevised–1971)
30 Mesita–1957 (Photorevised–1971)
31 Mesa Gigante–1957
32 Cañoncito School–1954 (Photorevised–1971)

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

KILOMETERS

MILES

FEET

CONTOUR INTERVAL 50 METERS

MAP 36 - Geothermal springs and wells, KGRA's, KGRF's, and geothermal-resource potential in the Grants 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See appendix 5 for details

GEOTHERMAL-RESOURCE POTENTIAL

- MODERATE TO LOW
- KGRF (Known geothermal resource field - defined by State Land Office)
- Steam or geothermal well, temperature in °F
- Hot spring, temperature in °F

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S route State route

GRANTS, NEW MEXICO

SW/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP

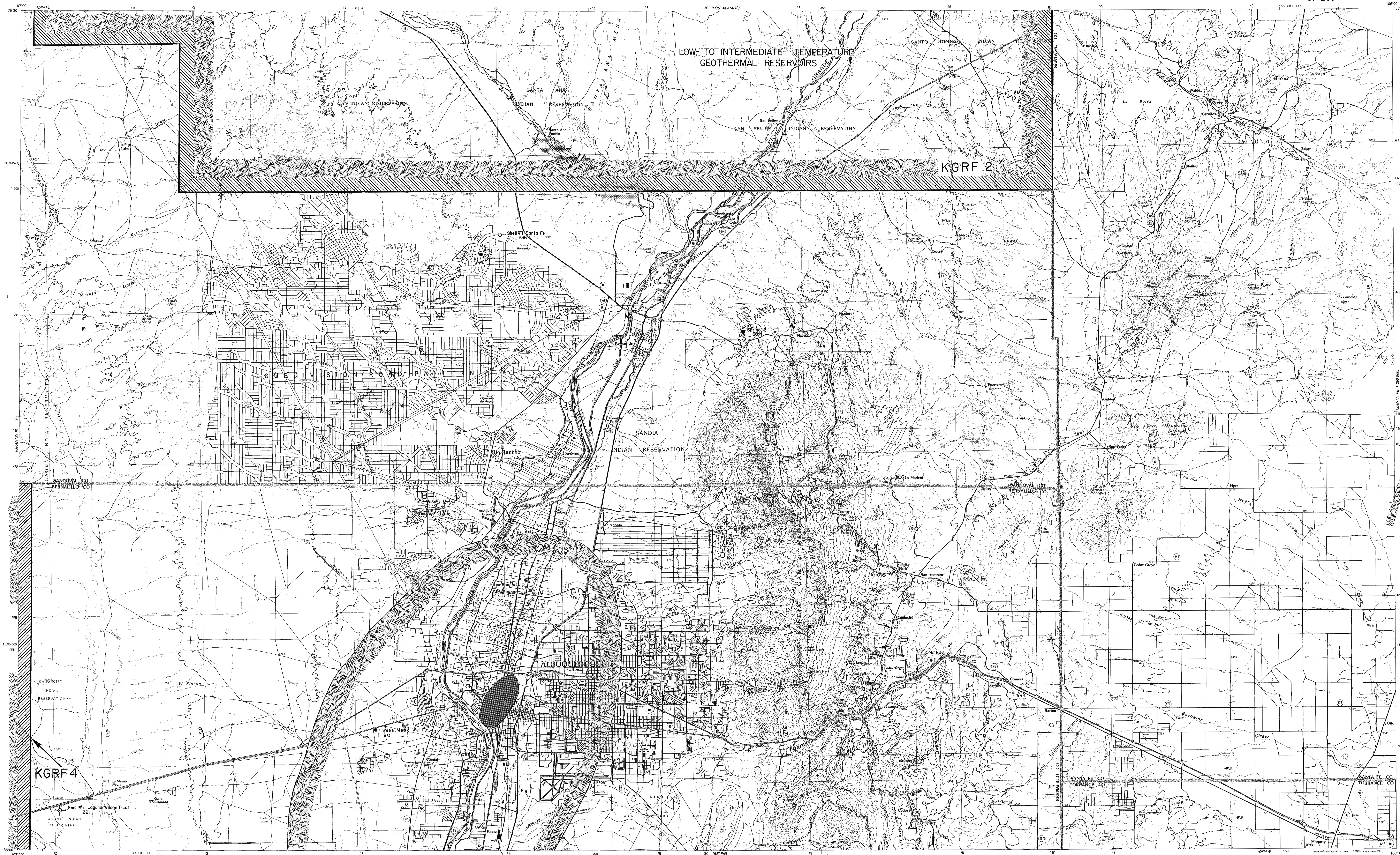
N3500–W10700/30x60

1978

OF 211

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 37
ALBUQUERQUE QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211



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Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1961. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

Some grant boundaries adjacent to Rio Grande and Rio Puerco are omitted because of insufficient data

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2 Sky Village NE – 1960
3 Bernalillo NW – 1953
4 Santa Ana Pueblo – 1954
5 San Felipe Pueblo – 1954
6 San Felipe Pueblo NE – 1954
7 Madrid – 1961
8 Sky Village – 1954
9 Sky Village SE – 1954 (Photorevised – 1972)
10 Loma Machete – 1954 (Photorevised – 1972)
11 Bernalillo – 1954 (Photorevised – 1972)
12 Placitas – 1954
13 Haga – 1954
14 Benavidez Ranch – 1954
15 Volcano Ranch – 1954 (Photorevised – 1972)
16 Los Griegos – 1960 (Photorevised – 1972)
17 Alameda – 1960 (Photorevised – 1972)
18 Sandia Crest – 1961 (Photorevised – 1972)
19 Sandia Park – 1954
20 San Pedro – 1954
21 Edgewood – 1956
22 La Mesita Negra – 1954 (Photorevised – 1971)
23 La Mesita Negra SE – 1954 (Photorevised – 1973)
24 Albuquerque West – 1960 (Photorevised – 1972)
25 Albuquerque East – 1960 (Photorevised – 1972)
26 Tijeras – 1961 (Photorevised – 1972)
27 Sedillo – 1954
28 Edgewood – 1954

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

GEOTHERMAL RESOURCE POTENTIAL

- HIGH
- LOW
- MODERATE TO LOW
- KGRF (Known geothermal resource field- defined by the State Land Office)
- Steam or geothermal well, temperature in °F
- Hot spring, temperature in °F

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route · U.S. route · State route

ALBUQUERQUE, NEW MEXICO
N3500—W10600/30x60
1978

MAP 37- Geothermal springs and wells, KGRA's, KGRF's and geothermal-resource potential in the Albuquerque 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See appendix 5 for details

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 38
ACOMA PUEBLO QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)

OF-211

Produced by the Geological Survey
in cooperation with the Soil Conservation Service

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1964. See index for dates of individual maps
Partially revised from aerial photographs taken 1974–1975 and other source data. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13,
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

There may be private inholdings within the boundaries of the National or State reservations shown on this map

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1 Arrosa Ranch–1961
2 Los Pilares–1961
3 Crow Point–1961
4 Acoma Pueblo–1961
5 South Butte–1960
6 Dough Mountain–1960 (Photorevised–1971)
7 South Garcia–1956
8 South Garcia–1954 (Photorevised–1971)
9 North Pasture–1961
10 Laguna Honda–1961
11 Blue Mesa–1961
12 East Mesa–1961
13 Marmon Ranch–1961
14 Cerro Verde–1960
15 South Garcia SE–1954
16 Sand Canyon–1964
17 Cebollita Peak–1964
18 Mecate Meadow–1964
19 Broom Mountain–1964
20 Cerro Del Oro–1964
21 Chicken Mountain–1964
22 Mesa Aparejo–1956
23 Bonnie Canyon–1964
24 Wild Horse Canyon–1964
25 Wiley Mesa–1964
26 Pueblo Viejo Mesa–1964
27 Field Ranch–1964
28 Puerto De Los Cavadores–1964

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000
KILOMETERS
MILES
FEET
ELEVATIONS SHOWN IN METERS

GEOTHERMAL RESOURCE POTENTIAL

MODERATE TO LOW — LOW

KGRF (Known geothermal resource field-defined by the State Land Office)

Hot springs, temperature in °F

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or other road
Trail
Interstate route — U.S. route — State route

MAP 38 - Geothermal springs and wells, KGRA's, KGRF's, and geothermal-resource potential in the Acoma Pueblo 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See appendix 5 for details

ACOMA PUEBLO, NEW MEXICO
NW 4 SOCORRO (NI 13-4) 1:250 000-SCALE MAP
N3430–W10700/30x60
1978

MAP 39

BELEN, NEW MEXICO
OF-211

LOW- TO INTERMEDIATE- TEMPERATURE
GEOTHERMAL RESERVOIRS

30x60 MINUTE SERIES (TOPOGRAPHIC)

BELEN, NEW MEXICO
N3430-W10600/30x60
1979

GEOTHERMAL RESOURCE POTENTIAL

MODERATE TO LOW

LOW

MAP 39 - Geothermal springs and wells, KGRA's, KGRF's, and geothermal-resource potential in the Belen 1:100,000 quadrangle, Northern Rio Puerco Resource Area See appendix 5 for details

Hot spring, temperature in °F

Steam or geothermal well, temperature in °F

KGRF (Known geothermal resource field - defined by the State Land Office)

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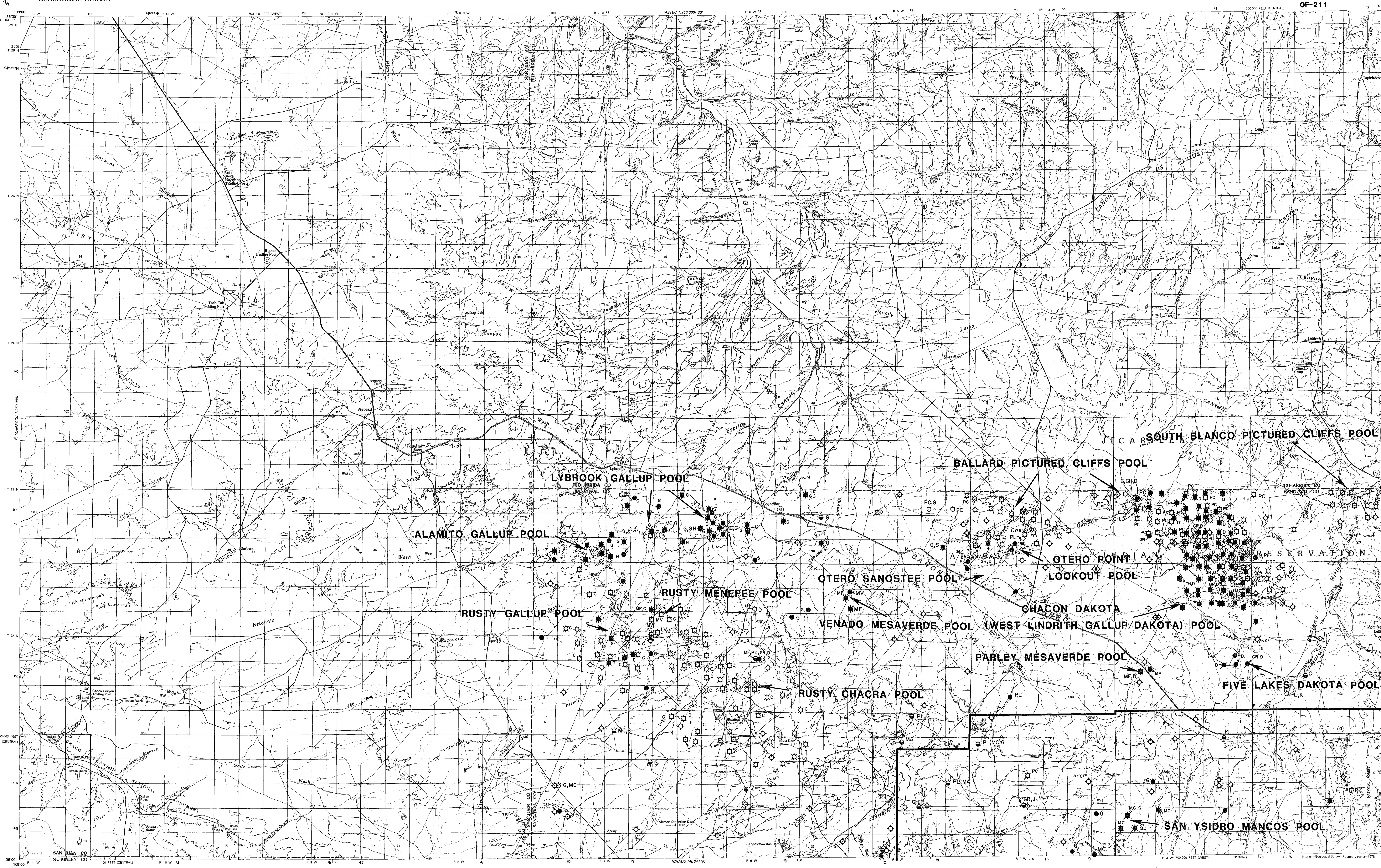
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 40
CHACO CANYON QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES
OF-211



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Partially revised from aerial photographs taken 1973–1976 and from other official sources. Revised information not field checked

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central and west zones. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

SCALE 1:100 000

NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND

ROAD CLASSIFICATION

MAP 40 - Petroleum test wells in the Chaco Canyon 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 41 for explanation of symbols

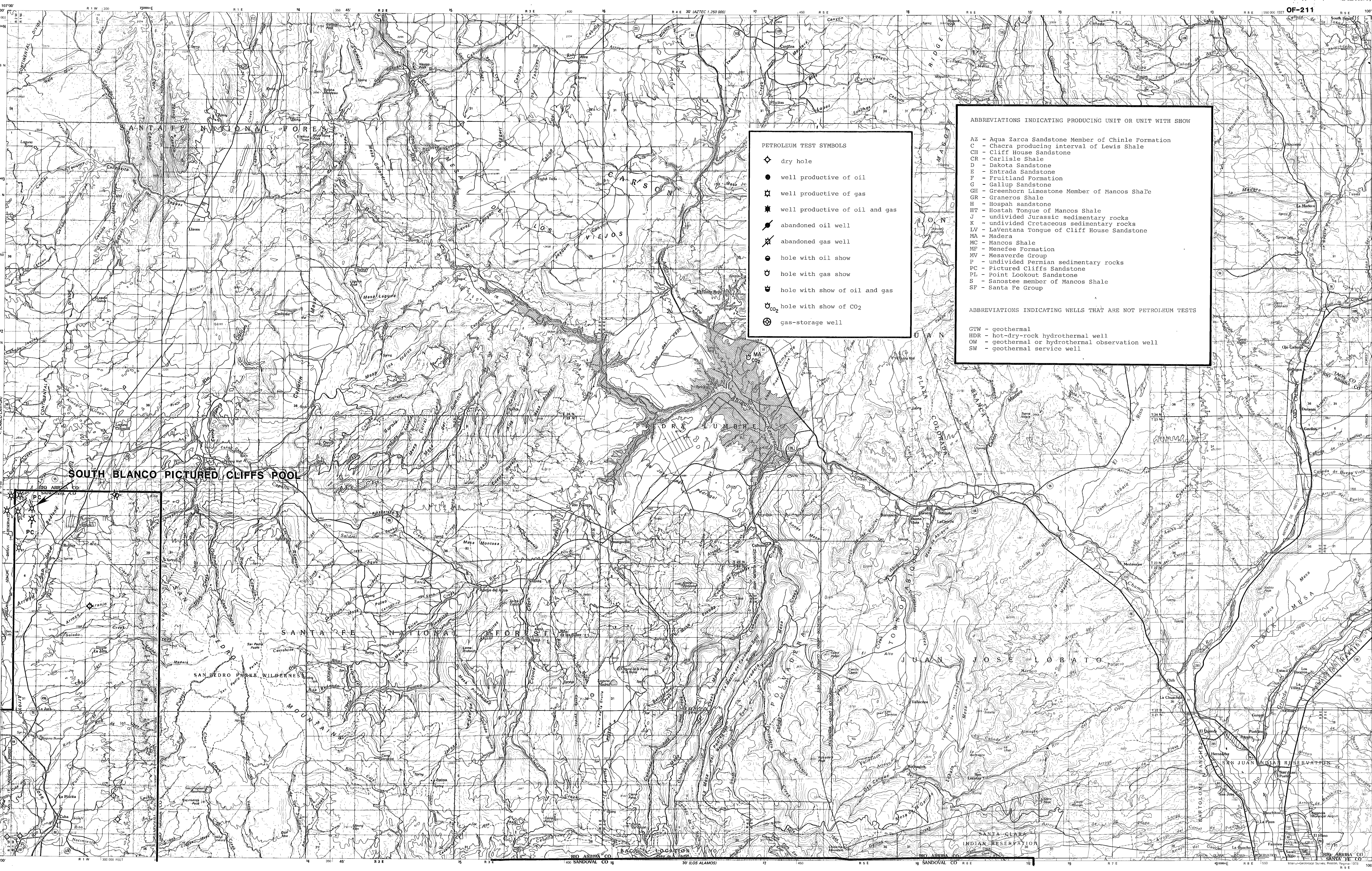
CHACO CANYON, NEW MEXICO

N3600-W10700/30x60

1976

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 41
ABIQUIU QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)
OF-211



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Projection and 10 000-meter grid, zone 13, Universal Transverse Mercator. 50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

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7 La Madera–1953
8 Laguna Peak–1953
9 Echo Amphitheater–1953
10 Ghost Ranch–1953
11 Canjilon SE–1953
12 El Rito–1953
13 Ojo Caliente–1953
14 Regina–1963
15 Gallina–1963
16 Arroyo Del Agua–1953
17 Youngsville–1953
18 Cañones–1953
19 Abiquiu–1953
20 Medanales–1953
21 Lyden–1953
22 Cuba–1963
23 Nacimiento Peak–1963
24 Jarosa–1953
25 Cerro Del Grant–1953
26 Polvadera Peak–1953
27 Vallecitos–1953
28 Chili–1953
29 San Juan Pueblo–1953

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MAP 41 - Petroleum test wells in the Abiquiu 1:100,000 quadrangle, Northern Rio Puerco Resource Area

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route — U.S. route — State route

ABIQUIU, NEW MEXICO
SE/4 AZTEC (NJ 13-10) 1:250 000-SCALE MAP
N3600–W10600/30x60
1978

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 42
CHACO MESA QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211

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Map edited 1977
Projection and 10 000-meter grid, zone 13 Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

SCALE 1:100 000

CONTOUR INTERVAL 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route   U.S. route   State route

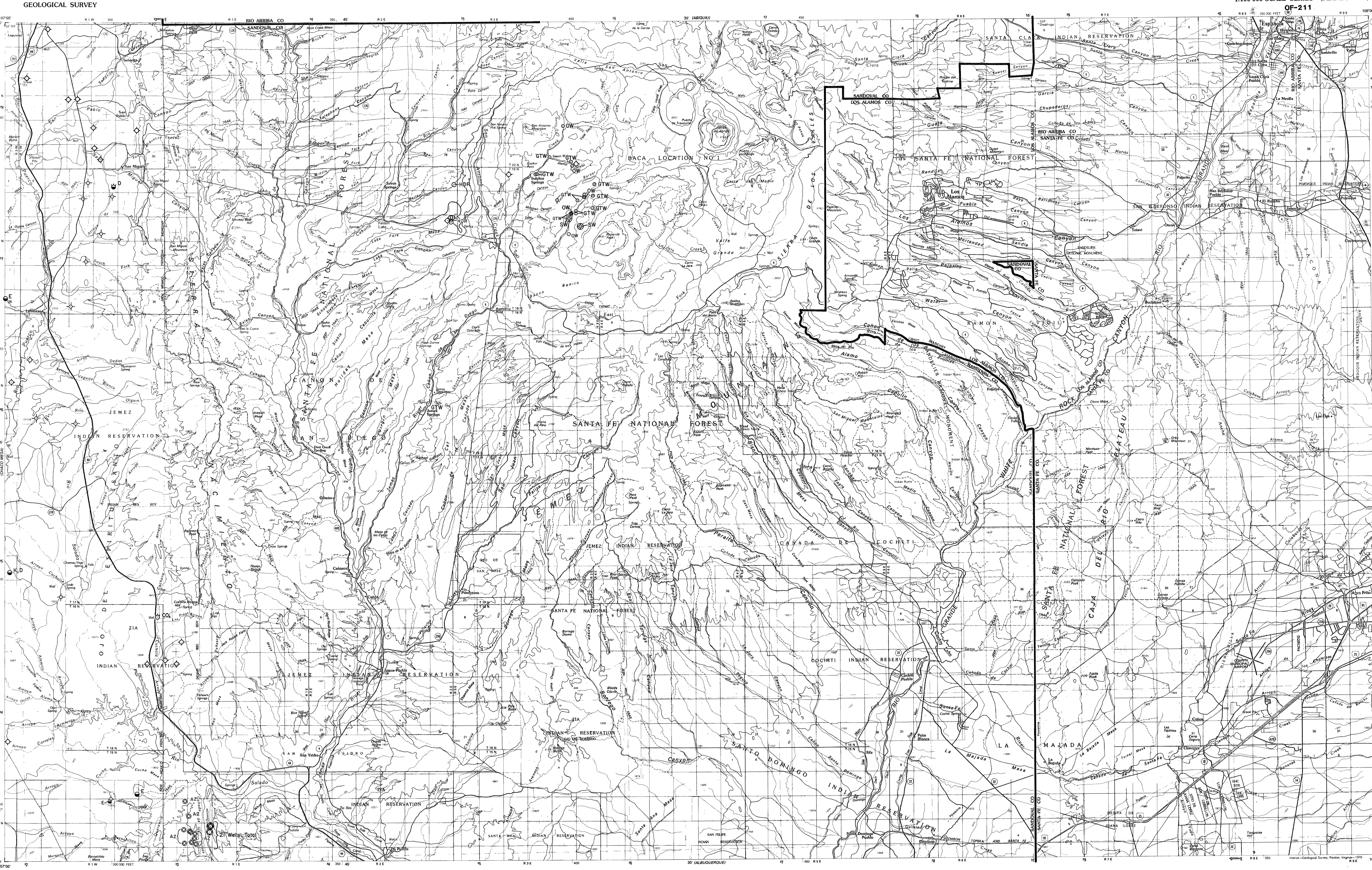
CHACO MESA, NEW MEXICO
N3530-W10700/30x60
1977

MAP 42 - Petroleum test wells in the Chaco Mesa 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 41 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 43
LOS ALAMOS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)
OF-211



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Map edited 1978

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

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2 Rancho del Chaparral–1970
3 Seven Springs–1970
4 Valle San Antonio–1970
5 Valle Toledo–1952
6 Guaje Mountain–1952
7 Puye–1952
8 Espanola–1953
9 La Ventana–1970
10 San Miguel Mountain–1970
11 Jemez Springs–1970
12 Redondo Peak–1970
13 Bland–1953
14 Frijoles–1952
15 White Rock–1952
16 Horcado Ranch–1953
17 Holy Ghost Spring–1969
18 Gilman–1970
19 Ponderosa–1970
20 Bear Springs Peak–1970
21 Cañada–1953
22 Cochiti Dam–1953
23 Montoso Peak–1952
24 Agua Fria–1951
25 Ojito Spring–1969
26 San Ysidro–1969
27 Jemez Pueblo–1969
28 Loma Creston–1970
29 Santo Domingo Pueblo SW–1953
30 Santo Domingo Pueblo–1953
31 Tetilla Peak–1953
32 Turquoise Hill–1952

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000
KILOMETERS
MILES
FEET
ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

NEW MEXICO
QUADRANGLE LOCATION

LEGEND

- Perennial stream, lake
- Intermittent stream, lake
- Village or locality
- Landmark structure
- Public park or recreation area
- Forest or game land area

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Street or unimproved road
- Trail
- Interstate route / U.S. route / State route

MAP 43 - Petroleum test wells in the Los Alamos 1:100,000 quadrangle, Northern Rio Puerco Resource Area

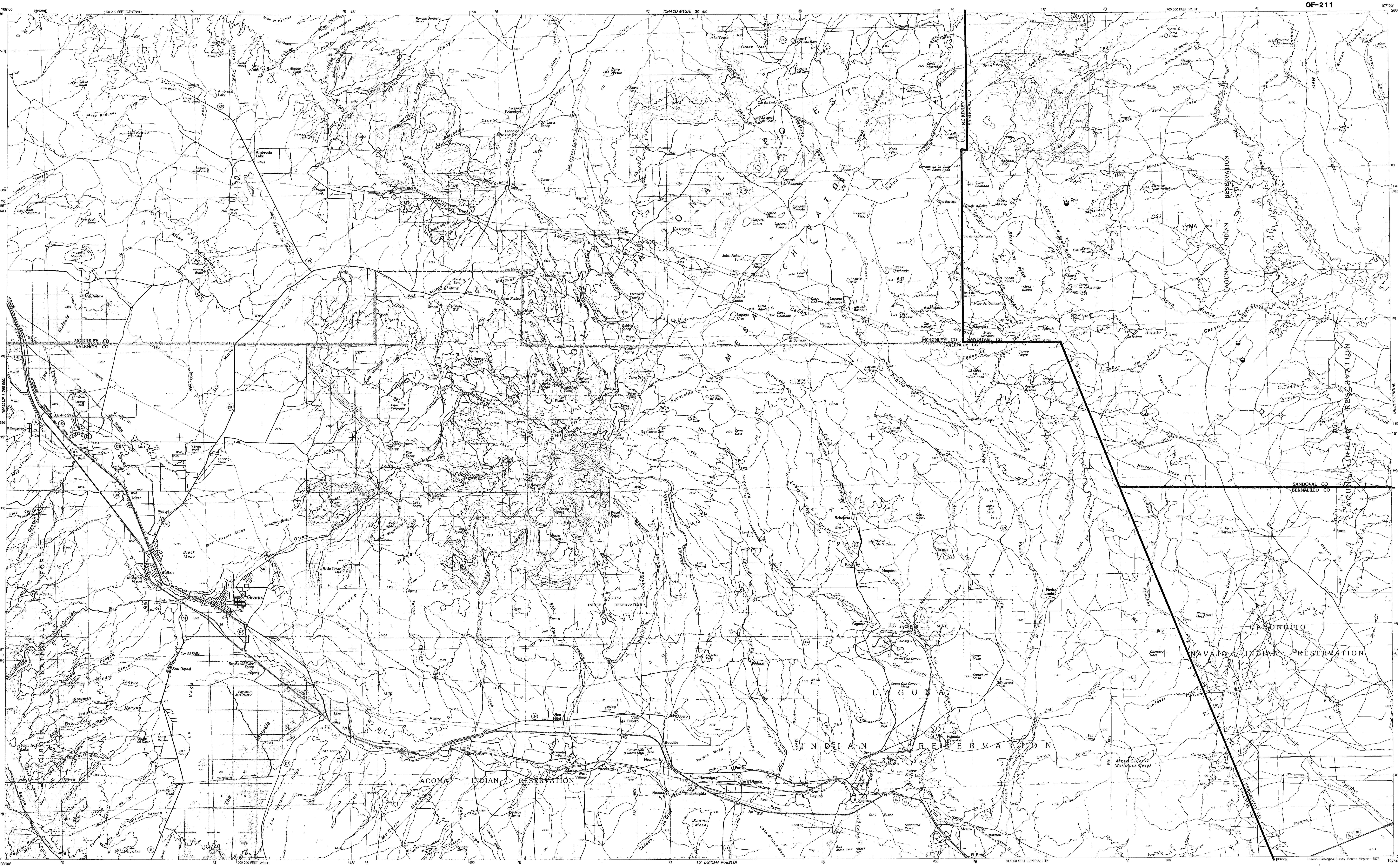
See map 41 for explanation of symbols

LOS ALAMOS, NEW MEXICO
NE/4 ALBUQUERQUE (NI 13-1) 1 250 000-SCALE MAP
N3530-W10600/30x60
1978

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 44
GRANTS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211



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Map edited 1978

Projection and 10 000 - meter grid, zone 13,
Universal Transverse Mercator
50 000 - foot grid ticks based on New Mexico coordinate system west and central zones. 1927 North American datum

MAP INDEX

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

LEGEND

- Perennial stream, lake
- Intermittent stream, lake
- Village or locality
- Landmark structure
- Public park or recreation area
- Forest or game land area
- Other public area or Military or Indian reservation

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Street or unimproved road
- Trail
- Interstate route — U S route — State route

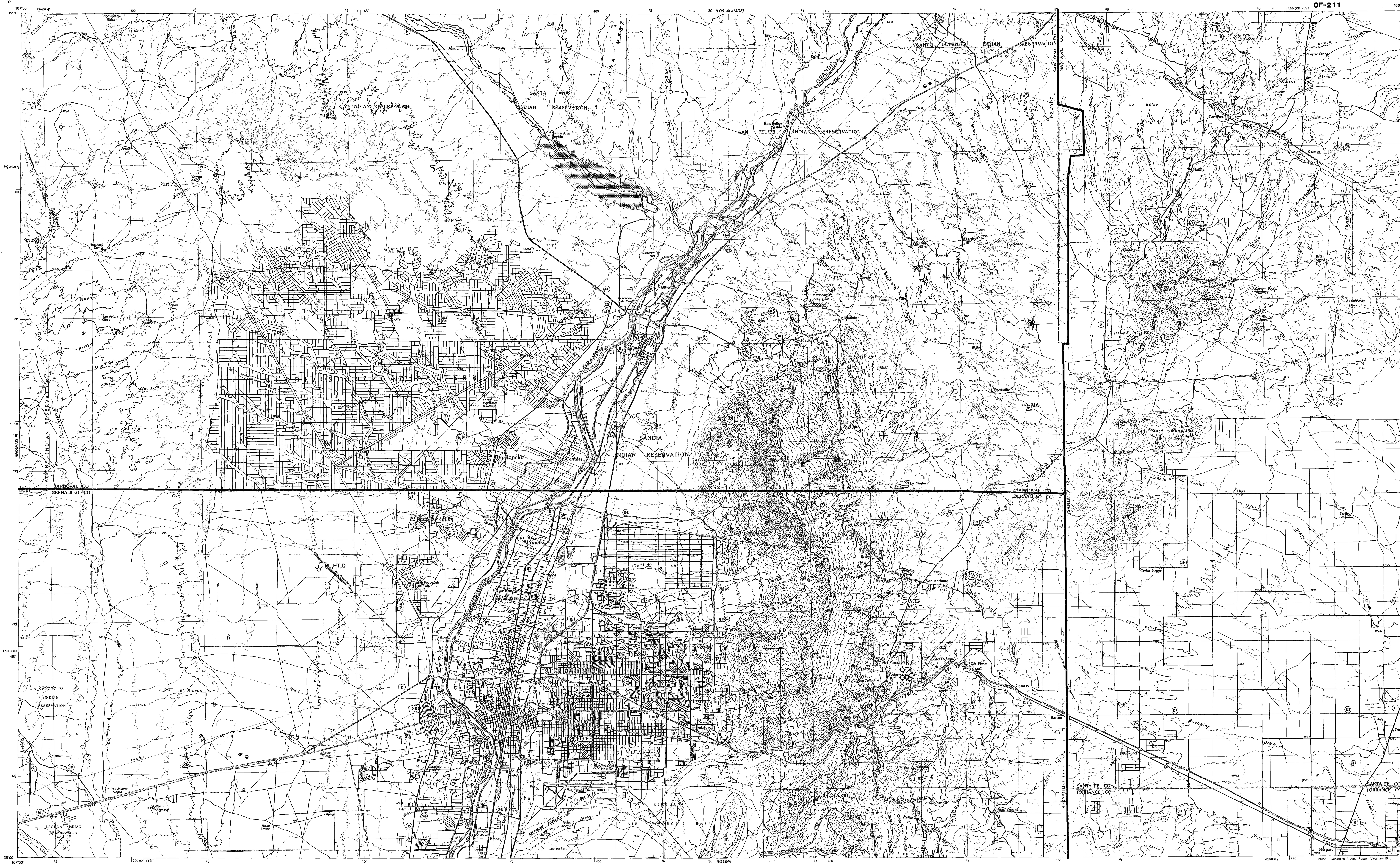
GRANTS, NEW MEXICO
SW/4 ALBUQUERQUE (NI 13-1) 1 250 000-SCALE MAP
N3500–W10700/30x60
1978

MAP 44 - Petroleum test wells in the Grants 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 41 for explanation of symbols

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 45
ALBUQUERQUE QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211



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Partially revised from aerial photographs taken 1975 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

Some grant boundaries adjacent to Rio Grande and Rio Puerco are omitted because of insufficient data

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2 Sky Village NE – 1960
3 Bernalillo NW – 1953
4 Santa Ana Pueblo – 1954
5 San Felipe Pueblo – 1954
6 San Felipe Pueblo NE – 1954
7 Madrid – 1961
8 Sky Village – 1954
9 Sky Village SE – 1954 (Photorevised – 1972)
10 Loma Machete – 1954 (Photorevised – 1972)
11 Bernalillo – 1954 (Photorevised – 1972)
12 Placitas – 1954
13 Hagan – 1954
14 Benavidez Ranch – 1954
15 Volcano Ranch – 1954 (Photorevised – 1972)
16 Los Griegos – 1960 (Photorevised – 1972)
17 Alameda – 1960 (Photorevised – 1972)
18 Sandia Crest – 1961 (Photorevised – 1972)
19 Sandia Park – 1954
20 San Pedro – 1954
21 Edgewood – 1956
22 La Mesita Negra – 1954 (Photorevised – 1971)
23 La Mesita Negra SE – 1954 (Photorevised – 1973)
24 Albuquerque West – 1960 (Photorevised – 1972)
25 Albuquerque East – 1960 (Photorevised – 1972)
26 Tijeras – 1961 (Photorevised – 1972)
27 Sedillo – 1954
28 Edgewood – 1954

GN MN
0°54' 16 MILS
12° 213 MILS
UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000
KILOMETERS
MILES
FEET
CONTOUR INTERVAL 50 METERS

NEW MEXICO
QUADRANGLE LOCATION

LEGEND
Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure

ROAD CLASSIFICATION
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route   U.S. route   State route

MAP 45 - Petroleum test wells in the Albuquerque 1:100,000 quadrangle, Northern Rio Puerco Resource Area

See map 41 for explanation of symbols

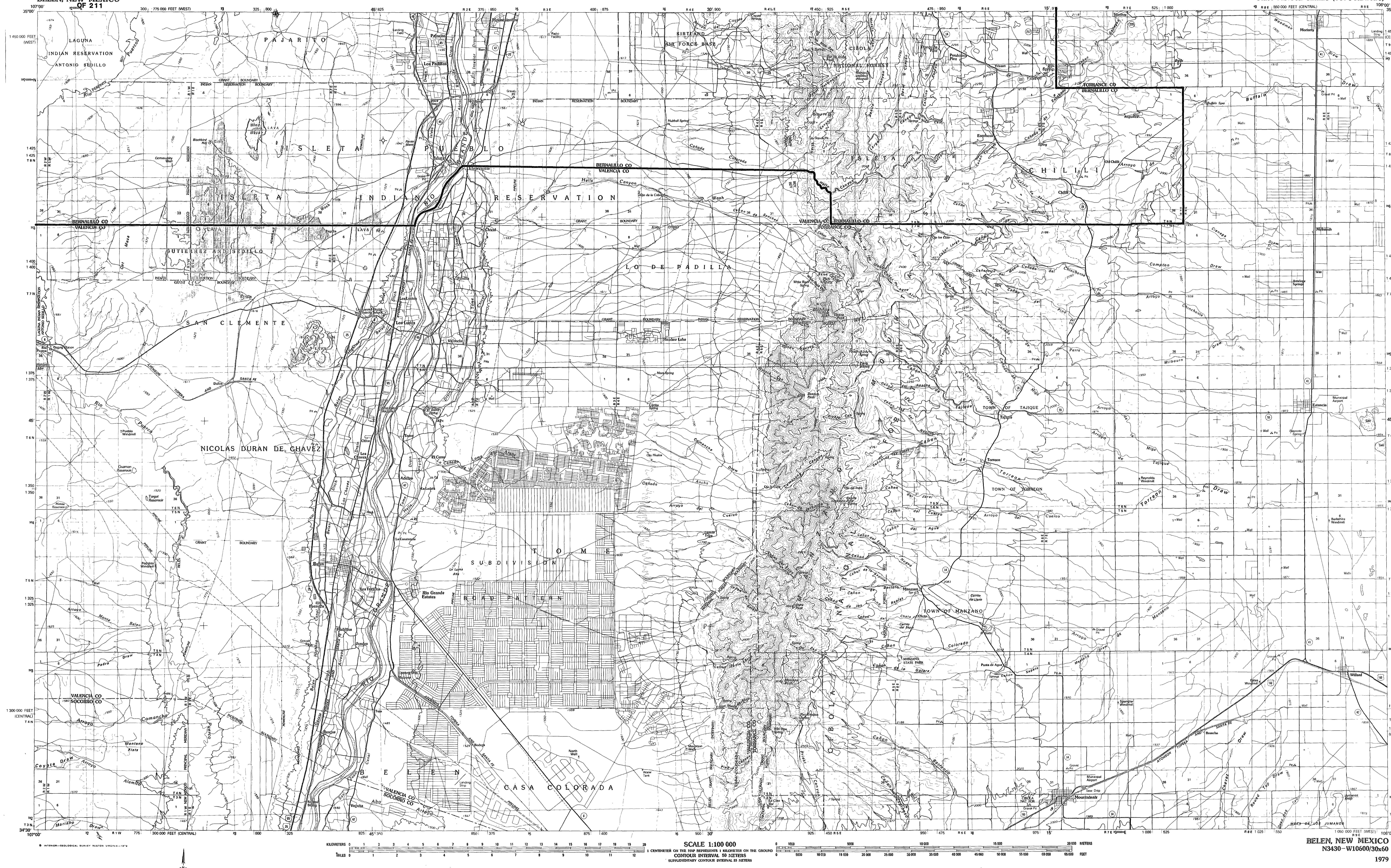
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092

ALBUQUERQUE, NEW MEXICO
SE/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3500—W10600/30x60
1978

MAP 46

BELEN, NEW MEXICO
OF 211

30x60 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:100 000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
SUPPLEMENTARY CONTOUR INTERVAL 25 METERS

BELEN, NEW MEXICO
N3430-W10600/30x60
1979

MAP 46- Petroleum test wells in the Belen 1:100,000 quadrangle, Northern Rio Puerco Resource Area
See map 41 for explanation of symbols

OF 211

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 47
CHACO CANYON QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES
OF-211

Mapped, edited, and published by the Geological Survey

Compiled in 1976 from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1959–1967. See index for dates of individual maps

Partially revised from aerial photographs taken 1973–1976 and from other official sources. Revised information not field checked

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central and west zones. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Huerfano Trading Post NW–1966
2 Huerfano Trading Post–1967
3 Nageezi–1959
4 Gonzales Mesa–1963
5 Lapis Point–1963
6 Schmitz Ranch–1963
7 Ojito–1963
8 Huerfano Trading Post SW–1966
9 Blanco Trading Post–1966
10 Tafoya Canyon–1963
11 Otero Store–1963
12 Billy Rice Canyon–1963
13 Lindrith–1963
14 Pueblo Bonito NW–1966
15 Kimbeto–1967
16 Lybrook NW–1966
17 Lybrook–1966
18 Counselor–1966
19 Tancosa Windmill–1966
20 Five Lakes Canyon NW–1963
21 Five Lakes Canyon NE–1963
22 Pueblo Bonito–1966
23 Sargent Ranch–1966
24 Fire Rock Well–1966
25 Lybrook SE–1966
26 Mule Dam–1966
27 Deer Mesa–1963
28 Taylor Ranch–1963
29 Arroyo Chijuilita–1963

SCALE 1:100 000

NATIONAL GEODETIC VERTICAL DATUM OF 1929

NEW MEXICO

QUADRANGLE LOCATION

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

MAP 47 - Petroleum-resource potential of the Chaco Canyon 1:100,000 quadrangle, Northern Rio Puerco Resource Area

CHACO CANYON, NEW MEXICO
SW/4 AZTEC (NJ 13-10) 1:250 000-SCALE MAP
N3600–W10700/30x60
1976

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 48
ABIQUIU QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)

OF-211

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1953–1963. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13.
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

1 Llaves–1955
2 Navajo Peak–1953
3 Alire–1953
4 Canjilon–1953
5 Magote Peak–1953
6 Valle Grande Peak–1953
7 La Madera–1953
8 Laguna Peak–1953
9 Echo Amphitheater–1953
10 Ghost Ranch–1953
11 Canjilon SE–1953
12 El Rito–1953
13 Ojo Caliente–1953
14 Regina–1963
15 Gallina–1963
16 Arroyo Del Agua–1953
17 Youngsville–1953
18 Cañones–1953
19 Abiquiu–1953
20 Medanales–1953
21 Lyden–1953
22 Cuba–1963
23 Nacimiento Peak–1963
24 Jarosa–1953
25 Cerro Del Grant–1953
26 Polvadera Peak–1953
27 Vallecitos–1953
28 Chili–1953
29 San Juan Pueblo–1953

GN MN
0°53′ 16 MILS
12½° 222 MILS
UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000
KILOMETERS
MILES
FEET

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

high resource potential
moderate
low
low to zero
unknown resource potential

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route
U.S. route
State route

ABIQUIU, NEW MEXICO
SE/4 AZTEC (NJ 13-10) 1:250 000-SCALE MAP
N3600–W10600/30x60
1978

MAP 48 - Petroleum-resource potential of the Abiquiu 1:100,000 quadrangle, Northern Rio Puerco Resource Area

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 49
CHACO MESA QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000-scale topographic maps dated 1960–1970. See index for dates of individual maps
Partially revised from aerial photographs taken 1974–76 and from other official sources. Revised information not field checked
Map edited 1977

Projection and 10 000-meter grid, zone 13 Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

INDEX TO 1:24 000-SCALE MAPS

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1 Seven Lakes NW–1970
2 Seven Lakes NE–1970
3 Pueblo Pintado–1961
4 Pueblo Alto Trading Post–1960
5 Star Lake–1961
6 Ojo Encino Mesa–1961
7 Johnson Trading Post–1961
8 Mesa Portales–1961
9 Seven Lakes–1970
10 Kin Nahzin Ruins–1970
11 Whitehorse–1961
12 Whitehorse Rincon–1961
13 Rincon Marquez–1961
14 Tinian–1961
15 Wolf Stand–1961
16 Headcut Reservoir–1961
17 Laguna Castillo–1963
18 Orphan Annie Rock–1963
19 Hospah–1961
20 Mesita Americana–1961
21 Mesita Del Gavilan–1961
22 Canada Calladita–1961
23 Arroyo Empedrado–1961
24 San Luis–1961
25 Borrego Pass–1963
26 Mesa De Los Toros–1963
27 Piedra De La Aguila–1961
28 El Dado–1961
29 Mesa Cortada–1961
30 Cerro Pardo–1961
31 Guadalupe–1961
32 Cabezon Peak–1961

GN MN
1°30' 27 MILS
12½° 222 MILS
UTM GRID AND 1977 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000
1 0 1 2 3 4 5 6 7 8 9 10 KILOMETERS
1 0 1 2 3 4 5 MILES
5000 0 5000 10000 15000 20000 25000 FEET

CONTOUR INTERVAL 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

high resource potential
moderate

NEW MEXICO
QUADRANGLE LOCATION

LEGEND
Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area

ROAD CLASSIFICATION
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

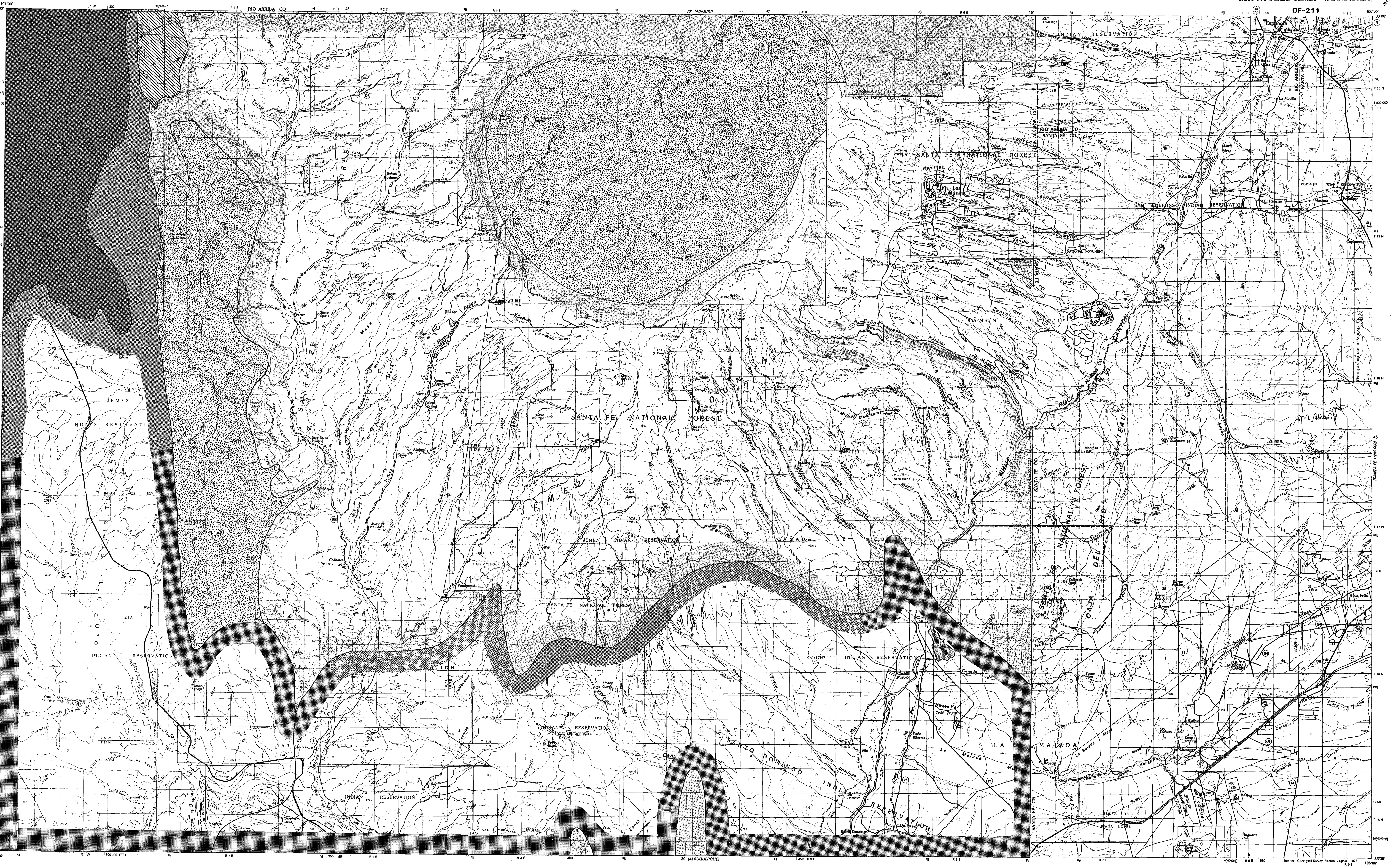
MAP 49- Petroleum-resource potential of the Chaco Mesa 1:100,000 quadrangle, Northern Rio Puerco Resource Area

This map complies with national map accuracy standards
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

CHACO MESA, NEW MEXICO
NW/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3530–W10700/30x60
1977

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 50
LOS ALAMOS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)
OF-211



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000-scale topographic maps dated 1951–1970. *See index for dates of individual maps*
Partially revised from aerial photographs taken 1974 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13: Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

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1 San Pablo–1970
2 Rancho del Chaparral–1970
3 *Seven Springs–1970*
4 Valle San Antonio–1970
5 Valle Toledo–1952
6 Guaje Mountain–1952
7 Puye–1952
8 Espanola–1953
9 La Ventana–1970
10 San Miguel Mountain–1970
11 Jemez Springs–1970
12 *Redondo Peak–1970*
13 Bland–1953
14 Frijoles–1952
15 White Rock–1952
16 Horcado Ranch–1953
17 Holy Ghost Spring–1969
18 Gilman–1970
19 *Ponderosa–1970*
20 Bear Springs Peak–1970
21 Cañada–1953
22 Cochiti Dam–1953
23 Montoso Peak–1952
24 Agua Fria–1951
25 Ojito Spring–1969
26 San Ysidro–1969
27 Jemez Pueblo–1969
28 Loma Creston–1970
29 Santo Domingo Pueblo SW–1953
30 Santo Domingo Pueblo–1953
31 Tetilla Peak–1953
32 Turquoise Hill–1952

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000

ELEVATIONS SHOWN IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

high resource potential
moderate
low
low to zero
unknown resource potential

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area
Forest or game land area
Other public area or Military or Indian reservation

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

MAP 50 - Petroleum-resource potential of the Los Alamos 1:100,000 quadrangle, Northern Rio Puerco Resource Area

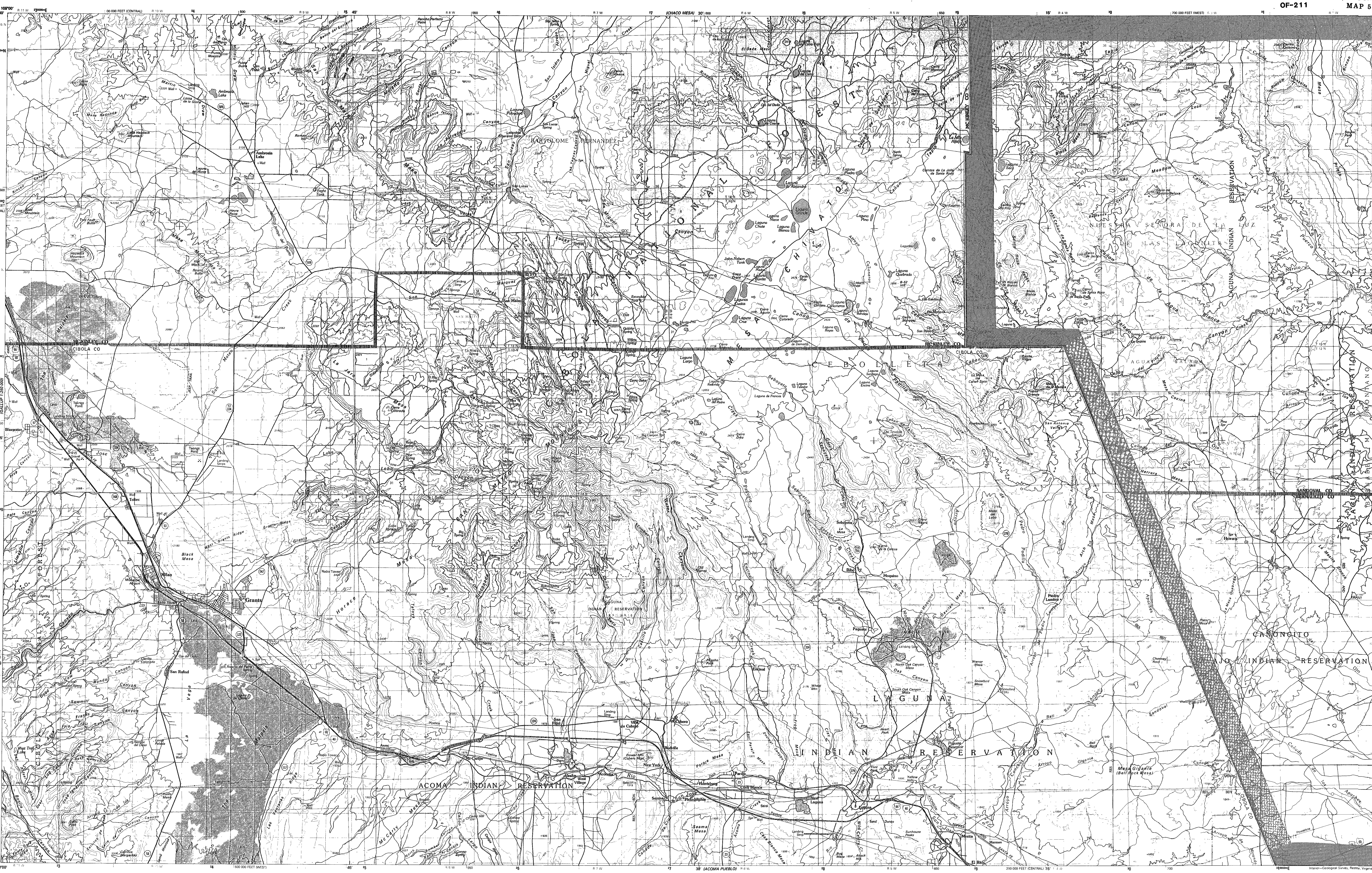
This map complies with national map accuracy standards
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

LOS ALAMOS, NEW MEXICO
NE/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3530-W10600/30x60
1978

Interior—Geological Survey, Reston, Virginia—1978

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GRANTS QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211
MAP 51



Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 - scale topographic maps dated 1954 – 1963. See index for dates of individual maps. Partially revised from aerial photographs taken 1973–75 and other official sources. Revised information not field checked. Map edited 1978

Projection and 10 000 - meter grid, zone 13, Universal Transverse Mercator
50 000 - foot grid ticks based on New Mexico coordinate system west and central zones. 1927 North American datum

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1 Goat Mountain–1957
2 Ambrosia Lake–1957
3 San Lucas Dam–1963
4 Cerro Alesna–1963
5 El Dado Mesa–1961
6 Laguna Seca–1961
7 Cerro Tinaja–1961
8 Casa Salazar–1961
9 Bluewater–1957 (Photorevised–1971)
10 Dos Lomas–1957
11 San Mateo–1963
12 Cerro Pelon–1963
13 Laguna Cañoneros–1961
14 Marquez–1961
15 La Gotera–1961
16 Puerco Dam–1961
17 Milan–1957 (Photorevised–1971)
18 Grants–1957 (Photorevised–1971)
19 Lobo Springs–1957
20 Mount Taylor–1957
21 Seboyeta–1957
22 Moquino–1957
23 Arch Mesa–1957
24 Herrera–1954
25 San Rafael–1957
26 Grants SE–1957 (Photorevised–1971)
27 Mc Cartys–1957 (Photorevised–1971)
28 Cubero–1957 (Photorevised–1971)
29 Laguna–1957 (Photorevised–1971)
30 Mesita–1957 (Photorevised–1971)
31 Mesa Gigante–1957
32 Cañoncito School–1954 (Photorevised–1971)

GN MN
1°27′ 26 MILS
12½° 222 MILS
UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000
KILOMETERS 1 0 1 2 3 4 5 6 7 8 9 10
MILES 1 0 1 2 3 4 5
FEET 5000 0 5000 10000 15000 20000 25000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

moderate resource potential

NEW MEXICO
QUADRANGLE LOCATION

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or unimproved road
Trail
Interstate route U.S. route State route

MAP 51- Petroleum-resource potential of the Grants 1:100,000 quadrangle, Northern Rio Puerco Resource Area

This map complies with national map accuracy standards
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GRANTS, NEW MEXICO
SW/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3500–W10700/30x60
1978

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 52

ALBUQUERQUE QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (TOPOGRAPHIC)
OF-211

Mapped, edited, and published by the Geological Survey

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1961. See index for dates of individual maps
Partially revised from aerial photographs taken 1975 and 1976 and from other official sources. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, central zone. 1927 North American datum

Areas covered by dashed light-blue pattern are subject to controlled inundation

Some grant boundaries adjacent to Rio Grande and Rio Puerco are omitted because of insufficient data

INDEX TO 1:24 000 AND 1:62 500-SCALE MAPS

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

- high resource potential
- moderate
- low
- low to zero

LEGEND

- Perennial stream, lake
- Intermittent stream, lake
- Village or locality
- Landmark structure
- Public park or recreation area
- Forest or game land area

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Street or unimproved road
- Trail
- Interstate route — U.S. route — State route

MAP 52 - Petroleum-resource potential of the Albuquerque 1:100,000 quadrangle, Northern Rio Puerco Resource Area

This map complies with national map accuracy standards
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092

ALBUQUERQUE, NEW MEXICO
SE/4 ALBUQUERQUE (NI 13-1) 1:250 000-SCALE MAP
N3500—W10600/30x60
1978

OF 211

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAP 53
ACOMA PUEBLO QUADRANGLE
NEW MEXICO
1:100 000-SCALE SERIES (PLANIMETRIC)
OF-211

Produced by the Geological Survey
in cooperation with the Soil Conservation Service

Compiled from USGS 1:24 000 and 1:62 500-scale topographic maps dated 1954–1964. See index for dates of individual maps
Partially revised from aerial photographs taken 1974–1975 and other source data. Revised information not field checked
Map edited 1978

Projection and 10 000-meter grid, zone 13,
Universal Transverse Mercator
50 000-foot grid ticks based on New Mexico coordinate system, west and central zones. 1927 North American datum

There may be private inholdings within the boundaries of the National or State reservations shown on this map

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1 Arrosa Ranch–1961
2 Los Pilares–1961
3 Crow Point–1961
4 Acoma Pueblo–1961
5 South Butte–1960
6 Dough Mountain–1960 (Photorevised–1971)
7 South Garcia–1956
8 South Garcia–1954 (Photorevised–1971)
9 North Pasture–1961
10 Laguna Honda–1961
11 Blue Mesa–1961
12 East Mesa–1961
13 Marmon Ranch–1961
14 Cerro Verde–1960
15 South Garcia SE–1954
16 Sand Canyon–1964
17 Cebollita Peak–1964
18 Mecate Meadow–1964
19 Broom Mountain–1964
20 Cerro Del Oro–1964
21 Chicken Mountain–1964
22 Mesa Aparejo–1956
23 Bonnie Canyon–1964
24 Wild Horse Canyon–1964
25 Wiley Mesa–1964
26 Pueblo Viejo Mesa–1964
27 Field Ranch–1964
28 Puerto De Los Cavadores–1964

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

SCALE 1:100 000
KILOMETERS
MILES
FEET
ELEVATIONS SHOWN IN METERS

moderate resource potential

NEW MEXICO
QUADRANGLE LOCATION

MAP 53- Petroleum-resource potential of the Acoma Pueblo 1:100,000 quadrangle, Northern Rio Puerco Resource Area

LEGEND

Perennial stream, lake
Intermittent stream, lake
Village or locality
Landmark structure
Public park or recreation area

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Street or other road
Trail
Interstate route
U.S. route
State route

ACOMA PUEBLO, NEW MEXICO
NW/4 SOCORRO (NI 13-4) 1:250 000-SCALE MAP
N3430–W10700/30x60
1978

Interior—Geological Survey, Reston, Virginia—1979

OF 211

This map complies with national map accuracy standards

MAP 54

BELEN, NEW MEXICO
OF-211

30x60 MINUTE SERIES (TOPOGRAPHIC)

SCALE 1:100 000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
SUPPLEMENTARY CONTOUR INTERVAL 25 METERS

BELEN, NEW MEXICO
N3430–W10600/30x60
1979

MAP 54 - Petroleum-resource potential of the Belen 1:100,000 quadrangle, Northern Rio Puerco Resource Area

moderate resource potential
low
low to zero