

Geologic Map of the Luna Quadrangle, Catron County, New Mexico.

By

Tommy L. Finnell and James C. Ratte

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Open-file Digital Geologic Map OF-GM 129

Scale 1:24,000

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New Mexico Bureau of Geology and Mineral Resources
801 Leroy Place, Socorro, New Mexico, 87801-4796

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Luna 7 ½ minute quadrangle

DESCRIPTION OF MAP UNITS

- Qc Colluvium (Holocene)**-Slope wash, talus and unspecified debris. 0-8 m thick
- Qf Alluvial fan deposits (Holocene)**-Boulder and gravel deposits at the mouths of tributary drainage. 0-10 m thick
- Qa Stream alluvium (Holocene)**-Sand, gravel, and boulder deposits along the San Francisco River valley and tributary valleys on flood plains and terraces as much as 25 m above stream level. 0-10 m thick
- Ql Landslide deposits (Pleistocene and Holocene?)**-Bedrock slide-blocks and related debris; mapped only along the south-facing slope of the San Francisco Mountains east of Burrow Canyon in the southeast corner of the quadrangle and along Trout Creek and the San Francisco River in the northwestern part of the quadrangle
- Qb Basalt of Trout Creek (Pliocene)**-Dark-gray, olivine basalt flows and minor reddish-brown scoria; basalt contains olivine crystals as much as 2.5 cm across in a fine-grained (aphanitic) groundmass of microlitic plagioclase and magnetite. Major flows cap Bill Lee and Hellroaring mesas, and appear to fill an ancestral Trout Creek, creating an inverted topography across the Luna graben., and deflecting the San Francisco River out of the graben to where it has become entrenched across the San Francisco Mountains. A whole-rock sample from Trout Creek area (northwest corner, Sec. 29, R. 20 W., T. 5 S.) gave a K-Ar age of 2.65 +/- 0.10 m.y. (R.F.Marvin and others, 1987). 0-60 m thick
- QTg Gila Group, undivided (Oligocene?-Pliocene)**-Fine to coarse-grained fanglomerate and sandstone derived mainly from local bedrock; contains well-rounded to subangular basaltic, andesitic and rhyolitic welded tuff clasts. These basin-fill deposits are confined mainly to the Luna graben, which trends northeast across the center of the quadrangle. Intertongues with Bearwallow Mountain Andesite along the San Francisco River near the eastern edge of the quadrangle. 0 to 200 m thick

SPEARS GROUP

Volcaniclastic sedimentary rocks interlayered with the volcanic rocks of the Mogollon and Datil Groups (Cather and others, 1994, p. 259-266; Stratigraphic Nomenclature Chart inside back cover).

Tsu Upper Spears Group (Oligocene)-Mainly reddish-brown to light-tan eolian sandstone interbedded between volcanic rocks of the Mogollon Group. Foreset laminations generally dip east to northeast; may contain numerous concretions 2-3 cm in diameter, more rarely to 12 cm. Zeolitic cement consists of clinotilolite and chabazite above Shelley Peak Tuff, but only clinotilolite below Shelley Peak (A.J.Gude III, oral commun., 1982). 0-to as much as 70 m thick

Pueblo Creek Formation (late Eocene – early Oligocene)-Volcaniclastic sedimentary rocks interbedded with the volcanic rocks of the Datil Group.

Tvh Volcaniclastic Sedimentary Rocks of Heiffer Basin (Oligocene)-Yellowish-gray, conglomerate, sandstone, and interbedded light-gray to white tuff. Conglomerate clasts of well-rounded silicic to intermediate composition volcanic rocks are most common in lower part of sedimentary sequence, where interbeds are fluvial sandstone and tuff. Beds that directly overlie porphyritic andesite, Tla, are commonly green and well-indurated. As much as 300 m thick

Tvs Volcaniclastic Sedimentary Rocks of Spur Lake Basin (Eocene- Oligocene)-Light-gray to pale-brown, poorly indurated sandstone and conglomerate. Slopes generally covered with talus and colluvium. An interbedded layer of ash-flow tuff a few meters thick, tuff of Bishop Peak, Tbpt, occurs about 35 meters below the top of this unit. Boulders of the tuff, as much as a meter across, in the upper part of the conglomerate along Dillman Creek and on the east side of Hellroaring Mesa, indicate erosion of the tuff in nearby areas to the west before deposition of the overlying andesite lava flows, Tla. Conglomerate beds beneath the tuff, Tbpt, contain distinctive well rounded clasts of Paleozoic limestone and pink Precambrian granitic gneiss, as well as Tertiary volcanic rocks. Thickness about 100 meters, or more; base not exposed. Named for Spur Lake Basin in Underwood Lake quadrangle to north. Correlates with “Volcaniclastic Rocks (Tpc) of Bull Basin Quadrangle to south (Ratté, 1989)

MOGOLLON GROUP

The Mogollon Group includes the volcanic rocks (ash-flow tuffs, and silicic to mafic lava flows) that unconformably underlie the volcaniclastic sedimentary rocks of the Gila Group, and unconformably overlie the Pueblo Park Formation of the Spears Group. Tmgu- Mogollon Group, undivided; shown only in cross section D-D'

Tba Bearwallow Mountain Andesite (late Oligocene-early Miocene)-Dark gray to brownish gray, fine grained, vesicular lava flows; contain small olivine crystals (1-5 mm), which are mostly altered to reddish-brown iddingsite. 0 to 300-400 m thick

Tbt Bloodgood Canyon Tuff (Oligocene)-Very light gray to pale pinkish-gray, densely welded to poorly welded, rhyolite ash-flow tuff (ignimbrite) contains 10-30 percent phenocrysts, mainly perthitic sanidine (moonstone) and quartz crystals, a few to several mm across, and trace amounts of sodic plagioclase, sphene, biotite, pyroxene, and opaque oxides in a matrix of devitrified, flattened (eutaxitic) pumice fragments as much as several centimeters long, and very fine-grained devitrified glass shards. Thins from about 60 m in the San Francisco Mountains in the southeast part of the quadrangle to about 10 m along the San Francisco River at the east edge, relative to its source in the Bursum caldera in the Mogollon Mountains about 65 km southeast

Tst Shelley Peak Tuff (Oligocene)-Pale-red to light-gray, densely welded to poorly welded ash-flow tuff (ignimbrite). As much as 40% phenocrysts, 1-5 mm, mainly sodic plagioclase, and minor sanidine, biotite, opaque oxide and green pyroxene.; zircon is common in thin sections. 0-30 m thick

Tsa Squirrel Springs Canyon Andesite (Oligocene)-Porphyritic andesite lava flows contain phenocrysts of plagioclase as much as 12 mm long in a fine-grained groundmass of plagioclase, olivine and opaque oxide; olivine mostly altered to iddingsite. 0-10 m thick. Probably related to northwest trending, porphyritic andesite dikes, as much as 8 meters wide, Tpad, which cut older rocks in two localities: 1) dike in northeast part of quadrangle, west of Bishop Canyon, cuts volcanoclastic rocks of Heiffer Basin, Tvh, and extends for about 6 km from the vicinity of Centerfire Creek to the northern edge of the quadrangle. 2) short dike, about 200 meters long, cuts Davis Canyon Tuff, Tdc, and younger volcanoclastic rocks, Tvh, between Big Canyon and Trail Canyon in the east-central part of the quadrangle.

Tdt Davis Canyon Tuff (Oligocene)-Pale bluish-gray to light-gray, densely welded to poorly welded, rhyolitic ash-flow tuff; contains as much as 10 percent, or more, tiny (generally 1 mm or less) phenocrysts of sanidine, quartz and sodic plagioclase in a fine-grained devitrified groundmass. Light-gray to brown, eutaxitic (flattened and stretched) pumice fragments are as large as blocks 20 cm long, and may be distinctly lined. Densely welded zones containing larger than usual phenocrysts may resemble Bloodgood Canyon Tuff, Tbt, requiring stratigraphic context for convincing correlation. Thins to west across quadrangle from about 100 m to less than about 20 m thick

DATIL GROUP

The Datil Group includes those volcanic rocks, mainly ash-flow tuffs (ignimbrites), that underlie the volcanoclastic sedimentary rocks of the upper Spears Group and are interlayered with the volcanoclastic rocks of the Pueblo Park Formation of the lower Spears Group. Except for the Bishop Peak Tuff, Datil Group ignimbrites are represented in this area by thin (0-a few m), discontinuous, non-welded tuffs, which generally are not identifiable, except where some ages correspond to specific tuffs of the Datil Group.

Tvt **Datil Group Tuffs (upper Eocene – lower Oligocene)**-As many as four tuffs at various stratigraphic levels are numbered sequentially from bottom (oldest) to top (youngest). The oldest tuff, Tvt₁, contains numerous, pale-green pumice lapilli as much as 6-10 mm long and conspicuous small sanidine phenocrysts. Light-green tuffaceous sandstone beds alternate with lapilli tuff beds at places.

Tvt₂ is about 50 m stratigraphically above Tvt₁; it is very light-gray (nearly white), laminated to cross-bedded to massive, 0-2 m thick, and contains small sanidine and biotite phenocrysts, and conspicuous volcanic lithic fragments, as much as 15 mm across, in a matrix of devitrified (zeolitized?) glass shards.

Tvt₃ is very light-gray (nearly white), phenocryst-poor, vitric (glassy) tuff, about 22 m above Tvt₂. Biotite and sanidine concentrates from Tvt₃ gave Eocene K-Ar radiometric ages of 36.5 +/- 1.3 m.y. and 34.5 +/- 1.2 m.y., respectively (age sample locality no. 2). An up-graded sanidine concentrate gave an age of 31.9 +/- 0.7 m.y. (R.F.Marvin, H.H.Mehnert, J.Gravies, and V. Merritt, U.S. Geological Survey, written communication, 1982).

Tvt₄ is a light-tan tuff, 0-3 m thick, and observed only in the north half of sec. 21, T. 5 S., R. 20 W, about 30 meters above Tvt₃.

Tla **Andesite of Dry Leggett Canyon (Eocene)**-Dark-colored, porphyritic andesite lava flows and dikes, Tvad, contain abundant, stubby, plagioclase and black pyroxene phenocrysts as much as 0.5 cm or larger. Vesicles common, and may contain bright-green to yellow unidentified mineral material and calcite. "Luna" agate, which is much sought by mineral collectors and rock hounds, is common in vesicular zones in the andesite. Overlies Volcanoclastic Sedimentary Rocks of Spur Lake Basin, Tvs, and unconformably capped by Basalt of Trout Creek, Qb, north of Luna graben. 0-85 m thick

Tbpt **Tuff of Bishop Peak (Eocene)**-Reddish-brown to reddish-orange, partially-welded to densely-welded ash-flow tuff contains small phenocrysts of biotite and sanidine, and conspicuous, small pumice blocks and lithic fragments.

Present in one small outcrop on the west side of Trout Creek, under Bill Lee Mesa, east of Hulse Cienega east of Bishop Canyon, and along S A Creek in the very northeast corner of the quadrangle. Biotite from a sample collected in the adjacent Underwood Lake quadrangle, to the north, gave a K-Ar age of 37.1 +/- 1.3 m.y. (Marvin, R.F., Mehnert, H.H., and E. Brandt, U. S. Geological Survey, written communication, 1982). Zero to a few meters thick

MAP SYMBOLS

Depositional contact

Fault, dashed where approximately located, dotted where concealed. Ball and bar on downthrown side. Arrow accompanied by dip

Strike and dip of bedded rocks

Horizontal beds

Compaction foliation in ash-flow tuffs (ignimbrites)

Sand and gravel quarry

Location of age sample

Dikes

Tpad-porphyritic andesite dike

Tvad-non porphyritic andesite dike

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