United States Geological Survey
OPEN FILE MAP
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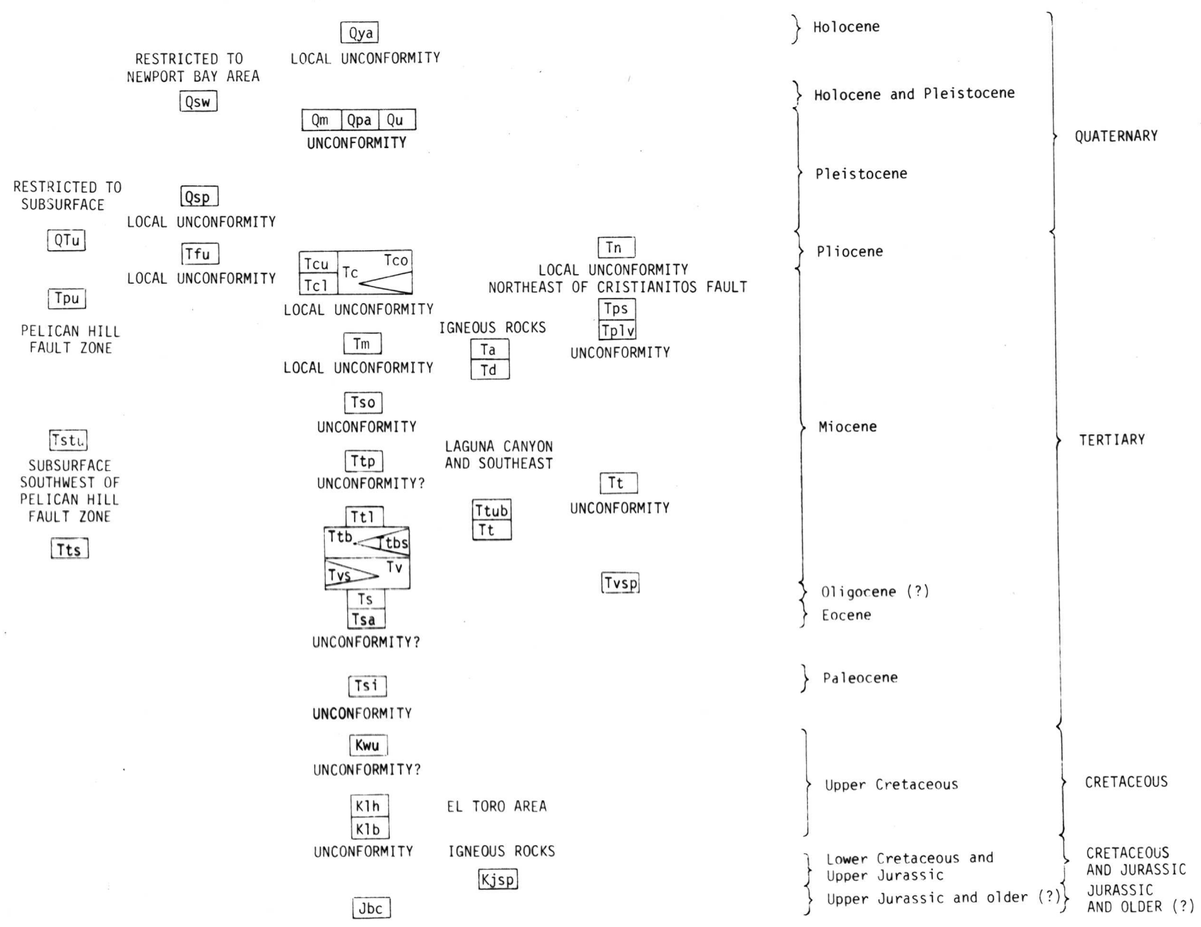
## CORRELATION OF UNITS ON MAP AND SECTIONS




## DESCRIPTION OF UNITS ON MAP AND SECTIONS

**Qya** YOUNGER ALLUVIUM (Holocene) Sand, gravel, and silt, clayey; lenticular and cross-bedded, laminated at places, locally contains beach and estuarine deposits.

**Qsw** SLOPE-WASH DETRITUS (Holocene and late Pleistocene [?]) Sand and gravel, clayey; indistinctly bedded; locally derived; mapped in Newport Bay area only.

**Qoa** OLDER ALLUVIUM (late Pleistocene, Rancholabrean age) Gravel, sand, and silt, clayey; semiconsolidated at places; indistinctly bedded, locally lenticular and cross-bedded.

**Qm** MARINE TERRACE DEPOSITS (late Pleistocene) Sand, silty and pebbly at places: laminated and cross-bedded; locally highly fossiliferous and lime cemented: contains scattered eolian deposits; overlain by nonmarine slope-wash detritus; subscripts indicate relative levels with 1 the lowest.

**Qsp** SAN PEDRO FORMATION OF POLAND AND OTHERS (1956) (early Pleistocene) Siltsone, sandstone, and conglomerate; semiconsolidated; thin-bedded to lenticular, indistinctly bedded at places; marine.

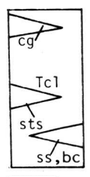
**QTu** UNNAMED UNIT (early Pleistocene [?] and late Pliocene [?]) Sandstone, conglomerate, siltstone, and claystone; semiconsolidated in part; marine.

**Tfu** FERNANDO FORMATION, UNDIFFERENTIATED ("Wheelerian", "Venturian" [?], "Repettian" Stages) Very fine-grained sandstone and sandy siltstone, conglomerate at places; finer grained in subsurface; thin-to-thick bedded and lenticular; marine.

**Tn** NIGUEL FORMATION (late [?] Pliocene) Sandstone, siltstone, and conglomerate; thin-to-thick bedded, lenticular and cross-bedded at places; includes locally derived detritus from underlying units; marine and nonmarine.

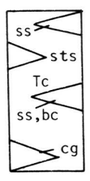
**Tcu** CAPISTRANO FORMATION

UPPER UNIT ("Repettian" Stage) Siltstone, and very fine-grained sandstone, pebbly sandstone at places; thin-bedded to lenticular and cross-bedded; marine; restricted to Dana Point quadrangle.



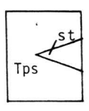

LOWER UNIT ("Delmontian" and upper Mohnian Stages) Mudstone, thin-bedded to massive, local diatomite and vitric tuff; cg, conglomerate, lenticular; sts, interbedded sandstone and siltstone; ss, bc, sandstone and breccia, lenticular; marine; restricted to Dana Point quadrangle.

**Tco** OSO MEMBER (late Miocene) Sandstone, fine-to very coarse-grained, pebbly at places, thin-bedded to massive; concretionary; contains local intercalations of shale and claystone, marine.



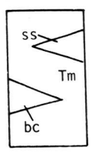

CAPISTRANO FORMATION, UNDIFFERENTIATED (early Pliocene and late Miocene) Mudstone, minor sandstone, diatomite, vitric tuff, silty shale; laminated to massive; concretionary; ss, siltstone; ss, bc, sandstone and breccia, lenticular; cg, conglomerate, lenticular; marine.

PUENTE FORMATION




SOQUEL MEMBER (upper and lower Mohinian [?] Stage) Sandstone, pebbly at places, interbedded siltstone; thick-bedded to massive, concretionary; st, siltstone, clayey, lenticular; marine.

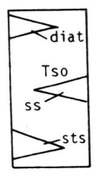
**Tplv** LA VIDA MEMBER (lower Mohnian Stage) Clayey siltstone and silty shale, locally tuffaceous, intercalated fine-grained sandstone at places; laminated and thin-bedded; marine.




MONTEREY SHALE (upper Mohnian through upper [?] Relizian Stages) Siliceous shale, claystone, and sandstone, locally calcareous, tuffaceous at places; thinly laminated to thin-bedded; ss, sandstone, lenticular, bc, breccia and conglomerate, lenticular; marine.

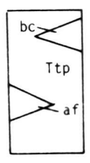
**Ta** ANDESITE (Mohnian [?] Stage) Fine-to coarse-grained, pilotaxitic, flow banded and vesicular at places; augite-bearing; occurs as dikes and sill-like bodies southwest of the Pelican Hill fault zone.

**Td** DIABASE (Relizian Stage) Coarse-grained, ophitic to subophitic, vesicular at places; contains augite and locally hypersthene and pigeonite; occurs chiefly as dikes along Miocene faults and as sill-like intrusives in the Los Trancos Member of the Topanga Formation.




SAN ONOFRE BRECCIA (lower Luisian [?] and Relizian Stages) Schist breccia and minor amounts of conglomerate, sandstone, and siltstone; lenticular; diat, diatomite; ss, sandstone lacking blueschist detritus; sts, sandstone and siltstone lens; marine and nonmarine (?).

TOPANGA FORMATION




PAULARINO MEMBER (Lower Luisian and Relizian Stages) Sandstone, fine- to coarse-grained, tuffaceous, and laminated siltstone, sandy; thin- to thick-bedded and lenticular; bc, andesite breccia, in part primary; af, augite-hyper-sthene andesite flows and flow breccias, glassy, vesicular at places; marine.

**Ttl** LOS TRANCOS MEMBER (lower Relizian Stage) Interbedded clayey siltstone and fine- to medium-grained sandstone, pebbly at places; thin- to thick-bedded or indistinctly bedded; contains tuffaceous layers and first occurrence of blueschist detritus; marine.

**Ttb** BOMMER MEMBER, COARSE-GRAINED UNIT (middle Miocene) Sandstone, medium- to very coarse-grained, pebbly, very thick-bedded, locally cross-bedded; limy in part, marine.

**Ttbs** BOMMER MEMBER, FINE-GRAINED UNIT (middle Miocene) Sandstone, fine- to medium-grained; limy in part; intermediate- to thick-bedded; contains intercalated sandy siltstone; marine.

**Ttub** UNNAMED UNIT, BLUESCHIST DETRITUS (Relizian [?] Stage) Sandstone, fine- to coarse-grained and siltstone, sandy; thin- to thick-bedded, locally lenticular; contains variable amounts of blueschist detritus; marine; east and southeast of Laguna Canyon; in part equivalent to Los Trancos Member.

**Ttu** BLUESCHIST DETRITUS (middle Miocene) Sandstone, medium- to coarse-grained, pebbly at places; lenticular and cross-bedded, thick-bedded; marine; in part equivalent to Bommer Member.

**Tstu** SAN ONOFRE BRECCIA AND TOPANGA FORMATION, UNDIFFERENTIATED (middle Miocene) Breccia, sandstone, and siltstone; in shattered zones along Pelican Hill fault zone where continuity of rock units has been destroyed.

**Tt** TOPANGA FORMATION, SANTA ANA MOUNTAINS (middle Miocene) Sandstone, medium- to coarse-grained, pebbly at places, locally limy and tuffaceous; thin- to thick-bedded; contains sporadic intercalated siltstone beds; marine.

**Tts** TOPANGA FORMATION, SUBSURFACE, NEWPORT (Relizian Stage) Siltstone, sandstone, and breccia, thin- to thick-bedded and lenticular; contains greenschist and blueschist detritus; marine.

**Tv** VAQUEROS FORMATION (early Miocene) Sandstone, fine- to coarse-grained, calcareous; thin- to thick-bedded, lenticular at places, locally biostromal; contains intercalated clayey siltstone at places, marine.

**Tvs** VAQUEROS FORMATION, SILTSTONE UNIT (early Miocene, lower [?] Saucesian Stage) Siltstone, clayey to sandy, minor amounts of fine-grained sandstone; indistinctly bedded and thinbedded; concretionary, marine; limited to southwestern San Joaquin Hills.

**Ts** SESPE (FORMATION early Miocene [?], Oligocene [?], and late Eocene [?]) Conglomeratic sandstone, and mudstone, variegated; thin- to thick-bedded and lenticular, cross-bedded at places; nonmarine.

**Tvsp** VAQUEROS AND SESPE FORMATIONS, UNDIFFERENTIATED (early Miocene and Oligocene [?]) Sandstone, conglomerate, and mudstone, variegated in part; thin- to thick-bedded, lenticular, cross-bedded at places; marine and nonmarine; limited to northern and eastern edges of map.

**Tsa** SANTIAGO FORMATION (middle [?] Eocene) Sandstone, conglomerate, claystone; thin- to thick-bedded and lenticular, cross-bedded at places; locally concretionary; marine and nonmarine,

**Tsi** SILVERADO FORMATION (Paleocene) Sandstone, fine- to coarse-grained, pebbly at places, sandy claystone marker; indistictly bedded to thick-bedded, locally cross-bedded; marine and nonmarine (?); lower part in subsurface only.

**Kwu** WILLIAMS FORMATION, UNDIFFERENTIATED (Campanian [?] Stage) Sandstone, conglomerate, siltstone, interbedded; thin- to thick-bedded; marine.

**Klh** LADD FORMATION

HOLZ SHALE MEMBER (Campanian [?] Stage) Silty, silty shale, minor very fine-grained sandstone, pebbly at places; thin-bedded; marine; subsurface only.

**Klb** BAKER CANYON CONGLOMERATE MEMBER (Upper Turonian [?] Stage) Conglomerate, interbedded sandstone and siltstone; thick- to thin-bedded, chiefly marine but may include nonmarine beds locally near base; subsurface only.

**Klsp** SANTIAGO PEAK VOLCANICS (Early Cretaceous [?] and Late Jurassic [?]) Metavolcanic rock, dense, pyritiferous; subsurface, El Toro area only.

**Jbc** BEDFORD CANYON FORMATION (Callovian [?] and Bajocian [?] Stages) Clayey siltstone, slightly metamorphosed; subsurface, El Toro area only.

## EXPLANATORY NOTES

Changes and additions on the Geologic map of the San Joaquin Hills - San Juan Capistrano area (Vedder, Yerkes, and Schoellhamer, 1957) have substantially modified the original mapping, which was completed in 1954. Field checks, photo interpretation, compilation of subsurface information, and examination of new construction sites since that time have necessitated the release of an updated map. Selected landslides, strike-and-dip symbols and fault traces have been added or altered on the basis of recent mapping along the east edge by the California Division of Mines and Geology (Morton, Edgington, and Fife, 1974; Fife, 1974; Edgington, 1974).

### MAP SYMBOLS

Contact
Solid where well exposed; dashed where determined by scattered exposures and float; short dashed where inferred; dotted where concealed.

70 D U
Fault
Trace of fault; solid where exposed; dashed where imperfectly exposed; short dashed where inferred; dotted where concealed. U, relatively upthrown side; D, relatively downthrown side, relative offset querried where uncertain; numerals indicate dip of fault surface where measured.

U Td D
Dike intruded along fault

31
Strike and dip of beds

85
Strike and dip of overturned beds

Strike of vertical beds

Horizontal beds

5
Apparent dip of beds

45-60
Generalized dip of contorted beds

12
Explanatory well or core hole
Number refers to Table 1.

xF563
Fossil locality, large marine invertebrates, chiefly mollusks
See Table 2 for U.S.G.S. Cenozoic catalog numbers and locality descriptions.

xm728
Fossil locality, foraminifers
See Table 3 for U.S.G.S. Cenozoic catalog numbers and locality descriptions.

xV-401
Fossil locality; mammals
See Table 4 for U.S.G.S. Cenozoic catalog numbers and locality descriptions.

Landslide
Arrows indicate direction of movement.

## SELECTED REFERENCES
Published chiefly since 1957

Bartow, J. A., 1966, Deep submarine channel in upper Miocene, Orange County, California: Jour. Sedimentary Petrology, v. 36, p. 700-705.

_____, 1971, The Doheny Channel--A Miocene deep-sea fan-valley deposit, Dana Point, California, in Bergen, F. W., ed., Guidebook Newport Lagoon to San Clemente, California, Pacific Section, Soc. Econ. Paleontologists and Mineralogists, Los Angeles, October, 1971, p. 43-49.

Casey, R. E., and Price, A. B., 1973, A tentative radiolarian zonation and paleo-oceanographic interpretation from Newport Bay, California, in Ingle, J. C., ed., Guidebook SEPM Trip 1 Miocene sedimentary environment and biofacies, southeastern Los Angeles Basin, Ann. Meeting Am. Assoc. Petroleum Geologists, Soc. Econ. Paleontologists and Mineralogists, Soc. Exploration Geophysicists, Los Angeles, May, 1973, p. 67-70.

Edgington, W. J., 1974, Geology of the Dana Point quadrangle, Orange County, California: California Div. Mines and Geology, Spec. Rept. 109, 31 p.

Fife, D. L., 1974, Geology of the south half of the El Toro quadrangle, California: California Div. Mines and Geology, Spec. Rept. 110, 27 p.

Ingle, J. C., 1973, Biostratigraphy and paleoecology of early Miocene through early Pleistocene benthonic and planktonic Foraminifera, San Joaquin Hills - Newport Bay - Dana Point area, Orange County, California in Ingle, J. C., ed., Guidebook SEPM Trip 1 Miocene sedimentary environment and biofacies, southeastern Los Angeles Basin, Ann. Meeting Am. Assoc. Petroleum Geologists, Soc. Econ. Paleontologists and Mineralogists, Soc. Exploration Geophysicists, Los Angeles, May 1973, p. 18-38.

Kanakoff, G. P., and Emerson W. K., 1959, Late Pleistocene invertebrates of the Newport Bay area [California]: Los Angeles County Mus. Contr. Sci., no. 31, 47 p.

Kern, J. P. and Wicander, E. R., 1974, Origin of a bathymetrically displaced marine invertebrate fauna in the upper part of the Capistrano Formation (lower Pliocene), southern California: Jour. Paleontology, v. 48, no. 3, p. 495-505.

Morton, P. K., Edgington, W. S., and Fife, D. L., 1974, Geology and engineering geologic aspects of the San Juan Capistrano quadrangle, Orange County, California: California Div. Mines and Geology Spec. Rept. 112, 64 p.

Poland, J. F., Piper, A. M., and others, 1956, Ground-water geology of the coastal zone, Long Beach-Santa Ana area, California: U.S. Geol. Survey Water-supply Paper 1109, 162 p.

Piper, D. J. W., 1971; Lower Capistrano Formation at Dana Harbor; notes on turbidite sedimentology in Bergen, F. W., ed., Guidebook Newport Lagoon to San Clemente, California, Pacific Section, Soc. Econ. Paleontologists and Mineralogists, Los Angeles, October, 1971, p. 37-40.

Piper, D. J. W., and Normark, W. R., 1971, Re-examination of a deep-sea fan and fan-valley, southern California: Geol. Soc. America Bull., v. 82, p. 1823-1830.

Smith, P. B., 1960, Foraminifera from the Monterey Shale and Puente Formation, Santa Ana Mountains and San Juan Capistrano area, California: U.S. Geol. Survey Prof. Paper 294-M p. 463-495.

Stuart, C. J., 1973, Lithofacies in the San Onofre Breccia, Laguna Beach to Dana Point, Orange County, California: a preliminary report in Ingle, J. C., ed., Guidebook SEPM Trip 1 Miocene sedimentary environment and biofacies, southeastern Los Angeles Basin, Ann. Meeting Am. Assoc. Petroleum Geologists, Soc. Econ. Paleontologists and Mineralogists, Soc. Exploration Geophysicists, Los Angeles, May 1973, p. 55-58.

Vedder, J. G., 1970, Road log stop 4,5,6, description of units. Summary of geology of the San Joaquin Hills [California], in Vernon, J. W. Chm., Guidebook, Pacific Sections, Am. Assoc. Petroleum Geologists, Soc. Econ. Paleontologists and Mineralogists, Soc. Exploration Geophysicists, March 1970, Newport Beach, California, p. 2-9; 15-19.

_____, 1971, The San Onofre Breccia in the San Joaquin Hills in Bergen, F. W., ed., Guidebook Newport Lagoon to San Clemente, California, Pacific Section, Soc. Econ. Paleontologists and Mineralogists, Los Angeles, October, 1971, p. 12-21.

_____, 1972, Review of stratigraphic names and megaformal correlations of Pliocene rocks along the southeast margin of the Los Angeles basin, California, in Stinemeyer, E. H., ed., The Pacific Coast Miocene Biostratigraphic Symposium, Pacific Section, Soc. Econ. Paleontologists and Mineralogists, Bakersfield, California, March, 1972, p. 158-172.

Vedder, J. G., Yerkes, R. F., and Schoellhamer, J. E., 1957, Geologic map of the San Joaquin Hills-San Juan Capistrano area, Orange County, California: U.S. Geol. Survey Oil and Gas Inv. Map, OM 193.

Warren, A. D., 1972, Luisian and Mohnian biostratigraphy of the Monterey Shale at Newport Lagoon, Orange County, California, in Stinemeyer, E. H., ed., The Pacific Coast Miocene Biostratigraphic Symposium, Pacific Section, Soc. Econ. Paleontologists and Mineralogists, Bakersfield, California, March 1972, p. 27-36.

White, W. A., 1971, Biostratigraphy of the Capistrano Formation, Dana Point-Capistrano area, California, in Bergen, F. W., ed., Guidebook Newport Lagoon to San Clemente, California, Pacific Section, Soc. Econ. Paleontologists and Mineralogists, Los Angeles, October 1971, p. 50-54.

Wilcoxon, J. A., 1969, Tropical planktonic zones and calcarcous nannoplankton correlations in part of the California Miocene: Nature, v. 221, no. 5184, p. 950-951.

Wornardt, W. W., Jr., 1973, Diatom, silicoflagellate, radiolarian, calcareous mannofossil, and foraminiferal biostratigraphy of the middle and late Miocene and Pliocene of Newport Back Bay, Newport Beach, California, in Ingle, J. C., ed., Guidebook SEPM Trip 1 Miocene sedimentary environment and biofacies, southeastern Los Angeles Basin, Ann. Meeting Am. Assoc. Petroleum Geologists, Soc. Econ. Paleontologists and Mineralogists, Soc. Exploration Geophysicists, Los Angeles, May 1973, p. 39-53.

Yerkes, R. F., McCulloh, T. H., Schoellhamer, J. E., and Vedder, J. G., 1965, Geology of the Los Angeles basin, California; an introduction: U.S. Geol. Survey Prof. Paper 420A, 57 p.

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