

U. S. DEPARTMENT OF THE INTERIOR

U. S. GEOLOGICAL SURVEY

**Preliminary geologic map of the Santa Susana quadrangle,
Southern California**

Compiled by

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Open File Report 95-829

This report is preliminary and has not been reviewed for conformity with U. S. Geological Survey editorial standards or the North American Stratigraphic Code. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U. S. Government.

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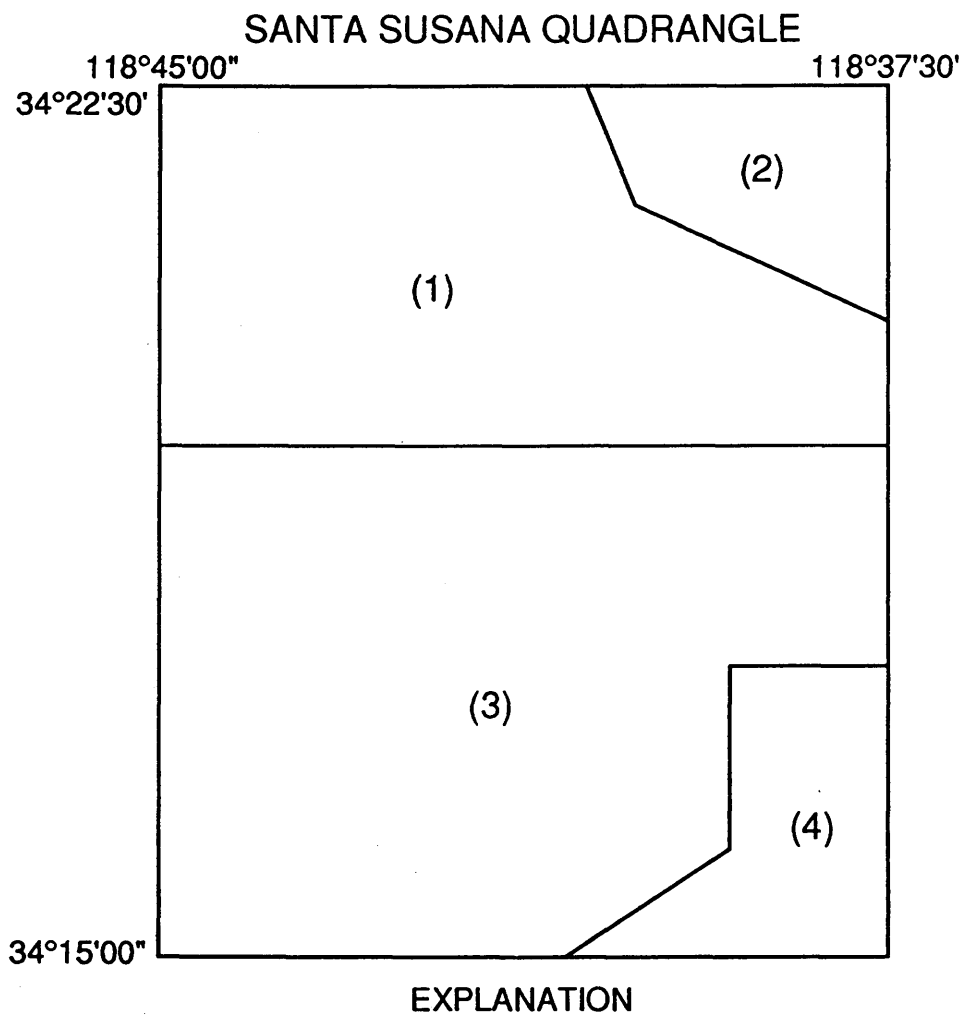
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INTRODUCTION

This 1:24,000 map is a preliminary product of the Southern California Digital 1:100,000 Geologic Map Series (Morton and Kennedy, 1989). It was scanned and processed digitally using the U. S. Geological Survey Alacarte menu-driven adaptation (Wentworth and Fitzgibbon, 1991) of ARC/INFO, a commercial geographic information system (GIS) available from Environmental Systems Research Institute, Redlands, California. Minor adjustments have been made in geologic boundaries to conform to the metric base, which was enlarged from 1:100,000.

This 1:24,000 quadrangle is one of sixteen that form the west half of the Los Angeles 1:100,000 quadrangle; the 1:24,000 quadrangle maps form the basic data supporting the regional-scale maps, and thus include available data on exploratory wells and fossil collections.

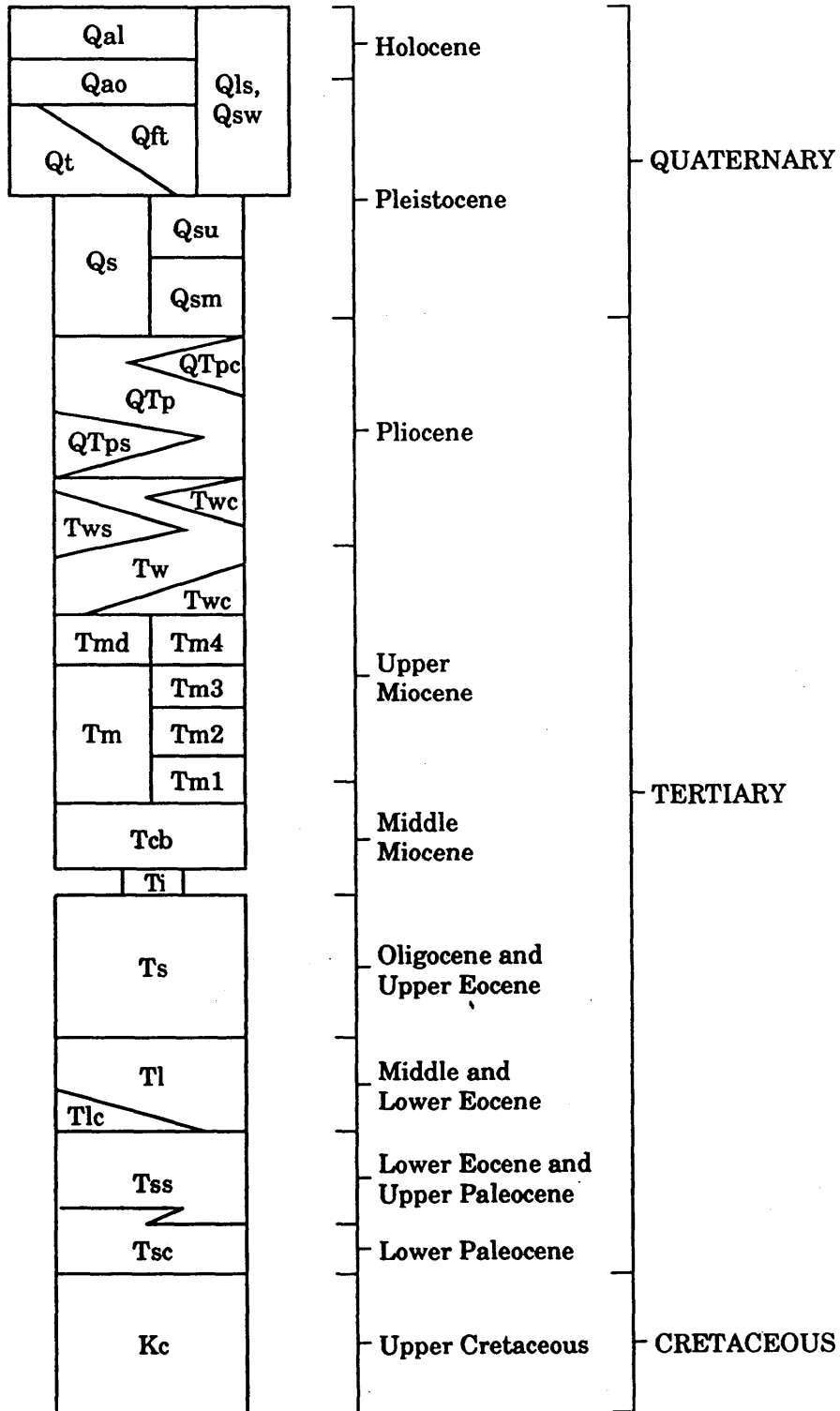
Stratigraphic nomenclature is largely that of the source materials; it is subject to further modification as compilation progresses.



1. Butler, 1977; CDMG, 1972; Yeats, 1987
2. Winterer and Durham, 1962
3. CDMG, 1972; Squires, 1983
4. CDMG, 1972; Hanson, 1981

Figure 1--Index map showing sources of geologic mapping

CORRELATION OF MAP UNITS, SANTA SUSANA QUADRANGLE



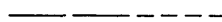







EXPLANATION, PRELIMINARY GEOLOGIC MAP, SANTA SUSANA QUADRANGLE

DESCRIPTION OF MAP UNITS

- Qal** Alluvium (Holocene)--Gravel, sand, and silt; unconsolidated and uncemented; in and adjacent to active channels
- Qao** Older alluvium (Holocene and Pleistocene)--Gravel, sand, silt, and clay; massive to poorly bedded; unconsolidated to moderately consolidated and locally cemented; locally includes boulders and beds of shale pebbles from the Modelo Formation
- Qls** Landslide deposits (Holocene and Pleistocene)--Disrupted bedrock and surficial materials in complex associations of slumps, block glides, debris slides, earthflows, and rockfalls
- Qsw** Slope wash (Holocene and Pleistocene)--Soil, rock fragments, and organic debris; thickness greater than 1 m; locally well cemented by calcium carbonate
- Qt** Terrace deposits (Pleistocene)--Interbedded sand, silt, and rock fragments; massive to poorly bedded and poorly consolidated; generally along walls of streams
- Qft** Fan and terrace deposits undivided (Chiefly Pleistocene)--Sand, silt, and rock fragments, massive to poorly bedded; poorly to well consolidated
- Qs** Saugus Formation (Pleistocene)--Sandstone, conglomerate, and siltstone; nonmarine, poorly sorted, loosely consolidated; thickness more than 300 m; **Qsu**, sandstone, medium to coarse grained, friable, pebbly, cross bedded; **Qsm**, marine facies: sandstone and conglomerate, locally contains marine molluscs;
- QTP** Pico Formation (Pleistocene? and Pliocene)--Sandy siltstone, clayey siltstone, sandstone, and pebbly sandstone; massive to well bedded; locally rich in foraminifera; **QTpc**, sandstone and conglomerate; **QTps**, siltstone, soft olive gray with limonite concretions, and very fine-grained sandstone
- Tw** Towsley Formation (early Pliocene and late Miocene)--Sandstone, arkosic, fine-to coarse-grained, well-indurated; thickness more than 760 m; **Twc**, chiefly sandstone with structures characteristic of turbidity current deposition or conglomerate; **Tws**, chiefly siltstone or mudstone
- Tm** Modelo Formation (middle? and late Miocene)--Shale, silty to sandy, cherty, siliceous, diatomaceous, or clayey, interbedded sandstone; in Oat Mountain quadrangle to east contains foraminifera characteristic of Luisian and Mohnian Stages; thickness greater than 600 m; **Tmd**, diatomaceous shale; **Tm4**, siltstone with limestone concretions; **Tm3**, diatomaceous to siliceous shale and chert; **Tm2**, siliceous shale and bedded chert, lenses of sandstone; **Tm1**, chiefly sandstone, fine- to coarse-grained, some interbedded shale

- Tcb Calabasas Formation (of Topanga Group)** (Middle Miocene)--Sandstone and siltstone; massive to poorly bedded, locally with concretions; finer-grained beds locally contain foraminifera,
- Ti Igneous rocks** (Middle Miocene?)--Intrusive basalt
- Ts Sespe Formation** (Oligocene and late Eocene)--Fluvial sandstone, pebble-cobble conglomerate, claystone, and mudrock; nonmarine, thickness more than 1650 m; (see Taylor, 1983, for facies interpretations)
- Tl Llajas Formation** (early and middle Eocene)--Type section, center of map: transitional alluvial-marine sequence (Squires, 1983a); conglomerate, interbedded well-laminated well-sorted sandstone, bioturbated sandstone and siltstone; 1 meter-thick sandstone bed near center of type section contains abundant molluscan fauna referred to the early-middle Eocene (Squires, 1983a); thickness about 490 m; **Tlc**, pebble conglomerate and interbedded thin sandstone, thickness about 55 m
- Tss Santa Susana Formation** (late Paleocene to early Eocene)--Chiefly mudrock, pervasively fractured, with local tongues of fine- to medium-grained sandstone and pebble conglomerate; locally abundant mollusks diagnostic of the "Meganos" and "Martinez" Stages (Saul, 1983); thickness about 1000 m
- Tsc Simi Conglomerate** (Paleocene)--Chiefly pebble-cobble conglomerate, interbedded fine-grained sandstone, minor mudrock; conglomerate massive to poorly bedded; locally contains diagnostic mollusk Turritella peninsularis (Parker, 1983; Saul, 1983); thickness as great as 50 m
- Kc Chatsworth Formation** (Upper Cretaceous)--Sandstone, coarse-grained to pebbly, arkosic, massive, resistant, strongly jointed, beds several meters thick; interbeds of weak, friable, micaceous siltstone as thick as 5 m; diverse molluscan faunas from adjoining Simi Hills to south referred to mid-Campanian to early Maestrichtian Stages (Saul and Alderson, 1981); thickness more than 610 m, base not exposed or drilled

MAP SYMBOLS

| | |
|---|---|
|  | Contact or mapped horizon—Long-dashed where approximately located, short-dashed where inferred |
|  | Fault— Long-dashed where approximately located, short-dashed where inferred, dotted where concealed |
|  | Thrust fault—Approximately located, dotted where concealed; teeth on upper plate |
|  | Anticline— Approximately located, dotted where concealed; showing crestline |
|  | Syncline— Approximately located, dotted where concealed; showing troughline |
|  | Strike and dip of inclined beds |
|  | Exploratory well— Number refers to table 1 below |
|  | Fossil locality--Number refers to table 2 below |

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Table 1--DATA ON EXPLORATORY WELLS, SANTA SUSANA QUADRANGLE¹

| MAP NO. | T | RW | SEC. | OPERATOR | NAME/NUMBER | ELEV- ATION (FT.) | TOTAL DEPTH (FT.) | BOT- TOM ² |
|------------|----|----|------|---------------------------------------|----------------------------------|-------------------------|-------------------------|--------------------------|
| 197 | 3N | 18 | 1 | Great Basins Pet. | Carlsberg NL&F 1 | 1096 | 5025 | Mu |
| 199 | 3N | 18 | 1 | UNOCAL | Tapo Ridge 1-1 | 2105 | 6033 | C |
| 200 | 3N | 18 | 1 | UNOCAL | Simi 11 | 1337 | 6640 | O |
| 202 | 3N | 18 | 2 | Exxon Corp. | Newhall Land & Farming 1 | 1906 | 5798 | M |
| 203 | 3N | 18 | 2 | UNOCAL | Oakridge 60-2 | 2622 | 11036 | O |
| 204 | 3N | 18 | 3 | UNOCAL | Oakridge 41-3 | 2425 | 5488 | M |
| 216 | 3N | 18 | 11 | UNOCAL | Simi 15 | 2736 | 7980 | O |
| 217 | 3N | 18 | 12 | UNOCAL | Simi 28 | 1996 | 10993 | O |
| 218 | 3N | 18 | 12 | UNOCAL | Simi 10-12 | 2276 | 2250 | O |
| 219 | 3N | 18 | 13 | Alpha Petrol. | M. T. 1 | 2300 | 10017 | O? |
| 220 | 3N | 18 | 13 | Havenstrite Oil | Tapo 1 | 1948 | 8394 | E |
| 221 | 3N | 18 | 13 | AECO Corp. | Aeco-Nordon-Sunset- Tapo 1-13 | 1967 | 2822 | O |
| 222 | 3N | 18 | 13 | Chevron USA Inc. | Tapo 2 | 1710 | 1370 | M |
| 223 | 3N | 18 | 14 | J. A. Bell | Tapo 71X | 2125 | 7386 | C |
| 224 | 3N | 18 | 14 | Chevron USA Inc. | Tapo 1 | 1850 | 1098 | Pl-Q |
| 230 | 3N | 18 | 25 | Marathon Oil Co. | Getty Tapo Ranch 1 | 1325 | 3799 | C |
| 231 | 3N | 18 | 26 | Getty Oil Co. | Tapo 1-26 | 1465 | 7000 | C |
| 232 | 3N | 18 | 29 | ARCO Oil & Gas Co. | Tapo Fee B-1 | 1037 | 1970 | O |
| 233 | 3N | 18 | 30 | UNOCAL | Simi 1-30 | 1157 | 3650 | O |
| 234 | 3N | 18 | 31 | UNOCAL | Oak Park 23 | 1100 | 1100 | C |
| 235 | 3N | 18 | 31 | UNOCAL | Simi 1-31 | 784 | 3343 | E |
| 236 | 3N | 18 | 32 | Getty Oil Co. | Tapo 103 | 1178 | 2674 | O |
| 237 | 3N | 18 | 34 | Getty Oil Co. | Tapo 49 | 1193 | 4481 | E |
| 238 | 3N | 18 | 35 | Getty Oil Co. | Tapo 101 | 1188 | 3224 | E |
| 239 | 3N | 18 | 35 | McDonald & Norris | Water Co. 1 | 1111 | 3636 | E |
| 240 | 3N | 18 | 35 | R. & K. Hammerlee | Dudley 1 | 1155 | 927 | O |
| 241 | 3N | 18 | 36 | Midway-Simi Oil Co. | 1 | 1130 | 1905 | E |
| 242 | 3N | 18 | 36 | Williamson & Danaher | 1 | 1200 | 1034 | E |
| 243 | 3N | 18 | 36 | Bartlow-Hetman Oil Development Co. | 3 | 1072 | 888 | E |
| 336 | 3N | 17 | 2 | Chevron USA Inc. | NL & F 7-1 | 1508 | 9327 | Mu |
| 337 | 3N | 17 | 2 | Chevron USA Inc. | CSO 32 | ? | 2445 | Mu |
| 338 | 3N | 17 | 2 | Calif. Star Oil | Simi 1 | 2350 | 1300 | Mu-Pl |
| 339 | 3N | 17 | 7 | UNOCAL | South Tapo 17-7 | 2425 | 2829 | O |
| 340 | 3N | 17 | 7 | UNOCAL | Simi 18-7 | 2160 | 2025 | O |
| 341 | 3N | 17 | 8 | UNOCAL | Anchos Robles 1 | 2560 | 7880 | O |
| 342 | 3N | 17 | 8 | UNOCAL | Fryer 1 | 2790 | 2882 | M |
| 343 | 3N | 17 | 9 | UNOCAL | Simi 23 | 2819 | 9492 | O |
| 344 | 3N | 17 | 10 | UNOCAL | Blue Sage 1 | 2550 | 10697 | C |
| 345 | 3N | 17 | 10 | UNOCAL | Chivo Canyon 1 | 2931 | 9929 | O |
| 349 | 3N | 17 | 14 | UNOCAL | Union-T. W. Stuck 1 | 2906 | 10405 | O |
| 350 | 3N | 17 | 14 | Chevron USA Inc. | Brady 2-1A | 3229 | 9576 | E |
| 351 | 3N | 17 | 14 | UNOCAL | Marvel Ranch 1-4 | 2580 | 8336 | E |

| MAP NO. | T | RW | SEC. | OPERATOR | NAME/NUMBER | ELEV- ATION (FT.) | TOTAL DEPTH (FT.) | BOT- TOM ² |
|------------|----|----|------|--|-----------------------|-------------------------|-------------------------|--------------------------|
| 351 | 3N | 17 | 14 | UNOCAL | Marvel Ranch 1-4 | 2580 | 8336 | E |
| 352 | 3N | 17 | 16 | UNOCAL | Simi 19 | 2007 | 6734 | E |
| 353 | 3N | 17 | 16 | UNOCAL | Simi 29 | 2074 | 3842 | P-E |
| 354 | 3N | 17 | 17 | UNOCAL | Simi 6 | 2137 | 2920 | P1 |
| 355 | 3N | 17 | 18 | UNOCAL | Simi Core Hole 22 | 2308 | 3403 | O |
| 356 | 3N | 17 | 18 | UNOCAL | Simi 22-18 | 2201 | 1750 | O |
| 357 | 3N | 17 | 18 | UNOCAL | Simi 9 | 1630 | 3936 | E |
| 358 | 3N | 17 | 22 | UNOCAL | Simi 4 | 1730 | 3317 | P |
| 359 | 3N | 17 | 23 | Midway Drilling Co. | 1 | 2170 | 1428 | E |
| 360 | 3N | 17 | 23 | UNOCAL | Simi 13 | 2349 | 3485 | E |
| 361 | 3N | 17 | 23 | Mobil Oil Co. | Joughin 1 | 2100 | 2714 | E |
| 362 | 3N | 17 | 23 | Chevron USA Inc. | A. R. Joughin Comm. 1 | 1947 | 3471 | Ku |
| 367 | 3N | 17 | 28 | UNOCAL | Simi 24 | 1448 | 5177 | P |
| 368 | 3N | 17 | 29 | M. H. Marr | Marr Ranch 103 | 1500 | 1550 | E |
| 369 | 3N | 17 | 29 | M. H. Marr | Marr Ranch 27 | 1906 | 6936 | E |
| 370 | 3N | 17 | 30 | M. H. Marr | Marr Ranch 21 | 1805 | 2620 | E |
| 371 | 3N | 17 | 31 | Shell CPI | Marr 1 | 1201 | 3922 | E |
| 372 | 3N | 17 | 31 | Northridge Oil Co. | Simco 1 | 1150 | 3048 | E |
| 373 | 3N | 17 | 31 | Northridge Oil Co. | Simco 2 | 1100 | 1219 | E |
| 374 | 3N | 17 | 32 | M. H. Marr | Marr Ranch 26 | 1750 | 6800 | E |
| 375 | 3N | 17 | 32 | K. C. Oil Co. | KC-1 | 1475 | 1694 | E |
| 386 | 2N | 18 | 1 | Bartlow-Hetman Oil Development Co. | 2 | 1038 | 850 | O |
| 387 | 2N | 18 | 1 | Bartlow-Hetman Oil Development Co. | 4 | 1057 | 600 | O |
| 388 | 2N | 18 | 1 | Jess C. Barnes | Ricaute 1 | 1010 | 771 | O |
| 389 | 2N | 18 | 1 | Jess C. Barnes | Didio-Jeannie 1 | 995 | 600 | O |
| 390 | 2N | 18 | 1 | Simi Oil & Ref. Co. | 1 | 995 | 2798 | O |
| 391 | 2N | 18 | 2 | James S. Hull | Hull 1 | 950 | 1717 | O |
| 405 | 2N | 18 | 11 | Carillo Explor- ation Co. | Wiekhorst 1 | 975 | 3789 | E |
| 406 | 2N | 18 | 12 | Paloma Oil Co. | Paloma-Marr 1 | 972 | 2812 | E |
| 407 | 2N | 18 | 14 | Newell & Lattner | Newell-Lattner 1 | 950 | 2303 | E |
| 408 | 2N | 18 | 14 | Regent Oil Co. | Runkle 1 | 930 | 3247 | P-E |
| 409 | 2N | 18 | 14 | Simian Oil Co. | Simian 1 | 981 | 1178 | E |
| 411 | 2N | 18 | 14 | Webb Oil Co. | Runkle 1 | 1180 | 1445 | E |
| 442 | 2N | 17 | 5 | Germanina Trucano | 1 | 1070 | 1000 | P |
| 443 | 2N | 17 | 5 | Pamoan Oil Co. | Flannagan 2 | 1335 | 2725 | P |
| 444 | 2N | 17 | 5 | Alexander Drlg. Co. | 1 | 1185 | 1724 | P |
| 445 | 2N | 17 | 5 | Crinklaw, Smith, & Larson Partners. | Flannagan 1 | 1250 | 1260 | P |
| 446 | 2N | 17 | 5 | A. J. Mead | 1 | 1100 | 1254 | P |
| 447 | 2N | 17 | 6 | S. S. Syndicate | 2 | 1075 | 1155 | E |
| 448 | 2N | 17 | 6 | Pamoan Oil Co. | Hot Rod Flannagan 1 | 1080 | 3251 | E |
| 449 | 2N | 17 | 6 | Simco Inc. | 1 | 1000 | 800 | E |
| 450 | 2N | 17 | 6 | E. F. Stella | Button 1A | 1035 | 1119 | E |
| 452 | 2N | 17 | 6 | S. S. Syndicate | 1 | 1000 | 1000 | E |

| MAP NO. | T | RW | SEC. | OPERATOR | NAME/NUMBER | ELEV- ATION (FT.) | TOTAL DEPTH (FT.) | BOT- TOM ² |
|------------|----|----|------|--------------------------|-------------|-------------------------|-------------------------|--------------------------|
| 453 | 2N | 17 | 7 | C. A. Palmer, Trustee | Brandies 1 | 1194 | 2498 | P |
| 454 | 2N | 17 | 8 | Pomac Oil Co. | 1 | 900 | 565 | P |
| 455 | 2N | 17 | 8 | Dawson Oil Co. | Dawson 1 | 980 | 2860 | P |

¹Data from Yerkes and Showalter, 1990.

²C, confidential; E, Eocene; K, Cretaceous; M, Miocene; O, Oligocene non-marine; P, Paleocene; Pl, Pliocene; Q, Pleistocene; u, upper.

Table 2--DATA ON FOSSIL LOCALITIES, SANTA SUSANA QUADRANGLE

| MAP NO ¹ | T | RW | SEC | COLL- ECTOR | AGE | MAP UNIT | SOURCE |
|---------------------|----|----|-----|----------------|--------|-------------|--|
| F725 | 3N | 18 | 24 | CSUN | Pl. | Ts1 | Squires & White, 1983 |
| F739 | 3N | 17 | 29 | CSUN | Pl. | Ts1 | (do.) |
| F8122 | 3N | 17 | 32 | USGS | Ee | Tss | Kew, 1924 |
| F8123 | 3N | 17 | 32 | USGS | Em | T1 | (do.) |
| F8124 | 2N | 18 | 12 | USGS | Em | T1 | (do.) |
| FS371 | 3N | 17 | 26 | CSUN | Em | T1 | Squires, 1983 |
| FS374 | 3N | 17 | 28* | CSUN | Em | T1 | (do.) |
| FS444 | 3N | 17 | 28* | CSUN | Em | T1 | (do.) |
| FS445 | 3N | 17 | 28* | CSUN | Em | T1 | (do.) |
| FS458 | 3N | 17 | 29 | CSUN | Em | T1 | (do.) |
| FS475 | 3N | 17 | 30 | CSUN | Em | T1 | (do.) |
| FS493 | 3N | 17 | 28* | CSUN | Em | T1 | (do.) |
| FS498 | 3N | 17 | 26 | CSUN | Em | T1 | (do.) |
| fA25 | 2N | 17 | 11 | UOC | K1 | Kc | Almgren, 1981 |
| fA52 | 2N | 17 | 17 | UOC | K1 | Kc | (do.) |
| fA59-62 | 2N | 17 | 11 | UOC | K1 | Kc | (do.) |
| fA77 | 2N | 17 | 16 | UOC | K1 | Kc | (do.) |
| fA89 | 2N | 17 | 16 | UOC | K1 | Kc | (do.) |
| f1086- 1087 | 3N | 17 | 29 | LSU | Em | T1 | Cushman & McMasters, 1936 |
| f1099- 1089 | 3N | 17 | 29 | LSU | Em | T1 | (do.) |
| f1090 | 3N | 17 | 32 | LSU | Em | T1 | (do.) |
| f1091 | 3N | 17 | 32 | LSU | Ee | Tss | (do.) |
| f1092 | 3N | 17 | 32 | LSU | Em | T1 | (do.) |
| f1093 | 3N | 17 | 29 | LSU | Em | T1 | (do.) |
| f1094 | 3N | 17 | 30 | LSU | Em | T1 | (do.) |
| f1095 | 3N | 17 | 30 | LSU | Em | T1 | (do.) |
| f1096 | 3N | 17 | 31 | LSU | Em | T1 | (do.) |
| f1097 | 3N | 17 | 29 | LSU | Em | T1 | (do.) |
| f1098 | 3N | 17 | 32 | LSU | Ee | Tss | (do.) |
| f1968- 1969 | 3N | 17 | 30 | LSU | Em | T1 | (do.) |
| f1970 | 3N | 17 | 30 | LSU | Ee | Tss | (do.) |
| fsec.L | 3N | 17 | 30 | UOC | Eml | T1 | Filewicz & Hill, 1983; Heitman, 1983; and Schymiczek, 1983 |
| fsec.SS | 3N | 17 | 32 | UOC | Pl. | Tss | (do.) |
| fW31 | 3N | 17 | 2 | USGS | M1-Pl. | Tto | Winterer & Durham, 1962 |
| fW33 | 3N | 17 | 5* | USGS | M1-Pl. | Tto | (do.) |
| fW34 | 3N | 17 | 5* | USGS | M1-Pl. | Tto | (do.) |

¹F, macrofossil collection; f, microfossil collection; number same as collector's number.

²Asterisk (*) indicates projected section.

³CSUN, Calif. State Univ. at Northridge; LSU, Leland Stanford Univ.; UOC, Union Oil Company; USGS, U. S. Geological Survey.

⁴E, Eocene; K, Cretaceous; M, Miocene; Pl., Pliocene; e, early; l, late; m, middle.