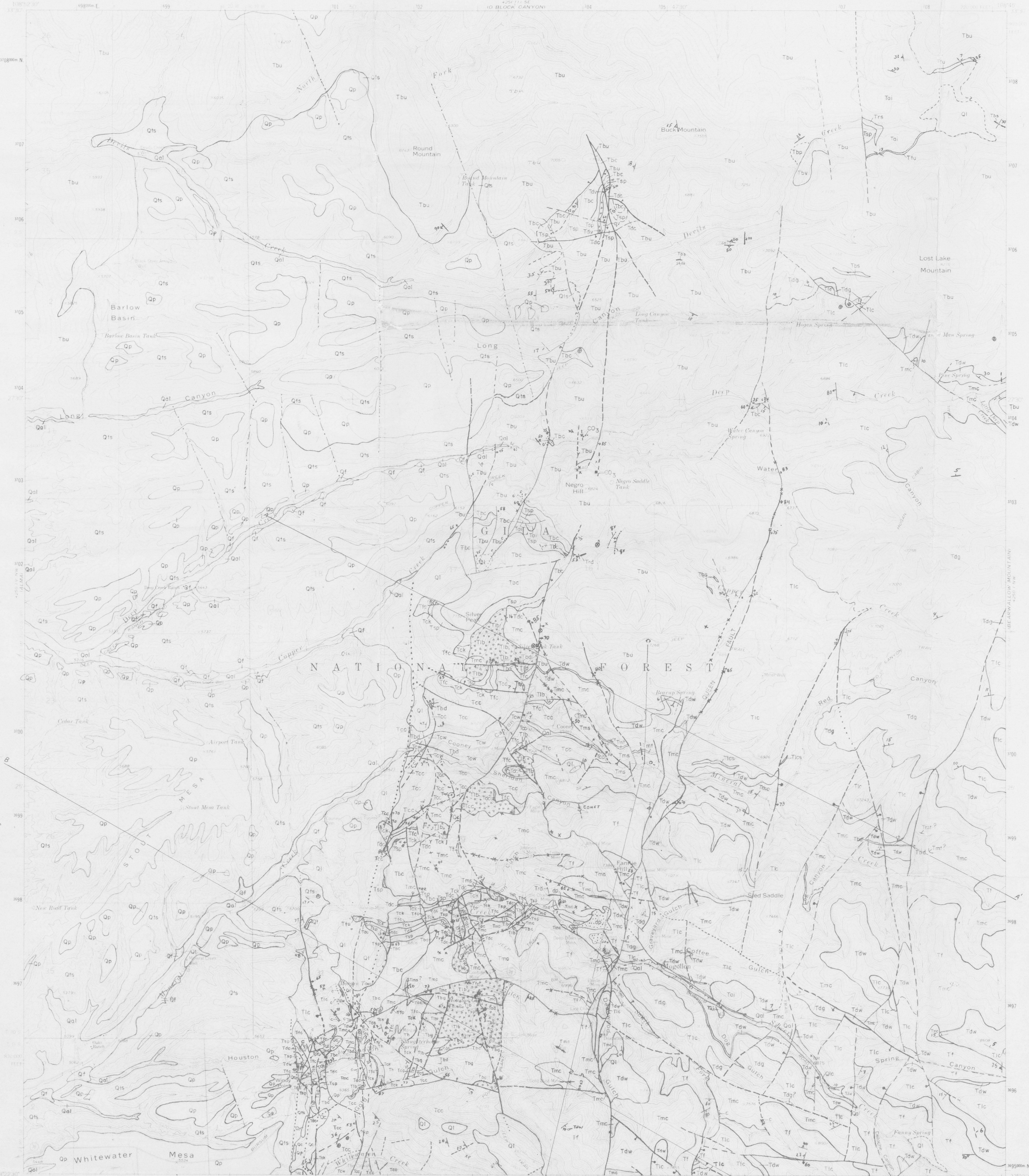
RATTE



Base from U.S. Geological Survey, 1963.

U.S. Geological Survey
OPEN FILE REPORT
This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.

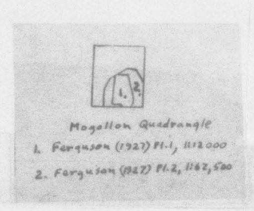
SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1963 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

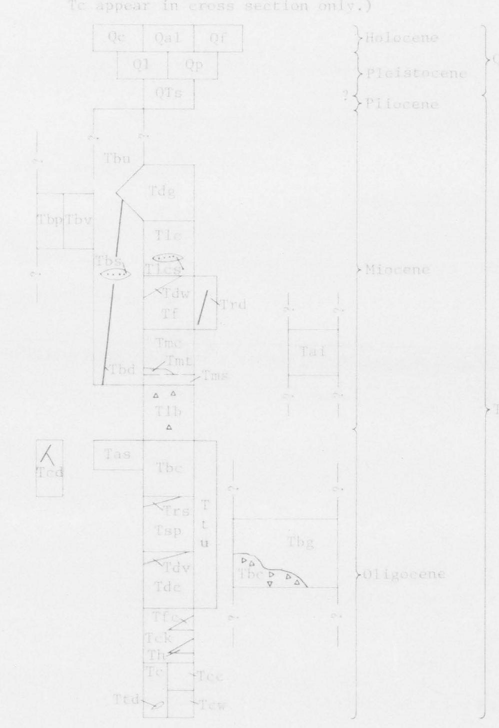
QUADRANGLE LOCATION

Geology by J. C. Ratté, 1972-76, modified from Ferguson (Pl. I, 3, 1927). Quaternary deposits mapped primarily from aerial photographs. Assisted by J. T. Doherty and B. T. Brady, 1975.



CORRELATION OF MAP UNITS

(Correlation queried where uncertain. Units Tas and Tc appear in cross section only.)



DESCRIPTION OF MAP UNITS

Qc COLLUVIUM (HOLOCENE)--Talus or slope wash, shown locally where bedrock is unknown

Qal VALLEY ALLUVIUM (HOLOCENE)

Qf TORRENTIAL FAN DEPOSITS (HOLOCENE)

Ql LANDSLIDE DEPOSITS (PLEISTOCENE?)

Qp PEDIMENT AND TERRACE DEPOSITS (PLEISTOCENE)

QTs SEDIMENTARY ROCKS (PLEISTOCENE?, PLIOCENE AND MIOCENE) --Mainly basin-filling fanglomerates; maximum thickness in quadrangle at least 200 m

Tbu ANDESITIC LAVAS, UNDIFFERENTIATED (MIOCENE)--Mapped where absence of Deadwood Gulch Tuff, Fanney Rhyolite or Dog Gulch Formation makes correlation of mafic flows uncertain. Flows range from trachyandesite to rhyodacite; lavas about 500 m thick in northeastern part of quadrangle. Where age relations are indeterminate, some andesitic dikes may be older or younger than indicated here, but mafic igneous activity prior to the Mineral Creek Andesite is represented only by the Houston Andesite and possible older intrusions or flows within the Cooney Tuff, all of which seem to have been minor in volume

Tbp Local lava plug?

Tbv Oxidized rubble--Localized near a probable vent or cinder cone

Tbs Local lenses of volcanic sandstone--Thickness a few meters to tens of meters

Tbd Andesitic dikes

Tdg DOG GULCH CONGLOMERATE (MIOCENE)--Consists of mudflow and alluvial conglomerate; gray, red, and yellow in color. Constitutes an alluvial facies related to andesitic volcanic centers. Thickness 0 to about 300 m in quadrangle

Tlc LAST CHANCE ANDESITE (MIOCENE)--Lava flows and flow breccia

Local lenses of volcaniclastic sandstone--Thickness a few meters to tens of meters

Tf FANNEY RHYOLITE (MIOCENE)--Most outcrops within the Mogollon quadrangle probably represent shallow level intrusions, but locally rhyolite may have protruded to the surface through older rocks

Tdw Deadwood Gulch Tuff member--Layers of pyroclastic to volcaniclastic tuff breccia facies of Fanney Rhyolite. Locally intruded by Fanney Rhyolite as north of Spring Canyon near the southeast corner of the quadrangle

Trd Rhyolite dike

Tmc MINERAL CREEK ANDESITE (MIOCENE)--Mainly lava flows and flow breccia; may include sandstone and mudflow or fluvial conglomerate where those rocks are not mapped separately; includes some rocks mapped by Ferguson (1927) as Last Chance Andesite; (0-250+ m thick). A whole rock K-Ar age of 25.0±0.5 m.y. was reported by Simpson and Strangway (1970) for a sample from north of Houston Gulch that previously had been correlated by Ferguson (1927) with Last Chance Andesite

Tmt Thin light-colored rhyolitic tuff breccia--Mapped only in north wall of Cooney Canyon

Tms Mixed andesite, mudflow and alluvial debris--Mapped locally at base of andesite

Tai ANDESITIC INTRUSIVE ROCKS (MIOCENE?)--Several small hypabyssal plutons of hornblende and biotite-bearing porphyritic rocks of intermediate composition. The largest body is in the northeastern corner of the quadrangle; it has given a K-Ar hornblende age of 29.6±1.4 m.y., but a K-Ar biotite age of 23.8±0.6 m.y. on adjacent tuffs, in contact with the pluton, is younger than other ages for the tuffs and may represent a reset age that could be the age of the adjacent intrusive rock. An andesitic intrusive east of Mogollon on Silver Creek has given a K-Ar biotite age of 26.4±0.6 m.y. The biotite is fresher than the rest of the rock and may represent a post-intrusion alteration event, possibly related to mineralization in the Mogollon district. Two smaller intrusive bodies have been mapped: 1) near the mouth of the canyon of Copper Creek; 2) along Houston Gulch west of Slaughterhouse Spring (ages from R. F. Marvin, written commun., 1975)

Tlb LITHIFIED MEGA-BRECCIA (MIOCENE OR OLIGOCENE)--Coarse lithified megabreccia (Lipman, 1976) consisting mainly of blocks of ash-flow tuff and locally some Cranktown Sandstone. Deposits were derived from topographic wall of Bursum caldera as landslide and talus debris, and were deposited along the outer margin of the caldera moat, 0-80+ m thick within quadrangle

Tas TUFF OF APACHE SPRING (OLIGOCENE)--Intracaldera equivalent of Bloodgood Canyon Rhyolite Tuff of Elston (1968). Shown on cross sections only

Tbc BLOODGOOD CANYON RHYOLITE TUFF OF ELSTON (1968) (OLIGOCENE) --Densely welded ash-flow tuff with about 15-20 percent phenocrysts, mainly 1-3 mm quartz and alkali feldspar, rare accessory biotite and conspicuous yellow sphene; plagioclase is rare or absent. South of Copper Creek, tuff is generally silicified at Bursum caldera margin, and feldspar phenocrysts are largely argillized and leached. North of Copper Creek, fault bounded inliers of tuff are typical of unaltered Bloodgood Canyon Tuff of Elston (1968). Numerous K-Ar and fission-track ages indicate this tuff to be 26-27 m.y. old (Elston and others, 1973; Ratté and Gaskill, 1973). This tuff is here recognized as the rhyolitic outflow equivalent of the tuff of Apache Spring (Tas), which is the intracaldera tuff of the Bursum caldera (Rhodes, 1976). Generally 50-100 m thick within quadrangle

Tcd Small (<1 m) ash-flow tuff dike--Located northwest of Houston Gulch, southeast of Morgan tank

Trs Thin red sandstone--locally overlies the tuff of Shelley Peak, but was mapped separately only on Devils Creek in the northeast corner of the quadrangle

Tsp TUFF OF SHELLEY PEAK (OLIGOCENE)--Generally red, phenocryst-rich, low silica rhyolite ash-flow tuff with 20-30 percent or more plagioclase, alkali feldspar and biotite phenocrysts. Accessory zircon and green clinopyroxene are also characteristic of this tuff. The pyroxene is represented mainly by ghost outlines of altered crystals in the altered tuffs along the Bursum caldera margin, but unaltered relicts are recognizable in this tuff along Devils Creek in the northeast corner of the quadrangle. Generally 50-60 m thick within quadrangle. K-Ar and fission track ages on biotite, sanidine and zircon are in excellent agreement and indicate an age of 27-28 m.y. for this tuff (R. F. Marvin and C. W. Naeser, written commun., 1975. Correlated with tuff of Shelley Peak (Ratté and Gaskill, 1975)

Tdv Rhyolite tuff breccia and volcaniclastic materials a few meters thick overlie the tuff of Davis Canyon locally on the southwest flank of Buck Mountain in the northern part of the quadrangle

Tdc TUFF OF DAVIS CANYON (OLIGOCENE)--Phenocryst-poor, white to gray, rhyolite ash-flow tuff; contains tiny sparse crystals of sanidine, plagioclase and quartz and a few tiny opaque granules in a devitrified granophyric matrix. Small gray eutaxitic pumice lenses are characteristic. Correlated with tuff of Davis Canyon (Ratté and Gaskill, 1975). Thickness 0-50+ m

Ttu BLOODGOOD CANYON RHYOLITE TUFF OF ELSTON (1968), TUFF OF SHELLEY PEAK, AND TUFF OF DAVIS CANYON, UNDIVIDED (OLIGOCENE)--Mapped south of Bearup mine on south side Silver Creek and in northeast corner of quadrangle

Tck CRANKTOWN SANDSTONE (OLIGOCENE)--Volcaniclastic sandstone and conglomerate with interlayered lenticular, thin andesite sills and (or) flows; 0-120+ m thick. Lithology is like sandstone and conglomerate interlayered in Cooney Tuff

Tfc TUFF OF FALL CANYON (OLIGOCENE)--Moderately phenocryst rich, white to gray, rhyolite ash-flow tuff with about 20 percent angular quartz, sanidine and plagioclase phenocrysts and accessory zircon; biotite altered and rare; tuff occurs as lenses and as a more continuous layer interlayered in Cranktown Sandstone; characterized locally by devitrification spheres as much as about 1/2 m in diameter. An upper cooling unit, which lacks quartz phenocrysts, is present south of Silver Peak. This unit correlates with tuff of Fall Canyon in the Gila Wilderness study area (Ratté and Gaskill, 1975); thickness 0-50+ m

Th HOUSTON ANDESITE (OLIGOCENE)--Andesite sill; intrudes Cranktown Sandstone in Houston Gulch; thickness 0-30 m

Tbg BRECCIA COMPLEX OF GOLD DUST GULCH (OLIGOCENE)--A complex of pyroclastic breccias whose relationships are only partly understood is located in an area bounded by Gold Dust Gulch, Upper Houston Gulch, and the Power Plant Road. The complex includes: 1) mappable bodies of recognizable ash-flow tuff units (shown with a breccia pattern overlay, as Tbc in the breccia complex box of the correlation of map units); 2) bodies of lithified megabreccia (Tlb) which has a quartz bearing ash-flow tuff matrix; and 3) a sequence of quartz-bearing ash-flow tuff units with interlayered mesobreccia. Parts 2 and 3 can be interpred as mixing of caldera wall breccia with concurrently erupting quartz-rich ash-flow tuff, rather than post-collapse slump associated with resurgence and moat-filling, such as the debris designated as lithified megabreccia (Tlb). The quartz-rich ash-flow tuffs and breccia are part of the tuff of Apache Spring (intracaldera ash-flow tuff equivalent to Bloodgood Canyon Rhyolite Tuff of Elston (1968))

Thickness 0-200+ m

Tc COONEY TUFF (OLIGOCENE)--Shown on cross sections only. Rhyolitic to quartz latitic ash-flow tuff sheet with a maximum thickness within this quadrangle on the order of 600 m with no base exposed. The sheet consists of numerous simple and compound cooling units that range from ten meters or less to hundreds of meters thick, and vary from densely welded and devitrified to poorly welded, vapor phase ash-flow tuff. Cooling units are commonly separated by a few meters of lenticular gray to green and red volcaniclastic sandstone and conglomerate, and by sills of andesitic composition as much as 12 m thick. Within the Mogollon quadrangle, the Cooney Tuff is pervasively altered nearly everywhere, and contains abundant secondary clays, calcite, sericite, and chlorite. The thickest known sections of Cooney Tuff are in the Mogollon quadrangle and on the south side of Whitewater Canyon in the adjoining Holt Mountain quadrangle. The tuff is believed to be within and near the margin of a hypothetical ash-flow tuff cauldron older than the Bursum caldera, and may have initiated cauldron subsidence in the Mogollon Mountains. A K-Ar age of 32±1.5 m.y. was obtained on biotite from phenocryst-rich, densely welded Cooney Tuff (Bikerman, 1972). The tuff can be separated locally into two lithologic members (Tcc and Tcw)

Tcc Cooney Canyon quartz latitic member--On the order of 300 m thick on the north side of Whitewater Canyon. Consists of multiple cooling units, commonly separated by volcaniclastic sandstone beds, and ranging widely in color and welding textures. The ash flows are characteristically phenocryst-rich, and generally contain 15-20 percent small plagioclase, biotite, and magnetite grains

Tcw Whitewater Creek rhyolite ash-flow tuff member (Whitewater Rhyolite of Ferguson, 1927)--Consititutes a simple cooling unit at least 160 m thick in Cooney Canyon and the canyon of Whitewater Creek. The Whitewater Creek member is densely welded except for a somewhat less welded, steeply rounded, slick rock bench at the top. The rhyolitic tuff contains 5-10 percent of lithic inclusions. The lower exposed part of the member is characterized by a thick lithophysal zone

Ttd Cooney ash-flow tuff intrusive?--Located south of Silver Peak bank

LIST OF SYMBOLS

CONTACT--Dashed where inferred on cross sections

FAULT, SHOWING DIP--Dashed where approximately located or inferred, dotted where concealed; ball and bar on downthrown side. Arrows indicate movement on cross section

LINEAMENT--Mapped on aerial photographs; may represent Quaternary faults

STRIKE AND DIP OF BEDS

Inclined

Horizontal

Apparent strike and dip

STRIKE AND DIP OF FLOW LAYERS IN LAVA OR COMPACTION FOLIATION IN TUFFS

Inclined

Vertical

VEINS--Mapped mainly where not obvious from location of prospects. For major veins of Mogollon mining district, see Ferguson, 1927, Plates 1, 3.

Calcite vein, C

Quartz vein, Qv

PROSPECT--Circled where more than one prospect pit at same locality

ADIT

SHAFT

MILL AND MINE DUMP

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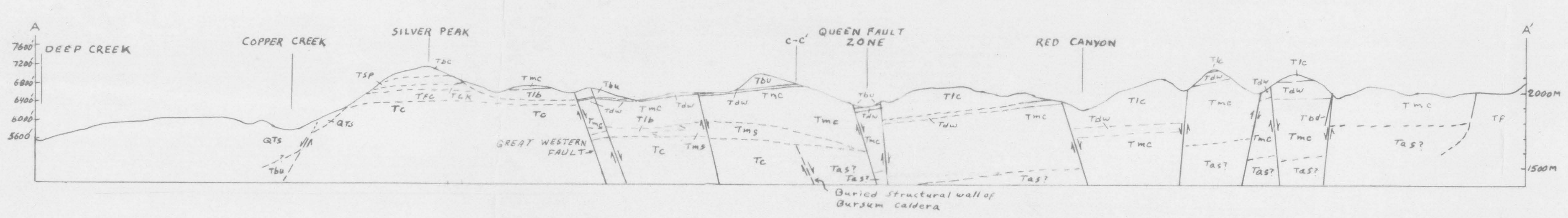

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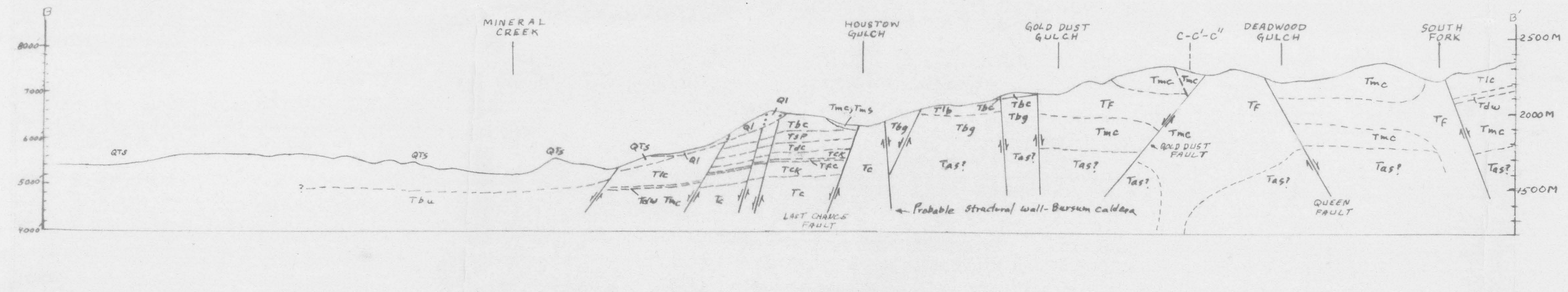

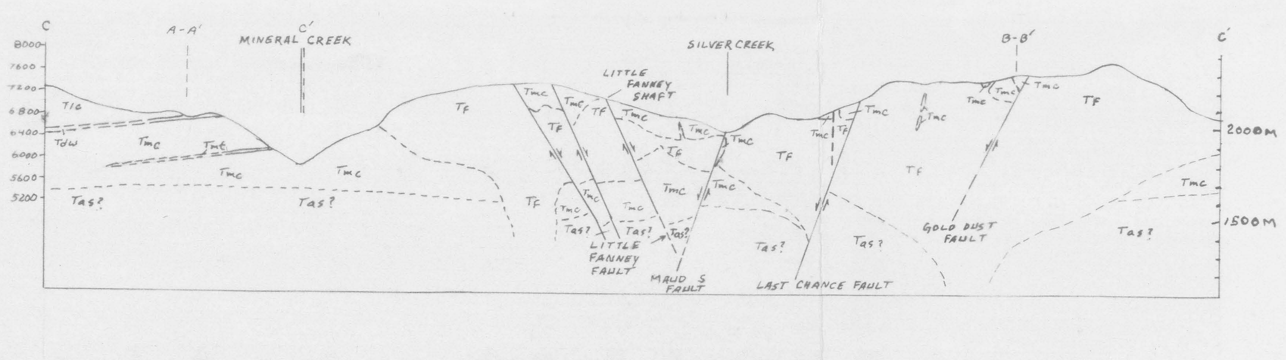

GEOLOGIC MAP OF THE MOGOLLON QUADRANGLE, CATRON COUNTY, NEW MEXICO

By

J. C. Ratté

1977