

DESCRIPTION OF MAP UNITS
More detailed descriptions of many of the map units are given in U.S. Geological Survey Professional Paper 852, Evolution of the Platoro caldera complex and related volcanic rocks, southeastern San Juan Mountains, Colorado, by Peter W. Lipman, 1975.

SURFICIAL DEPOSITS
Qal ALLUVIUM (HOLOCENE) - Silt, sand, gravel, and peaty material in valley bottoms. Locally includes small alluvial-fan and colluvial deposits at margins of valley bottoms.
Qc COLLUVIUM (HOLOCENE) - Poorly sorted material on slopes and steep valley bottoms, ranging in size from silt to boulders. Locally includes small alluvial-fan, talus, landslide, and glacial-moraine deposits.
Qf TALUS (HOLOCENE) - Angular rock fragments, as much as 1 m (metre) in diameter, forming talus cones, talus aprons, and scree slopes. Locally well sorted. Grades into colluvium (Qc) with an increase in sand and silt content.
Ql ALLUVIAL-FAN DEPOSITS (HOLOCENE AND PLEISTOCENE) - Generally poorly sorted material, ranging in size from silt to boulders, which grades into modern colluvium in upper parts of drainages. Only large low-angle fans are shown; most smaller steep fan deposits are mapped with colluvium. Fan deposits largely predate Pinedale outwash and are mostly derived from unglaciated drainages, but probably locally include some pre-Pinedale outwash.
Ql LANDSLIDE DEPOSITS (HOLOCENE AND PLEISTOCENE) - Poorly sorted rock debris derived from bedrock and glacial deposits. Includes block-slide, rock-slide, slump, and earth-flow deposits.
Qm GLACIAL MORAINE (PLEISTOCENE) - Poorly sorted deposits ranging in size from silt to boulders. Unit is terminal and lateral moraine material having typical hummocky or ridgy topography; some ground moraine has been mapped with colluvium (Qc). Probably Pinedale in age.
Qo GLACIAL OUTWASH (PLEISTOCENE) - Fair to well-sorted stratified terrace and fan deposits consisting of sand, gravel, and well-rounded boulders. Mostly Pinedale in age.

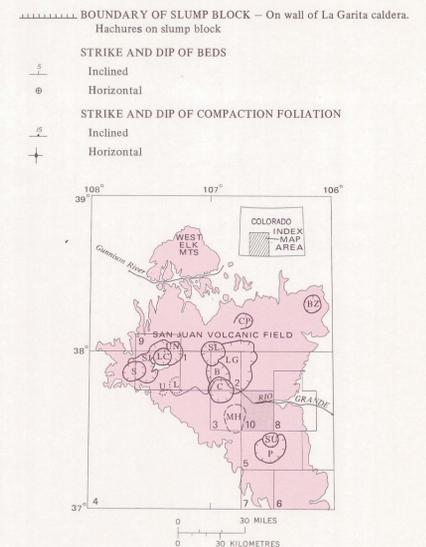
REGIONAL LAVAS AND RELATED ROCKS
Thb Basaltic lavas - Fine-grained lava flows of silicic alkalic olivine basalt and basaltic andesite. Mesa-capping erosional remnants of flows are present in south half of mapped area. Small sparse olivine phenocrysts, partly altered to iddingsite, are typical. Thickness 0-400 m.
Thr Rhyolite lavas and tuffs - Light-gray to white flow, volcanic neck, and pyroclastics of silicic alkalic rhyolite containing a few percent phenocrysts of micropertitic sodic sanidine, quartz, and biotite. K-Ar age 21.9 m.y. (million years).
Thu HUERTO FORMATION (OLIGOCENE) - Porphyritic dark andesite flows, breccias, and a few dikes, characterized by 5-25 percent thin tabular plagioclase phenocrysts. Thickness 0-50 m.
Tlp LOS PINOS FORMATION (OLIGOCENE) - Mostly bedded conglomerates, sandstones, and mudflow breccias derived from stratovolcanoes on the north flanks of the Platoro caldera to the south (index map). Elsewhere the Los Pinos includes younger Tertiary. Thickness 0-40 m.
Tsm SHEEP MOUNTAIN FORMATION (OLIGOCENE) - Sparsely porphyritic dark andesite flow. Interlayered with the Masonic Park Tuff (Tmp) near the mouth of Beaver Creek. Thickness 10 m.
Ttd SUMMITVILLE ANDESITE, LOWER MEMBER (OLIGOCENE) - Single flow of dark andesite. Interlayered with units of the Treasure Mountain Tuff on the north ridge of Del Norte Peak. Thickness 0-15 m.

ASH-FLOW SHEETS
Tc SNOWSHOE MOUNTAIN TUFF (OLIGOCENE) - Nonwelded to partly welded light-gray quartz latitic ash-flow sheet containing 40-50 percent phenocrysts (plagioclase, biotite, and augite). Remanent magnetic polarity: normal. Erupted from the Creede caldera (index map). K-Ar age >26.5 m.y. Thickness 0-100 m.
Tw WASON PARK TUFF (OLIGOCENE) - Nonwelded gray to densely welded red-brown ash-flow sheet of low-silica rhyolite containing about 30 percent phenocrysts (plagioclase, sanidine, biotite, and augite). White tridymitic collapsed pumice fragments are characteristic of the densely welded tuff. Remanent magnetic polarity: reverse. Erupted from buried source to northwest, in vicinity of younger Creede caldera (index map). Thickness 0-75 m.
Tm MAMMOTH MOUNTAIN TUFF (OLIGOCENE) - Nonwelded gray to densely welded red-brown quartz latitic ash-flow sheet containing about 40 percent phenocrysts of plagioclase, biotite, and augite. Remanent magnetic polarity: reverse. Erupted from buried source to northwest, near the younger Creede caldera (index map). K-Ar age 26.7 m.y. Thickness 0-175 m.
Tcr CARPENTER RIDGE TUFF (OLIGOCENE) - Nonwelded gray to densely welded red-brown ash-flow sheet containing about 5 percent phenocrysts (mainly plagioclase, sanidine, and biotite). Conspicuous lithophysal zone is locally well developed within the densely welded part of ash-flow sheet. Tuff strikingly compositionally zoned into two units in the Beaver Mountain area. Remanent magnetic polarity: reverse. Erupted about 27.5 m.y. ago from the Bachelor caldera (index map). Thickness 0-100 m.
Tcrq Phenocryst-rich quartz latitic unit of Beaver Mountain area - Grades downward into rhyolite unit (Tcr).

QUATERNARY
Tcr Rhyolite unit of Beaver Mountain area - Lithology more typical of the unwelded Carpenter Ridge Tuff (Tcr).
Tc FISH CANYON TUFF (OLIGOCENE) - Nonwelded light-gray to moderately welded quartz latitic ash-flow sheet containing 35-50 percent phenocrysts (mainly plagioclase, sanidine, biotite, and hornblende). Sparse resorbed quartz, accessory sphene, and the presence of hornblende without augite are distinctive characteristics. K-Ar age 27.8 m.y. Remanent magnetic polarity: normal. Erupted from the La Garita caldera (index map). Thickness 0-500 m.
Tmp MASONIC PARK TUFF (OLIGOCENE) - Nonwelded gray to partly welded yellow-brown quartz latitic ash-flow sheet containing 40-50 percent phenocrysts (mainly plagioclase, biotite, and augite). Andesitic lithic fragments a few centimetres across are typically conspicuous. Erupted from Mount Hope caldera (index map). K-Ar age 28.2 m.y. Remanent magnetic polarity: reverse. Thickness 0-400 m.
Tt TREASURE MOUNTAIN TUFF (OLIGOCENE) - Pyroclastic sequence, erupted from the Platoro-Summitville caldera complex, that within the mapped area includes two widespread quartz latitic ash-flow sheets interlayered with more local quartz latitic to low-silica rhyolitic ash-flow and ash-fall deposits. Characteristic phenocrysts throughout are plagioclase, biotite, and augite; quartz is absent and sanidine is sparse. Shown as unwelded unit (Tt) locally where subunits become difficult to distinguish because of thinning, wedging, and decreased welding. Age of all subunits falls between about 29 and 30 m.y. by K-Ar dates of overlying and underlying rocks.
Ttu Upper tuff - Local nonwelded to moderately welded light-gray to gray-brown quartz latitic ash-flow sheet containing 10-15 percent phenocrysts. Thickness 0-50 m.
Ttr Ra Jadero Member - Mostly a densely welded red-brown quartz latitic ash-flow sheet; enveloped by upper and lower black vitrophyric zones containing large red-brown devitrified pumice lenses. Contains about 20 percent large blocky phenocrysts and abundant small angular dark-colored volcanic fragments. Remanent magnetic polarity: reverse. Probably erupted from the Summitville caldera (index map). Thickness 0-40 m.
Ttm Middle tuff - Heterogeneous assemblage of ash-fall and local ash-flow tuffs, mostly relatively phenocryst-poor (5-10 percent). Ash-flow tuffs typically nonwelded to partly welded; several thin black vitrophyric zones are present locally. Thickness 0-75 m.
Ttj La Jara Canyon Member - Nonwelded gray to densely welded red-brown quartz latitic ash-flow sheet containing 20-40 percent phenocrysts and sparse red-brown andesitic fragments a few centimetres in diameter. Conspicuous black vitrophyric zone typically developed near base. K-Ar age 29.8 m.y. Remanent magnetic polarity: reverse. Erupted from the Platoro caldera. Thickness 0-100 m.
Ttrc TUFF OF ROCK CREEK (OLIGOCENE) - Red-brown partly to densely welded ash-flow sheet containing black scoria lenses and abundant small volcanic rock fragments. Contains sparse phenocrysts of plagioclase and augite; lacks biotite. Erupted from the Platoro caldera area. Thickness 0-25 m.

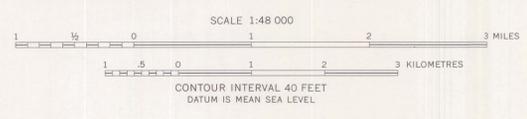
EARLY INTERMEDIATE-COMPOSITION ROCKS
Conejos Formation (OLIGOCENE)
Tcv Vent facies - Mostly lava flows and flow breccias of aphanitic to porphyritic andesite, rhyodacite, and quartz latite. Phenocrysts of plagioclase are common, typically accompanied by augite or hornblende; biotite is sparsely present in the more silicic flows. Includes rocks from at least two volcanic centers: a large stratovolcano at the southeast edge of the map near the northeast rim of the Platoro caldera (index map), and another centered in upper Baughman Creek 8 km off the map to the northeast. Thickness 0-500 m or more.
Tctb Rhyolite of Bear Creek - Local light-brown to gray lava dome containing small sparse phenocrysts of plagioclase and biotite. Maximum thickness more than 100 m.
Tcc Volcaniclastic facies - Mostly reworked material derived from vent facies (Tcv) and consisting of bedded conglomerates, sandstones, and mudflow breccias containing clasts of dark andesite and rhyodacite. Accumulated as clastic aprons on flanks of and between peneconterminous stratovolcanoes. Thickness 0-600 m.
Tca Intrusive rocks - Scattered dikes of porphyro-aphanitic intermediate-composition rock types. Probably mostly contemporaneous with the other early intermediate-composition rocks, but may include some younger intrusives.

CONTACT - Long dashed where approximate; short dashed where gradational.
FAULT - Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side.
BOUNDARY OF SLUMP BLOCK - On wall of La Garita caldera. Hachures on slump block.
STRIKE AND DIP OF BEDS
 Inclined
 Horizontal
STRIKE AND DIP OF COMPACTION FOLIATION
 Inclined
 Horizontal



EXPLANATION
 Known or readily inferred caldera
 Buried caldera
 B, Bachelor
 BZ, Bonanza
 C, Creede
 CP, Cochetopa Park
 L, Lost Lake
 LC, Lake City
 LG, La Garita
 MH, Mount Hope
 P, Platoro
 S, Silverton
 SJ, San Juan
 SL, San Luis
 SU, Summitville
 U, Ute Creek
 UN, Uncompagme
 Adjacent U.S. Geological Survey geologic maps
 1. Bristol Head quadrangle (GQ-631)
 2. Creede quadrangle (GQ-1053)
 3. Spar City quadrangle (GQ-1052)
 4. Durango 1° x 2° quadrangle (I-764)
 5. Platoro caldera area (I-923)
 6. Lower Conejos River canyon area (I-901)
 7. Chama Peak quadrangle (MF-862)
 8. Del Norte area (GQ-633)
 9. Lake City caldera area (I-962)
 10. South Fork area (This map)

Base from U.S. Geological Survey, 1:24,000, Beaver Creek Reservoir, Del Norte Peak, South Fork East, and South Fork West, 1967



Interior-Geological Survey, Reston, Va.-1976
 Geology mapped in 1965

GEOLOGIC MAP OF THE SOUTH FORK AREA, EASTERN SAN JUAN MOUNTAINS, SOUTHWESTERN COLORADO

By
 Peter W. Lipman and Thomas A. Steven
 1976