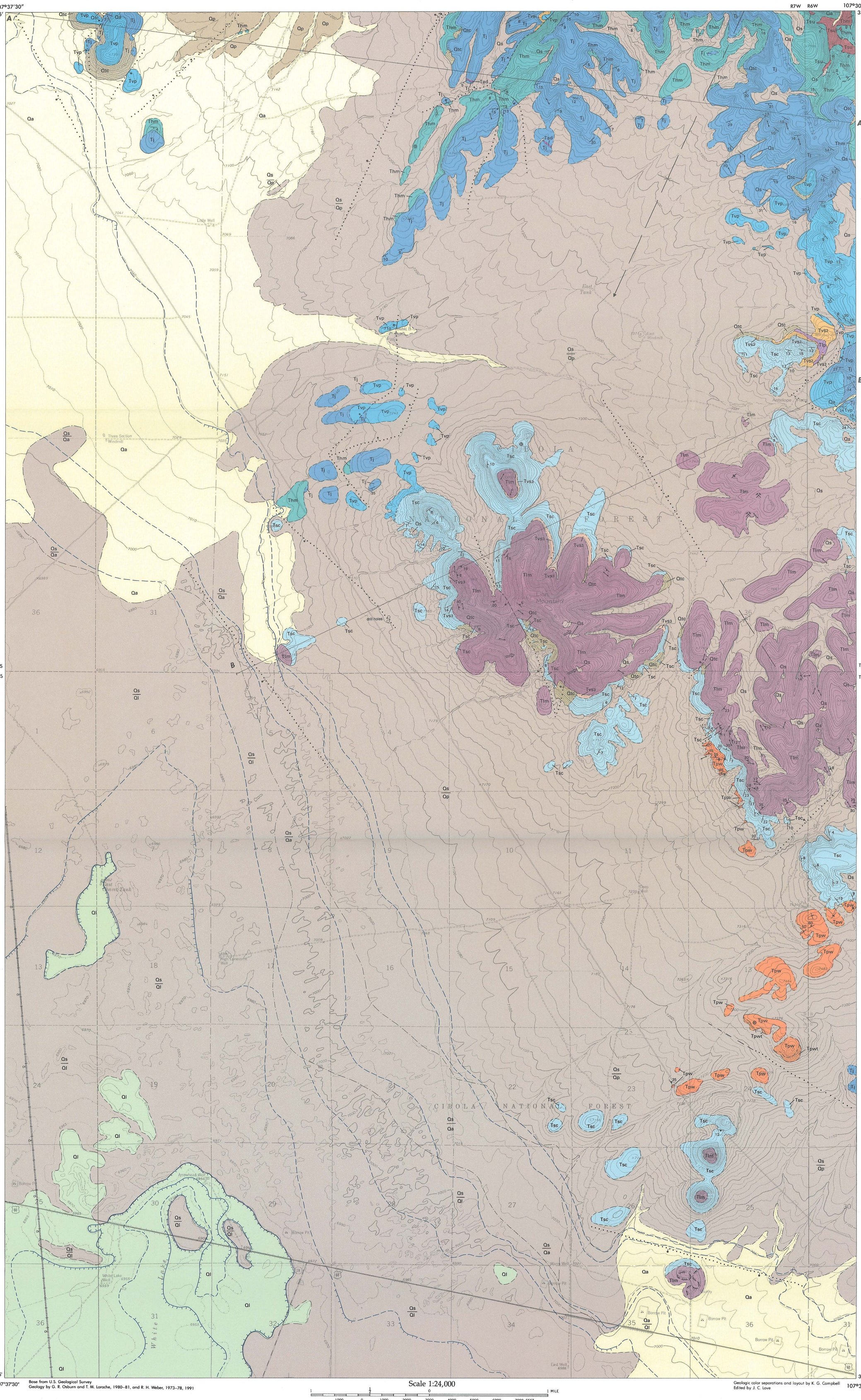


Base from U.S. Geological Survey
Geology by G. R. Osburn and T. M. Laroche, 1980–81, and R. H. Weber, 1973–78, 1991

Scale 1:24,000

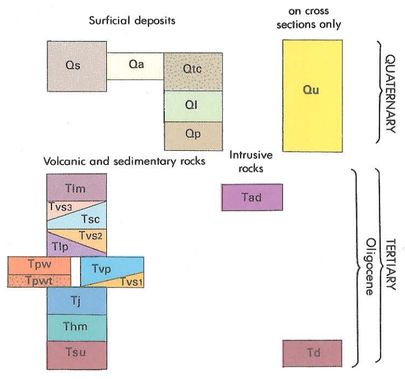
1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

Geologic color separations and layout by K. G. Campbell
Edited by J. C. Love

CORRELATION OF UNITS



DESCRIPTION OF UNITS

Surficial deposits

Qs — **Eolian sand (Quaternary)**—Very pale brown to dark-brown dune and sheet sands on basin floor, sheet sands on piedmont slopes and bedrock areas, and falling dunes on the lee (east and northeast) sides of hills. Scoured and grooved bedrock and blowout and dune orientation indicate a sand-transport direction of approximately N60°E. Map symbol *Qs* shown above symbol for underlying deposits where they are known or inferred. Thickness 0–50 ft (0–15 m), with a maximum measured thickness of 36.3 ft (11 m)

Qa — **Basin- and valley-floor alluvium and other bolson deposits (Quaternary)**—Includes very low gradient piedmont and valley deposits graded to present basin floor. Different morphologies were not separated because of their gradational nature. Surficial deposits consist mainly of dark-brown to grayish-brown, silty, sandy soil. In arroyo cuts deposits are typically pebbly sand with some conglomerate intervals

Qtc — **Talus and colluvium (Quaternary)**—Active or stabilized talus-slope deposits and surficial rock debris. Shown only where geological contacts are obscured

Ql — **Lacustrine deposits (Quaternary)**—Deposits of White Lake basin section of Pleistocene Lake Agustin and subsequent deposits of ponds, marshes, and playas. Consist of light-gray, olive, yellow, and brown sands, silts, and clays with local gravels on beaches and fan–delta of White House Canyon. Numerous small areas of overlying eolian sand (*Qs*) are undifferentiated. Contains a late Pleistocene (Rancholabrean) vertebrate megafauna of bison, horse, mammoth, camel, and short-faced bear

Qp — **Piedmont-slope and pediment alluvium (Quaternary?)**—Bolson deposits consisting of piedmont-slope gravels throughout much of the area and a pediment surface on the western side of Lion Mountain. Almost all areas are now covered by several feet to several tens of feet of eolian sand (*Qs*)

Qu — **Alluvial deposits undivided (Quaternary)**—In the Lion Mountain area alluvium comprises bolson deposits related to the White Lake basin of Pleistocene Lake Agustin and eolian sand derived from this basin. Shown only on cross sections

Volcanic and sedimentary rocks

Tlm — **Andesite of Lion Mountain (Oligocene?)**—Dark-gray to purple, coarsely porphyritic, dense to vesicular andesite lavas. Lavas contain from 10 to 25% total phenocrysts consisting of plagioclase, biotite, pyroxene, and magnetite. Several dikes (*Tad*) of a similar lithology are also present. Exposures extend several miles to the east to the central Gallinas Peak quadrangle. Thickness 0–700 ft (0–210 m)

Tvs3 — **Unnamed sedimentary rocks (Oligocene)**—Poorly exposed unit of sandstones and conglomerates (float only). Commonly contains clasts of rhyolite of Piñon Well (*Tpw*) and South Canyon Tuff (*Tsc*) but locally contains only andesitic clasts similar to andesite of Lion Mountain (*Tlm*) in a volcaniclastic sand matrix. Thickness 0–100 ft (0–30 m)

Tsc — **South Canyon Tuff (Oligocene)**—Simple cooling unit of quartz-rich, one-feldspar rhyolite tuff. Lower member of light-gray to brownish-gray, crystal-poor (2–6%) tuff and an upper member of medium-gray to purple-gray, moderately crystal-rich (15–25%) one-feldspar tuff with abundant chatoyant sanidine and euhedral quartz. The two members are mapped together. Source in northern San Mateo Mountains. Thickness 0–650 ft (0–200 m)

Tvs2 — **Unnamed sedimentary rocks (Oligocene)**—Conglomerates, sandstones, and local mudstones that intertongue with the thin flows of La Jara Peak Basaltic Andesite. Commonly red to buff in color and poorly exposed. Coarser sediments contain clasts similar to the rhyolite of Piñon Well (*Tpw*). Thickness 0–100 ft (0–30 m)

Tlp — **La Jara Peak Basaltic Andesite (Oligocene)**—Gray to brown, vesicular, aphanitic to slightly porphyritic lavas. Flows are commonly thin and locally are interbedded with volcaniclastic sedimentary rocks (*Tvs2*). Lavas typically contain a small percentage of plagioclase and red oxidized ferromagnesian phenocrysts. Thickness 0–180 ft (0–55 m)

Tvp — **Vicks Peak Tuff (Oligocene)**—Light-gray, moderately to densely welded, crystal-poor, pumiceous, rhyolite ash-flow tuff. Contains 1–3% sanidine phenocrysts and trace amounts of quartz, biotite, clinopyroxene, and plagioclase. Erupted from the Nogal Canyon cauldron in the southern San Mateo Mountains (Deal and Rhodes, 1976; Hermann, 1987). Thickness 0–400 ft (0–120 m)

Tvs1 — **Unnamed sedimentary rocks (Oligocene)**—Poorly exposed interval of volcaniclastic conglomerates and sandstones. Clasts of Hells Mesa and La Jencia Tuffs predominate. Thickness 0–20 ft (0–6 m)

Tpw / Tpwt — **Rhyolite of Piñon Well (Oligocene)**—Light-brown to pink, phenocryst-poor, flow-banded rhyolitic lavas that commonly have abundant spherulites. Outcrops extend from South well in the Gallinas Peak quadrangle to the northeastern part of the Arrowhead Well quadrangle, several miles to the southwest. Contains 1–4% sanidine phenocrysts. Commonly underlain by thin, poorly to moderately welded ash flow (*Tpwt*) that contains minor sanidine phenocrysts; believed to be comagmatic with lavas. Thickness 90–500 ft (27–150 m)

Tj — **La Jencia Tuff (Oligocene)**—Multiple-flow, compound cooling unit of light-brown or purple, moderately to densely welded, crystal-poor, rhyolite ash-flow tuffs. Contains lineated pumice in most outcrops and commonly is altered by vapor-phase recrystallization. Contains 3–7% tabular sanidine phenocrysts and minor amounts of small, rounded quartz phenocrysts; traces of biotite, plagioclase, clinopyroxene, sphene, and magnetite are also present. A thin interval (0–20 ft; 0–6 m) of South Crosby Peak Formation (Bornhorst, 1976) is present in some areas but is mapped with the base of the La Jencia Tuff. The South Crosby Peak consists of light-colored, bedded and reworked, lithic-rich, poorly welded tuffs that contain phenocrysts of sanidine (7%), plagioclase (2%), biotite (1%), quartz (~1%), and traces of pyroxene and hornblende. The La Jencia Tuff was erupted from the interconnected Sawmill Canyon and Magdalena cauldrons in the central Magdalena Mountains (Osburn and Chapin, 1983b). Thickness 0–450 ft (0–130 m)

Thm — **Hells Mesa Tuff (Oligocene)**—Simple cooling unit of pink to reddish-brown, densely welded, crystal-rich, quartz-rich, two-feldspar, rhyolitic ash-flow tuffs. Pumice foliation typically indistinct in outcrop except near the base and top. Unit is zoned from quartz-free rhyodacite at base to quartz-rich rhyolite at top; abrupt increase in quartz 10–25 ft (3–7 m) above base. Erupted from Socorro cauldron located in the Magdalena, Socorro, and Chupadera Mountains (Osburn and Chapin, 1983a, b). Outflow thickness 0–800 ft (0–245 m)

Td — **Datil Group (Oligocene)**—Includes all rocks stratigraphically above the Baca Formation and below the Hells Mesa Tuff or their temporal equivalents (Osburn and Chapin, 1983a, b). Shown only on cross sections

Tsu — **Upper member of the Spears Formation (Oligocene?)**—Brown to gray basaltic-andesite lava flows and breccias containing 2–10% large phenocrysts of pyroxene and 10–25% smaller plagioclase phenocrysts; thin, monolithic flow breccias and mudflow breccias often present between lava flows. Near Three Log Spring Canyon, just north of northeast corner of quadrangle, upper member was eroded completely before deposition of the overlying Hells Mesa Tuff. Thickness 200+ ft (60+ m)

Intrusive rocks

Tad — **Andesitic dikes (Oligocene)**—Thin, coarsely porphyritic, dark-gray to purple, mafic dikes containing 10–25% total phenocrysts that consist of abundant plagioclase, sparse pyroxene, and magnetite. Petrographically very similar to, and probably comagmatic with, the andesite of Lion Mountain (*Tlm*). Dikes 0–10 ft (0–3 m) wide

MAP SYMBOLS

Contact—Dashed where approximately located; alternating dots and dashes indicate a contact inferred from photo interpretation or from Soil Conservation Service soil maps

Fault—Dashed where approximately located; dotted where concealed; ball and bar on downthrown side

Relict Pleistocene shoreline—Ticks on lakeward side; dashed where approximately located

Inferred gravity slide block

Strike and dip of beds or compaction foliation in ash-flow tuffs

- Inclined
- Horizontal
- Vertical

Strike and dip of flow foliation in lavas and intrusions

- Inclined
- Horizontal
- Vertical

Trend of flow lineation in flow-banded ash-flow tuffs and lavas

Syncline—Showing direction of plunge of axis; dashed where approximately located

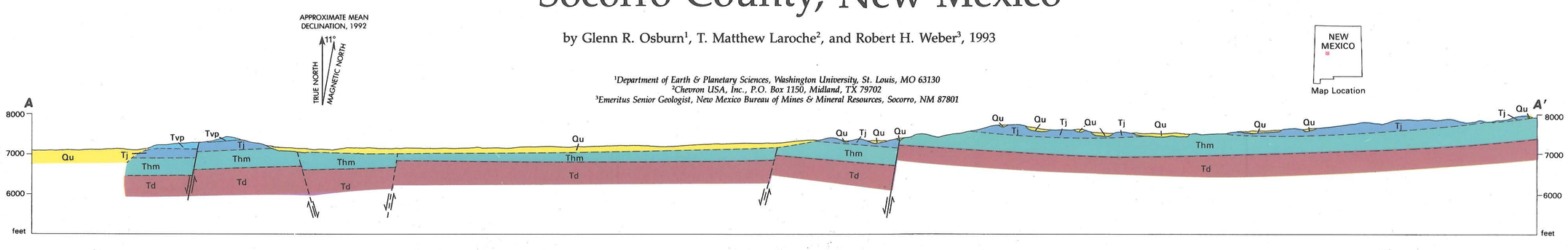
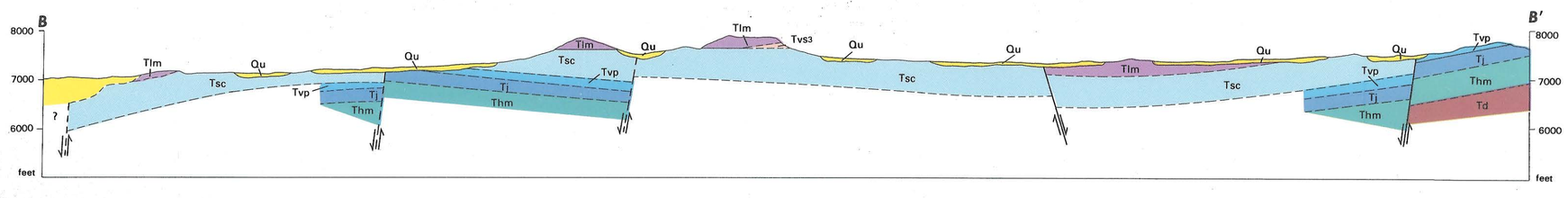
Vitrophyre

Prospect pit

Lineation direction on wind-scoured rocks

Railroad tracks and antenna stations—Very Large Array (VLA) radiotelescope system of National Radio Astronomy Observatory

Geology of Lion Mountain and northern Arrowhead Well quadrangles, Socorro County, New Mexico

by Glenn R. Osburn[1], T. Matthew Laroche[2], and Robert H. Weber[3], 1993

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