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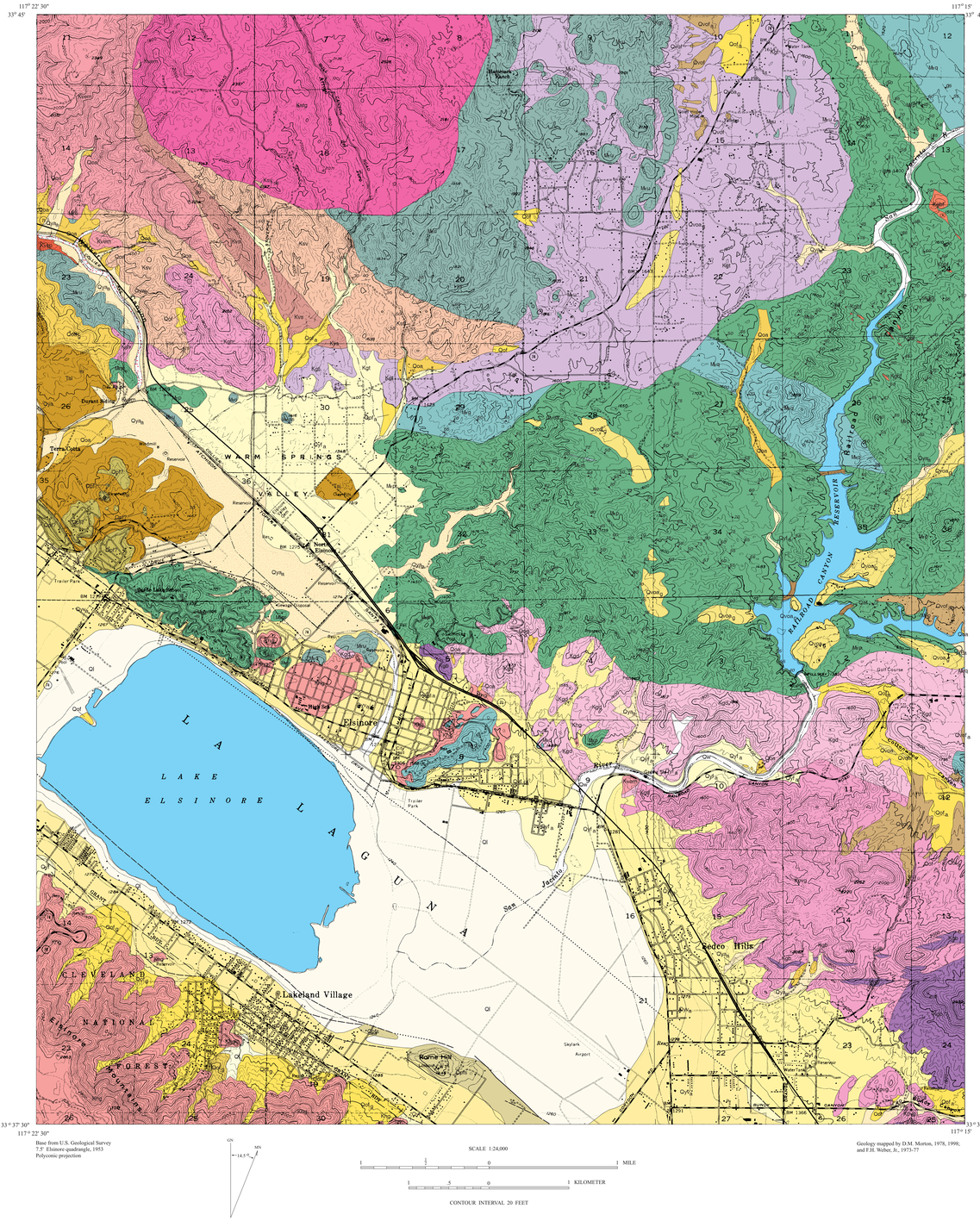
CALIFORNIA GEOLOGICAL SURVEY

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

OPEN-FILE REPORT 03-281



Base from U.S. Geological Survey
7.5' Elsinore quadrangle, 1953
Polyconic projection

GN MN 14.5°

SCALE 1:24,000

1 0 1 MILE

1 5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET

Geology mapped by D.M. Morton, 1978, 1998;
and F.H. Weber, Jr., 1973-77

PRELIMINARY GEOLOGIC MAP OF THE ELSINORE 7.5' QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA

Version 1.0

By

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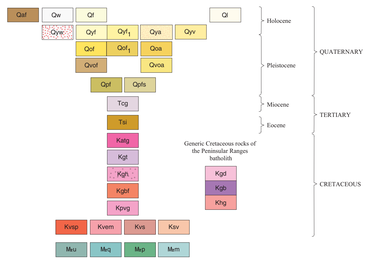
CORRELATION OF MAP UNITS



On some SCAMP geologic map plots, including the Elsinore 7.5' quadrangle, characteristic grain size information is displayed using subscripted alpha characters (e.g. Qyf_g, Qoa_b), where the characters conform to the following definitions:

a - arenaceous (very coarse sand through very fine sand)
b - boulder gravel (>25mm)
g - gravel (cobble through granule gravel)
s - silty
c - clayey

In the **Description of Map Units**, the Ma following U/Pb ages has an attached subscript; Ma_d for isotope dilution analyses, and Ma_p for ion probe analyses.

Contact—Generally located within ±15 meters

Fault—High angle. Strike-slip component on all faults is right-lateral; dip-slip component is unknown, but probably reflects valley-highland relations. Solid where located within ±15 meters; dashed where located within ±30 meters; dotted where concealed. Arrow and number indicate measured dip of fault plane that was exposed in trench.

Strike and dip of beds

70 **Inclined**

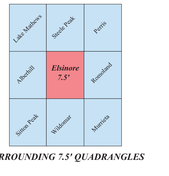
Strike and dip of igneous foliation

70 **Inclined**

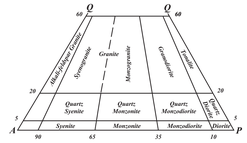
Strike and dip of metamorphic foliation

70 **Inclined**

Vertical



SURROUNDING 7.5' QUADRANGLES



Classification of plutonic rock types (from IUGA, 1973, and Streckeisen, 1973). A, alkali feldspar; P, plagioclase feldspar; Q, quartz.

LOCATION MAP

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or with the North American Stratigraphic Code. Any use of trade, firm, or product names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

This map was printed on an electronic plotter directly from digital files. Dimensional calibration may vary between electronic plotters and between X and Y directions on the same plotter, and paper may change size due to atmospheric conditions; therefore, scale and proportions may not be true on plots of this map.

Digital files available on World Wide Web at http://geopubs.wr.usgs.gov/openfile/of03-281

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-existent

Qaf **Artificial fill (late Holocene)**—Deposits of fill resulting from human construction, mining, or quarrying activities; includes compacted engineered and non-compacted non-engineered fill. Most large deposits are mapped, but in some areas, small deposits are not shown

Qw **Very young wash deposits (late Holocene)**—Unconsolidated bouldery to sandy alluvium of active and recently active washes

Qf **Very young alluvial-fan deposits (late Holocene)**—Active and recently active alluvial fans. Consists of unconsolidated, bouldery, cobbley, gravelly, sandy, or silty alluvial fan deposits, and headward channel parts of alluvial fans. Trunk drainages and proximal parts of fans contain greater percentage of coarse-grained sediment than distal parts

Qls **Very young lacustrine deposits (late Holocene)**—Dominantly gray, clayey, silty, and fine-grained sandy lacustrine deposits

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. Younger surficial units have upper surfaces that are capped by slight to moderately developed pedogenic-soil profiles (A/C to A/C/$B_{w(mbk)}$/C_{ox} profiles)

Qyv **Young alluvial-wash deposits (Holocene and late Pleistocene)**—Unconsolidated bouldery to sandy alluvium marginal to active and recently active washes

Qyf **Young alluvial-fan deposits (Holocene and late Pleistocene)**—Unconsolidated deposits of alluvial fans and headward drainages of fans. Consists predominately of gravel, sand, and silt. Trunk drainages and proximal parts of fans contain higher percentage of coarse-grained sediment than distal parts. Includes:

Qyf_1 **Young alluvial-fan deposits, Unit 1 (early Holocene and late Pleistocene)**—Unconsolidated alluvial fan deposits. Consists of gravel, sand, and silt; old part of *Qyf*. In part distinguished on basis of relative terrace levels

Qya **Young alluvial-channel deposits (Holocene and late Pleistocene)**—Fluvial deposits along canyon floors. Consists of unconsolidated sand, silt, and clay-bearing alluvium

Qyv **Young alluvial-valley deposits (Holocene and late Pleistocene)**—Fluvial deposits along valley floors. Consists of unconsolidated sand, silt, and clay-bearing alluvium

OLD SURFICIAL DEPOSITS—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Older 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 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)

Qof **Old alluvial-fan deposits (late to middle Pleistocene)**—Reddish-brown, gravel and sand, alluvial-fan deposits; indurated, commonly slightly dissected. In places includes thin alluvial-fan deposits of Holocene age. Includes:

Qof_1 **Old alluvial-fan deposits, Unit 1 (middle Pleistocene)**—Indurated, gravely alluvial-fan deposits. Most are slightly to moderately dissected; reddish-brown. Some deposits include thin, discontinuous surface layer of Holocene alluvial-fan material

Qoa **Old alluvial-channel deposits (late to middle Pleistocene)**—Fluvial sediments deposited on canyon floors, but much of unit now elevated. Consists of moderately indurated, commonly slightly dissected gravel, sand, silt, and clay-bearing alluvium. Locally capped by thin, discontinuous alluvial deposits of Holocene age

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 (middle to early Pleistocene)**—Mostly well-dissected, well-indurated, reddish-brown alluvial-fan deposits. Grain size chiefly sand and gravel

Qvoa **Very old alluvial-channel deposits (middle to early Pleistocene)**—Fluvial sediments deposited on canyon floors. Consists of moderately to well-indurated, reddish-brown, mostly very dissected gravel, sand, silt, and clay-bearing alluvium. In places, includes thin, discontinuous alluvial deposits of Holocene age. Deposits in Quail Valley and Railroad Canyon area contain rounded cobbles

Qpf **Pauba Formation (Pleistocene)**—Siltstone, sandstone, and conglomerate. Named by Mann (1955) for exposures in Rancho Pauba area about 3.2 km southeast of Temecula. Vertebrate fauna from Pauba Formation are of late Irvingtonian and early Rancholabrean ages (Reynolds and Reynolds, 1990a; 1990b). In type area, subdivided into two informal members; only the sandstone member is exposed in the quadrangle

Qpfs **Sandstone member**—Brown, moderately well-indurated, cross-bedded sandstone containing sparse cobble- to boulder-conglomerate beds. Restricted to Rome Hill area southeast of Lake Elsinore

Tcg **Conglomerate (Paleogene?)**—Monolithic cobble conglomerate. Underlies a very small area (about 100m wide) on ridge crest 1.8 km west of Railroad Canyon Reservoir dam. Conglomerate fills depression in metamorphic rock. Conglomerate is composed of exotic welded tuff clasts, some of which contain piemontite, characteristic mineral in welded tuff clasts in conglomerates of Poway Group (Woodford and others, 1968) (Kennedy, 1977). Welded tuff clasts appear identical to those common in early Miocene to late Eocene Sespe Formation and in conglomerate of Eocene Poway Group. Reworked tuff clasts occur in older alluvial deposits bordering Railroad Canyon Reservoir (*Qvoag*) and in northern part of the quadrangle (*Qvoag*) in Goodhope area. Distribution of reworked clasts within Elsinore quadrangle and quadrangles to north suggests occurrence here is small remnant of a very extensive conglomerate unit

Tsi **Silverado Formation (Paleocene)**—Nonmarine and marine sandstone, siltstone, and conglomerate. Dickerson (1914) first recognized Paleocene rocks in Santa Ana Mountains to west, and based on faunal similarities, correlated strata with Martinez Formation of central California. Woodring and Popenoe (1945) described unit in detail and named it Silverado Formation. Formation was deposited on deeply weathered erosional surface. Rocks underlying Silverado are characteristically saprolitic. Silverado Formation consists of basal conglomerate overlain by relatively thin sequence of sandstone and siltstone. Distinctive Claymont clay bed overlies sandstone and siltstone sequence, and is overlain by thick sequence of sandstone, siltstone, and conglomerate that includes second clay bed, the Serrano clay bed. Basal conglomerate is thoroughly weathered, 2- to 25-m-thick, massive, pale gray to reddish-brown, pebble conglomerate. Very locally is boulder conglomerate. Overlying this conglomerate is sandstone and siltstone which is also thoroughly weathered, consisting largely of quartz and clay. Claymont clay bed is 1- to 3-m thick, brown, green, and gray clay that weathers to distinctive brownish-red. Bed is mostly clay, partly pisolitic, and has scattered quartz grains in it. Locally, supports large-scale clay operation. Upper part of unit above Claymont clay bed is diverse section of marine and nonmarine sandstone, siltstone, and conglomerate, and includes Serrano clay bed. Latter is about 1 m thick, pale gray to white, and composed of nearly equal amounts plastic clay and quartz. In addition to clay, upper part of section contains carbonaceous shale and lignite beds. Thicker lignite beds were locally mined for fuel. Upper part of unit also contains abundant marine mollusks. Some eastern exposures of formation contain distinctive and diagnostic Paleocene Turritella pachecoensis

Rocks of the Peninsular Ranges batholith

Katg **Granodiorite of Arroyo del Toro pluton (Cretaceous)**—Light gray, medium-grained, massive, very homogeneous, and inclusion-free biotite-hornblende granodiorite. Some of the rock in the western part of the pluton is slightly porphyritic. Informally named for Arroyo del Toro, located in center part of pluton (Morton, 1999). Termed Steele Valley granodiorite by Dudley(1935) and included by Larsen(1948) within Woodson Mountain granodiorite. Near circular Arroyo del Toro is located in center of Gavilan ring complex, but apparently is not part of complex. Zircon ages of the pluton are 108.6 Ma_d and 111 Ma_p. 40Ar/39Ar biotite age is 104.3 Ma and potassium feldspar 98.5 Ma

Gavilan ring complex (Cretaceous)—Composite ring structure consisting of a variety of granitic rocks that range from monzogranite to tonalite. Informally named for exposures in Gavilan Plateau area. In this quadrangle, western part of complex was termed Estelle quartz diorite and eastern part was included in Perris quartz diorite by Dudley (1935). Western part of complex was termed Estelle tonalite and eastern part was included within Bonsall tonalite by Larsen (1948). Hypersthene is characteristic mineral of many rocks in complex. Based on texture, depth of erosion is greater in eastern part of complex than in western part. Rocks on west side of complex commonly have hypabyssal texture and appear to grade into volcanic textured rock. Several gold mines (e.g., Good Hope, Gavilan, and Santa Rosa mines), which constituted Pinacate mining district (Sampson, 1935), are located within complex in this quadrangle and the Steele Peak quadrangle. Gold apparently occurred in arsenopyrite bearing quartz veins. Located in center of ring complex, but not part of it, is near-circular Arroyo del Toro pluton. Includes:

Kgt **Massive textured tonalite**—Brown-weathering, massive, relatively heterogeneous, hypersthene-bearing biotite-hornblende tonalite. Most abundant rock type in complex. Equant-shaped mesocratic to melanocratic inclusions are common. Zircon age is 112.9 Ma_d and 113.6 Ma_p.

Kgh **Hypabyssal tonalite**—Massive, hypabyssal-textured tonalite and lesser granodiorite in southwestern part of complex. Contains small, equant shaped mesocratic inclusions

Kgbf **Fine grained hornblende gabbro, Railroad Canyon area (Cretaceous)**—Fine-grained hornblende gabbro constituting dikes, sills, and small elongate plutons. Emplaced in phyllite in Railroad Canyon area

Paloma Valley Ring Complex (Cretaceous)—Composite ring dike intrusion. Named and described by Morton and Baird (1976) for exposures in Paloma Valley area. Included within Woodson Mountain granodiorite and San Marcos gabbro by Larsen (1948). Ring complex consists of older, elliptical in plan, single ring-dike and two subsidiary short-arced dikes. A younger ring-set of thin dikes is largely within older ring dike. Older dike consists of granodiorite and monzogranite with vertical walls emplaced into gabbro by ring fracturing and magmatic stoping of gabbro. Younger ring-dike consists of hundreds of granitic pegmatite dikes. Most pegmatite dikes are 30 cm to over 1 m in thickness, and define a domal ring-dike geometry in which outer dikes are moderately to steeply outward dipping and pass inward to near horizontal dikes in center. Spatially associated with younger dikes in center of complex, are bodies of granophyre that contain stringers of granitic pegmatite. Younger dikes are interpreted as products of volatile-rich magma that filled a domal set of fractures resulting from cauldron subsidence. Granophyre is interpreted as a product of pressure quenching of pegmatite magma and attendant loss of volatiles. Zircon ages of rock from atypical hornblende-bearing granodiorite from western part of older dike near the mouth of the San Jacinto River is 121 Ma_d and 118.5 Ma_p. 40Ar/39Ar age of hornblende 117.7 Ma and biotite 118.8 Ma. Includes:

Kpvg **Monzogranite to granodiorite**—Pale gray, massive, medium-grained hypidiomorphic-granular biotite monzogranite, and less abundant hornblende-biotite granodiorite forming older ring dike. Plagioclase is An_{30} to An_{35}, subhedral, tabular crystals. Contains inclusions of small to large stoped blocks of gabbro

Generic Cretaceous granitic rocks of the Peninsular Ranges batholith

Kgd **Granodiorite, undifferentiated (Cretaceous)**—Biotite and hornblende-biotite granodiorite, undifferentiated. Most is massive and medium grained

Kgb **Gabbro (Cretaceous)**—Mainly hornblende gabbro. Includes Virginia quartz-norite and gabbro of Dudley (1935), and San Marcos gabbro of Larsen (1948). Typically brown-weathering, medium-to very coarse-grained hornblende gabbro; very large poikilitic hornblende crystals are common, and very locally gabbro is pegmatitic. Much is quite heterogeneous in composition and texture. Includes noritic and dioritic composition rocks

Khg **Heterogeneous granitic rocks (Cretaceous)**—Includes wide variety of heterogeneous granitic rocks. Some heterogeneous assemblages include large proportions of schist and gneiss. Tonalite composition rock is most abundant rock type.

Kvsp **Santiago Peak Volcanics (Cretaceous)**—Basaltic andesite, andesite, dacite, rhyolite, volcaniclastic breccia, welded tuff, and epiclastic rocks (Herzig, 1991). Originally named Black Mountain volcanics by Hanna (1926), but name was pre-empted. Larsen (1948) renamed unit Santiago Peak Volcanics for exposures in vicinity of Santiago Peak, northern Santa Ana Mountains. Rocks are very heterogeneous, discontinuous, and poorly exposed. Most of unit is hydrothermally altered; alteration was contemporaneous with volcanism. Zircon ages of Santiago Peak Volcanics range from 123 to 134 Ma (Anderson, 1991), making it coeval with older part of Peninsular Ranges batholith

Kvem **Estelle Mountain volcanics of Herzig (1991) (Cretaceous)**—Heterogeneous mixture of rhyolite flows, shallow intrusive rocks, and volcaniclastic rocks; andesite is rare. Informally named by Herzig (1991) for exposures in vicinity of Estelle Mountain, Lake Mathews 7.5' quadrangle. These rocks were termed Temescal dacite-porphyry by Dudley (1935) and Temescal Wash quartz latite porphyry by Larsen (1948). Zircon age of rock from unit collected west of Lake Mathews, Lake Mathews 7.5' quadrangle, is 125.8 Ma (Anderson, 1991)

Kvs **Intermixed Estelle Mountain volcanics of Herzig (1991) and Cretaceous(?) sedimentary rocks (Cretaceous?)**—Complexly intermixed volcanic and sedimentary rocks, which appear to be coeval; sedimentary rocks predominate

Ksv **Intermixed Estelle Mountain volcanics of Herzig (1991) and Mesozoic sedimentary rocks (Mesozoic)**—Complexly intermixed volcanic and sedimentary rocks; volcanic rocks predominate. West of Lake