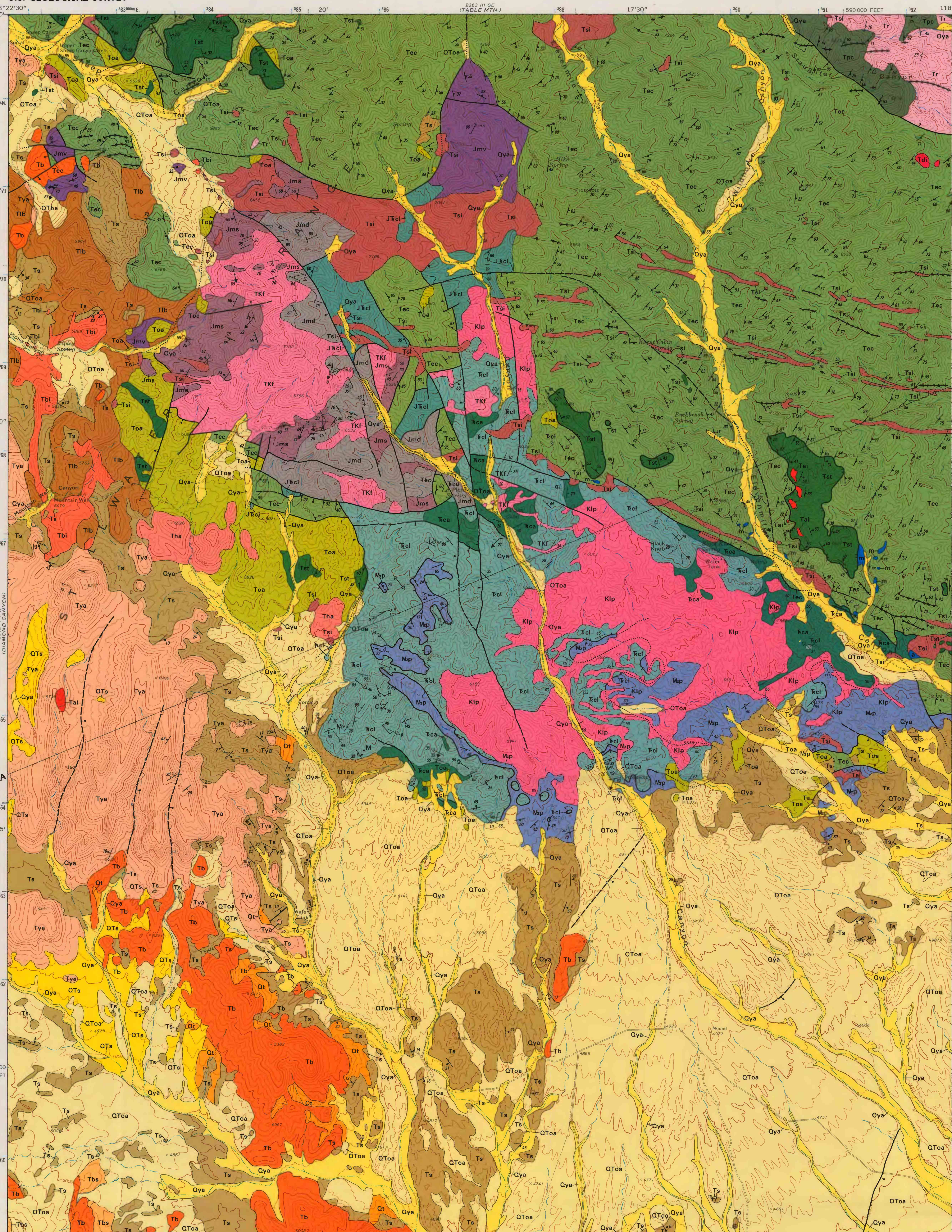
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAP
LA PLATA CANYON QUADRANGLE, NEVADA
GQ–1710

Pamphlet accompanies map



Base from U.S. Geological Survey, 1972
Universal Transverse Mercator projection

APPROXIMATE MEAN DECLINATION, 1994

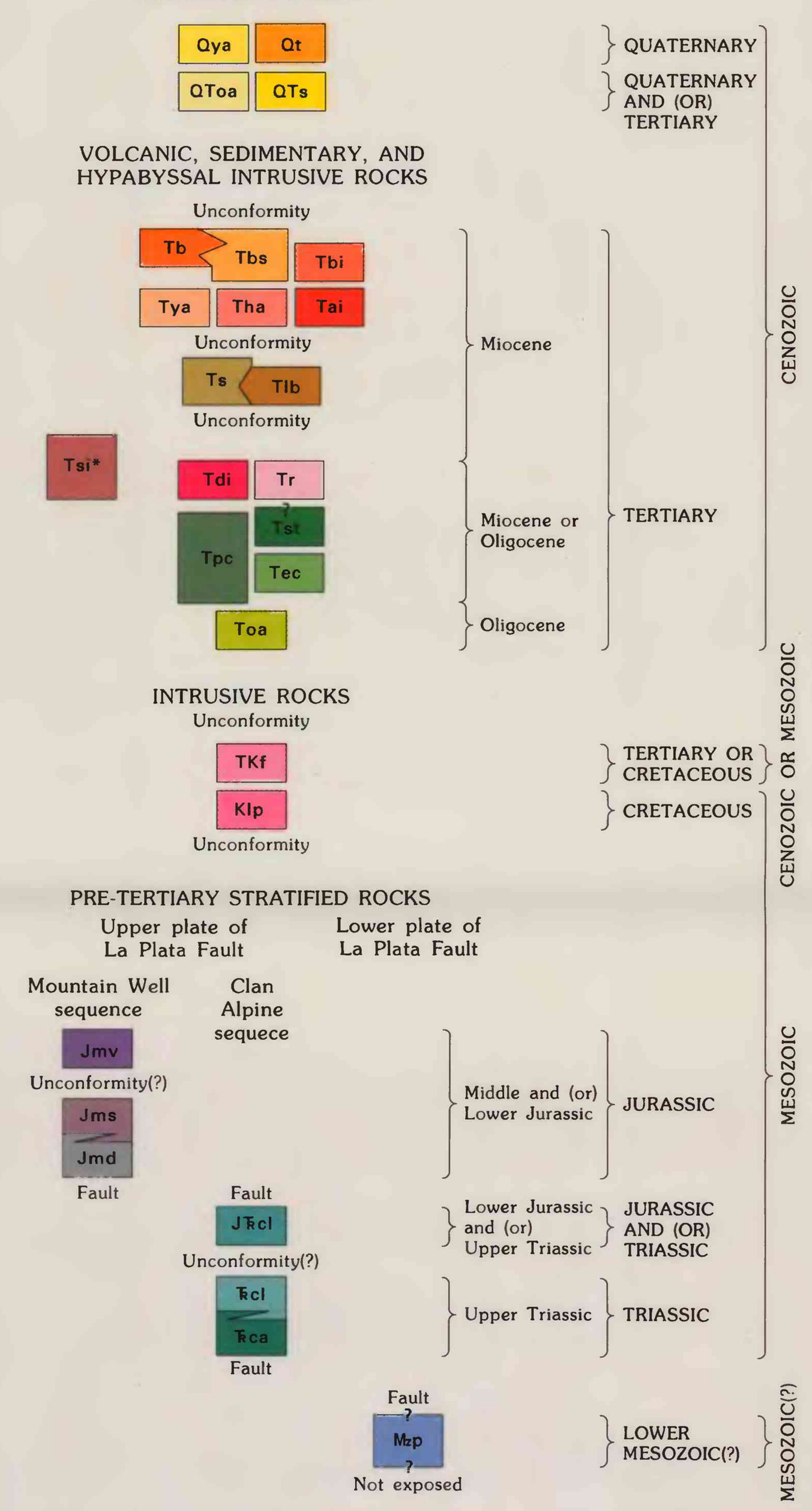
SCALE 1:24,000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

Geology mapped 1987–1993
Edited by Julia Thomas; cartographic design by Kevin Ghequiere
Manuscript approved for publication July 25, 1991

CORRELATION OF MAP UNITS



*See Description of Map Units for exact unit age assignment

DESCRIPTION OF MAP UNITS

[See accompanying pamphlet for references cited]

SURFICIAL DEPOSITS

Qya **Younger Alluvium (Quaternary)**—Unconsolidated alluvium, talus, and other surficial deposits

Qt **Talus (Quaternary)**—Basalt talus. Only larger exposures mapped

QToa **Older alluvium (Quaternary and (or) Tertiary)**—Consolidated and unconsolidated alluvium. Includes terrace deposits as high as 15 m. As mapped, locally includes deeply weathered Tertiary sedimentary rocks (Ts)

QTs **Sand (Quaternary and (or) Tertiary)**—Unconsolidated sand and small sand dunes. Probably mostly eolian sand from late Quaternary Lake Lahontan, but as mapped also may include deeply weathered Tertiary sedimentary rocks (Ts)

VOLCANIC, SEDIMENTARY, AND HYPABYSSAL INTRUSIVE ROCKS

Tb **Basalt (Miocene)**—Basalt lava flows and flow breccias. Dark-gray to black, aphyric to sparsely porphyritic rocks containing fine-grained phenocrysts of plagioclase, clinopyroxene, and locally olivine. Locally vesicular. Whole-rock K-Ar ages of 13.3±0.4 and 14.4±0.4 Ma from lava flows collected in Table Mountain quadrangle north of the map area (E.H. McKee, written commun., 1990)

Tbs **Basaltic sedimentary rocks (Miocene)**—Coarse-grained sandstone and granule and small-pebble conglomerate containing abundant clasts of basalt. Locally interbedded with and underlies basalt lavas. Only mapped in southwest corner of map area

Tbi **Basalt intrusions (Miocene)**—Dikes, plugs, and dikes that fed the basalt lava flows (Tb). Intrudes Tertiary sedimentary rocks and landslide breccia deposits (units Ts and Tlb, respectively). Whole rock K-Ar age of 13.9±0.5 Ma (E.H. McKee, written commun., 1988) collected from dike about 1 km north of Mountain Well

Tya **Younger andesite (Miocene)**—Dark-gray to black, generally coarsely porphyritic hornblende or pyroxene-plagioclase andesite and dacite lava flows, flow breccia, and lahars. Locally includes shallow intrusive rocks

Tha **Hornblende andesite (Miocene)**—Gray to reddish-brown, fine- to medium-grained porphyritic hornblende andesite lava flows. Contains about 10-15 percent medium-grained hornblende phenocrysts in dark-gray aphanitic groundmass. Hornblende K-Ar age of 15.3±0.5 Ma (E.H. McKee, written commun., 1989). Only mapped in vicinity of Mountain Well

Tai **Andesite intrusions (Miocene)**—Small plug or neck of coarse-grained porphyritic, flow-banded plagioclase-clinopyroxene andesite intruding andesitic lahars near west edge of the map area. Also includes several small bodies of pyroxene andesite that intrude(?) the tuff of Elevenmile Canyon and sedimentary rocks and tuff unit (Tst) in Elevenmile Canyon

Ts **Sedimentary rocks (Miocene)**—Generally well indurated, white, tan, and yellowish-brown, fine- to coarse-grained fluvial and lacustrine sedimentary rocks, which unconformably underlie the basalt, younger andesite, and hornblende andesite (units Tb, Tya, and Tha, respectively). Consist of siltstone, sandstone, and cobble to boulder conglomerate; cobbles commonly well rounded. Clasts comprise Tertiary rocks, including the tuff of Elevenmile Canyon, older andesite, and silicic intrusive rocks, with sparse clasts of pre-Tertiary rocks. Locally contains abundant plant impressions and petrified wood. Rocks near north edge of map area commonly contain abundant basalt scoria

Tlb **Landslide breccia (Miocene)**—Coarse deposits consisting of unsorted blocks of tuff and rhyolite set in coarse-grained sandstone to pebble conglomerate matrix. Contains blocks of the tuff of Elevenmile Canyon and silicic intrusive rocks (units Tec and Tsi, respectively) as much as 10 meters in diameter. Limited to area near Mountain Well, where deposits grade laterally into sedimentary rocks unit (Ts)

Tsi **Silicic intrusive rocks (Miocene and Oligocene?)**—Numerous texturally and compositionally distinct silicic dikes and domes and minor pyroclastic aprons. Includes aphyric felsite, sparsely porphyritic biotite rhyolite and quartz rhyolite, coarsely porphyritic biotite-quartz-plagioclase-K-feldspar rhyolite(?) porphyry, and coarsely porphyritic biotite-hornblende-plagioclase dacite porphyry. Most rocks are strongly argillized or propylitized, although glassy domes are locally present along west side of range in Table Mountain and Cox Canyon quadrangles. Biotite K-Ar ages of 24.2±0.8 and 24.8±0.8 Ma from glassy biotite rhyolite domes in Table Mountain quadrangle, biotite K-Ar age of 18.3±0.5 Ma from a partially chloritized biotite rhyolite dike in Elevenmile Canyon, hornblende K-Ar age of 22.6±0.7 Ma from a biotite-hornblende dacite porphyry in Poco Canyon in Table Mountain quadrangle, and a biotite K-Ar age of 25.6±1.1 Ma from a devitrified biotite rhyolite dike in East Lee Canyon in Job Peak quadrangle about 3 km northeast of map area (E.H. McKee, written communs., 1988-1991)

Tdi **Dacite intrusions (Miocene or Oligocene)**—Small plugs of fine- to medium-grained dacite porphyry containing about 25 percent phenocrysts of hornblende, plagioclase, and minor biotite. Intrude the tuff of Elevenmile Canyon near northeast corner of map. Biotite K-Ar age of 24.2±0.6 Ma (E.H. McKee, written commun., 1988)

Tr **Rhyolite (Miocene or Oligocene)**—Red, light-purple, green, black, and gray, generally sparsely porphyritic rhyolite flows, flow breccia, and intrusive rocks. Generally contains 0 to 10 percent fine- to medium-grained phenocrysts of white K-feldspar and minor plagioclase and altered biotite(?) in a devitrified aphanitic groundmass. Locally, strongly flow banded. Locally includes thin interbedded sequences of moderately welded, pumice-rich, crystal-poor ash-flow tuff and coarse-grained volcaniclastic sandstone and conglomerate. Generally equivalent to the latite flows, tuffs, and breccias unit of Page (1965, unit T-Jl)

Tst **Sedimentary rocks and tuff (Miocene or Oligocene)**—White to light-green, crystal-poor, pumice-rich, water-laid(?) rhyolite tuff and fine-grained tuffaceous sedimentary rocks. Tuff commonly contains distinctive clasts of dark-gray to black, silicified, very finely laminated, hot-spring(?) deposits as much as 50 cm long. Locally includes white, crystal-poor, rhyolite flows. Rocks are devitrified and commonly are argillically altered

Tpc **Tuff of Poco Canyon (Miocene or Oligocene)**—Reddish-brown, white, and greenish-gray, medium-grained, crystal-rich rhyolite and high-silica rhyolite ash-flow tuff. Tuff is devitrified, densely welded, locally vesicular, and commonly contains abundant, small (generally less than 2 cm) fragments of intermediate lavas and less common pre-Tertiary rocks. Locally contains coarse fragments (as large as 20 cm) of intermediate to silicic lavas. Generally contains 30-50 percent phenocrysts of sanidine, quartz, lesser plagioclase, and trace amounts of biotite. Sanidine locally is adularescent. In the La Plata Canyon quadrangle, tuff correlated with the tuff of Poco Canyon is pervasively hydrothermally altered (sericitic or argillic alteration), and its groundmass locally is recrystallized to felsite. Biotite and sanidine K-Ar ages of 24.5±0.8 and 23.3±0.7 Ma, respectively, from samples collected in Table Mountain quadrangle (E.H. McKee, written commun., 1987)

Tec **Tuff of Elevenmile Canyon (Miocene or Oligocene)**—Black, greenish-gray, and white, crystal-rich rhyolite to dacite ash-flow tuff. Contains 30-60 percent phenocrysts of medium-grained plagioclase, lesser sanidine and quartz, and 1-5 percent biotite. Generally densely welded. Commonly contains abundant dark-green, chloritized, crystal-rich, flattened pumice clasts as long as 6 cm and abundant fragments of pre-Tertiary rocks and the older andesite unit (Toa). Horizons containing coarse blocks of pre-Tertiary rocks and older Tertiary rocks (lag gravels?) are common near Elevenmile Canyon, and megabreccia blocks consisting of internally shattered marble (m) and older andesite (a) as large as 100 m are common in Elevenmile Canyon. Generally strongly propylitized, argillized, or bleached. Biotite K-Ar age of 24.5±0.9 Ma on a sample collected in Table Mountain quadrangle (E.H. McKee, written commun., 1989)

Toa **Older andesite (Oligocene)**—Mostly dark green to black, aphyric to medium-grained, porphyritic andesite, dacite, and basalt(?) lava flows. Phenocrysts consist of tabular plagioclase, hornblende, and pyroxene. Generally altered to propylitic or argillic mineral assemblages. Cut by numerous quartz±calcite veins east of Mountain Well. Generally equivalent to the Pliocene(?) basalt unit of Page (1965, unit Tb)

INTRUSIVE ROCKS

TKf **Felsite (Tertiary or Cretaceous)**—Light-colored felsite containing sparse, 1-2 mm phenocrysts of resorbed quartz and altered feldspar in a fine-grained, allotriomorphic granular groundmass of quartz, plagioclase, K-feldspar(?), sericite, and ghosts of tabular mafic minerals outlined by ragged aggregates of epidote

Klp **La Plata Canyon pluton (Cretaceous)**—Composite, light-colored granitic intrusion consisting of fine- to medium-grained, equigranular biotite granite, quartz monzonite, and associated leucocratic dike rocks (Butler, 1979). Potassium-argon alteration age of 84 Ma from muscovite in vein within wall rocks at fluorite prospect near mouth of La Plata Canyon (Garside and others, 1981)

PRE-TERTIARY STRATIFIED ROCKS

Upper plate of La Plata Fault

Mountain Well sequence (Middle and (or) Lower Jurassic)—Undated, metamorphosed volcanic and sedimentary rocks; provisional age assignment based on age of this association of rock types elsewhere in region. Divided into:

Jmv **Andesitic metavolcanic rocks**—Foliated dense greenstone, greenstone breccia exhibiting stretched clasts, and dacitic welded tuff and tuff breccia

Jms **Metasedimentary rocks**—Heterogeneous, interstratified and intergradational, subaqueous gravity-flow sequence mainly of gray to black (1) slaty siliceous argillite, (2) massive fine- to medium-grained orthoquartzite, (3) turbiditic quartz siltstone or fine-grained sandstone in well-bedded, thin- to medium-thick, T_b A(B)C(E) Bouma sequences, (4) calcareous quartz siltstone, (5) fine-grained mudchip or lime mudstone chip sedimentary breccia, and (6) lithic sandstone of dense felsitic or plagioclase-lath volcanic rocks along with minor quartzite and quartz grains. Also included are minor amounts of foliated marble and tuffaceous(?) greenstone. Less competent rock types strongly flattened on foliation and with grain-stretch lineation. Discontinuous channel(?) deposits of tectonically flattened limestone- and orthoquartzite-clast sedimentary breccia crop out in two places near stratigraphic base of unit, and at one of these localities the breccia forms coarse-grained base of a T_b AB(C) Bouma sequence of black orthoquartzite

Jmd **Dacitic volcanic-felsite flows and sedimentary breccia**—White to dark gray, mostly weathered light brown. Massive felsite completely aphanitic and featureless in hand specimen; in thin section, composed entirely of more or less flow-aligned laths of altered plagioclase in altered, probably originally glassy, groundmass. Tectonically flattened, crudely bedded sedimentary breccia of felsite clasts interstratified in upper part of unit, and upper part of unit interfingers with unit Jms. Stratigraphic base of unit Jmd everywhere faulted

Clan Alpine sequence (Lower Jurassic and Upper Triassic)—Limestone and argillite provisionally correlated with units assigned to the Clan Alpine sequence of Speed (1978) in the Clan Alpine Mountains, about 50 km northeast of map area. Divided into:

JꞦcl **Limestone (Lower Jurassic and (or) Upper Triassic)**—Massive, gray-weathering, lime mudstone; bedding mostly obscure, commonly veined with calcite, and locally foliated; in places abundantly oncolitic. Interpreted as a carbonate-platform deposit. Exposures of contact with unit Ꞧcl are limited in extent and difficult to interpret. Believed to depositionally overlie unit Ꞧcl and thus be laterally equivalent to the Mud Springs Canyon Formation of Speed (1978) in the Clan Alpine sequence of the Clan Alpine Mountains

Ꞧcl **Limestone (Upper Triassic)**—Regularly thin-bedded to medium-bedded black lime mudstone. Lightly metamorphosed except where conspicuously flattened, foliated, and lineated near La Plata Fault and where thermally altered to marble near contact with La Plata Canyon pluton. Turbiditic interbeds as thick as 20 cm formed of crinoid ossicles (and more rarely of molluscan shell fragments) exhibit T_b A and AB Bouma sequences; in southwesternmost exposures, crinoidal turbidites form as much as 50 percent of section through stratigraphic thicknesses of several tens of meters and are associated with rare units of limestone sedimentary breccia containing clasts as large as several centimeters. Lime mudstone beds commonly have internal planar lamination and locally have laminae of quartz silt or subordinate interbeds of black argillite. Interpreted as slope, and possibly partly basinal, deposit. Conspicuous white alteration lenses, several millimeters thick and as long as 20 cm, and composed of neomorphosed calcite, are locally abundant within lime mudstone beds. Age-diagnostic fossils scarce but include ammonite *Choristoceras* (at map locality C), spherical hydrozoan *Heterastridium* (locality H), and pelagic bivalve *Monotis subcircularis* (at localities labelled M), all of late Norian age and in southwestern part of outcrop area. Similar in lithic character, age, and depositional setting to, and is regarded as a lateral equivalent of the Hoyt Canyon Formation of Speed (1978), which forms part of the Clan Alpine sequence of the Clan Alpine Mountains

Ꞧca **Argillite (Upper Triassic)**—Predominantly planar laminated argillite with subordinate quartzose siltstone and fine-grained sandstone as laminae or thin, locally graded beds. Light brown, olive gray, or gray but black where hornfelsed near La Plata Canyon pluton. Weakly developed slaty foliation away from areas of thermal metamorphism. Minor intercalations of limestone. Interpreted as laterally equivalent to the slope or basinal siliciclastic rocks that are either interstratified with limestone strata of the Hoyt Canyon Formation of Speed (1978) or form the underlying Bernice Formation of Speed (1978) in the typical Clan Alpine sequence of the Clan Alpine Mountains. In southwesternmost part of pre-Tertiary outcrop area, rocks of unit Ꞧca are clearly succeeded stratigraphically by generally overturned, fossiliferous, turbiditic limestone of unit Ꞧcl; elsewhere in map area, stratigraphic superpositon of rocks assigned to these two units is ambiguous

Lower plate of La Plata Fault

Mzp **Phyllite (lower Mesozoic?)**—Strongly foliated phyllite, commonly spotted by intrafoliation porphyroblasts of andalusite which locally are aligned, forming a pronounced lineation. In contact zone of La Plata Canyon pluton, younger generation of andalusite porphyroblasts is superimposed upon and crosscuts foliation and lineation. Locally, phyllite grades into foliated, medium- to coarse-grained, impure, volcanic sandstone having only a small percentage of quartz grains; volcanic-lithic and feldspar (?) grains generally strongly stretched on foliation. No direct evidence for age, but lithologically, and in metamorphic and structural history, resembles rocks included in the Sand Springs "lithotectonic assemblage" of Oldow (1984) (J.I. Satterfield, oral commun., 1989) which lies to the south of the La Plata Canyon area, and from which fossils of probable Triassic and Jurassic ages are known (N.J. Silberling, unpub. data)

Contact—Dashed where approximately located

High-angle normal fault—Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side

Low-angle normal fault—Dashed where approximately located; dotted where concealed. Double barbs on upper plate

La Plata Fault—Dashed where approximately located; dotted where concealed. Barbs on upper plate

Strike and dip of beds
- 33 **Inclined, upright**
- 71 **Inclined, overturned**
- 39 **Inclined, facing direction unknown**
- **Vertical**
- **Horizontal**

Strike and dip of cleavage—Preferred parallel planar fracture
- 21 **Inclined**
- 43 **Inclined; cleavage in plane of bedding**
- **Vertical**

Strike and dip of foliation—Megascopic metamorphic mineral-growth fabric and compaction foliation in tuffaceous volcanic rocks
- 68 **Inclined**
- 37 **Inclined; foliation in plane of bedding**
- **Vertical**

Strike and dip of flow banding—In Tertiary volcanic rocks
- 69 **Inclined**

Plunge of minor fold axes—In rocks of Clan Alpine sequence
- 38 **Inclined; ductile D2 fold**
- 41 **Inclined; brittle D3 fold**
- **Horizontal; brittle D3 fold**

42 19 **Plunge of fold axis and strike and dip of axial surface**—Brittle D3 fold in rocks of Clan Alpine sequence

9 **Lineation**—Metamorphic mineral-growth or grain-stretch fabric. May be combined with strike and dip symbols for beds or foliation

C **Fossil locality**—In unit Ꞧcl (see DESCRIPTION OF MAP UNITS)

Dikes—Part of silicic intrusive rocks unit (Tsi)

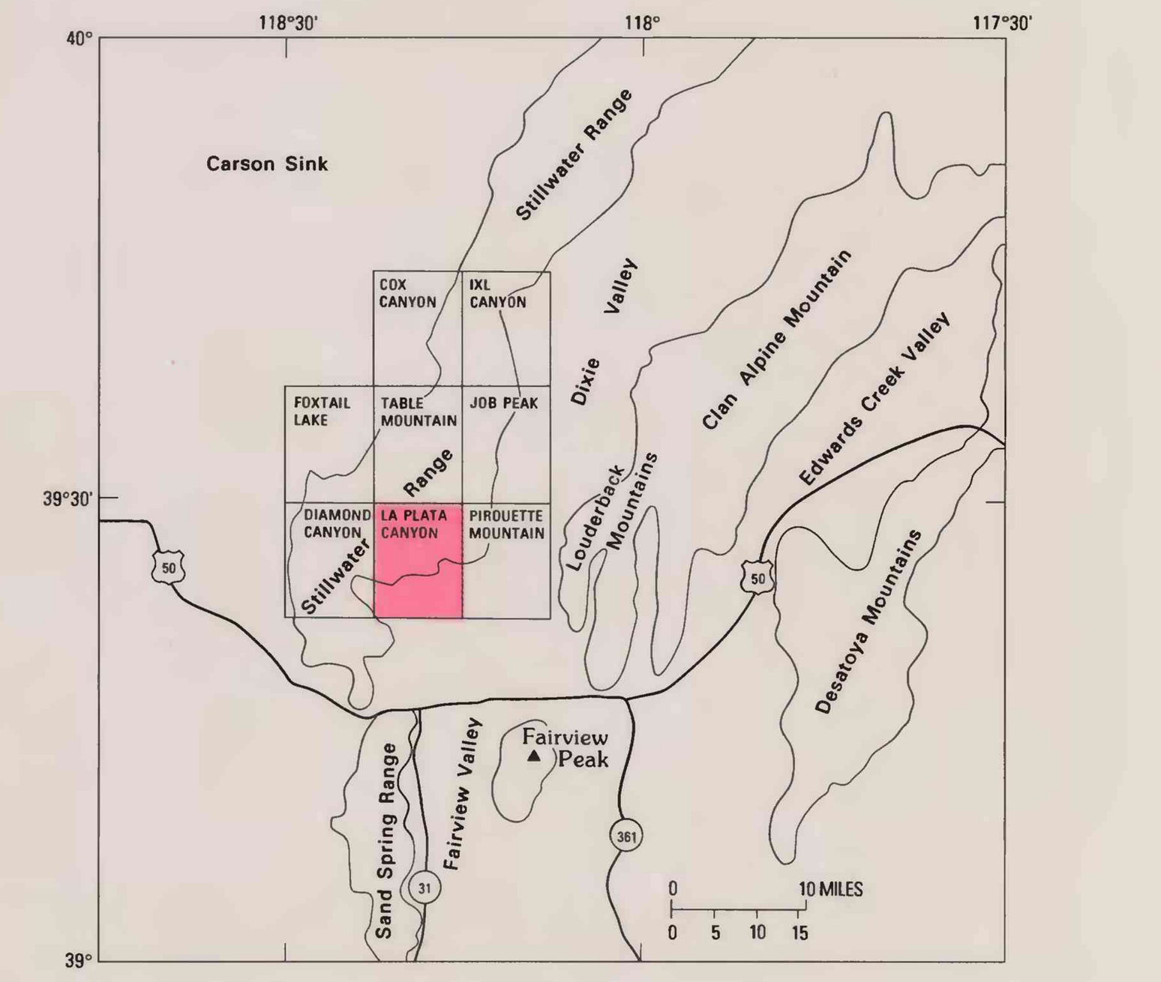
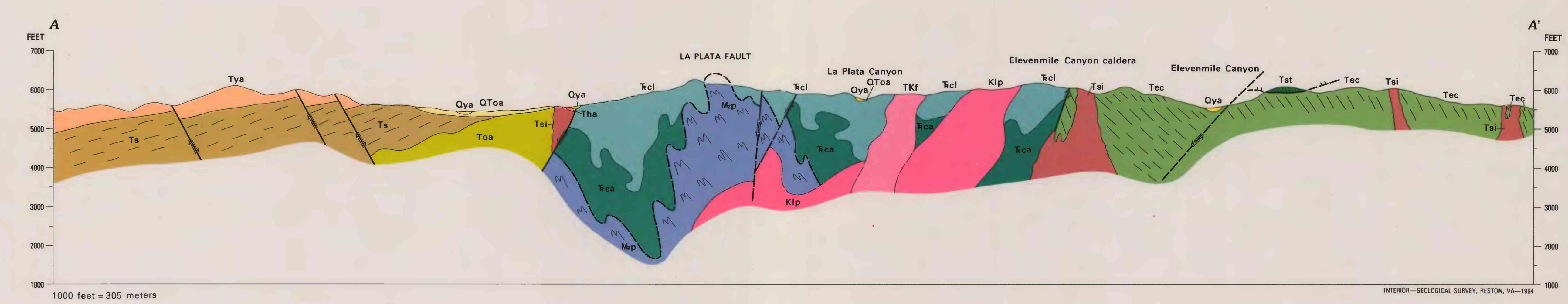


Figure 1. Index map of west-central Nevada, showing location of La Plata Canyon quadrangle and other nearby quadrangles.



1000 feet = 305 meters

GEOLOGIC MAP OF THE LA PLATA CANYON QUADRANGLE, CHURCHILL COUNTY, NEVADA

By
David A. John and Norman J. Silberling

1994

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA—1994

For sale by the U.S. Geological Survey Map Distribution, Box 25286, Federal Center, Denver, CO 80225