

EXPLANATION

Miocene (T)

Intrusive igneous rocks
Dikes and sills of basalt, diabase, and andesite; augite andesite sill caps Archuleta Mesa, 300 feet thick. Vertical biotite hornblende lamprophyre dikes in northeastern part of basin, 1-30 feet thick.

Eocene

San Jose Formation
Fine- to coarse-grained arkosic locally conglomeratic sandstone and interbedded shale; 0-2,500 feet thick. In northern part of basin, abundant volcanic debris including andesite pebbles; proportion of volcanic debris and sandstone decreases southward; conglomerate pebbles include quartzite, jasper, granite, andesite, and shale; stictified wood common.

Paleocene

Nacimiento Formation
Light-gray to black fluvial and lacustrine shale and some scattered sandstone beds; sandstone more abundant in upper part. 0-1,300 feet thick.

Ojo Alamo Sandstone
Overlapping massive sheets of fluvial light- to dark-brown medium- to coarse-grained arkosic conglomeratic sandstone. Conglomerate pebbles smaller to nonexistent toward eastern part of basin. 0-400 feet thick.

Upper Cretaceous

Kirtland Shale and Fruitland Formation¹
Kk, Kirtland Shale. Upper unit consists of the upper shale member and Farmington Sandstone Member; interbedded tabular fine- to medium-grained arkosic sandstone and shale, infrequently conglomeratic; lower shale member, light- to dark-gray and brown shale and silty shale and rare sandstone interbeds. 0-1,500 feet thick.
Kf, Fruitland Formation; interbedded fluvial and paludal shale, carbonaceous shale, sandstone, siltstone, coal, and thin scarce coquina beds; coquina and coal concentrated in lower part. 0-500 feet thick.

Pictured Cliffs Sandstone
Fine-grained sandstone; contains Ophiomorpha major and scattered grains of carbonaceous shale, coal, glauconite, and mica which give rock a salt-and-pepper appearance. 0-400 feet thick.

Lewis Shale
Dark marine shale and scattered interbeds of marine sandstone, sandy to silty limestone, calcareous concretions, and bentonite. 0-2,400 feet thick.

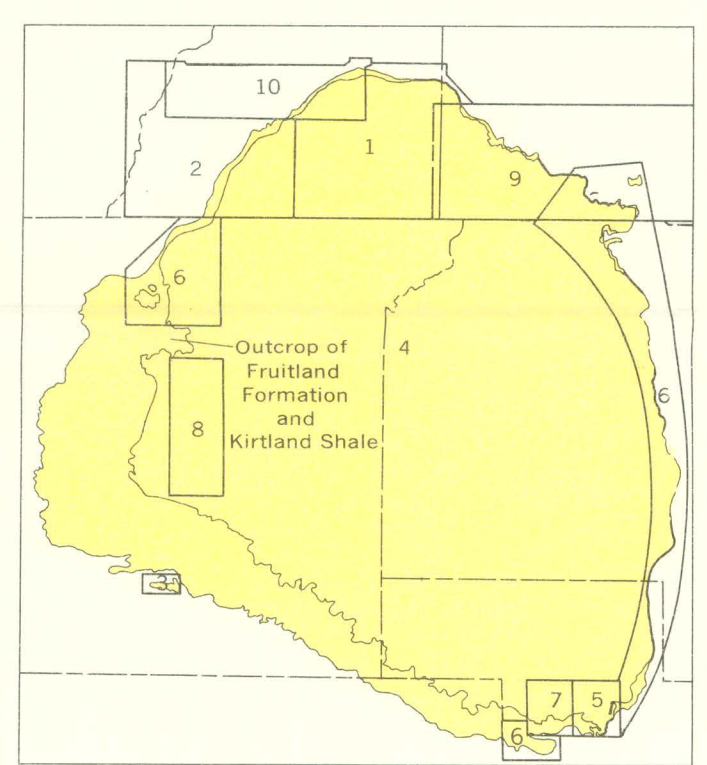
Animas Formation
Tau, upper member; fine- to coarse-grained fluvial conglomeratic andesitic sandstone beds and scattered thin shale interbeds and thin coal beds; 0-2,670 feet thick.
Kam, McDermott Member; more andesitic and coarsely conglomeratic facies of the Animas; termination of the McDermott south of the Colorado border near the La Plata River marks the southernmost extent of the andesite pebble conglomerate.

Other units: Kpc, Pictured Cliffs Sandstone; Toa, Ojo Alamo Sandstone; Klo, Lewis Shale and older rocks.

CONTACT
Dashed where inferred

FAULT
U, upthrown side; D, downthrown side

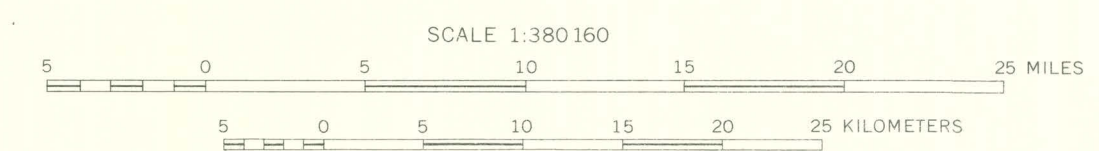
¹Tertiary pollen and spores identified by R. H. Tschudy (see text) were collected from the upper part of the Kirtland Shale and Fruitland Formation undivided at Mesa Portales in the southeastern part of the San Juan Basin.



- SOURCES OF GEOLOGIC DATA
1. Barnes (1953).
 2. Barnes, Baltz, and Hayes (1954).
 3. Bauer and Reeside (1921).
 4. Dane and Bachman (1957; covers entire New Mexico part of San Juan Basin).
 5. Fassett (1966).
 6. Fassett, J. E., and Hinds, J. S., 1961-68, U.S. Geological Survey reconnaissance mapping. These areas were not completely re-mapped; only selected contacts in parts of the areas shown were examined and in some cases altered.
 7. Hinds (1966).
 8. O'Sullivan and Beikman (1963).
 9. Wood, Kelley, and MacAlpin (1948).
 10. Zapp (1949).

NOTE
San Jose-Nacimiento contact in northwestern part of basin from Reeside (1924). Fruitland-Kirtland contact on west and south sides of basin in New Mexico from Bauer and Reeside (1921). Dane (1936), Hayes and Zapp (1955), and O'Sullivan and Beaumont (1957).

Base from U.S. Geological Survey 1:500,000, New Mexico, 1959 and Colorado, 1967



GEOLOGIC MAP OF THE SAN JUAN BASIN, NORTHWESTERN NEW MEXICO, AND SOUTHWESTERN COLORADO