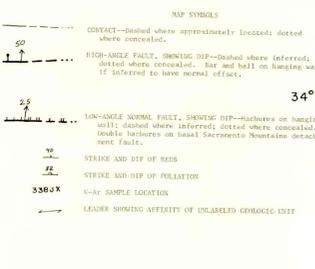
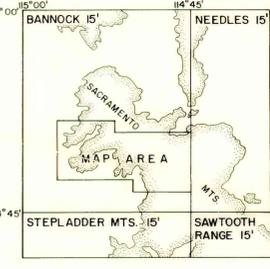
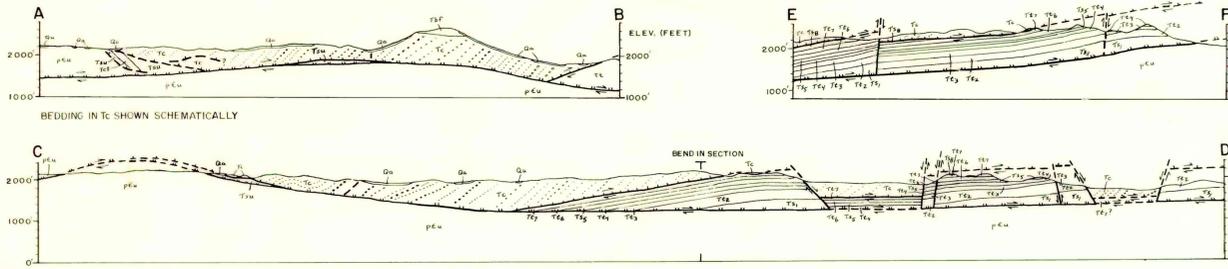
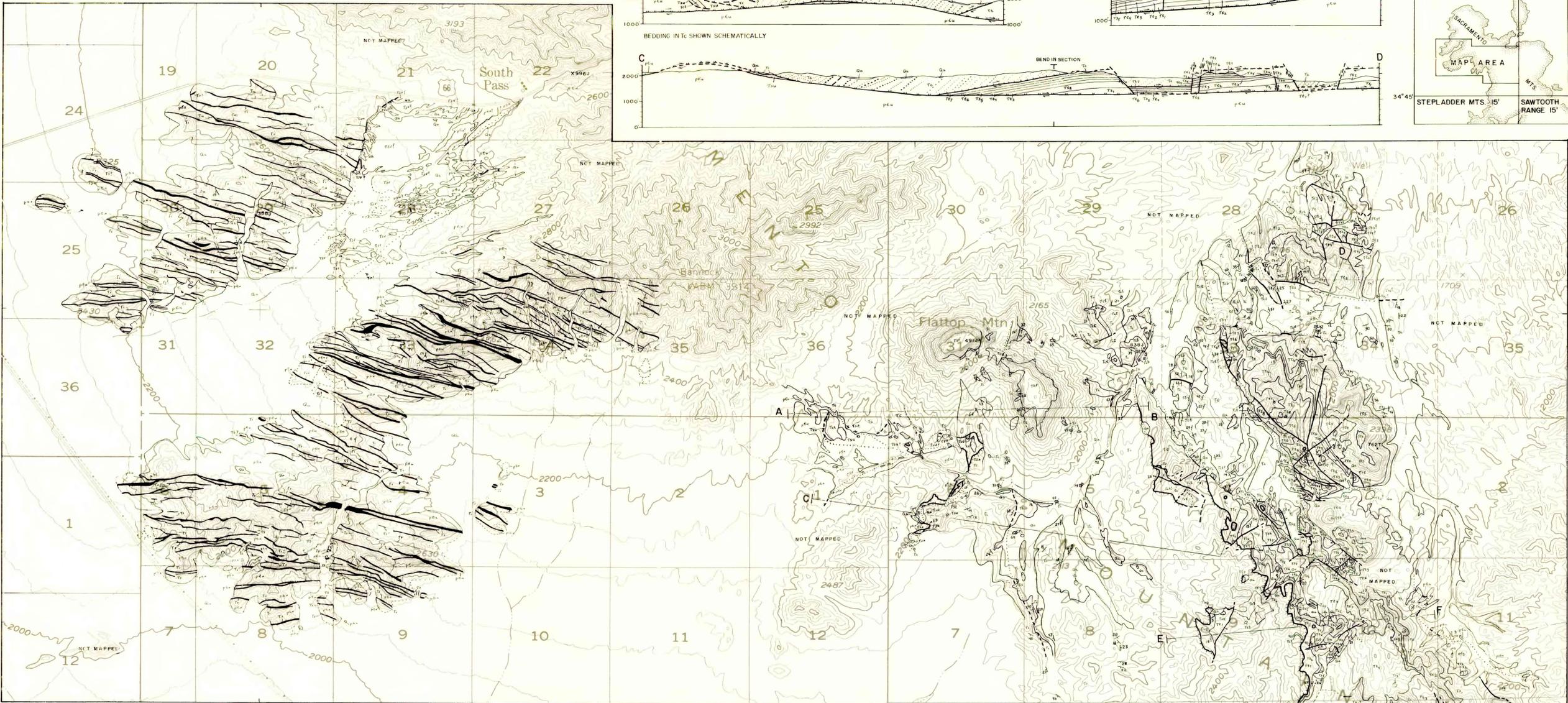
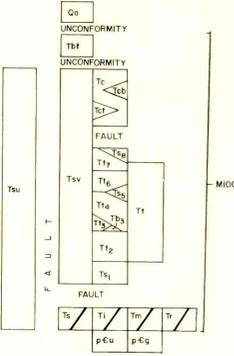


CORRELATION OF MAP UNITS



INTRODUCTION

The structural evolution of the northern Sacramento Mountains is dominated by the Sacramento Mountain detachment fault. This low-angle normal fault places a variety of Miocene volcanic and sedimentary rocks, and several small blocks of Precambrian crystalline rocks, over a complex terrain of Precambrian igneous and metamorphic rocks that have been intruded by east-west trending Miocene dikes (Spencer and Turner, 1983). These dikes are consistently east of the detachment fault, but their displaced equivalents have not been located above the fault. The fault surface is highly irregular, and allochthonous rocks vertically occur in low-lying areas while autochthonous rocks form adjacent mountains. As reviewed by Davis et al. (1980, Fig. 2), the Sacramento Mountain detachment fault separates a broad (5 to 7 mi) north-south trending, eastward-dipping body of predominantly Tertiary rocks from flat-lying Precambrian crystalline rocks. Northeast-trending synformal and antiformal, shorter wavelength (< 2 mi) irregularities of the Sacramento Mountain detachment fault are interpreted as original features of the detachment fault surface.

To the Flattop Mountain-Eagle Peak area, a low-angle normal fault structurally higher than the Sacramento Mountain detachment fault separates a lower allochthon of gently tilted tuff and volcanoclastic sedimentary rocks from an upper allochthon of moderately to steeply tilted conglomerate with minor interbedded tuff and basalt. Northwest to west-trending, graben-bounding high-angle normal faults cut both allochthons, but are interpreted as terminating upward at the Sacramento Mountain detachment fault based on mapping along the east side of map area by Nichols and Fletcher (1960) and Collins (1965). The flat-lying basalt of Flattop Mountain rests unconformably on tilted conglomerate of the upper allochthon. Sedimentary rocks and tuffs of the lower allochthon are correlative with lithologically similar sedimentary rocks and tuffs of the central Sacramento Mountains region by McCallister (1982) as "Pleistocene limestone, shale, and sandstone tuffs" (his unit T1a) and "limestone and crystal tuff" (his unit T1). Conglomerates of the upper allochthon are correlative with McCallister's "fanglomerate" (his unit T2).

| Unit | Description of Map Units |
|------|--|
| Qa | ALLUVIAL DEPOSITS (QUATERNARY) —Unconsolidated and poorly consolidated sandstone and conglomerate. Includes all alluvium, colluvium, talus, and Holocene stream deposits. Talus of basalt clasts cover older rocks over a large area on the flanks of Flattop Mountain. |
| Tuf | BASE OF FLATTOP MOUNTAIN (MIOCENE) —Flows 5 to 10 m thick of massive, medium to dark gray or black, non-vesicular basalt, platy basalt with stretched and flattened vesicles, and brecciated, pumiceous, red, brown, or gray basalt. Flow sands on terraces reveal a core of non-vesicular basalt surrounded by plate basalt, in turn surrounded by vesicular basalt. Massive basalt yielded a K-Ar age of 14.2 ± 0.2 m.y. (Table 1). |
| Tc | CONGLOMERATE (MIOCENE) —Red, gray, or chocolate brown, unsorted to poorly sorted cobble and conglomerate interpreted as alluvial fan deposits. Dominant clast types are Precambrian porphyritic biotite granite (unit T9) and quartz, with minor, more leucocratic granitic rocks locally containing garnet, very fine-grained metacarbonate(?) or metachert(?) rocks, and limestone. Unit includes interbedded volcanoclastic and heterolithic breccias, both clast and matrix supported, of gneiss and granite rock. In one breccia bed (SE 1/4, SE 1/4, sec. 6, T8N, R20E), foliation in aneurite clasts is aligned from clast to clast, indicating east-southwest-southwest or crystal (Green, 1968, p. 29). Unit also contains minor tuff, tuff basalt, planar and cross-stratified sandstone, siltstone, calcareous siltstone, cherty limestone, and limestone. |
| Tb | BASALT (MIOCENE) —Dark gray, massive to clay weathering, vesicular basalt forming discontinuous (T1) to (T10) m. Locally includes red to brown pumiceous and altered massive flow and flow breccia. A whole-rock sample yielded a K-Ar age of 14.2 ± 0.1 m.y. (Table 1). |
| Td | TUFF (MIOCENE) —Dark gray, bluish-gray, tan, brown or orange tuff and tuff breccia forming discontinuous dikes within unit Tc. Contains angular quartz and feldspar grains, and lithic fragments. |
| Tg | TUFF AND VOLCANOCLASTIC SILTSTONE, SANDSTONE, AND CONGLOMERATE (MIOCENE) —Discontinuous siltstone, sandstone, and conglomerate and sparse tuff. Clasts are typically brown weathering tuff, but clasts of basalt(?) and sparse clasts of quartz and limestone are present at one location (SE 1/4, sec. 11, T8N, R20E). At this location, conglomerate contains interbedded, light gray, dark-brown weathering, resistant tuff with sparse feldspar phenocrysts (1 m). |
| Tj | TUFF (MIOCENE) —Cliff forming, gray, brown, or purple, red to red-brown weathering tuff. Volcanic lithic fragments (1 m) from 10 to 200 m of rock. Also contains small feldspar and sparse biotite and quartz crystals. |

| Unit | Description of Map Units |
|------|---|
| Tk | TUFF (MIOCENE) —Pale orange, pale yellow, or tan, poorly to moderately resistant tuff. Contains abundant volcanic-lithic fragments. Locally contains flattened pumiceous clasts (10 to 30 cm) that weather to form elongate pits, and have gradational contacts with the surrounding tuffaceous matrix. At one location (SE 1/4, NE 1/4, sec. 16, T8N, R20E), unit contains interbedded red weathering volcanoclastic sandstone. |
| Tl | VOLCANOCLASTIC SANDSTONE AND CONGLOMERATE (MIOCENE) —Tan, brown, or orange, slope forming, volcanoclastic sandstone and conglomerate. Dominant lithology is poorly sorted, medium to fine-grained sandstone, with basaltic debris in vertical to near vertical orientation and variable resistance to weathering. Minor conglomerate beds typically have pebbles to cobble-sized clasts, but locally clasts are as large as 1 meter. Local interbedded tuffaceous sandstone contains pumice fragments in some areas. At one location (SE 1/4, NE 1/4, sec. 16, T8N, R20E), large-scale trough cross-stratification indicates approximately N60E paleowind direction. Best preserved on northward in sec. 11, T8N, R20E. |
| Tm | TUFF (MIOCENE) —Medium to medium brown non-vesicular tuff with biotite and quartz and volcanic-lithic fragments (1 m). Contains phenocrysts of plagioclase, quartz, and sparse biotite and sanidine(?). Unfoliated primary foliation is defined by devitrified glass shards wrapping around phenocrysts and lithic fragments. |
| Tn | TUFF AND BASALT (MIOCENE) —Light tan to light gray, moderately resistant, volcanic-lithic tuff (T1) to (T10) m. Also contains sparse biotite, quartz, and feldspar. Low density indicates that rock is porous, although pores are too small to be seen in hand specimen. The tuff strikes out to the south in T8N, R20E, sec. 10, where it intertongues with dark-gray to black basalt (Tb) that is correlative with "basalt porphyry" (Tbp) of McCallister (1982). |
| To | TUFF (MIOCENE) —Thickness of unit varies considerably due primarily to variation in the number of individual tuff beds. Forages this unit. In T8N, R20E, sec. 10 and T8N, R20E, sec. 3, four major tuff beds, each 15 to 30 meters (50 to 100 feet) thick, represent unit #2 at the maximum known thickness of 150 meters (500 feet). In descending order, these beds are: (1) medium to dark brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?); (2) medium to dark brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?); (3) medium to dark brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?); (4) medium to dark brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). |
| Tp | TUFF (MIOCENE) —Cliff forming, gray, brown, or purple, red to red-brown weathering tuff. Volcanic lithic fragments (1 m) from 10 to 200 m of rock. Also contains small feldspar and sparse biotite and quartz crystals. |

| Unit | Description of Map Units |
|------|--|
| Tq | TUFF (MIOCENE) —Medium to medium brown non-vesicular tuff with biotite and quartz and volcanic-lithic fragments (1 m). Contains phenocrysts of plagioclase, quartz, and sparse biotite and sanidine(?). Unfoliated primary foliation is defined by devitrified glass shards wrapping around phenocrysts and lithic fragments. |
| Ts | TUFF AND BASALT (MIOCENE) —Light tan to light gray, moderately resistant, volcanic-lithic tuff (T1) to (T10) m. Also contains sparse biotite, quartz, and feldspar. Low density indicates that rock is porous, although pores are too small to be seen in hand specimen. The tuff strikes out to the south in T8N, R20E, sec. 10, where it intertongues with dark-gray to black basalt (Tb) that is correlative with "basalt porphyry" (Tbp) of McCallister (1982). |
| Tt | TUFF (MIOCENE) —Medium to medium brown non-vesicular tuff with biotite and quartz and volcanic-lithic fragments (1 m). Contains phenocrysts of plagioclase, quartz, and sparse biotite and sanidine(?). Unfoliated primary foliation is defined by devitrified glass shards wrapping around phenocrysts and lithic fragments. |
| Tu | TUFF (MIOCENE) —Medium to medium brown non-vesicular tuff with biotite and quartz and volcanic-lithic fragments (1 m). Contains phenocrysts of plagioclase, quartz, and sparse biotite and sanidine(?). Unfoliated primary foliation is defined by devitrified glass shards wrapping around phenocrysts and lithic fragments. |
| Tv | SEDIMENTARY AND VOLCANIC ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Medium to dark brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| Tw | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| Tx | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| Ty | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| Tz | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |

| Unit | Description of Map Units |
|------|---|
| T1 | INTRUSIVE DIKE (MIOCENE) —Dark to light-gray to locally brownish-gray dike rock with abundant plagioclase (1 to 10 mm) and sparse to abundant biotite (1 to 3 mm). Hornblende and quartz are present locally in small amounts. Locally, biotite is partially to entirely replaced by chlorite. The matrix appears aphanitic in hand sample but in this section is composed of microcrystalline quartz, feldspar, and sparse material. Biotite alteration of plagioclase is common. Fresh biotite from this unit yielded a K-Ar age of 14.1 ± 0.2 m.y. (Table 1). |
| T2 | MAFIC DIKE (MIOCENE) —Aphanitic, dark gray to dark brownish-gray dike with sparse fine-grained biotite, locally including chlorite and hornblende. Distinguished from intermediate composition dikes by its dark color and general lack of phenocrysts. |
| T3 | RYOLITIC DIKE (MIOCENE) —Aphanitic, light gray matrix with approximately 50% phenocrysts of quartz (1 to 8 mm), plagioclase (1 to 8 mm) and poikiloblastic biotite (1 to 10 mm). |
| T4 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T5 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T6 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T7 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T8 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T9 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T10 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |

| Unit | Description of Map Units |
|------|---|
| T11 | INTRUSIVE DIKE (MIOCENE) —Dark to light-gray to locally brownish-gray dike rock with abundant plagioclase (1 to 10 mm) and sparse to abundant biotite (1 to 3 mm). Hornblende and quartz are present locally in small amounts. Locally, biotite is partially to entirely replaced by chlorite. The matrix appears aphanitic in hand sample but in this section is composed of microcrystalline quartz, feldspar, and sparse material. Biotite alteration of plagioclase is common. Fresh biotite from this unit yielded a K-Ar age of 14.1 ± 0.2 m.y. (Table 1). |
| T12 | MAFIC DIKE (MIOCENE) —Aphanitic, dark gray to dark brownish-gray dike with sparse fine-grained biotite, locally including chlorite and hornblende. Distinguished from intermediate composition dikes by its dark color and general lack of phenocrysts. |
| T13 | RYOLITIC DIKE (MIOCENE) —Aphanitic, light gray matrix with approximately 50% phenocrysts of quartz (1 to 8 mm), plagioclase (1 to 8 mm) and poikiloblastic biotite (1 to 10 mm). |
| T14 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T15 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T16 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T17 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T18 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T19 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T20 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |

| Unit | Description of Map Units |
|------|---|
| T21 | INTRUSIVE DIKE (MIOCENE) —Dark to light-gray to locally brownish-gray dike rock with abundant plagioclase (1 to 10 mm) and sparse to abundant biotite (1 to 3 mm). Hornblende and quartz are present locally in small amounts. Locally, biotite is partially to entirely replaced by chlorite. The matrix appears aphanitic in hand sample but in this section is composed of microcrystalline quartz, feldspar, and sparse material. Biotite alteration of plagioclase is common. Fresh biotite from this unit yielded a K-Ar age of 14.1 ± 0.2 m.y. (Table 1). |
| T22 | MAFIC DIKE (MIOCENE) —Aphanitic, dark gray to dark brownish-gray dike with sparse fine-grained biotite, locally including chlorite and hornblende. Distinguished from intermediate composition dikes by its dark color and general lack of phenocrysts. |
| T23 | RYOLITIC DIKE (MIOCENE) —Aphanitic, light gray matrix with approximately 50% phenocrysts of quartz (1 to 8 mm), plagioclase (1 to 8 mm) and poikiloblastic biotite (1 to 10 mm). |
| T24 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T25 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T26 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T27 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T28 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T29 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T30 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |

| Unit | Description of Map Units |
|------|---|
| T31 | INTRUSIVE DIKE (MIOCENE) —Dark to light-gray to locally brownish-gray dike rock with abundant plagioclase (1 to 10 mm) and sparse to abundant biotite (1 to 3 mm). Hornblende and quartz are present locally in small amounts. Locally, biotite is partially to entirely replaced by chlorite. The matrix appears aphanitic in hand sample but in this section is composed of microcrystalline quartz, feldspar, and sparse material. Biotite alteration of plagioclase is common. Fresh biotite from this unit yielded a K-Ar age of 14.1 ± 0.2 m.y. (Table 1). |
| T32 | MAFIC DIKE (MIOCENE) —Aphanitic, dark gray to dark brownish-gray dike with sparse fine-grained biotite, locally including chlorite and hornblende. Distinguished from intermediate composition dikes by its dark color and general lack of phenocrysts. |
| T33 | RYOLITIC DIKE (MIOCENE) —Aphanitic, light gray matrix with approximately 50% phenocrysts of quartz (1 to 8 mm), plagioclase (1 to 8 mm) and poikiloblastic biotite (1 to 10 mm). |
| T34 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T35 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T36 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T37 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T38 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T39 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T40 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |

| Unit | Description of Map Units |
|------|---|
| T41 | INTRUSIVE DIKE (MIOCENE) —Dark to light-gray to locally brownish-gray dike rock with abundant plagioclase (1 to 10 mm) and sparse to abundant biotite (1 to 3 mm). Hornblende and quartz are present locally in small amounts. Locally, biotite is partially to entirely replaced by chlorite. The matrix appears aphanitic in hand sample but in this section is composed of microcrystalline quartz, feldspar, and sparse material. Biotite alteration of plagioclase is common. Fresh biotite from this unit yielded a K-Ar age of 14.1 ± 0.2 m.y. (Table 1). |
| T42 | MAFIC DIKE (MIOCENE) —Aphanitic, dark gray to dark brownish-gray dike with sparse fine-grained biotite, locally including chlorite and hornblende. Distinguished from intermediate composition dikes by its dark color and general lack of phenocrysts. |
| T43 | RYOLITIC DIKE (MIOCENE) —Aphanitic, light gray matrix with approximately 50% phenocrysts of quartz (1 to 8 mm), plagioclase (1 to 8 mm) and poikiloblastic biotite (1 to 10 mm). |
| T44 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T45 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T46 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T47 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T48 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T49 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T50 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |

| Unit | Description of Map Units |
|------|---|
| T51 | INTRUSIVE DIKE (MIOCENE) —Dark to light-gray to locally brownish-gray dike rock with abundant plagioclase (1 to 10 mm) and sparse to abundant biotite (1 to 3 mm). Hornblende and quartz are present locally in small amounts. Locally, biotite is partially to entirely replaced by chlorite. The matrix appears aphanitic in hand sample but in this section is composed of microcrystalline quartz, feldspar, and sparse material. Biotite alteration of plagioclase is common. Fresh biotite from this unit yielded a K-Ar age of 14.1 ± 0.2 m.y. (Table 1). |
| T52 | MAFIC DIKE (MIOCENE) —Aphanitic, dark gray to dark brownish-gray dike with sparse fine-grained biotite, locally including chlorite and hornblende. Distinguished from intermediate composition dikes by its dark color and general lack of phenocrysts. |
| T53 | RYOLITIC DIKE (MIOCENE) —Aphanitic, light gray matrix with approximately 50% phenocrysts of quartz (1 to 8 mm), plagioclase (1 to 8 mm) and poikiloblastic biotite (1 to 10 mm). |
| T54 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T55 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T56 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T57 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T58 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T59 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |
| T60 | SEDIMENTARY ROCKS, UNDIFFERENTIATED (PRECAMBRIAN) —Light gray to light brown, moderate to highly-resistant cliff-forming tuff with volcanic-lithic fragments and sparse biotite, quartz, and sanidine(?). Also includes detrital, chlorite, biotite, and quartz. Also includes detrital, chlorite, biotite, and quartz. |

GEOLOGIC MAP OF PART OF THE NORTHWESTERN SACRAMENTO MOUNTAINS, SOUTHEASTERN CALIFORNIA
by Jon E. Spencer and Ryan D. Turner
1983

DESCRIPTION OF MAP UNITS

Qa ALLUVIAL DEPOSITS (QUATERNARY)—Unconsolidated and poorly consolidated sandstone and conglomerate. Includes all alluvium, colluvium, talus, and Holocene stream deposits. Talus of basalt clasts cover older rocks over a large area on the flanks of Flattop Mountain.

Tuf BASE OF FLATTOP MOUNTAIN (MIOCENE)—Flows 5 to 10 m thick of massive, medium to dark gray or black, non-vesicular basalt, platy basalt with stretched and flattened vesicles, and brecciated, pumiceous, red, brown, or gray basalt. Flow sands on terraces reveal a core of non-vesicular basalt surrounded by plate basalt, in turn surrounded by vesicular basalt. Massive basalt yielded a K-Ar age of 14.2 ± 0.2 m.y. (Table 1).

Tc CONGLOMERATE (MIOCENE)—Red, gray, or chocolate brown, unsorted to poorly sorted cobble and conglomerate interpreted as alluvial fan deposits. Dominant clast types are Precambrian porphyritic biotite granite (unit T9) and quartz, with minor, more leucocratic granitic rocks locally containing garnet, very fine-grained metacarbonate(?) or metachert(?) rocks, and limestone. Unit includes interbedded volcanoclastic and heterolithic breccias, both clast and matrix supported, of gneiss and granite rock. In one breccia bed (SE 1/4, SE 1/4, sec.