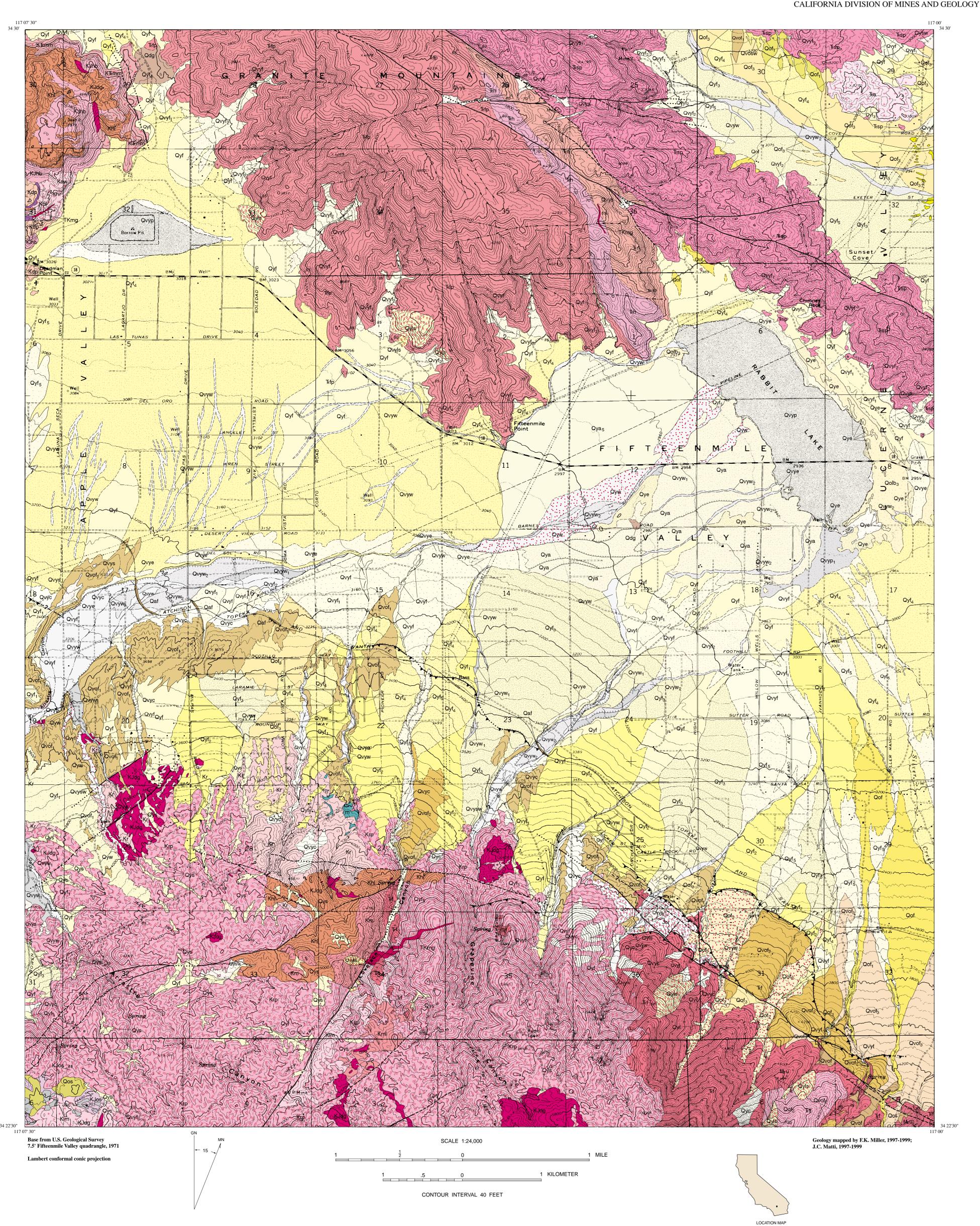
U.S. DEPARTMENT OF THE INTERIOR U.S. GEOLOGICAL SURVEY Prepared in cooperation with the OPEN-FILE REPORT 01-132 U.S. FOREST SERVICE (San Bernardino National Forest) and the



GEOLOGIC MAP OF THE FIFTEENMILE VALLEY 7.5' QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA

Version 1.0

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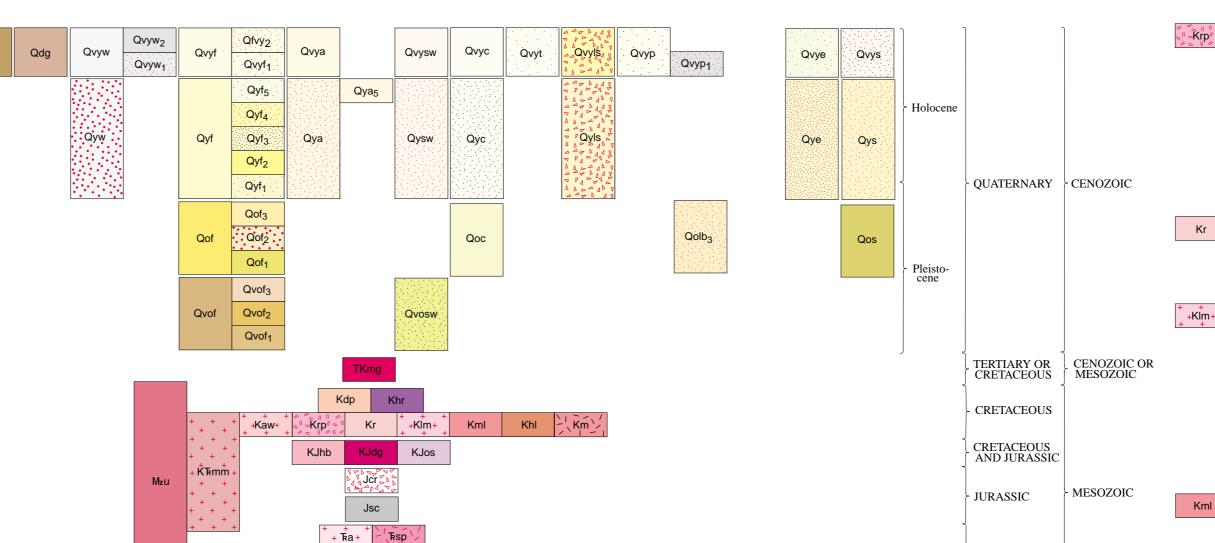
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CORRELATION OF MAP UNITS



Qya Young alluvial-valley deposits (Holocene and late Pleistocene)—Slightly consolidated, undissected to slightly dissected deposits of poorly sorted sand and silt containing scattered subangular pebbles; forms inactive parts of alluvial valleys. Subunits of Qya form nested series of terraces; includes Young alluvial-valley deposits, Unit 5 (late Holocene)—Slightly consolidated **Contact**—Solid where located within ±15 meters; undissected to slightly dissected deposits of poorly sorted sand and silt long dash where located within ±30 containing scattered subangular pebbles. Distinguished by relative degree of meters; short dash where location

dissection and terrace development

Fault—High angle. Solid where located within ±15 meters; dashed where located within ± 30 meters; dotted where concealed; queried where uncertain. Arrows indicate relative strike-slip

error may exceed 30 meters; queried

where uncertain. Hachures indicade

contact separates terraced alluvial

units; hachures point to lower terrace

Thrust fault—Solid where located within ±15 meters; dashed where located within ±30 meters; dotted where concealed; queried where uncertain. Barbs on hanging wall. Hachures indicate scarp; hachures on down-dropped

Topographic scarp—Origin unknown. Solid where located within ± 15 meters ————————————Lineament—Aligned swales and topographic

Strike and dip of bedding

Strike and dip of primary igneous foliation

DESCRIPTION OF MAP UNITS

VERY YOUNG 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. All or parts of these deposits are potentially active. Includes: Artificial fill (late Holocene)-Sand, gravel, and bedrock from pits and quarries; mapped primarily where used for railroad grade adjustment **Disturbed ground (late Holocene)**—Clay, sand, gravel, and bedrock in areas where

exposed material typically reflects composition of substrate; thickness ranges from meters to less than 1 mm Very young wash deposits (late Holocene)—Chiefly sand and gravel in modern washes; pebble to boulder clasts are sparse to abundant. Includes: Very young wash deposits, Unit 2—Chiefly sand and gravel. Distinguished as lower level terrace deposits on surfaces cut into Qvyw sediments; pebble to

excavation has obscured, redistributed, or covered naturally occurring units;

boulder clasts are sparse to abundant Very young wash deposits, Unit 1—Chiefly sand and gravel. Distinguished as upper level terrace deposits on surfaces cut into Qvyw sediments; pebble to boulder clasts are sparse to abundant Very young alluvial-fan deposits (late Holocene)—Undissected, unconsolidated to

loosely compacted deposits of gravel and sand. Distinguished as high-level

loosely compacted deposits of active parts of alluvial fans. Mainly small alluvial cones at mouths of canyons. Includes Very young alluvial-fan deposits, Unit 2—Undissected, unconsolidated to loosely compacted alluvial deposits. Distinguished as low-level terrace deposits on surfaces cut into Qvyf sediments Very young alluvial-fan deposits, Unit 1—Undissected, unconsolidated to

Very young alluvial-valley deposits (late Holocene)—Unconsolidated to locally cemented deposits of sand and fine gravel; lesser silt Very young slope-wash deposits (late Holocene)—Unconsolidated deposits of sand and fine gravel; largely sheet-transported weathering products of granitic rocks Very young colluvial deposits (late Holocene)—Unconsolidated to slightly consolidated sandy and pebbly deposits of hillslopes and base of slopes; much is

Very young talus deposits (late Holocene)—Unconsolidated deposits of angular

terrace deposits on surfaces cut into Qvyf sediments

and sub-angular pebble-, cobble-, and boulder-sized clasts that form scree and rubble on hillslopes and at bases of slopes Very young landslide deposits (late Holocene)—Slope-failure deposits that consist of displaced bedrock blocks and (or) chaotically mixed rubble. May be active

angular, derived from grus. Essentially no soil development

Very young playa deposits (late Holocene)—Pale-brown to pale-gray, clayey silt and silty clay containing variable amounts of sand. Relatively coherent where completely dry. Active playa surface of Rabbit Lake. Includes: **Very young playa deposits, Unit 1**—Pale-brown to pale-gray, clayey silt and silty clay containing variable amounts of sand. Relatively coherent where completely dry. Slightly elevated, up to 0.5 m, and locally shows slight dissection compared to active playa surface of Rabbit Lake. Sediments probably from higher stand of lake

Very young eolian deposits (late Holocene)—Fine-grained sand and silt mainly

YOUNG SURFICIAL DEPOSITS—Sedimentary units that are slightly

along north side of wash exiting Arrastre Canyon. Thin and discontinuous,

forming sand patches in lee of desert vegetation; mapped only where sand patches have coalesced into mappable areas more than about 100 m across. No dune morphology Very young surficial deposits, undifferentiated (late Holocene)—Sand and pebble to small cobble gravel deposits not assigned to any specific surficial materials unit. Unconsolidated to slightly consolidated. Includes wash, alluvial fan, colluvial, and valley-filling deposits

clasts are sparse to abundant. Slightly compacted

consolidated to cemented and slightly to moderately dissected. Alluvial fan deposits (Ovf series) typically have high coarse:fine clast ratios. These young surficial units have upper surfaces that are capped by slightly to moderately developed soil profiles (A/C to A/AC/B_{cambic}/C_{ox} profiles) (Bull, 1991). Includes: Young wash deposits (Holocene and late Pleistocene)—Chiefly sand and gravel flanking modern washes; some slope wash may be included. Pebble to boulder

Young alluvial-fan deposits (Holocene and late Pleistocene)—Slightly

consolidated, essentially undissected deposits of poorly sorted subangular boulders, cobbles, gravel, and sand that form inactive parts of alluvial fans. Most lack any discernable bedding. Includes abundant debris-flow deposits. Subunits of Qyf commonly form nested series of fans, some terraced. Includes: Young alluvial-fan deposits, Unit 5 (late Holocene)—Slightly consolidated, undissected to slightly dissected deposits of poorly sorted pebbles, gravel, and sand; finer grained than other Qyf units, especially away from mountains. Distinguished by grain size, relative degree of dissection, overlap relations of fans, and (or) relative position in terrace sequence

Young alluvial-fan deposits, Unit 4 (late Holocene)—Slightly consolidated, undissected to slightly dissected deposits of poorly sorted boulders, pebbles gravel, and sand; finer grained than other Qyf units except Qyf₅. Distinguished by relative degree of dissection, overlap relations of fans, and (or) relative position in terrace sequence Young alluvial-fan deposits, Unit 3 (late to middle Holocene)—Slightly

consolidated, slightly dissected deposits of poorly sorted boulders, gravel, and sand. Distinguished by relative degree of dissection, overlap relations of fans, and (or) relative position in terrace sequence Young alluvial-fan deposits, Unit 2 (early Holocene)—Slightly consolidated, slightly dissected deposits of poorly sorted boulders, gravel, and sand.

Distinguished by relative degree of dissection, overlap relations of fans, and (or) relative position in terrace sequence Young alluvial-fan deposits, Unit 1 (early Holocene to late Pleistocene)—Moderately consolidated, slightly dissected deposits of poorly sorted boulders, gravel, and sand. Distinguished by degree of dissection, overlap relations of fans, and (or) relative position in terrace sequence

lack penetrative fabric. Primary flow structure is defined in some parts of pluton by subtle streaks of concentrated mafic minerals, and in much of pluton by aligned flat inclusions. Except near contacts with mafic plutons, rocks are homogeneous with respect to composition and texture **Even-grained monzogranite**—Medium- to coarse-grained biotite monzogranite.

pluton. Contains no hornblende

Mixed mafic and leucocratic granitic rocks (Cretaceous)—Fine-grained hornblende-biotite monzogranite and heterogeneous, leucocratic granitic rocks. Forms small, irregularly shaped bodies southeast of Lovelace Canyon. Plagioclase is prominently zoned; average composition is intermediate oligoclase. Potassium feldspar is microcline. Interstitial, strained quartz averages about 20 percent of rock. Overall hornblende:biotite ratio averages 1:10, but hornblende is locally concentrated in fine-grained centimeter-long clots in which color index is about 60 and hornblende: biotite ratio is about 10:1 Clots grade over 1 cm into rock typical of unit in which color index is about 12. Sphene is abundant, anhedral to subhedral, and concentrated near mafic clots. Texture is equigranular to seriate; no penetrative directional fabric. Unit may be fine-grained facies of heterogeneous leucocratic granitic rocks unit (Khl) that has been contaminated by partially resorbed rocks of mixed diorite and gabbro

Qysw Young slope wash deposits (Holocene and late Pleistocene)—Undissected to slightly dissected, mostly medium- to very coarse-grained sand and small, angular rock clasts on slopes and at base of slopes. Poorly sorted; transport largely by sheet wash of weathering products Young colluvial deposits (Holocene and late Pleistocene)—Undissected to slightly Granite Mountains

transported relatively short distance downslope. Includes deposits of silt, sand, and pebble-sized clasts on hillslopes and at bases of slopes Young landslide deposits (Holocene and late Pleistocene)—Relatively stabilized slope-failure deposits that consist of displaced bedrock blocks and (or) chaotically mixed rubble. Slightly dissected. Deposits are probably inactive under current climatic conditions Ove Young eolian deposits (Holocene and late Pleistocene)—Elongate mounds of Slightly dissected: dune forms indistinct Qys Young surficial deposits, undifferentiated (Holocene and late Pleistocene)—Sand

fan, colluvial, and valley-filling deposits 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 soils (A/AB/B/C_{OX} profiles and Bt horizons (Bull, 1991) as much as 1 to 2 m thick and reddish-yellow hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature Bt horizons as red as 5YR 5/6) (Munsell, 1975). Includes: Qof Old alluvial fan deposits (late to middle Pleistocene)—Reddish-brown alluvial fan

- TRIASSIC

have originated by debris-flow processes. Mostly clast-supported; evidence of stratification in this unit and all subunits is rare. Includes: Old alluvial fan deposits, Unit 3 (late to middle Pleistocene)—Reddish-brown alluvial fan deposits of primarily sand- to boulder-sized clasts that are moderately consolidated and variably dissected. Distinguished primarily by relative overlap relations at fan margins. Relatively smooth, but elevated surfaces; commonly faulted against Qvof₂ or ponded against fault-line scarps

dissected, slightly consolidated, relatively stabilized deposits of grus that has

and pebble to small-cobble gravel deposits not assigned to any specific surficial

materials unit. Slightly consolidated to unconsolidated. Includes wash, alluvial

deposits of primarily sand- to boulder-sized, subangular clasts, that are

moderately consolidated and slightly to moderately dissected. Most appear to

Old alluvial fan deposits, Unit 2 (late to middle Pleistocene)—Reddish-brown alluvial fan deposits of primarily sand- to boulder-sized clasts that are moderately consolidated and slightly to moderately dissected; surface littered with abundant, very large, angular boulders. Unit commonly flanks and laps onto Qvof₂. Distinguished by relative degree of dissection and overlap relations at fan margins Old alluvial fan deposits, Unit 1 (middle Pleistocene)—Reddish-brown alluvial

fan deposits of sand- to boulder-sized clasts that are moderately to well

consolidated and moderately to well dissected. Distinguished by relative degree

developed in Qvof₂

wave-lap processes

Qoc Old colluvial deposits (late to middle Pleistocene)—Reddish-brown, moderately dissected, moderately to well consolidated, well stabilized deposits of grus and granitic debris that has transported relatively short distances downslope, predominently by nonchannelized sheet wash processes. Includes deposits of sand- and angular pebble-sized clasts on hillslopes and at bases of slopes Qolb3 Old lacustrine deposits (bar), Unit 3 (late to middle Pleistocene)—Sand and gravely mixture; slightly to moderately consolidated. Deposited by eolian and

of dissection and overlap relations at fan margins

Qos Old surficial deposits, undifferentiated (late to middle Pleistocene)—Reddishbrown deposits of sand and pebble to small cobble gravel not assigned to any specific surficial materials unit. Slightly to well consolidated. Includes wash, alluvial fan, colluvial, and valley-filling deposits 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 soils (A/AB/B/C_{ox} profiles having Bt horizons as much as 2 to 3 m thick and maximum reddish-yellow hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6) Very old alluvial fan deposits (middle to early Pleistocene)—Reddish-brown, strongly pigmented alluvial-fan deposits of primarily sand- to boulder-sized

clasts that are moderately to well-consolidated and well-dissected. Includes: Very old alluvial fan deposits, Unit 3 (middle to early Pleistocene)—Reddishbrown, strongly pigmented alluvial fan deposits of primarily large-boulder- to sand-sized clasts that are moderately well-consolidated. Surfaces are welldissected, hummocky, and littered with abundant, very large, angular boulders Very old alluvial fan deposits, Unit 2 (early Pleistocene)—Reddish-brown, very strongly pigmented alluvial fan deposits of primarily large-boulder- to cobblesized clasts that are well-consolidated and well-dissected. Surfaces are very well-dissected, hummocky and littered with abundant, very large, angular

boulders. Appear to be mainly debris-flow deposits Very old alluvial fan deposits, Unit 1 (early Pleistocene)—Reddish-brown, very strongly pigmented alluvial fan deposits of primarily sand- to boulder-sized clasts that are well-consolidated and well-dissected. Pigmentation decreases below upper 1 to 4 m, depending on amount of erosion of original fan surface. Contains larger proportion of fine-grained material than other Qvof units. In places, matrix-supported boulders restricted to meter-thick lenses. Locally is indistinctly bedded, but most of unit shows no bedding features. Unit Qdg of

Very old slope wash deposits (middle to early Pleistocene)—Reddish-brown, well

dissected, mostly medium- to very coarse-grained sand and small, angular rock

monzodiorite, diorite, and monzonite that resembles nearby Cretaceous,

granoblastic, but near-granitic textures, and non-granitic compositions. Unit

contains irregular, pods of older monzonite that have poorly defined,

clasts. Restricted to single occurance near northeastern edge of quadrangle Mafic granodiorite (Tertiary or Cretaceous)—Medium- to fine-grained hornblende-biotite granodiorite; highly seriate. Color index about 20. Restricted to three dikes, one north of Deadman Point, one 3 km northeast of Fifteenmile Point, and one on east side of Lovelace Canyon; latter is highly porphyritic, containing abundant 2-cm-long potassium feldspar phenocrysts Granitic rocks, undivided (Mesozoic)—Monzogranite to diorite, including small areas of monzonite. Fine- to coarse-grained; massive to foliate and lineate. Color indicies range from 10 to 50; rocks contain biotite or hornblende and biotite. Found only in small, partially fault-bounded area in southeastern corner of quadrangle; more extensive east of quadrangle. Includes heterogeneous, nondistinctive granitic rocks that cannot be assigned to larger granitic units in quadrangle. Typically, unit is heterogeneous mix of monzogranite,

Jurassic, and Triassic rocks Kdp Monzogranite of Deadman Point (Cretaceous)—Biotite monzogranite, very quartz-rich (>30 percent). Medium- to coarse-grained. Plagioclase is calcic oligoclase; potassium feldspar is microcline. Microcline is more abundant than plagioclase. Biotite is only mafic mineral; typically occurs as 1 mm grains, much smaller than felsic minerals. Color index averages about 5. Monzogranite is relatively homogeneous, leucocratic, non-foliate, and nonporphyritic. Forms highly irregular body and numerous dikes in northwestern part of quadrangle. Contains numerous small pods of heterogeneous mediumto fine-grained alaskitic rock that grade into typical Deadman Point biotite monzogranite. Cretaceous age assignment based on compositional and textural similarities to nearby Cretaceous granitic rocks (Miller and Morton, 1980) Hybrid rocks (Cretaceous)—Biotite monzogranite containing high proportion of evenly and unevenly mixed, partially resorbed quartzite and schist; rocks have

gradational borders KRmm Mixed monzogranite and leucocratic monzonite (Cretaceous to **Triassic**)—Leucocratic hornblende monzonite cut by dikes and small bodies of biotite monzogranite and hornblende-biotite monzogranite that ranges to granodiorite and possibly quartz monzodiorite. Forms irregular shaped bodies

in western Granite Mountains Alaskitic rocks of western Granite Mountains (Cretaceous)—Highly leucocratic monzogranite; color index ranges from 0 to 1. Biotite is only mafic mineral; occurs as sub-millimeter grains that are partially altered. Contains 25 to 30 percent quartz. Plagioclase is intermediate albite; potassium feldspar is microcline and is more abundant than plagioclase. Contains secondary muscovite and up to 0.3 percent opaque minerals. Medium-grained, equigranular, massive. Minor intergranular grain-size reduction. Composition, grain-size, and texture homogeneous throughout unit. Paucity of biotite and relatively large amount of opaque minerals may indicate unit has undergone selective alteration. Distinguished from alaskite of Sunset Cove (Fa) by texture, greater quartz content, presence of sparse biotite, and absence of fluorite and garnet. Cretaceous age assignment based on compositional and

> Rattlesnake pluton of MacColl (1964) (Cretaceous)—Porphyritic and nonporphyritic biotite monzogranite, each facies mapped separately. Forms large body and several irregularly shaped satellitic bodies in southern part of quadrangle. Cretaceous age assignment based on compositional and textural similarities to nearby Cretaceous granitic rocks. Yields conventional K-Ar age of 72.4 Ma; not considered emplacement age due to protracted cooling history effecting entire region (Miller and Morton, 1980). Consists of:

textural similarities to nearby Cretaceous granitic rocks (Miller and Morton,

Porphyritic monzogranite—Porphyritic biotite monzogranite. Coarse-grained, mostly massive. Contains scattered, pale pink to white, 2 to 3 cm-long phenocrysts of mixed microcline and perthitic orthoclase. Plagioclase is white, intermediate to calcic oligoclase, and is roughly twice as abundant as potassium feldspar. Quartz averages about 25 percent of rock. Biotite is only mafic mineral, except for local, small grains of hornblende, chiefly near borders of pluton. Color index averages about 10, increasing to as much as 18 near contacts where pluton intrudes mafic country rocks; hornblende and sphene content increase with color index. Groundmass texture is granular and rocks

Similar in most respects to porphyritic monzogranite (Krp) of Rattlesnake pluton of McColl (1964), except that it contains few or no phenocrysts and grain-size and composition are more variable. Specifically, much of unit is finer grained and biotite content noticably more variable than in porphyritic parts of Monzogranite of Luna Mountain (Cretaceous)—Biotite monzogranite. Mediumto coarse-grained. Found only in southwestern corner of quadrangle; informally named for Luna Mountain, 2 km south of quadrangle. Characterized by high concentration of intermediate to felsic composition dikes. Composition and

Cretaceous plutons (Miller and Morton, 1980)

Khl Heterogeneous leucocratic granitic rocks (Cretaceous)—Fine-, medium-, and coarse-grained leucocratic monzogranite, possibly ranging to quartz monzonite; fine-grained rocks vastly predominate. Irregularly mixed on scales from hand-

mixture of large and small igneous and metamorphic inclusions in leucocratic medium-grained monzogranite. Forms several noncontiguous bodies west of Lovelace Canyon. In much of unit, volume of inclusions exceeds volume of monzogranite containing them. Plagioclase in leucocratic monzogranite is intermediate oligoclase and potassium feldspar is microcline. Quartz averages about 25 percent. Color index variable, but does not exceed 5. Monzogranite is equigranular, has both medium- and fine-grained variants. Inclusions are derived from (1) Triassic monzonite of Fawnskin, (2) unnamed monzodiorite of probable Jurassic age, (3) fine-grained metamorphosed, leucocratic granitic rocks of unknown age, and (4) Paleozoic and (or) Late Proterozoic carbonatebearing sedimentary rocks and fine-grained clastic rocks. Some inclusions are rounded, some are angular, especially larger ones. Unit cut by small and large

heterogeneous leucocratic granitic rocks unit (Khl) KJhb Hornblende-biotite granodiorite (Cretaceous and Jurassic)—Heterogeneous hornblende-biotite granodiorite. Also includes biotite granodiorite and biotite monzogranite. Fine- to coarse-grained; seriate to hypidiomorphic-granular. Grain size, texture, and composition variable throughout unit. Unit may contain rocks from more than one intrusive event. Forms irregular shaped masses in western Granite Mountains Mixed diorite and gabbro (Cretaceous and Jurassic)—Biotite-hornblende diorite and quartz diorite, and hornblende-biotite diorite to quartz monzodiorite. Most is medium- to coarse-grained; locally ranges to fine-grained. Forms several.

small, irregularly shaped bodies around and within Rattlesnake pluton of McColl (1964); appears to have spatial association with intermediate composition Cretaceous and Jurassic plutons. Rocks of this unit have wide compositional and textural range, but are generally distinguished from other units by very high color index and lack of penetrative fabric. All rocks consist of plagioclase (intermediate andesine) and hornblende ±quartz; most contain biotite; some contain clinopyroxene and orthopyroxene. Rarely rocks contain enough potassium feldspar to be monzodiorite, but most contain almost none. Accessory minerals include sphene, apatite, epidote, allanite, and opaque mineral(s). Typically, rocks are even grained hypidiomorphic-granular, but

Mixed granitic rocks of Oak Spring (Cretaceous and Jurassic)—Predominently biotite quartz monzodiorite, but includes abundant dikes, pods, and irregular masses of monzogranite of Luna Mountain (Klm). Quartz monzodiorite is

Cataclastic rocks (Jurassic)—Fine-grained to nearly aphanitic cataclastic rocks; similar to chlorite breccias of detachment faults. Medium to dark greenishgray. Derived primarily from extreme deformation of granitic units. In central part of unit rocks are very comminuted, nearly aphanitic; grades non-uniformly

outward into progressively less deformed rock containing progressively larger

fine-grained porphyroblastic rock made up predominently of quartz,

plagioclase, and potassium feldspar. Porphyroblasts are 1- to 2-mm-long

euhedral and anhedral plagioclase. Granoblastic, but typically contains bands of very fine-grained quartz up to 2 mm thick, commonly separated by quartz-

feldspar bands. Contains as much as 5 percent biotite, and trace muscovite.

Inferred to be metamorphosed mylonitic or cataclastic rocks of possible

monzogranite composition, but could be very fine grained, slightly

metamorphosed, leucocratic granitic rocks, or leucocratic metavolcanic rocks.

Rock has no fabric other than subtle, irregularly developed quartz-feldspar

banding. Distinct and not derived from cataclastic rocks unit (Jcr); differs in

that recrystallization has erased all primary fabric and texture. Protolith and age

of metamorphism very uncertain. In Fawnskin quadrangle, Miller and others

(1999) considered unit to be older than quartz monzodiorite of Dry Canyon;

unit now thought to be younger, based on ubiquitous presence of 0.2- to 1-m-

long, wispy, inclusion-like masses of monzodiorite of Dry Canyon in Silver

and fluorite-bearing alaskite. Contains no mafic minerals other than very sparse

opaque minerals. Plagioclase is albite and potassium feldspar is perthitic

orthoclase and minor microcline. Some potassium feldspar appears to have

partially replaced plagioclase. Quartz content about 25 percent. Garnet is pale

gold and forms small, typically very fine-grained, spongy masses. Very sparse

fluorite forms 1 mm and sub-millimeter grains; some is purple and visible in

hand specimen. Texture is characterized by variable bimodal grain-size. One to

3 mm-long grains of quartz, plagioclase, and orthoclase are irregularly

distributed in groundmass composed mostly of 0.1- to 0.01-mm-long grains of

same minerals. Plagioclase replaced by potassium feldspar, presence of

fluorite, and absence of mafic minerals indicate unit may have undergone severe

late-stage-emplacement alteration. Triassic age assignment based on

compositional and alteration features that, in this region, are found only in

monzonite, latter probably resulting from introduction of quartz after (or late-

stage) emplacement. Rock contains abundant, finely granular, yellow-orange

garnet and pale green epidote that clearly replaces hornblende and pyroxene.

Very sparse purple fluorite scattered irregularly through unit. Small unaltered

shreds of hornblende are rare. No other mafic minerals in rock. Texture ranges

from even-grained to seriate; much of rock is subporphyritic similar to

Monzonite of Fifteenmile Point (\(\bar{kfp} \)). Garnet appears to be alteration or late-

stage reaction product derived from pyroxene and probably hornblende. Rock

Monzonite of Hill 4001 (Triassic)—Hornblende monzonite. Forms elongate, dike-

form body in Granite Mountains northwest of Rabbit Lake (dry). Medium-

grained. Texture is seriate, locally even-grained. Most of unit has distinct, but

poorly developed primary flow foliation. Unlike other monzonite units in

region, hornblende forms large equant grains imparting spotted appearance to

rock. Size of hornblende decreases eastward in unit. Contains very abundant

sphene and large, sparsely scattered allanite. Average color index is 8. Barth

monzonite. Medium- to coarse-grained. Very similar to both Monzonite of

Fifteenmile Valley and Monzonite of Strawberry Peak, but texture is more

uniformally even-grained. Some of unit altered similar to Monzonite of

Strawberry Peak, but alteration not as thourough. Probably textural variation of

coarse-grained. Texture ranges from even-grained to seriate; much of rock is

subporphyritic. One or both feldspars commonly are lath-shaped, and in

combination with hornblende, define poorly to moderately well developed

primary foliation. Potassium feldspar is orthoclase and plagioclase is

intermediate oligoclase. Quartz sparse, but ubiquitous, varying from 1 to 4

percent. Average color index 12; relatively constant, but locally as high as 22

and as low as 5. Most of unit contains clinopyroxene, both as cores in

monzonite and monzodiorite. Medium- to coarse-grained, locally porphyritic.

Distinguished by very low quartz content and abundance of hornblende and

sphene. Quartz generally less than 5 percent; where monzonite intrudes

quartzite units, is as high as 12 percent, but most quartz is exotic. Hornblende

commonly has altered pyroxene cores. Plagioclase is intermediate to calcic

oligoclase; potassium feldspar is microcline. Ratio of microcline to plagioclase

is highly variable, but generally greater than 3:2. Color index averages 18;

hornblende, pyroxene, and less commonly biotite are mafic minerals. Texture is

hypidiomorphic-granular to seriate, locally porphyritic. Flow-aligned feldspar

and hornblende impart foliate or lineate appearance to rock in places, but fabric

is highly variable in orientation even at outcrop scale. Zircon U-Pb age is 231

Fawnskin, except color index is between 10 and 15, and microcline is generally

much more abundant than plagioclase; unit ranges to syenite in places.

Underlies small area in southeastern part of quadrangle, and a larger area in

northwestern part of Fawnskin quadrangle to southeast (Miller and others,1999)

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Leucocratic monzonite of Fawnskin (Triassic)—Identical to monzonite of

Metasedimentary rocks, undivided (Age unknown)—Chiefly small bodies of

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hornblende, and as stand-alone grains. Sphene and epidote are very abundant

Monzonite of Fawnskin (Triassic)—Hornblende monzonite, ranging to quartz

Monzonite of Rabbit Lake (Triassic)—Hornblende monzonite and quartz

Monzonite of Fifteenmile Point (Triassic)—Hornblende monzonite. Medium- to

may have undergone recrystallization subsequent to alteration

and others (1997) report U-Pb age of 235 Ma.

Monzonite of Fifteenmile Valley pluton

Ma (J.L. Wooden, written commun., 1996)

calcsilicate rock surrounded by granitic rocks

continental margin: Tectonics, v. 16, p. 290-304.

University Press, 326 p.

Quartz monzonite of Strawberry Peak (Triassic)-Monzonite and quartz

Triassic granitic rocks

Alaskite of Sunset Cove (Triassic)-Medium- to fine-grained, leucocratic, garnet-

grains and grain aggregates. Directional fabric is conspicuously absent

Fine-grained rocks of Silver Canyon (Jurassic)—Pale-gray to medium-gray, very

texture highly variable in part of unit and relatively uniform in rest. Heterogeniety due to inconsistent concentration of dikes and contamination by incomplete mixing of digested host rocks. Potassium feldspar is microcline; plagioclase is sodic andesine. Color index ranges from 8 to 15, biotite is only mafic mineral. Sphene is ubiquitous, sparse, and commonly anhedral. Most rock is even-grained, but seriate texture is also common. Contains very abundant pods and screens of metamorphic and granitic rocks. Considered Cretaceous on basis of textural and compositional similarity to nearby

sample to hillside. Nearly all rocks are monzogranite composition; possible quartz monzonite may represent inclusions derived from Jurassic rocks. Plagioclase is intermediate oligoclase and potassium feldspar is microcline. Quartz averages about 20 percent of rock Fine-grained rocks typically have color index less than 3; coarse-grained rocks, some of which contain sphene, have color index between 3 and 8. Biotite is only mafic mineral in unit. Texture is typically equigranular, but locally has subtle lineation and foliation. Forms irregularly shaped bodies west of Lovelace Canyon and in western Mixed granitic and metamorphic rocks (Cretaceous)—Extremely heterogeneous

irregular shaped dikes of equigranular monzogranite, and appears to grade into

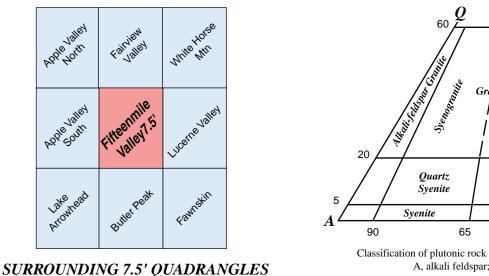
textures include porphyritic, glomeroporphyritic, and pegmatitic. Probably includes rocks of more than one period of intrusion

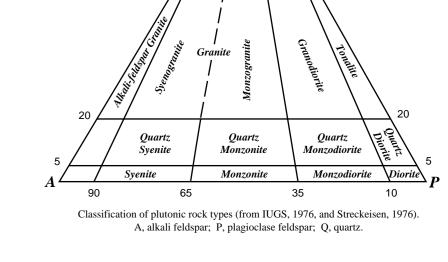
medium grained and equigranular. Plagioclase is intermediate to calcic oligoclase; potassium feldspar is microcline; contains about 15 percent quartz. Color index averages 18; biotite is only mafic mineral. Contains abundant sphene and opaque mineral(s), and trace epidote and allanite. Contacts are gradational over several tens of meters. Age based on compositional and textural similarities to nearby rocks of Cretaceous and Jurassic age (Miller and Morton, 1980)

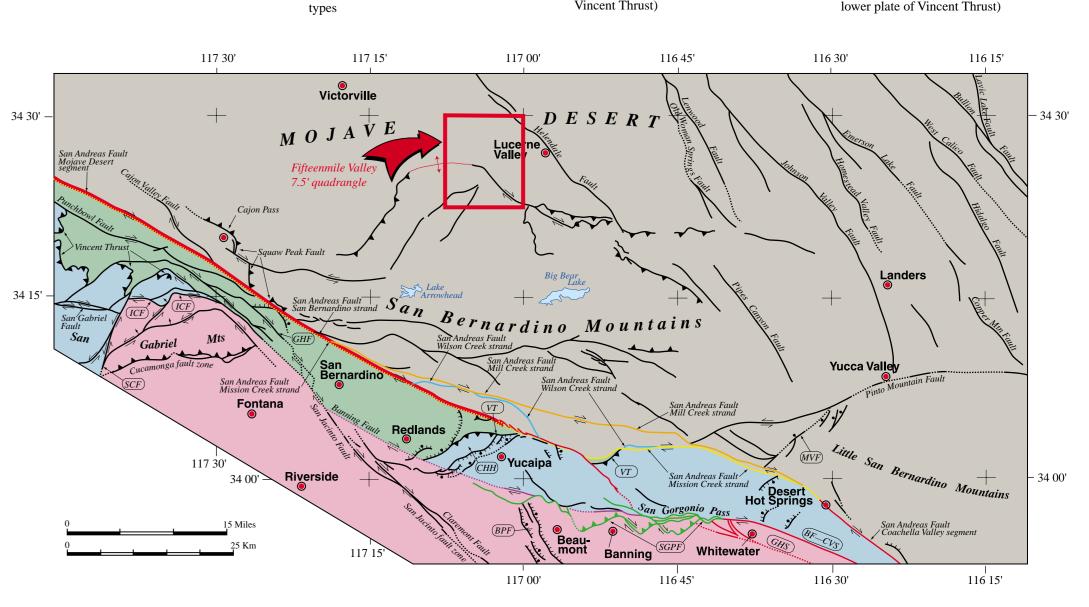
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Basement rocks of Peninsular Basement rocks of San Bernardino Basement rocks of San Gabriel

Mountains- and Mojave Desert-

Map showing regional geologic framework and location of Fifteenmile Valley 7.5' quadrangle. Faults modified from Matti and others (1992), 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; SGPF, San Gorgonio Pass Fault; VT, Vincent Thrust