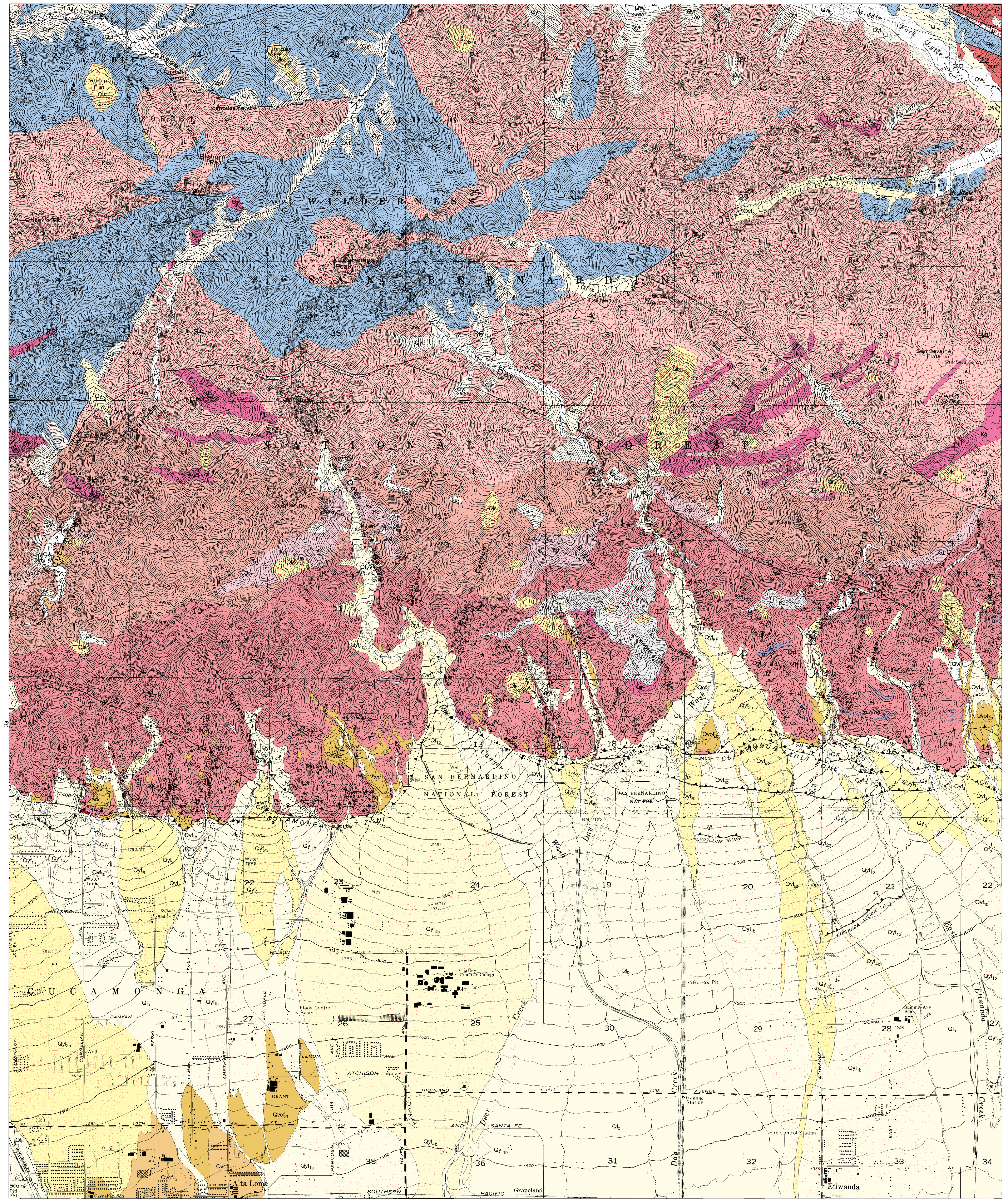
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
U.S. FOREST SERVICE (San Bernardino National Forest)
and the CALIFORNIA DIVISION OF MINES AND GEOLOGY

OPEN-FILE REPORT 01-311
Version 1.0



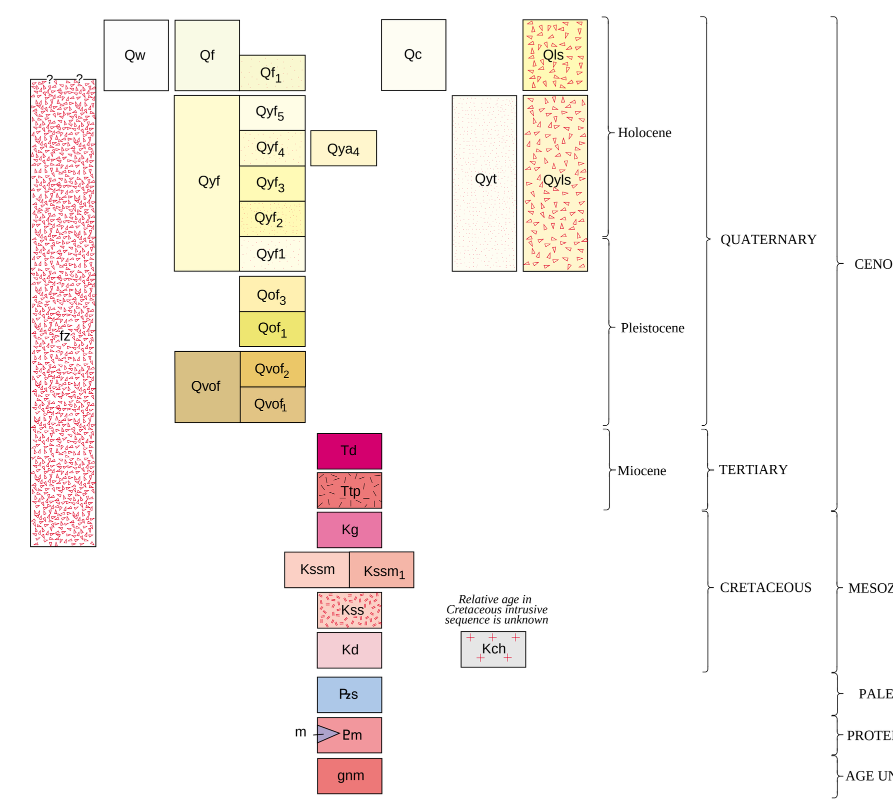
Base from U.S. Geological Survey
7.5' Cucamonga Peak quadrangle, 1966
Lambert conformal conic projection

SCALE 1:24,000

CONTOUR INTERVAL 40 FEET

Geology mapped by D.M. Morton and J.C. Matti, 1970-1989. Supported by National Cooperative Geologic Mapping Program and National Earthquake Hazards Reduction Program

CORRELATION OF MAP UNITS



NOTE: Subscripts of Quaternary unit labels on map denote grain size characterizing the unit within individual polygons. (e.g. Qyf_b)

lg- large boulders	s - silty
b - boulder gravel	c - clayey
g - gravel (cobble through granule gravel)	m - marl
a - arenaceous (very coarse sand through very fine sand)	p - peat

Contact—Solid where accurately located; dashed where approximately located; dotted where concealed; queried where inferred.

Contact—Separates terraced alluvial units, hachers point towards topographically lower surface.

Contact—Geomorphic feature—crown scarp; hachers point towards topographically lower surface.

High angle fault—Solid where accurately located; dashed where approximately located; dotted where concealed; queried where inferred. Parallel, paired arrows indicate relative horizontal movement. Arrows and numbers indicate direction and dip of fault surface and bearing and plunge of slickensides

Thrust fault—Solid where accurately located; dashed where approximately located; dotted where concealed; queried where inferred. Sawteeth on upper plate. Hachures indicate scarp; hachures on down-dropped block. Arrow and number indicates direction and dip of fault surface.

Fault zone—Consists of crushed and brecciated rock and gouge; solid where accurately located; dashed where approximately located

Strike and dip of sedimentary beds

- 70 **Inclined**
- **Vertical**
- 70 **Overturned**
- **Horizontal**

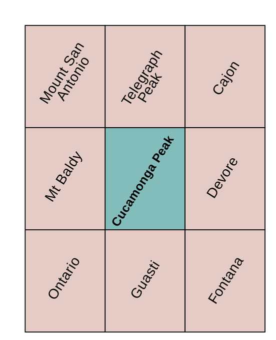
Strike and dip of foliation and layering in metamorphic rocks

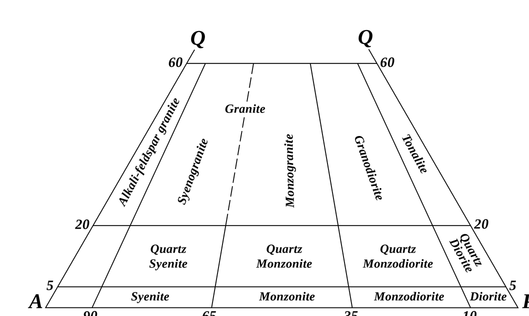
- 70 **Inclined**
- **Vertical**

70 **Bearing and plunge of aligned minerals in metamorphic rocks**

Bearing and plunge of horizontal mineral lineation in metamorphic rocks

70 **Bearing and plunge of unspecified linear features**





Classification of granitic rock types (from IUGS, 1976, and Streckeisen, 1976). A, alkali-feldspar; P, plagioclase feldspar; Q, quartz

DESCRIPTION OF MAP UNITS

MODERN SURFICIAL DEPOSITS—Sediment recently transported and deposited in channels and washes, on surfaces of alluvial fans and alluvial plains, and on hillslopes. Soil-profile development is non-existant to minimal. Includes:

Qw **Very young wash deposits (late Holocene)**—Unconsolidated coarse-grained sand to bouldery alluvium of active channels and washes flooring drainage bottoms within mountains and on alluvial fans along base of mountains. Most alluvium is, or recently was, subject to active stream flow. Includes some low-lying terrace deposits along alluviated canyon floors and areas underlain by colluvium along base of some slopes

Qf **Very young alluvial fan deposits (late Holocene)**—Unconsolidated deposits of coarse-grained sand to bouldery alluvium of modern fans having undissected surfaces

Qf_1 **Very young alluvial fan deposits, Unit 1**—Unconsolidated deposits of coarse-grained sand to bouldery alluvium of modern fans having undissected surfaces; commonly distinguished by terrace level

Qc **Very young colluvial deposits (late Holocene)**—Unconsolidated deposits of soil and angular rock debris along base of slopes. Ranges from deposits consisting of almost wholly rock fragments to deposits of soil and humus-rich material

Qls **Very young landslide deposits (late Holocene)**—Slope failure deposits consisting of displaced bedrock blocks and (or) chaotically mixed rubble. Deposits are possibly active under current climatic conditions and moderate to strong ground-shaking conditions

YOUNG SURFICIAL DEPOSITS—Sedimentary units that are slightly consolidated to cemented and slightly to moderately dissected. Alluvial fan deposits (Qyf series) typically have high coarse:fine clast ratios. Young surficial units have upper surfaces that are capped by slight to moderately developed pedogenic-soil profiles (A/C to A/AC/$B_{cambric}C_{ox}$ profiles). Includes:

Qyf **Young alluvial fan deposits (Holocene and late Pleistocene)**—Unconsolidated to moderately consolidated, coarse-grained sand to bouldery alluvial fan deposits having slightly to moderately dissected surfaces. Includes from youngest to oldest:

Qyf_5 **Young alluvial fan deposits, Unit 5 (Holocene)**—Alluvial fan deposits having slightly dissected surfaces and stage S7 soils. Slightly younger than Qyf_4 based on geomorphic relations. Found in northeast part of quadrangle between East Kimbark and Ames Canyons

Qyf_4 **Young alluvial fan deposits, Unit 4 (Holocene)**—Alluvial fan deposits having slightly dissected surfaces and stage S7 soils. Unconsolidated to slightly consolidated, coarse-grained sand to bouldery alluvium

Qyf_3 **Young alluvial fan deposits, Unit 3 (Holocene)**—Alluvial fan deposits having slightly dissected surfaces and stage S6 or incipiently developed stage S5 soils. Unconsolidated to slightly consolidated, coarse-grained sand to bouldery alluvium

Qyf_2 **Young alluvial fan deposits, Unit 2 (Holocene)**—Alluvial fan deposits having moderately dissected surfaces and well-developed S5 soils. Slightly to moderately consolidated, coarse-grained sand to bouldery alluvium

Qyf_1 **Young alluvial fan deposits, Unit 1 (late Pleistocene)**—Alluvial fan deposits having moderately dissected surfaces and well-developed S5 soils. moderately consolidated, coarse-grained sand to bouldery alluvium

Young alluvial-valley deposits (Holocene)—Includes:

Qya_4 **Young alluvial-valley deposits, Unit 4 (Holocene)**—Low terraces of gravelly sand. Unconsolidated to slightly consolidated; surfaces are essentially undissected

Qyt **Young talus deposits (Holocene and late Pleistocene)**—Slightly to moderately dissected, consolidated to cemented deposits of angular and subangular pebble-, cobble-, and boulder-size material that form scree and rubble on hillslopes and at base of slopes

Qyls **Young landslide deposits (Holocene and late Pleistocene)**—Slope failure deposits that consist of displaced bedrock blocks and (or) chaotically mixed rubble. Deposits are probably inactive under current climatic conditions and moderate to strong ground-shaking conditions

OLD SURFICIAL DEPOSITS—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Old surficial deposits have upper surfaces that are capped by moderately to well developed pedogenic soils (A/AB/B/C_{ox} profiles and Bt horizons as much as 1 to 2 m thick and have maximum hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature Bt horizons reaching 5YR 5/6). Includes:

Old alluvial fan deposits (late to middle Pleistocene)—Unconsolidated to well consolidated alluvial fan deposits of coarse-grained sand to bouldery alluvium. These old fans have moderately to well dissected surfaces. Includes from youngest to oldest:

Qof_3 **Old alluvial fan deposits, Unit 3 (late Pleistocene)**—Alluvial fan deposits having moderately dissected surfaces and stage S4 soils. Moderately to well consolidated

Qof_1 **Old alluvial fan deposits, Unit 1 (middle Pleistocene)**—Alluvial fan deposits having well-dissected surfaces and stage S3 soils. Generally noticably better consolidated than Qof_3

VERY OLD SURFICIAL DEPOSITS—Sediments that are slightly to well consolidated to indurated, and moderately to well dissected. Upper surfaces are capped by moderate to well developed pedogenic soils (A/AB/B/C_{ox} profiles having Bt horizons as much as 2 to 3 m thick and maximum hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6)

Qvof **Very old alluvial fan deposits (early Pleistocene)**—Unconsolidated to well-consolidated alluvial fan deposits of coarse-grained sand to bouldery alluvium. Many very old fans are characterized by extremely dissected surfaces. Includes from youngest to oldest:

$Qvof_2$ **Very old alluvial fan deposits, Unit 2**—Alluvial fan deposits having extremely dissected surfaces and stage S2 soils

$Qvof_1$ **Very old alluvial fan deposits, Unit 1**—Alluvial fan deposits having extremely dissected surfaces and stage S1 soils

fz **Crushed rock in fault zones (Holocene to late Tertiary)**—Gouge and crushed and brecciated rock developed along Lytle Creek and San Jacinto Fault zones

Td **Dacitic rocks (Oligocene)**—White, fine-grained, porphyritic dacite. Contains phenocrysts of subhedral to euhedral biotite. Occurs as fault-bounded, tabular mass in Cucamonga fault zone in western part of quadrangle

Ttp **Granodiorite of Telegraph Peak (Oligocene)**—Biotite granodiorite, ranging to biotite monzogranite. Medium- to coarse-grained, mostly massive, hypidiomorphic-granular, white-weathering biotite granodiorite. Highly fractured most places; deeply weathered on ridge tops. Miller and Morton (1977) report conventional K-Ar ages of biotite ranging from 14 Ma to 19 Ma. Younger age is here reinterpreted to be cooling age; older age probably near emplacement age

Kg **Monzogranite and granodiorite (Cretaceous?)**—Medium- grained, sub-porphyritic, massive monzogranite to granodiorite. Phenocrysts are potassium feldspar. Weathers off-white. Occurs mainly as large, northeast striking dikes up to half kilometer wide, cutting Cretaceous(?) tonalite of San Sevaine Lookout (Kt), west of Lytle Creek

Kssm **Mylonitized tonalite of San Sevaine Lookout (Cretaceous)**—Gneissic and mylonitic tonalite; mylonitic deformation discontinuously distributed throughout unit. Consists of mixture of $Kssm_1$ and Kss

$Kssm_1$ **Tonalite of San Sevaine Lookout (Cretaceous)**—Hornblende-biotite tonalite, possibly ranging to granodiorite and quartz diorite. Foliated, gray, medium- to coarse-grained; generally equigranular, but locally sub-porphyritic, containing small, poorly formed feldspar phenocrysts. Foliation defined by oriented hornblende and biotite, commonly as dark, multi-grained, flattened inclusions. Contains large septa of marble, gneiss, and schist, the latter two incorporated in varying degree into the tonalite; some rock contains scattered garnets having kelyphytic rims. Along southeast side includes:

Kss **Tonalite of San Sevaine Lookout, uniform mylonite (Cretaceous)**—Uniformly mylonitized tonalitic rocks. Homogeneous, gray, porphyroblastic mylonite; zone is 200 to 400 m in width. Mylonite is tonalite composition, but ranges to diorite and monzogranite locally. Very fine grained to aphanitic, having porphyroclasts of plagioclase, quartz, and most notably porphyroclasts or porphyroblasts of hornblende as much as 3 cm in length. Most elongate porphyroclasts or porphyroblasts show strong preferential orientation down dip. Includes dark-gray to black, aphanitic mylonite and ultramylonite layers (psuedotachylyte) approximately 3 cm thick

Kd **Diorite (Cretaceous)**—Diorite; forms discontinuous masses near contacts between Tonalite of San Sevaine Lookout and granulitic complex to south. Medium- to coarse-grained rock consisting mostly of plagioclase (andesine) and hornblende. Hornblende occurs as stubby prisms. Near margins of bodies rock is commonly mylonitic. As mapped here, unit is Deer diorite of Alf (1948)

Kch **Charnockite (Cretaceous)**—Massive to foliated charnockite. Forms irregular to tabular masses as much as 2 km long. Near-white, medium to coarse grained. Consists mainly of plagioclase and hypersthene, biotite, garnet, and quartz. Much of charnockite has been affected by retrograde metamorphism, which affects not only charnockite, but surrounding granulitic gneiss

Pzs **Schist and gneiss (Paleozoic)**—Well foliated schist and gneiss exposed on Penstock Ridge and areas west of Lytle Creek. Composition of schist and gneiss is variable, but most is biotite-bearing

m Pm **Granulitic gneiss, mylonite, and cataclasite (Proterozoic?)**—Prograde granulitic gneiss that is largely retrograded to amphibolite and greenschist grade mylonite and cataclasite. Granulitic gneiss includes quartz-feldspar gneiss, garnet-quartz-feldspar gneiss, amphibolite, garnet-pyroxene rich rocks, and spinel-pyroxene rich rocks. Gneiss includes layers of coarse-grained marble (m) that are progressively more mylonitic southward in unit

gnm **Cataclastic gneiss (age unknown)**—Cataclastic and mylonitic biotite gneiss intruded by granitic rocks which have also been mylonitized. Gneiss is layered, intensely folded, and contains amphibolite grade mineral assemblages. Restricted to area in northeastern part of quadrangle. Gneiss contains scattered pods of white, coarse- to very fine-grained, mylonitic marble

GEOLOGIC SUMMARY

The Cucamonga Peak quadrangle includes part of the boundary between two major physiographic provinces of California, the Transverse Ranges Province to the north and the Peninsular Ranges Province to the south. The north part of the quadrangle is in the eastern San Gabriel Mountains, and the southern part includes an extensive Quaternary alluvial fan complex flanking the upper Santa Ana River Valley, the northernmost part of the Peninsular Ranges Province.

Thrust faults of the active Cucamonga Fault zone along the south margin of the San Gabriel Mountains, are the rejuvenated eastern terminus of a major old fault zone that bounds the south side of the western and central Transverse Ranges (Morton and Matti, 1993). Rejuvenation of this old fault zone, including the Cucamonga Fault zone, is apparently in response to compression in the eastern San Gabriel Mountains resulting from initiation of right-lateral slip on the San Jacinto Fault zone in the Peninsular Ranges. Within northern part of the quadrangle are several arcuate in plan faults that are part of an antiformal schuppen-like fault complex of the eastern San Gabriel Mountains. Most of these arcuate faults are reactivated and deformed older faults that probably include the eastern part of the San Gabriel Fault.

The structural grain within the San Gabriel Mountains, as defined by basement rocks, is generally east striking. Within the Cucamonga Peak quadrangle, these basement rocks include a Paleozoic schist and gneiss sequence, which occurs as large continuous and discontinuous bodies intruded by Cretaceous granitic rocks. Most of the granitic rocks are of tonalitic composition, and many are mylonitic. South of the granitic rocks is a complex assemblage of Proterozoic(?) metamorphic rocks, at least part of which is metasedimentary. This assemblage is intruded by Cretaceous tonalite on its north side, and by charnockitic rocks near the center of the mass. The charnockitic rocks are in contact with no other Cretaceous granitic rocks. Consequently, their relative position in the intrusive sequence is unknown. The Proterozoic(?) assemblage was metamorphosed to upper amphibolite and lower granulite grade, and subsequently to a lower metamorphic grade. It is also intensely deformed by mylonitization characterized by an east striking, north dipping foliation, and by a pronounced subhorizontal lineation that plunges shallowly east and west.

The southern half of the quadrangle is dominated by large symmetrical alluvial fan complexes, particularly two emanating from Day and Deer Canyons. Other Quaternary units ranging from early Pleistocene to recent are mapped, and represent alluvial fan, landslide, talus, and wash environments.

REFERENCES CITED

Alf, R.M., 1948, A mylonite belt in the southeastern San Gabriel Mountains, California: Geological Society of America Bulletin, v. 59, p. 1101-1120

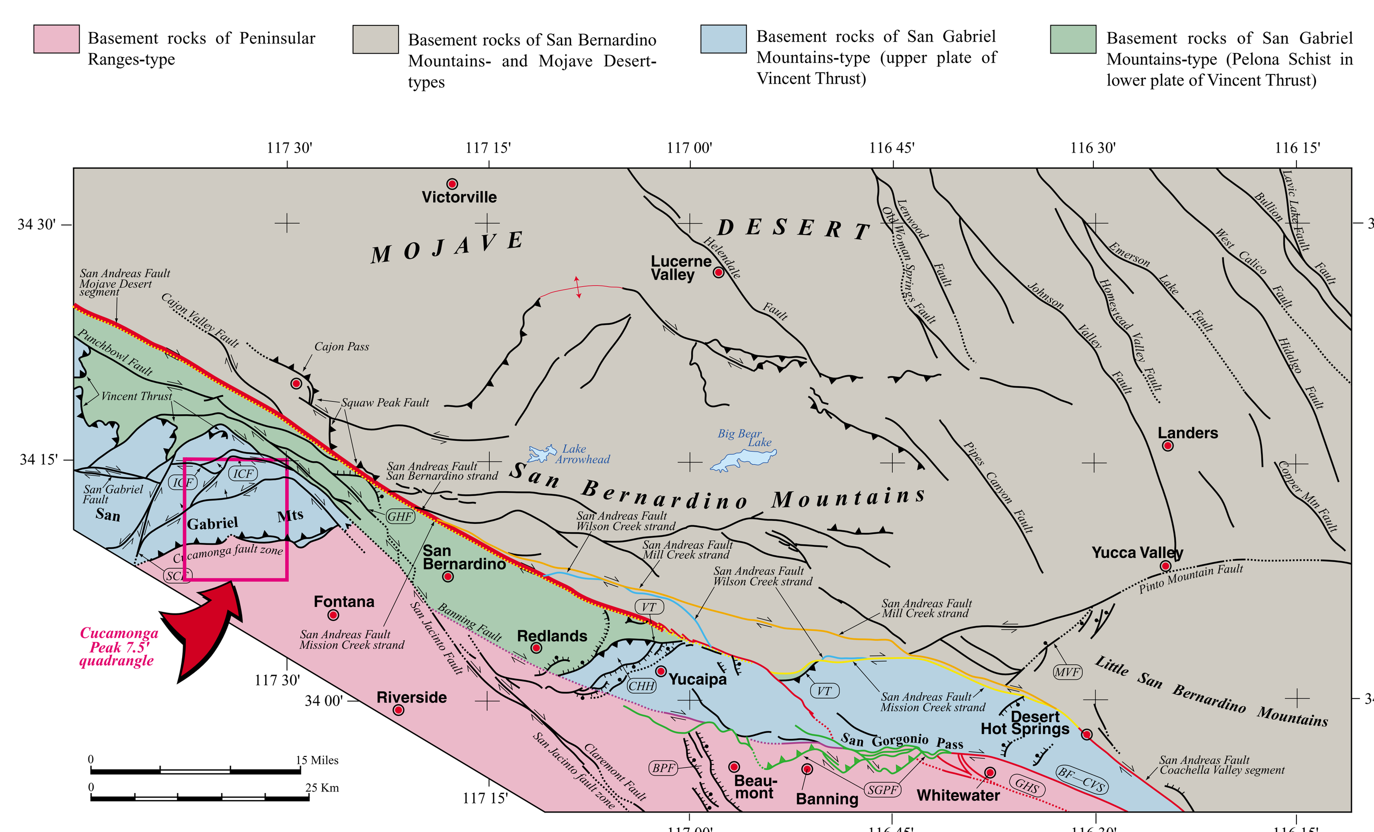
Miller, F.K., and Morton, D.M., 1977, Comparison of granitic intrusions in the Pelona and Orocopia Schists, southern California: U.S. Geological Survey Journal of Research, vol. 5, no. 5, p. 643-649.

Morton, D.M., and Matti, J.C., 1993, Extension and contraction within an evolving strike-slip fault complex: the San Andreas and San Jacinto Fault zones at their convergence in southern California, *in* Powell, R.E., Weldon, R.J., and Matti, J.C., ed., The San Andreas Fault system: Displacement, palinspastic reconstruction, and geologic evolution: Geological Soc. of America, Mem. 178, p. 217-230.

Rogers, T.H., compiler, 1965, San Bernardino Sheet of Geologic map of California: California Division of Mines and Geology, scale, 1:250,000.

Matti, J.C., Morton, D.M., 1993, Paleographic evolution of the San Andreas fault in southern California: A reconstruction based on a new cross-fault correlation, *in* Powell, R.E., Weldon, R.J., and Matti, J.C., ed., The San Andreas Fault system: Displacement, palinspastic reconstruction, and geologic evolution: Geological Soc. of America, Mem. 178, p. 217-230.

Matti, J.C., Brown, H.J., Miller, F.K., Calzia, J.P., Wrucke, C.T., and Conway, C.M., 1993, Preliminary geologic map of the north-central San Bernardino Mountains, California: U.S. Geological Survey Open-File Report 93-544, scale, 1:100,000.



Map showing regional geologic framework and location of Cucamonga Peak 7.5' quadrangle. Faults modified from Matti and others (1993), Matti and Morton (1993), and Rogers (1967). Faults shown in colors are strands of the San Andreas Fault; red indicates modern traces of the San Andreas Fault. *BF—CVS,* Banning Fault—Coachella Valley segment; *GHS,* San Andreas Fault—Garnet Hill strand; *BPF*, Beaumont Plain fault zone; *CHH*, Crafton Hills horst-and-graben complex; *GHF*, Glen Helen Fault; ICF, Icehouse Canyon Fault; *MVF*, Morongo Valley Fault; *SCF*, San Antonio Canyon Fault; *VT*, Vincent Thrust

GEOLOGIC MAP OF THE CUCAMONGA PEAK 7.5' QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA

Version 1.0

By

Douglas M. Morton[1] and Jonathan C. Matti[2]

Digital preparation by

Catherine Koukladas[1] and P. M. Cossette[3]

[1] U.S. Geological Survey, Department of Earth Sciences, University of California, Riverside, CA 92521

[2] U.S. Geological Survey, University of Arizona, 520 North Park Avenue, Tucson, AZ 85719

[3] U.S. Geological Survey, Room 202, West 904 Riverside Avenue, Spokane, WA 99201-1087

LOCATION MAP