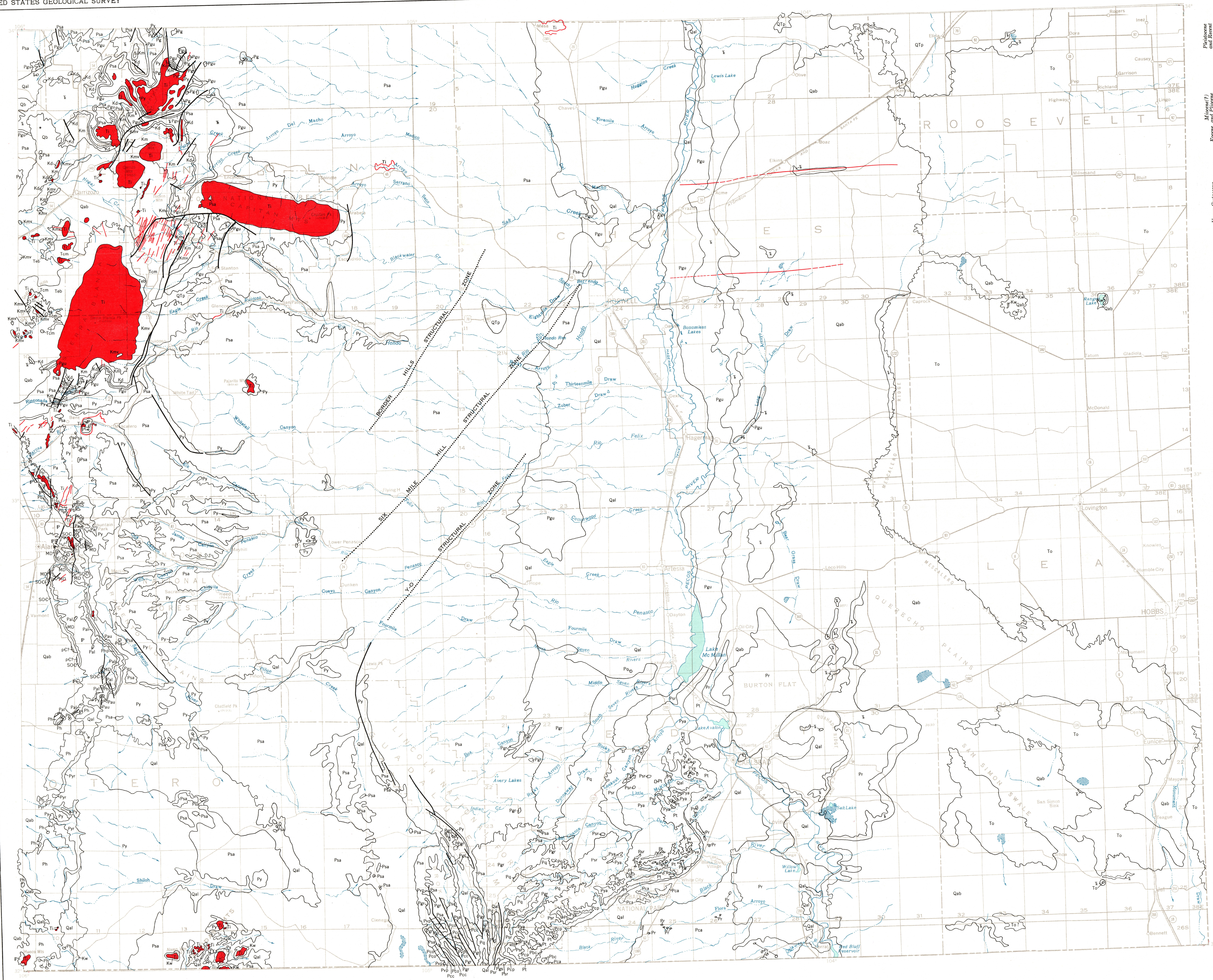
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED WITH THE COOPERATION OF
THE NEW MEXICO BUREAU OF MINES AND MINERAL RESOURCES AND
THE DEPARTMENT OF GEOLOGY, UNIVERSITY OF NEW MEXICO



EXPLANATION

SEDIMENTARY ROCKS

QUATERNARY (Pleistocene and Recent)

Qal — **Alluvium**

Qab — **Alluvium, bolson deposits, dune sand, and other surficial deposits**

QTp — **Gravel, sand, and caliche**
May include some redeposited material from Ogallala formation

Note: Some Cretaceous and Triassic rocks that occur locally within sink-holes in areas of Quaternary and Tertiary rocks are not shown

TERTIARY

Miocene(?) and Pliocene

To — **Ogallala formation**
Irregularly bedded sand, grit, and local gravel conglomerate cemented by lime or caliche, and local beds of shale, clay, and limestone

Eocene

Tcm — **Cub Mountain formation of Bodine (1956)**
Pebble and coarse pebble conglomerate, red and white sandstone, and red clay. In part equivalent to Baca formation

CRETACEOUS

Upper Cretaceous

Kmv — **Mesaverde group**
Gray, yellow, and buff quartzose sandstone, gray shale, carbonaceous shale, and coal

Km — **Mancos shale**
Gray, marine shale and sandy shale and some light-gray thin-bedded limestone

Kd — **Dakota sandstone**
Quartzose sandstone, conglomerate, and gray shale

Lower Cretaceous

Kw — **Lower Cretaceous rocks, undifferentiated**
In southern Otero County, dark, massive, and irregularly bedded quartzitic sandstone, pebbly sandstone, and conglomerate overlain by thin-bedded shale, sandstone, and fossiliferous limy shale
In Lea County includes gray shale and sandstone, probably equivalent to the Tucumcari shale member of the Purgatoire formation

TRIASSIC (Upper Triassic)

Ꞧ — **Triassic rocks, undifferentiated**
Maroon, red, and gray irregularly bedded sandstone, bright- and dark-red shale and sandy shale, and purplish limestone-pebble beds. Includes Dockum group (Santa Rosa sandstone, Chinle formation, and equivalents) and Pierce Canyon red beds in Eddy County and adjacent areas

PERMIAN

Ochoa — Delaware Basin facies

Pr — **Rustler formation**
Thin-bedded grayish-pink dolomite and associated gypsum and brown siltstone

Pca — **Castile formation**
Gypsum and interlaminated dark bituminous limestone and white gypsum

Guadalupe

Pgu — **Undifferentiated rocks of Guadalupe age**
Gypsum, anhydrite, dolomite, dolomitic limestone, and red sandstone, siltstone, and shale. Includes equivalents of Bernal formation and red beds and evaporite equivalents of Grayburg, Queen, Seven Rivers, Yates, and Tansill formations (the Whitehorse group of some authors)

EDDY AND SOUTHEASTERN OTERO COUNTIES

SHELF FACIES

Carlsbad group:

Pt — **Tansill formation**
Thin-bedded carbonate rocks interbedded with gypsum; includes a siltstone member in the upper part

Pya — **Yates formation**
Thick- to thin-bedded carbonate rocks interbedded with grayish-orange sandstone and siltstone

Psr — **Seven Rivers formation**
Thick- to thin-bedded carbonate rocks, grading laterally into interbedded dolomite and gypsum and thence into a dominantly gypsum facies

Pq — **Queen formation**
Thick- to thin-bedded sandstone, siltstone, and sandy dolomite, predominantly siltstone in the upper part

Pgr — **Grayburg formation**
Alternating yellowish-gray dolomite and thin sandstone beds

REEF FACIES

Pcp — **Capitan limestone**
Thick-bedded to massive light-gray fossiliferous calcitic limestone of reef origin and associated thick-bedded, depositionally dipping reef talus

Pgs — **Goat Seep limestone**
Massive and thick-bedded limestone and dolomite of reef origin

DELAWARE BASIN FACIES

Pbc — **Bell Canyon formation**
Sandstone, very fine grained, and light-gray and brownish-gray siltstone with a few thin limestone members

Pcc — **Cherry Canyon formation**
Fine-grained, thin-bedded quartz sandstone and several thin but persistent limestone units. The lower part extends northward as a tongue beneath the Goat Seep limestone and grades laterally into the upper part of the San Andres formation. The underlying Brushy Canyon formation of Texas wedges out northward and does not crop out in New Mexico

Leonard

Psa — **San Andres formation**
Light- to dark-gray, evenly bedded limestone and dolomite, locally with thick gypsum beds and with several sandstone beds in the lower part

Pg — **Glorieta sandstone**
White to gray fine- to medium-grained quartz sandstone

Py — **Yeso formation**
Pinkish-gray or yellow fine-grained silty sandstone and gypsum with some limestone and dolomitic limestone

SOUTHWESTERN OTERO COUNTY

Psa — **San Andres formation**
Light- to dark-gray thin- to medium-bedded cherty limestone, with some dolomite. Includes thin quartz sandstone beds at or near the base, in part the Hondo sandstone member of Lang (1937)

Py, Pyr — **Yeso formation**
Pinkish siltstone and sandstone, some gray shale, and white gypsum particularly at the base. Includes a distinctive member of red sandstone (called a tongue of the Abo sandstone by Darton, 1928), and underlying red shale and white gypsum, Pyr

EDDY AND SOUTHEASTERN OTERO COUNTIES — SHELF FACIES

Psa — **San Andres formation**
Thick-bedded brownish-gray cherty limestone, locally with small bioherms. Includes thin quartz sandstone beds at or near the base, in part the Hondo sandstone member of Lang (1937). The San Andres formation of the Shelf facies is equivalent to the lower part of the Cherry Canyon formation and the upper part of the Bone Spring limestone of the Delaware Basin facies

Py — **Yeso formation**
Thin-bedded gray limestone and gypsum and interbedded pinkish siltstone and sandstone. In Cornudas Mountains, thick-bedded dark gray to black limestone overlain by red siltstone, sandstone and gypsum

DELAWARE BASIN FACIES

Pco, Pvp — **Bone Spring limestone**
Includes the Cutoff shaly member, Pco, consisting of platy black shale and dark limestone, and the Victorio Peak gray member, Pvp, consisting of massive and thick-bedded gray limestone. The lower part of the Bone Spring limestone of Texas does not crop out in New Mexico

Wolfcamp

Pa — **Abo sandstone**
Dark-red or reddish-brown mudstone and sandstone, locally arkosic and conglomeratic

Pau — **Upper tongue of Abo sandstone**
Reddish-brown sandstone, siltstone, and shale

Php — **Pendejo tongue of Hueco limestone of Pray (1954)**
Light- to medium-gray, thin- to medium-bedded limestone with lesser amounts of gray calcareous shale and some thin-bedded brown sandstone and siltstone

Pal — **Lower tongue of Abo sandstone**
Red shale, reddish-brown siltstone, fine-grained sandstone, granule and pebble conglomerate, and some interbedded gray limestone

Ph — **Hueco limestone**
Thin-bedded and some thick-bedded gray and dark-gray limestone with interbedded marly limestone

Pb — **Bursum formation and equivalent rocks**
Bedded gray limestone and gray shale, in places grading laterally into red beds and limestone conglomerate. Present only in northern Sacramento Mountains

PENNSYLVANIAN

ℙ — **Pennsylvanian rocks, undifferentiated**
Bedded and massive gray limestone with dark chert, gray, brown, and red shale, graywacke, arkose, and conglomerate. Includes that part of the Magdalena group below the Bursum formation

DEVONIAN AND MISSISSIPPIAN (DEVONIAN AND CARBONIFEROUS)

MD — **Mississippian and Devonian rocks undifferentiated**
Includes Helms formation, thin-bedded shaly limestone and yellow-gray shale; Rancheria formation of Laudon and Bowsher (1941, 1949), gray silty thin-bedded limestone; Lake Valley limestone, light-gray cherty limestone and marl and biohermal limestone; and Caballero formation of Laudon and Bowsher (1941, 1949), limestone and calcareous shale, all of Mississippian age; and Percha shale, black shale and calcareous shale; Sly Gap formation of Stevenson (1945) and Stainbrook (1935, 1948), yellow to dark-gray shale and nodular limestone; and Onate formation of Stevenson (1945), dark-gray silty and sandy dolomite, all of Devonian age

CAMBRIAN, ORDOVICIAN, AND SILURIAN

SOꞒ — **Silurian, Ordovician, and Cambrian rocks undifferentiated**
Includes Fusselman limestone, light-gray fine-grained dolomite and cherty dolomite, of Silurian age; and Valmont dolomite of Pray (1953), light-gray thin-bedded dolomite and cherty dolomite; Montoya limestone, medium- to dark-gray dolomite and cherty dolomite with quartz sandstone at base; El Paso limestone, gray cherty dolomite and dolomitic sandstone, all of Ordovician age; and Bliss sandstone, brown quartz sandstone, in part glauconitic, and interbedded sandy dolomite and limestone in the upper part, of Cambrian and Ordovician age

IGNEOUS ROCKS

QUATERNARY (Pleistocene and Recent)

Qb — **Basalt flows**
Location of volcanic vent indicated by ✶

TERTIARY

Miocene(?) and Pliocene

Teb — **Basalt and andesite flows and other volcanic rocks.**
May include some flows of Quaternary age

Eocene

Ti — **Rhyolite, trachyte, diorite, basic dikes, and other intrusive rocks**
Long dashes where approximately located; short dashes where indefinitely located. Locally includes some extrusive rocks

OTERO COUNTY METAMORPHIC AND IGNEOUS ROCKS

PRECAMBRIAN

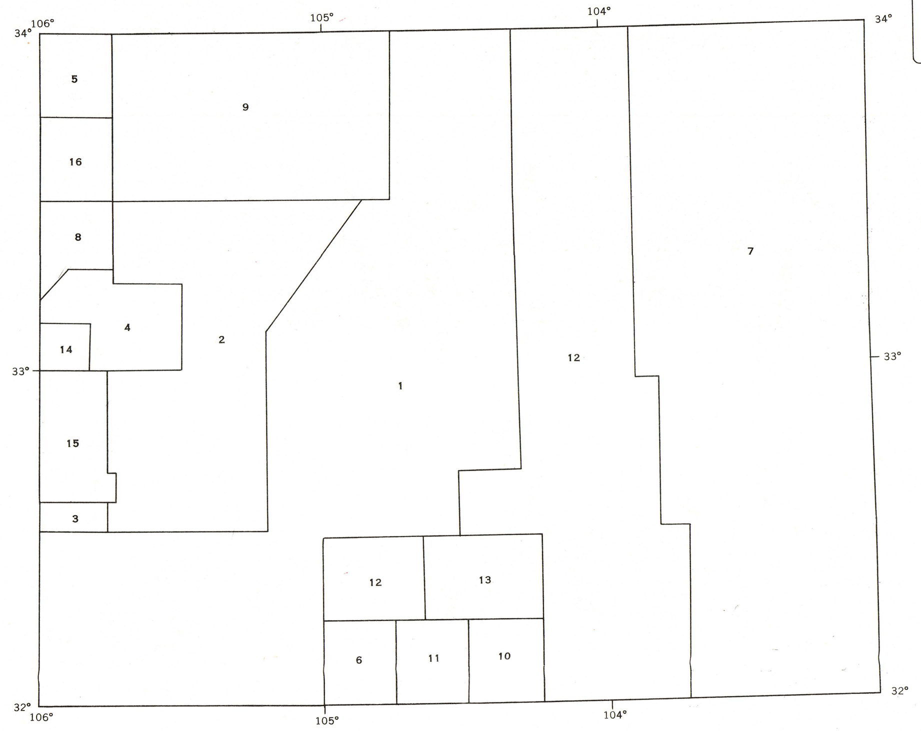
pꞒ — **Quartzite and granite**

Contact

Approximate location of lateral gradation between map units

Fault

Structural zone
A trend along which occur joints, small faults, and flexures having a similar or parallel trend



INDEX MAP OF SOUTHEASTERN PART OF NEW MEXICO
Showing sources of geologic data

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INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C. M R-2902

Base from U. S. G. S. map of New Mexico 1:500,000 with some modification in base drainage

PRELIMINARY GEOLOGIC MAP OF THE SOUTHEASTERN PART OF NEW MEXICO

By
Carle H. Dane and George O. Bachman

Scale 1: 380 160

5 0 5 10 15 20 Miles

1958

For sale by U. S. Geological Survey, price 75 cents