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Explanatory pamphlet accompanies map

GEOLOGIC MAP OF THE YUCAIPA QUADRANGLE, SAN BERNARDINO AND RIVERSIDE COUNTIES, CALIFORNIA

By

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METHODS

The information presented on this geologic map was generated by a combination of reconnaisance and detailed mapping techniques. Bedrock geology was described, mapped, and interpreted on the basis of traverse-mapping methods whereby geologic observations are recorded at various stations along ridge-crest, stream-bottom, or road traverses. Along each traverse, structural-attitude symbols identify the location of individual observation stations. Information recorded at these stations and at unreported stations between them provides the basis for the characterization of each bedrock map unit. Faults and map-unit boundaries (contacts) identified along each traverse typically were extended laterally by using aerial photographs and binoculars to project the fault or contact toward its identified occurrence along a nearby traverse. Only rarely were individual geologic contacts or fault lines walked out to determine their variability and character throughout the map area.

Surficial rock units were described, mapped, and interpreted on the basis of aerial-photographic interpretation augmented by observations at specific stations identified on the map. The bounding contacts of each surficial unit and the location of fault-line scarps that traverse the units were plotted by using a PG-2 stereographic plotter that allows location accuracy equivalent to the accuracy standard for the topographic-contour base.

The map units were described according to standard field methods, using the following descriptive classifications:

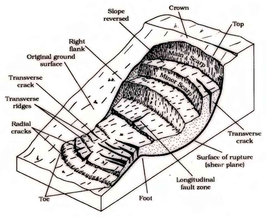
Plutonic rock classification.--Plutonic rocks and their deformed equivalents are classified in accordance with the International Union of Geological Sciences Subcommission on the Systematics of Igneous Rocks (1973; Streckeisen, 1976).

Sedimentary rock classification.--Sandstones are classified in accordance with the scheme suggested by Friedman and Sanders (1978). Bedding thicknesses follow the classification of Ingram (1954).

Color classification.--The matrix color of surficial materials and their pedogenic soils is classified according to the Munsell soil-color charts (Munsell, 1975). Bedrock colors also are classified according to the Munsell system, supplemented by the Rock-Color Chart distributed by the Geological Society of America (reprinted 1970).

Aerial photography.--Several aerial-photography series were used for this investigation. The primary source materials are 1:24,000-scale color photography flown for the U.S. Geological Survey in May and June, 1975 by I.K. Curtiss, Inc. Other source materials include: (1) 1:20,000-scale black-and-white photographs, vintage 1953 (ASCS, symbol AXM and AXL); (2) 1:30,000-scale black-and-white photographs, vintage 1966 (U.S. Geological Survey, symbol GS-VBNS); (3) 1:20,000-scale black-and-white photographs, vintage 1938 (ASCS, symbol AXL); and (4) 1:18,000-scale black-and-white photographs, vintage 1930 (Spence Airplane Photos, Los Angeles, flown for the U.S. Geological Survey).

Source of compiled data.--Structural attitude data were compiled from Smith (1959) in two small parts of the quadrangle : (1) in the NE 1/4 of Sec. 17, T1S/R1W, and (2) northwest of Morton Peak north and south of the boundary between Sec. 1 and 12, T1S/R2W.



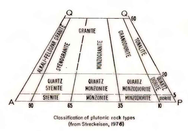
SCALE OF STRATIFICATION THICKNESS
(after Ingram, 1954)

Very thick bedded	Thicker than 1 m
Thick bedded	30 cm to 100 cm
Medium bedded	10 cm to 30 cm
Thin bedded	3 cm to 10 cm
Very thin bedded	1 cm to 3 cm
Thickly laminated	0.3 cm to 1 cm
Thinly laminated	Thinner than 0.3 cm

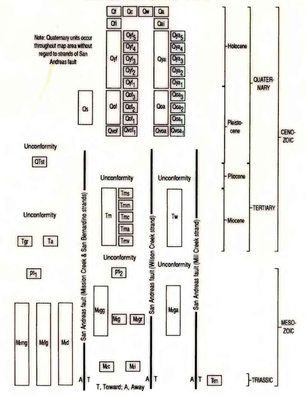
SANDSTONE CLASSIFICATION USED IN THIS REPORT
(modified from Friedman and Sanders, 1978)

End-member sand-size particles	<15% matrix	>15% matrix
Quartz	Quartzose sandstone	Muddy quartzose sandstone
Feldspar	Feldspathic sandstone[1]	Muddy feldspathic sandstone[1]
Rock fragments	Lithic sandstone	Muddy lithic sandstone

[1]For sandstone having appreciable amounts of feldspar framework grains, we use the informal term "arkose" or "arkosic"



CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

SEDIMENT ACTIVELY TRANSPORTED AND DEPOSITED IN CHANNELS AND WASHES, ON SURFACES OF ALLUVIAL FANS AND ALLUVIAL PLAINS, AND ON HILL SLOPES (Holocene)--Soil-profile development is non-existent to minimal. Includes:

- **Qw** Deposits in channelized washes of streams and rivers
- **Qa** Deposits of alluvial plains and valley floors
- **Qai** Intermittently active deposits of alluvial plains and valley floors
- **Qf** Deposits of alluvial fans
- **Qfi** Intermittently active deposits of alluvial fans
- **Qc** Colluvial deposits of scree, talus, and slope-wash

Qya YOUNG DEPOSITS OF ALLUVIAL PLAINS (Holocene and late Pleistocene)--Slightly to moderately consolidated gravel, sand, and silt with slightly to moderately developed pedogenic soil profiles (A/C to A/AC/B_{cambic}/C_{ox} profiles). Locally divided into, from younger to older:

- **Qya5** Slightly consolidated gravel, sand, and silt
- **Qya4** Slightly consolidated gravel, sand, and silt
- **Qya3** Slightly to moderately consolidated gravel, sand, and silt
- **Qya2** Moderately consolidated gravel, sand, and silt
- **Qya1** Moderately consolidated gravel, sand, and silt

Qyf YOUNG DEPOSITS OF ALLUVIAL FANS (Holocene and latest Pleistocene)--Slightly to moderately consolidated gravel, sand, and silt with slight to moderately developed pedogenic soils (A/C to A/AC/B_{cambic}/C_{ox} profiles). Locally divided into, from younger to older:

- **Qyf5** Slightly consolidated gravel, sand, and silt
- **Qyf4** Slightly consolidated gravel, sand, and silt
- **Qyf3** Slightly to moderately consolidated gravel, sand, and silt
- **Qyf2** Moderately consolidated gravel, sand, and silt
- **Qyf1** Moderately consolidated gravel, sand, and silt

Qoa OLD DEPOSITS OF ALLUVIAL PLAINS (late Pleistocene)--Moderately to well consolidated gravel, sand, and silt with moderate to well developed pedogenic soils (A/AB/B/Cox profiles with B_t horizons). Locally divided into, from younger to older:

- **Qoa3** Moderately consolidated gravel, sand, and silt
- **Qoa2** Moderately to well consolidated gravel, sand, and silt
- **Qoa1** Well consolidated gravel, sand, and silt

Qof OLD DEPOSITS OF ALLUVIAL FANS (late Pleistocene)--Moderately to well consolidated gravel, sand, and silt with moderate to well developed pedogenic soils (A/AB/B/C_{ox} profiles with Bt horizons). Locally divided into, from younger to older:

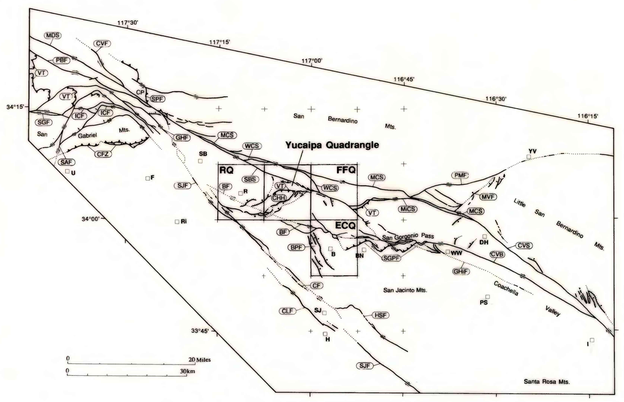
- **Qof3** Moderately consolidated gravel, sand, and silt
- **Qof2** Moderately to well consolidated gravel, sand, and silt
- **Qof1** Well consolidated gravel, sand, and silt

Qvoa VERY OLD DEPOSITS OF ALLUVIAL PLAINS (late Pleistocene)--Well consolidated sediment with well developed pedogenic soils. Includes:

- **Qvoa1** Well dissected gravel, sand, and silt

Qvof VERY OLD DEPOSITS OF ALLUVIAL FANS (late Pleistocene)--Well consolidated sediment with well developed pedogenic soils. Includes:

- **Qvof1** Well dissected gravel, sand, and silt



Index map showing location of study area (bold outline) and adjacent quadrangles referred to in the text. Faults modified from Matti and others (1992). B, Beaumont; BN, Banning; BF, Banning fault; BPF, Beaumont Plain fault zone; CF, Claremont fault; CFZ, Cucamonga fault zone; CHH, Crafton Hills horst-and-graben complex; CLF, Casa Loma fault; CP, Cajon Pass; CVB, Coachella Valley segment, Banning fault; CVF, Cajon Valley fault; CVS, Coachella Valley segment, San Andreas fault; DH, Desert Hot Springs; ECQ, El Casco quadrangle; F, Fontana; FFQ, Forest Falls quadrangle; GHF, Glen Helen fault; GHiF, Garnet Hill fault; H, Hemet; HSF, Hot Springs fault; I, Indio; ICF, Icehouse Canyon fault; MCS, Mill Creek strand, San Andreas fault; MDS, Mojave Desert segment, San Andreas fault; MiCS, Mission Creek strand, San Andreas fault; MVF, Morongo Valley fault; PBF, Punchbowl fault; PMF, Pinto Mountain fault; PS, Palm Springs; R, Redlands; RQ, Redlands quadrangle; Ri, Riverside; SAF, San Antonio fault; SB, San Bernardino; SBS, San Bernardino strand, San Andreas fault; SGF, San Gabriel fault; SGPF, San Gorgonio Pass fault zone; SJ, San Jacinto; SJF, San Jacinto fault; SPF, Squaw Peak fault; U, Upland; VT, Vincent thrust; WCS, Wilson Creek strand, San Andreas fault; YV, Yucca Valley; WW, Whitewater.

ROCKS EAST OF MILL CREEK STRAND, SAN ANDREAS FAULT

- **Trm** PORPHYRITIC MONZOGRANITE (Triassic)--Hornblende-biotite monzogranite with euhedral K-feldspar phenocrysts

CENOZOIC AND MESOZOIC ROCKS BETWEEN MILL CREEK AND WILSON CREEK STRANDS, SAN ANDREAS FAULT

- **Tw** FORMATION OF WARM SPRINGS CANYON (Miocene?)--Nonmarine sandstone and conglomerate
- **Mzga** ORTHOGNEISS OF ALGER CREEK (Mesozoic?)--Biotite-hornblende granodiorite having well developed laminated fabric

CENOZOIC AND MESOZOIC ROCKS BETWEEN SAN BERNARDINO AND WILSON CREEK STRANDS OF THE SAN ANDREAS FAULT

These rocks comprise the Wilson Creek block of Matti and others (1985, 1992).

- **Qs** SURFICIAL DEPOSITS (Quaternary)
- **Tm** MILL CREEK FORMATION OF GIBSON (1971) (Miocene)--Nonmarine claystone, mudstone, sandstone, and conglomerate. Includes informal subunits recognized on the basis of their overall lithologic character:
  - **Tms** Stratigraphic interval where sandstone predominates over mudrock
  - **Tmm** Stratigraphic interval where mudrock predominates over sandstone
  - **Tma** Stratigraphic interval dominated by sandstone that is so feldspathic we describe it as arkosic
  - **Tmv** Unit of sandstone and pebble-cobble-bearing sandstone characterized by pebbles and small cobbles of volcanic rock
  - **Tmc** Unit of sandstone, pebbly sandstone, and pebble-cobble conglomerate characterized by clasts of Pelona Schist and greenstone diorite
- **ps_2** PELONA SCHIST (Mesozoic)--Dark blue-green to light-gray chlorite-albite-actinolite greenstone schist and light gray to yellowish gray quartzofeldspathic schist
- **Mzgg** GNEISSOSE GRANITOID ROCK (Mesozoic)--Biotite-bearing crystalline rocks characterized by compositional and textural heterogeneity
- **Mzg** GRANITOID ROCK (Mesozoic)--Biotite-bearing leucocratic granitoid rock that is monzogranitic to granodioritic in composition
- **Mzgr** MESOCRATIC GRANITOID ROCK (Mesozoic)--Granodiorite, tonalite, and quartz diorite that is highly weathered
- **Mzi** INCLUSION-RICH GRANITOID ROCK (Mesozoic)
- **Mzc** DIORITE OF CRAM PEAK (Mesozoic)--Hornblende diorite and quartz diorite

CENOZOIC AND MESOZOIC ROCKS WEST OF SAN BERNARDINO AND MISSION CREEK STRANDS OF THE SAN ANDREAS FAULT

- **QTst** FORMATION OF SAN TIMOTEO CANYON (Pleistocene and Pliocene)--Nonmarine sandstone and conglomerate
- **Tgr** GRANODIORITE (Tertiary?)
- **Ta** ANDESITE TO DACITE (Tertiary?)
- **ps_1** PELONA SCHIST (Mesozoic)--Quartzofeldspathic sericitic schist containing lenses and pegmatitic segregations of white vein quartz
- **Mzmg** MYLONITIC AND CATACLASTIC GRANITOID ROCK (Mesozoic)--Granodiorite, tonalite, and quartz diorite that have non-penetrative and penetrative fabrics
- **Mzfg** FOLIATED GRANITOID ROCK (Mesozoic)--Granitoid rocks having heterogeneous compositions and textures
- **Mzd** DIORITE (Mesozoic)--Hornblende-biotite diorite and quartz diorite

EXPLANATION

Contact--Solid where accurately located to within one contour interval. Dashed where approximately located to within two contour intervals. Dotted where concealed

Alluvial contact--Showing younger alluvial unit incised into older alluvial unit. Hachures at base of slope, on younger unit

Fault--Showing dip. Solid where accurately located to within one contour interval. Dashed where approximately located to within two contour intervals. Dotted where concealed; queried where inferred. Hachures indicate scarp, with hachures on down-dropped block. Arrows indicate relative movement; bar and ball on down-thrown block. (SAFmc) Mill Creek stand, San Andreas fault; (SAFwc) Wilson Creek strand, San Andreas fault. Degree of certainty indicated by the following symbols:

1. **Confirmed fault**--Documented by outcrop relations, trench observations, and (or) geomorphic expression
2. **Probable fault**--Strongly suggested by outcrop relations, trench observations, and (or) geomorphic relations, but not confirmed
3. **Possible fault**--Suggested by outcrop relations and (or) by geomorphic relations, but evidence is not compelling

Thrust fault--Showing dip. Solid where accurately located to within one contour interval. Dashed where located to within two contour intervals. Dashed where approximately located to within two contour intervals. Dotted where concealed; queried where inferred. Sawteeth on upper plate; hachures at base of slope on down-thrown block of fault scarp. (MCT), Mill Creek thrust

4. **Possible thrust fault**--Modified from a report by Rasmussen and Associates (1978) on file with the San Bernardino County Planning Department

Strike and dip of beds

- Inclined
- Overturned
- Vertical
- Horizontal

Strike and dip of foliation in igneous and metamorphic rocks
Foliation of mineral grains, inclusions, or schlieren in igneous rocks

- Inclined
- Vertical

Gneissose compositional layering in igneous and (or) metamorphic rocks

- Inclined
- Vertical

Schistose foliation in metamorphic rocks

- Inclined
- Vertical

Mineral foliation and (or) gneissose layering in cataclastic and (or) mylonitic rocks

- Inclined
- Vertical

Layering in marble

- Inclined
- Vertical

Bearing and plunge of lineations

- Streaking of crushed mineral grains
- Alignment of elongate crystals
- Rodding and ridging
- Minor-fold axis

Landslide--Arrows indicate direction of movement. Hachures indicate headwall of crown area. Consists of displaced intact bedrock blocks and (or) chaotically mixed rubble. Includes both younger active landslides and (or) older inactive landslides

▲ **Site where soil profile is described**

△ **Site where soil profile was examined but not described**

ACKNOWLEDGMENTS

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