Department of the Interior

U.S. Geological Survey

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82-221

GEOLOGIC MAP OF THE TULE SPRINGS QUADRANGLE, SAN DIEGO COUNTY, CALIFORNIA

by VICTORIA R. TODD 1982

BASE FROM U.S. GEOLOGICAL SURVEY 1960

GEOLOGY MAPPED 1978-1980

SCALE 1:24000

1 MILE

1 KILOMETER

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1975

TRUE NORTH

MAGNETIC NORTH

EXPLANATION

Quaternary

Qo — Older alluvium (sand and gravel in broad valleys)

Qal — younger alluvium (sand and gravel in narrow channels cutting older alluvium)

Qc — colluvium and debris flows

Tertiary(?) ?-?

TQo — Patches of alluvium and debris flows lying at high elevations (sand, silt, and boulders)

Cretaceous

Kl — Pegmatite, alaskite and aplite (Leucocratic dikes)

Kcp — Granite of Chiquito Peak (hornblende-biotite granite and granodiorite)

Khc — Gneiss of Harper Creek (aluminosilicate-bearing two-mica granodiorite gneiss; "S-type"?)

Kcr — Granodiorite of Cuyamaca Reservoir (biotite granodiorite and hornblende-biotite tonalite; "I-S"-type)

Kem — Quartz diorite and tonalite of East Mesa (fine-grained, porphyritic pyroxene quartz diorite and biotite-hornblende tonalite; lesser quartz norite, gabbro)

Kjv — Tonalite of Japatul Valley (Biotite-hornblende tonalite; ellipses indicate migmatitic wallrock admixture)

Ka — Tonalite of Alpine (Biotite-hornblende tonalite and pyroxene tonalite; dashed pattern indicates rock is approximately 50 percent mafic--gabbroic--inclusions)

Kc — Cuyamaca Gabbro (peridotite, olivine gabbro, hornblende gabbro, norite; pattern indicates fine-grained gabbro blocks in contaminated tonalite matrix--intrusion breccia)

Late Jurassic (?)

Jm — Metasedimentary and metavolcanic rocks (quartzo-feldspathic, micaceous semischistose rock and schist; micaceous feldspathic quartzite; black amphibolite; metamorphosed felsic tuff-breccia; calc-silicate rock and metaconglomerate; flattened ellipses indicate concordant granitic gneiss bodies)

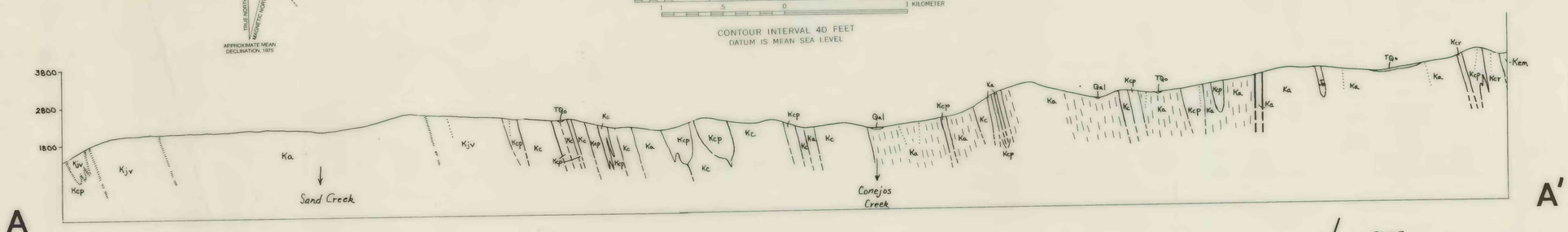
Contact, long-dashed where approximately located, queried where indefinite, dotted where concealed, hachured line indicates gradational contact. Internal contact within pluton shown by dot and dash line.

High-angle fault, long-dashed where approximately located or inferred, queried where probable, dotted where concealed; U, upthrown side; D, downthrown side; arrows indicate sense of apparent lateral displacement.

Fault or lineament from aerial photographs, not checked or identified on ground

Strike and dip of inclined foliation in crystalline rocks — 82

Strike and dip of vertical foliation



2000 FEET

CALIF

QUADRANGLE LOCATION

FAULT

CONTACT

GRADATIONAL CONTACT

FOLIATION

This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards and nomenclature.