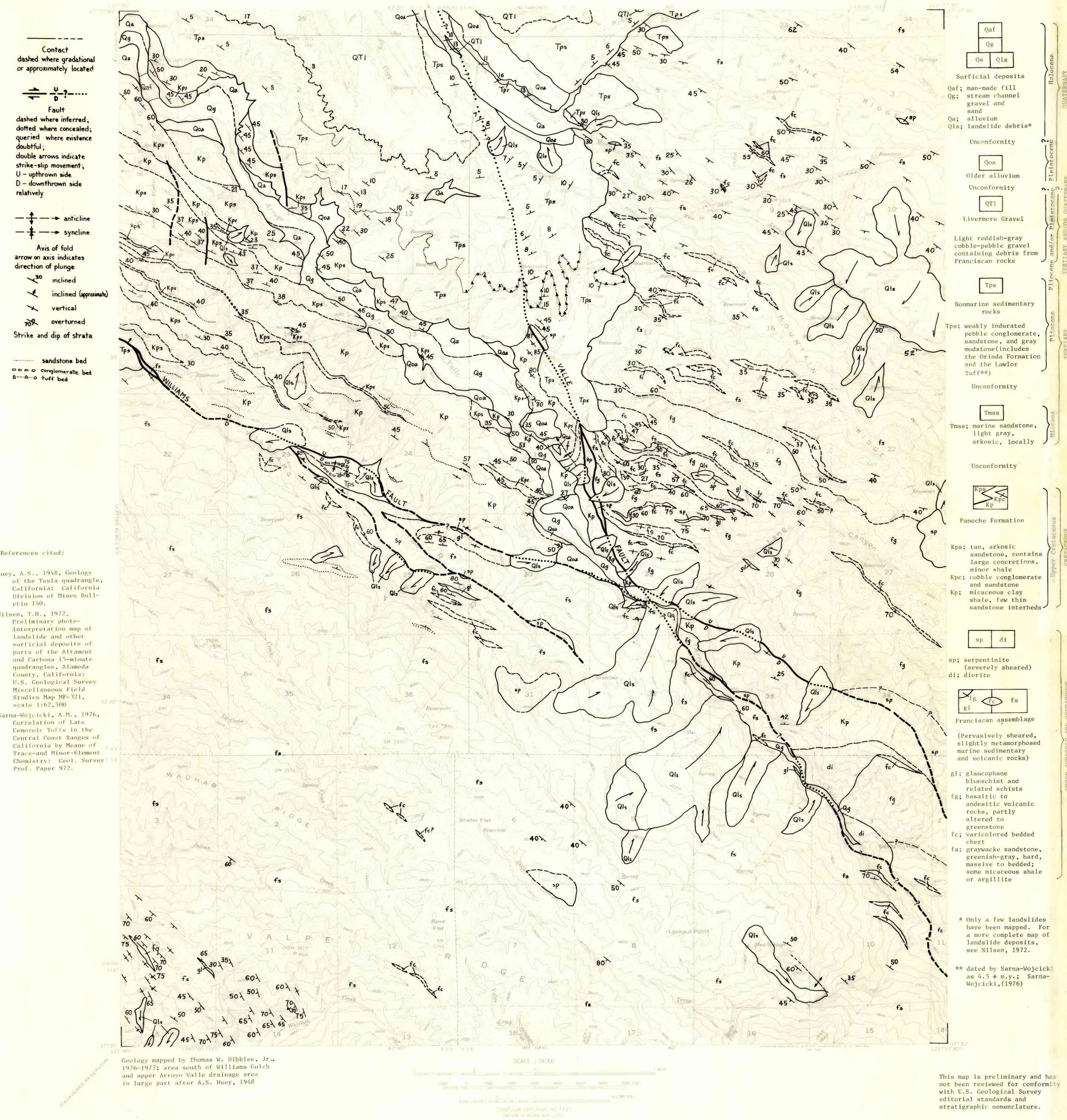


DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MENDENHALL SPRINGS QUADRANGLE
CALIFORNIA-ALAMEDA CO
7.5 MINUTE SERIES (TOPOGRAPHIC)
U.S. GEOLOGICAL SURVEY



Contact
dashed where gradational or approximately located

Fault
dashed where inferred, dotted where concealed, queried where existence doubtful; double arrows indicate strike-slip movement; U - upthrown side, D - downthrown side relatively

Axis of fold
arrow on axis indicates direction of plunge

Strike and dip of strata

..... sandstone bed
o-o-o-o conglomerate bed
-.-.-.- tuff bed

References cited:

Huey, A.S., 1948. Geology of the Tesla quadrangle, California: California Division of Mines Bulletin 140.

Nilsen, T.H., 1972. Preliminary photo-interpretation map of landslide and other surficial deposits of parts of the Altamont and Carbona 15-minute quadrangles, Alameda County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-321, scale 1:62,500

Sarna-Wojcicki, A.M., 1976. Correlation of Late Cenozoic Tuffs in the Central Coast Ranges of California by Means of Trace and Minor-Element Chemistry: Geol. Survey Prof. Paper 972.

Legend

Qaf
Qg
Qa Qls

Surficial deposits
Qaf; man-made fill
Qg; stream channel gravel and sand
Qa; alluvium
Qls; landslide debris*

Unconformity

Qoa
Older alluvium

Unconformity

QTI
Livermore Gravel

Light reddish-gray cobble-pebble gravel containing debris from Franciscan rocks

Tps
Nonmarine sedimentary rocks

Tps; weakly indurated pebble conglomerate, sandstone, and gray mudstone (includes the Orinda Formation and the Lawlor Tuff**)

Unconformity

Tmss
Tmss; marine sandstone, light gray, arkosic, locally

Unconformity

Kps
Kp

Panoche Formation

Kps; tan, arkosic sandstone, contains large concretions, minor shale
Kpc; cobble conglomerate and sandstone
Kp; micaceous clay shale, few thin sandstone interbeds

sp di

sp; serpentinite (severely sheared)
di; diorite

fg fc fs

Franciscan assemblage
(Pervasively sheared, slightly metamorphosed marine sedimentary and volcanic rocks)

gl; glaucophane blueschist and related schists
fg; basaltic to andesitic volcanic rocks, partly altered to greenstone
fc; varicolored bedded chert
fs; graywacke sandstone, greenish-gray, hard, massive to bedded; some micaceous shale or argillite

* Only a few landslides have been mapped. For a more complete map of landslide deposits, see Nilsen, 1972.

** dated by Sarna-Wojcicki as 4.5 ± m.y.; Sarna-Wojcicki, (1976)

Geology mapped by Thomas W. Dibblee, Jr., 1976-1977; area south of Williams Gulch and upper Arroyo Valle drainage area in large part after A.S. Huey, 1948

SCALE 1:24,000

PRELIMINARY GEOLOGIC MAP OF THE MENDENHALL SPRINGS QUADRANGLE, ALAMEDA COUNTY, CALIFORNIA

by
Thomas W. Dibblee, Jr.
1981

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.