



- DESCRIPTION OF MAP UNITS**
- QUATERNARY DEPOSITS**
Holocene and Pleistocene deposits
- Qn Young alluvium - Gravel, sand, and silt along active and intermittent stream channels; incised along Tepusquet Canyon and other major drainages
 - Qo Old alluvium - Gravel, sand, and silt generally perched above stream channels; dissected; depositional surfaces preserved
- Pleistocene deposits**
- Qr Upper part of Pico Robles(?) Formation of Hall (1978) - Sandstone, siltstone, claystone, and conglomerate, unconformably on well-consolidated Hall, 1978, present in the southwestern corner of Tepusquet Canyon quadrangle; two small patches of conglomerate east of lower Tepusquet Canyon questionably assigned to this unit
- TERTIARY SEDIMENTARY ROCKS**
Pliocene and/or Miocene sedimentary rocks
- Tt Tinquiqui Sandstone Member of the Sisquoc Formation - Sandstone and minor siltstone; marine sandstone generally fine grained, thick bedded to massive, locally laminated; unconformity at base; fossils not found within map area; contains late Miocene and early Pliocene mollusks and echinoids in adjoining areas to the south (Woodring and Bramlette, 1950)
 - Tm Monterey Formation - Siltstone, mudstone, shale, and minor sandstone; marine; shale laminated to thin bedded, siliceous and locally calcareous; brecciated and tar impregnated at places; mudstone indistinctly bedded to thin bedded; commonly calcareous; contains phosphatic locally contains dolomitic concretions or siliceous zones; sandstone very fine to coarse grained, indistinctly bedded and lenticular; locally or less thick, locally calcareous; mudstone near the base contains Zone CN2 calcareous nanofossils and Saccular Stage foraminifera; lower part assigned to Rincon Shale and Point Sal Formation by Redwine (1958), Redwine and others (1975), and Hall (1978), who reported Saccular and Relizian Stage foraminifera, upper part contains Lusatina, Moberian, and Detonemaria (?) foraminifera (Redwine and others, 1975) and includes the lower and upper members of the Monterey Shale as described by Redwine (1958) and Redwine and others (1975) (Explanatory Notes give reasons for not subdividing the Monterey Formation)
 - Ts Sandstone, marl; thick bedded to indistinctly bedded, fine to coarse grained, quartzitic; commonly glauconitic; generally calcareous and locally micaceous; unconformity at base; assigned to Vaqueros Formation by Redwine (1958), Redwine and others (1975), and Hall (1978), includes pebbly lenses in lower part at places, clasts chiefly reworked from Upper Cretaceous conglomerate; fossils not found within map area
- Miocene and/or Oligocene sedimentary rocks**
- Tx Simmler Formation - Conglomerate, sandstone, and mudstone; nonmarine, fluvial; lenticular; conglomerate consists of coarse clasts of basaltic sandstone; unconformity at base, locally channelled; assigned to Sepe Formation by Redwine (1958), Crandall (1961), and Redwine and others (1975)
- UPPER CRETACEOUS SEDIMENTARY ROCKS**
- Ks Sandstone, mudstone, and conglomerate; lenticular; submarine fan deposits; sandstone quartzitic; micaceous, commonly as loam booklets; base not exposed; contains rare Late Cretaceous foraminifera and mollusks; occurs southwest of Sur-Nacimiento fault zone; locally subdivided into Morris Formation and Buckhorn Sandstone by Crandall (1961) (See Explanatory Notes)
 - Ke Conglomerate and subordinate sandstone; nonmarine; conglomerate massive to thick bedded, moderately stratified, lenticular, poorly sorted; channelled at the base and internally; pebbles, cobbles, and boulders of porphyritic siliceous volcanic rocks abundant; clasts of granitic rocks and quartz common; intertongues with Ks (Vedder, Howell, and McLean, 1977)
- LOWER CRETACEOUS (?) AND UPPER JURASSIC ROCKS**
- Jo Ophiolite; diabase, microgabbro, serpentinite, and silica carbonaceous rock; diabase and microgabbro sericitized; secondary actinolite and prehnite; silica carbonaceous rock largely cherty and quartz; quartz protrusive into Monterey Formation between Tepusquet and Colton Canyons

- SYMBOLS**
- Contact
 - Fault trace
 - Anticline, approximate crestline
 - Syncline, approximate troughline
 - Landslide area
 - Strike and dip of bedding
 - Strike and dip of overturned beds
 - Strike of vertical beds
 - Horizontal or nearly horizontal beds
 - Apparent dip of beds
 - Generalized submarine-fan infillacies of Walker and Mutti (1973)
 - Point locality

EXPLANATORY NOTES

This preliminary map is one of a series that covers a large part of the Los Padres National Forest and adjoining areas from the vicinity of Santa Margarita to Big Pine Mountain. Most of the geologic data for this series was done sporadically from 1977 to 1987. From 1980 through 1985, the mapping was supported by funds supplied under the provisions of the Wilderness Act for a survey of the mineral resource potential of designated "wilderness" and "roadless" areas.

Parts of this map were constructed using reconnaissance field methods of widely separated ground traverses, helicopter overflights, and photogeology; consequently, some of the contacts and structures depicted are highly interpretive. For example, some faults and folds shown by short dashes were inferred from study of aerial photographs. The area west of lower Sepe Canyon and lower Tepusquet Canyon was done largely by photogeology. The geology in the northern part of the Manzanita Mountain quadrangle is modified from unpublished work by J.G. Vedder and R.D. Brown, Jr., in 1967. A narrow strip along the westernmost edge of the Tepusquet Canyon quadrangle is slightly revised from Hall (1978) (See Index to Geologic Mapping). Selected strike-and-dip symbols in the Buckhorn Canyon area were taken from Crandall (1961).

Both the nomenclature and delineation of some rock units differ from those of previous workers. Arnold and Anderson (1957) used the name Knoxville Formation for the small remnant in Colton Canyon here called Espada Formation, and they assigned a post-Monterey age to the diabasic rocks (unit Jo) in the same area. Although Crandall (1961) subdivided the Upper Cretaceous rocks in the northeastern part of the Tepusquet Canyon quadrangle into the Morris Formation and Buckhorn Sandstone, these two units intertongue eastward and can be differentiated only locally. Redwine (1958, 1981) and Redwine and others (1975) designated the small patch of Mesozoic rocks between Tepusquet Canyon and Colton Canyon as undifferentiated Franciscan-Knoxville and interpreted its contact with the surrounding Mesozoic strata to be an erosional unconformity rather than a protive contact.

Because the Late Cretaceous and early Eocene submarine fan sequences (units Ks and Ke, respectively) consist largely of lenticular turbidites without distinctive marker beds or throughgoing subformational units, these sequences are not subdivided. Designations of submarine-fan lithofacies (Walker and Mutti, 1973) in these sequences are generalized from field notes.

The name Sepe Formation was used by Redwine (1958), Crandall (1961), and Redwine and others (1975) for the redbeds south of Buckhorn Canyon on the Tepusquet Canyon quadrangle. Because these redbeds structurally resemble the Simmler Formation in adjoining areas to the north (Vedder and others, 1988) and the clast composition is different from the Sepe in the Santa Ynez Mountains, these strata are here assigned to the Simmler Formation.

Stratigraphic subdivision of the Miocene shaly sequences is hampered by limited exposures, gradational contacts, repetitive lithology, internal facies changes, and sparse poorly preserved foraminiferal assemblages. Even though Redwine (1958), Redwine and others (1975), and Hall (1978) assigned some of these strata to the Rincon Shale, Point Sal Formation, and the lower and upper members of the Monterey Shale, our mapping indicates that some of the distinguishing rock types attributed to these units not only are repetitive but also change along the strike of the beds. Fault and soil cover discontinuities hinder the delineation of such units. For these reasons, the Miocene shaly sequences were combined and assigned solely to the Monterey Formation after unsuccessful attempts to subdivide the Formation in the field. In general, the lower part of the Monterey tends to be calcareous and medium to thick bedded, whereas the upper part tends to be siliceous and laminated to thin bedded.

Fault nomenclature follows the usage of Page (1970) for the Sur-Nacimiento fault zone and Hall and Corbin (1967) for the East Huasteca fault zone, which here is extended southward. The Sepe fault (formally 1950) is not shown as a throughgoing fault to the northwest by Hall (1978), and the same fault apparently dies out southeastward near Algodones Canyon; consequently the name is not used here. Two other fault names are not applied for the following reasons: the trace of the "Colton" fault of Redwine (1981) (North fork of Big Pine fault of Hall, 1981) does not conform with the trace mapped by us. The South fork of the Big Pine fault described by Redwine and others (1975) has no known relation to the Big Pine fault, and where the south fork crosses Tepusquet Canyon, the same trace is shown as the Sepe fault by Jennings (1958).

Paleontologic data used in support of the mapping of the Tepusquet Canyon and Manzanita Mountain quadrangles were provided by several individuals. R.E. Aral reported on Upper Cretaceous foraminifera, and M.L. Gates Thomson determined the age and paleobiogeography of Miocene foraminifera. D.L. Jones and W.P. Elder furnished information on Late Cretaceous mollusks, and J.G. Vedder identified Miocene mollusks.

PERTINENT REFERENCES AND REFERENCES CITED

Arnold, R., and Anderson, R., 1957, Geology and oil resources of the Santa Maria oil district, Santa Barbara County, California: U.S. Geological Survey Bulletin 322, 161 p.

Crandall, B.G., 1961, Stratigraphy of the Buckhorn Sandstone, Santa Barbara and San Luis Obispo Counties, California: Los Angeles, California, University of California, Los Angeles, M.S. thesis, 111 p.

Hall, C.A., Jr., 1978, Geologic map of Twichell Dam and parts of Santa Maria and Tepusquet Canyon quadrangles, Santa Barbara County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-93, scale 1:24,000.

Hall, C.A., Jr., and Corbin, C.E., 1967, Stratigraphy and structure of Mesozoic and Cenozoic rocks, Nipomo quadrangle, southern Coast Ranges, California: Geological Society of America Bulletin, v. 78, p. 559-582.

Jennings, C.W., 1958, Geologic map of California, Olat P. Jenkins edition, Santa Maria sheet, California Division of Mines, scale 1:250,000.

Page, B.M., 1970, Sur-Nacimiento fault zone of California: continental margin tectonics: Geological Society of America Bulletin, v. 81, p. 667-690.

Redwine, L.E., 1958, Geology and oil exploration of the Tepusquet area, Santa Barbara County, California [abs.]: Pacific Petroleum Geologist, v. 12, n. 11, p. 1-2.

Redwine, L.E., 1981, Hypothetical continental extension, natural hydraulic fracturing, and dolomitization to explain petroleum reservoirs in Monterey Shale, Santa Maria area, California, in Garrison, R.E., and Klapp, R.G., eds., The Monterey Formation and related siliceous rocks of California: Society of Economic Paleontologists and Mineralogists, Pacific Section, Special Publication, p. 221-248.

Redwine, L.E., Ryall, J.L., Suchland, J.L., and Whaley, H.M., 1975, Geologic field guide of the eastern Santa Maria area in Olat, D., and Suchland, R., eds., Society of Economic Paleontologists and Mineralogists, Pacific Section, Guidebook, Annual Fall Field Trip, 24 p.

Roob, P.O., 1981, Dilatation brecciation—a proposed mechanism of fracturing, petroleum expansion and dolomitization in the Monterey Formation, California, in Garrison, R.E., and Douglas, R.L., eds., The Monterey Formation and related siliceous rocks of California: Society of Economic Paleontologists and Mineralogists, Pacific Section, Special Publication, p. 285-315.

Vedder, J.G., Howell, D.G., and McLean, H., 1977, Upper Cretaceous redbeds in the Sierra Madre-San Rafael Mountains, California, in Howell, D.G., Vedder, J.G., and McLaughlin, K., Cretaceous geology of the California Coast Ranges west of the San Andreas fault, Pacific Coast geology field guide 2: Society of Economic Paleontologists and Mineralogists, Pacific Section, p. 119-137.

Vedder, J.G., Howell, D.G., McLean, H., and Wiley, T.J., 1988, Geologic map of the Los Machos Hills and Colwell Mountain quadrangles, north part of the Spring Ridge quadrangle, California: U.S. Geological Survey Open-File Report 88-25, scale 1:24,000.

Walker, R.G., and Mutti, E., 1973, Turbidite facies and facies associations, in Middleton, G.V., and Bouma, A.H., eds., Turbidites and deep-water sedimentation: Society of Economic Paleontologists and Mineralogists, Pacific Section, p. 119-137.

Woodring, W.P., and Bramlette, M.N., 1950, Geology and paleontology of the Santa Maria district, California: U.S. Geological Survey Professional Paper 222, 185 p.

Base map from U.S. Geological Survey Tepusquet Canyon, 1964, and Manzanita Mtn., 1964, quadrangles

PRELIMINARY GEOLOGIC MAP OF TEPUSQUET CANYON AND MANZANITA MTN. QUADRANGLES, CALIFORNIA

By
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1991

Geology mapped at intervals from 1979 to 1989 with assistance from J.M. Joyce in 1979 and 1982 and D. Kingston in 1982. The westernmost edge of Tepusquet quadrangle mapped by C.A. Hall, Jr. (1978) (See Index to Geologic Mapping). The northeastern corner of Manzanita Mtn. quadrangle modified from unpublished mapping by J.G. Vedder and R.D. Brown, Jr., in 1967. Field check of Tepusquet Canyon quadrangle in 1990 by J.G. Vedder, H. McLean, and R.G. Stanley.

This map 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 is for descriptive purposes only and does not imply endorsement by the U.S. Government.