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## INTRODUCTION

This map presents the geology of four 7½-minute quadrangles in the western Transverse Ranges in which the possibility of some uranium resource potential has been discovered and to which geoquimical studies have been undertaken to evaluate this potential. This map will be used as a base map for the reports resulting from those studies.

The area lies east of Santa Barbara in the eastern Santa Ynez and western Topatopa Mountains and mountains to the north. The map is mostly compiled from mapping and compilation by Dibblee (1966, 1979, 1982a, 1982b, 1982c, and unpub.). The geology of the region has been summarized by Nilsen and Clarke (1975, p. 26-29); Dickinson (1969, p. 6-23), and Dibblee (1966, p. 63-68).

Eocene marine sedimentary rocks predominate and five east-west trending faults divide the area into four structural blocks. Within these blocks subparallel trending synclines and anticlines expose rocks ranging in age from Cretaceous through Pliocene. Significant movement on one of these faults, the Santa Ynez fault, and lateral and temporal changes in depositional environments make precise lithostratigraphic correlations difficult. Structures and stratigraphy are briefly discussed below in relation to their position north or south of the Santa Ynez fault.

## Discussion of Geology

The map area is predominately underlain by Eocene sedimentary rocks which overlie an upper Cretaceous shale with some conglomerate interbeds. The older Tertiary rocks probably represent two complete sedimentary cycles: turbidite deposits of the upper Juncal Formation and lower Matilija Sandstone shallowed into the upper Matilija, renewed transgression brought bathyal depth deposition of the Cozy Dell Shale; subsequent regression instituted deposition of shallower water Coldwater Sandstone through the non-marine Sespe Formation (Nilsen and Clarke, 1975, p. 28-29). It is the conformable contact between shallow marine Coldwater and overlying non-marine Sespe that is being prospected for uranium resources. The nonmarine Sespe Formation is conformably overlain by Miocene marine rocks, which were deposited as a transgressive sequence on an interhaval sill (Dickinson, 1969, p. 71).

In the Santa Ynez-Topatopa Mountains the Tertiary formational designations appear to cause few problems when used. North of the Santa Ynez fault, however, interfingering relationships, facies changes, and microfossil age discrepancies create nomenclatural and stratigraphic problems. Whether the rocks should be divided into: 1) formational units, as presented here; 2) the reassignment of the second regressive sequence to the Topatopa Group, as suggested by Dickinson (1969, p. 71); or 3) the assignment of the marine Paleogene rocks to one lithostratigraphic unit with sublithofacies, is debatable.

Two major faults, the Santa Ynez and the Pine Mountain, cross the study area. Dickinson and Lowe (1966, p. 2465) described the Pine Mountain fault as a high angle reverse fault with thousands of feet of separation, and Vedder and Brown (1968, p. 256) interpreted the fault as an extension of the Nacimiento thrust. Another interpretation suggests several stages of deformation including one of left-lateral strike-slip movement (T. H. Medlin, 1982, oral commun.). While both dip-slip and strike-slip movement have occured along the Santa Ynez fault (Dibblee, 1966, p. 66; Gordon, 1978, p. 59; McCracken, 1969, p. 46); Medlin, 1981), and while most workers agree to a few kilometers of uplift, there is general disagreement on the amount of left-lateral movement. Both faults have been active since middle Miocene, and the westernmost Santa Ynez fault may still be active (Hall, 1977, p. 428; Sylvester and Darrow, 1979, p. 385; Keaton, 1978, p. 111). Folding of the Tertiary sediments preceeded faulting.

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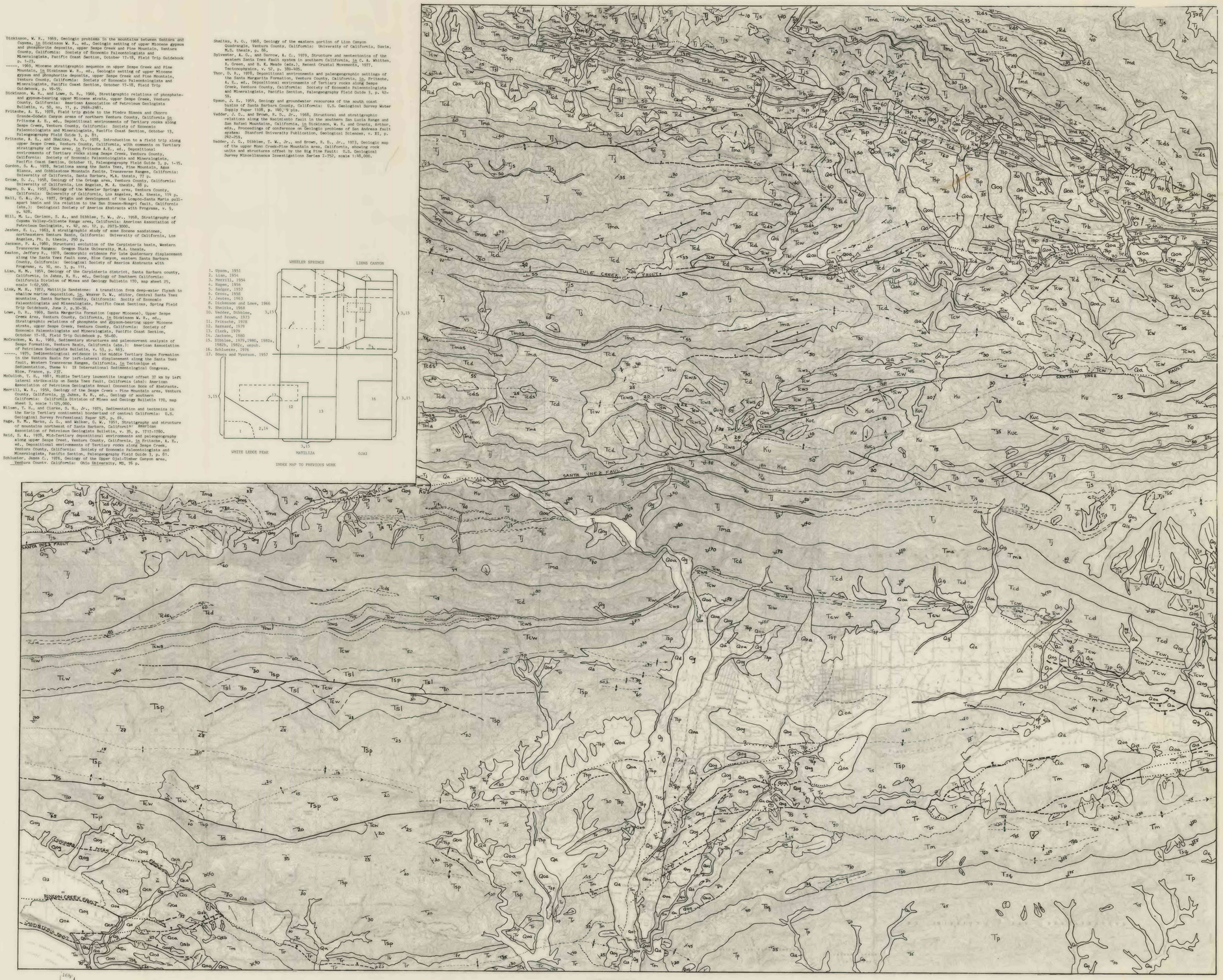


## CORRELATION OF MAP UNITS

| | | |
|---|---|---|
| Qa | Holocene | QUATERNARY |
| Qg | | |
| Qls | | |
| Qoa | | |
| Qoa | Unconformity | |
| | Pleistocene | |
| Qvs | | |
| Qsb | | |
| Unconformity | | |
| Tp | Pliocene | TERTIARY |
| Tsq | | |
| Tsm/Tsmp | | |
| Tmr Tms | Miocene | |
| Tr/Trb | | |
| Tv | Oligocene | |
| Tsp/Tsl | | |
| Tcw/Tcws | | |
| Tcd/Tcds | Eocene | |
| Tma/Tmas | | |
| Tj/Tjs | | |
| Unconformity | | |
| Ku/Kuc | Upper Cretaceous | CRETACEOUS |

## DESCRIPTION OF UNITS

Qa SURFICIAL SEDIMENTS (Holocene) - Stream channel, flood plain, fan deposits, and aeolian deposits

Qg Unconsolidated boulder to sandy gravel deposits

Qls Landslide debris

Qoa OLDER SURFICIAL SEDIMENTS (Pleistocene) - Sandy to silty alluvial fan deposits

Qog Older alluvial boulder to gravel terrace deposits

Qvs Nonmarine sediments (Pleistocene) - Along lower Rincon Creek, consist of the Casitas Formation: red, well-cemented gravels, arkosic sands, and clays (Dibblee, 1966, p.59). In Upper Ojai Valley, consist of the Saspal Formation: alluvial gravels, sands, and clays (Dibblee, 1982c)

Qsb SANTA BARBARA FORMATION (Pleistocene) - Buff to yellow, fine- to coarse-grained, fossiliferous sandstone and interbedded calcareous siltstone. Unconformity at base. Gradational upwards into Casitas Formation (Dibblee, 1966, p. 58)

Tp PICO FORMATION (Pliocene) - Marine siltstone, claystone and sandstone

Tsq SISQUOC FORMATION (upper Miocene and (or) lower Pliocene) - Marine diatomaceous siltstone and argillaceous to semi-siliceous shale. Weakly laminated, fissil to massive. In the map area, occurs only south of the Santa Ynez fault

Tsm SANTA MARGARITA FORMATION (upper Miocene) - White, fine-grained, fossiliferous, marine sandstone and phosphatic mudstone. Divided into several facies in the upper Sespe creek area (Dickinson and Lowe, 1966, p. 2467-2470; Lowe, 1969, p. 56; Thor, 1978, p. 63). Also includes:

Tsmp Phosphatic mudstone interbeds

Tm MONTEREY FORMATION (lower to upper Miocene) - Yellowish-gray, thin bedded, moderately resistant, in part siliceous, shale. Beds commonly exhibit primary sedimentary structures indicative of a moderately deep depositional environment. Contains Foraminifera and fish scales. Also includes:

Tms Yellowish gray to white, fine- to medium-grained sandstone and minor local conglomerate informally referred in part by Dibblee (unpub.) to the Branch Canyon Formation of Hill and others (1958)

Tr RINCON SHALE (lower Miocene) - Gray, massive to poorly bedded, argillaceous to silty shale with a few very fine grained micaceous sandstone layers. Also includes:

Trb Piedra Blanca Sandstone of Badger (1957). Light grey to buff, massive to cross-bedded, fine to medium grained, arkosic sandstone. Depositional environments and nomenclatural problems for this unit are summarized by Reid (1978, p. 27-41) who refers it to the Vaqueros

Tv VAQUEROS SANDSTONE (upper Oligocene to lower Miocene) - Light grey to buff, well sorted, fine- to coarse-grained, fossiliferous sandstone, with interbeds of mudstone and siltstone. Sandstones are crossbedded and contain thin calcareous layers (Dibblee, 1966, p. 41; Reid, 1978, p. 27-41)

Tsp SESPE FORMATION (late Eocene and early Oligocene) - Light tannish to red-brown, thick, resistant beds composed of 75% sandstone, 15% conglomerate, and 10% siltstone occur both north and south of the Santa Ynez fault (Dibblee, 1966, p. 37). Sandstones are fine to coarse grained, moderately to poorly sorted, friable, and arkosic. Thin (2-3 cm) red to green siltstone interbeds are moderately porous and permeable. Unfossiliferous except for trace fossils of marine-like burrows (Fritsche, 1978, p. 77). Grain size decreases stratigraphically upward. The diagnostic red-brown color and primary structures such as moderate, raindrop prints, large scale cross beds, and graded bedding indicate a non-marine fluvial depositional environment (McCracken, 1975, p. 238). The Vaqueros Sandstone rests depositionally on the Sespe Formation. Also includes:

Tsl Predominantly basal conglomerate, but in the vicinity of Chimahoo Mountains (8 miles west of Nelenes Oaks) includes light pinkish to yellowish gray coarse grained sandstone and reddish and brownish gray silty shale and mudstone (Bowers and Myerson, 1957)

Tcw COLDWATER SANDSTONE (late Eocene) - White to light tan, moderatly to well sorted, moderately resistant, fine- to medium-grained, micaceous sandstone. These marine sandstone beds tend to be laterally persistant and vary in thickness from 0.2 to 2 m. The beds are commonly massive, but some contain sedimentary structures including low angle cross-beds, parallel laminations, and scour and fill structures (Fritsche and Shukita, 1978, p. 2-3; Gordon, 1978, p. 19). Siltstone interbeds (5 to 20 % of the unit in the upper part) contain 0.3 to 0.6 m thick, irregularly and widely spaced, discontinuous calcareous concretionary layers (Fritsche and Shukita, 1978, fig. 6). Brown to red siltstone, and local lags of oyster shells, indicative of near- to on-shore environments, mark the transitional zone between basal Sespe Formation and Coldwater Sandstone north and south of the Santa Ynez fault (Dibblee, 1966, p. 33; Shukita, 1970, p. 20-23; Bowes and Myerson, 1957, p. 6). Also includes:

Tcws Laterally persistant siltstone beds

Tcd COZY DELL SHALE (middle and upper Eocene) - Predominatly black to grey, argillaceous to silty, micaceous shale and mudstone with occasional fine grained sandstone interbeds and limy concretions (Nilsen and Clarke, 1975, p. 28). Also includes:

Tcds Buff colored, resistant, fine- to-medium grained sandstone (Dibblee, 1966, p. 26)

Tma MATILIJA SANDSTONE (middle and upper Eocene) - Composed of many buff colored beds of massive to cross-bedded, fine- to medium-grained sandstone separated by partings of micaceous shale. Gradational through shale interbeds with the underlying Juncal. Also includes:

Tmas Gray micaceous shale with local thin sandstone layers

Tj JUNCAL FORMATION (lower (?), middle, and upper Eocene) - Predominately dark to medium gray micaceous shale with minor thin interbedded sandstone. Also includes:

Tjs Light gray, massive to thin-bedded, resistant, fine- to medium-grained arkosic sandstone and minor interbedded gray micaceous shales

Ku UNNAMED MARINE STRATA (late Cretaceous) - Commonly greyish-black, thin-bedded to laminated non-calcareous micaceous shale with thin interbeds of micaceous, clay-rich sandstone (Shukita, 1970, p. 8). Also includes:

Kuc Howard Canyon Conglomerate of Badger (1957, p. 11) tan, thick-bedded to massive conglomerate of cobbles in coarse-grained sandstone martix

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

# GEOLOGIC MAP OF THE LION CANYON, MATILIJA, OJAI, WHEELER SPRINGS, AND WHITE LEDGE PEAK QUADRANGLES, CALIFORNIA

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