DIVISION OF MINES
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DEPARTMENT OF NATURAL RESOURCES
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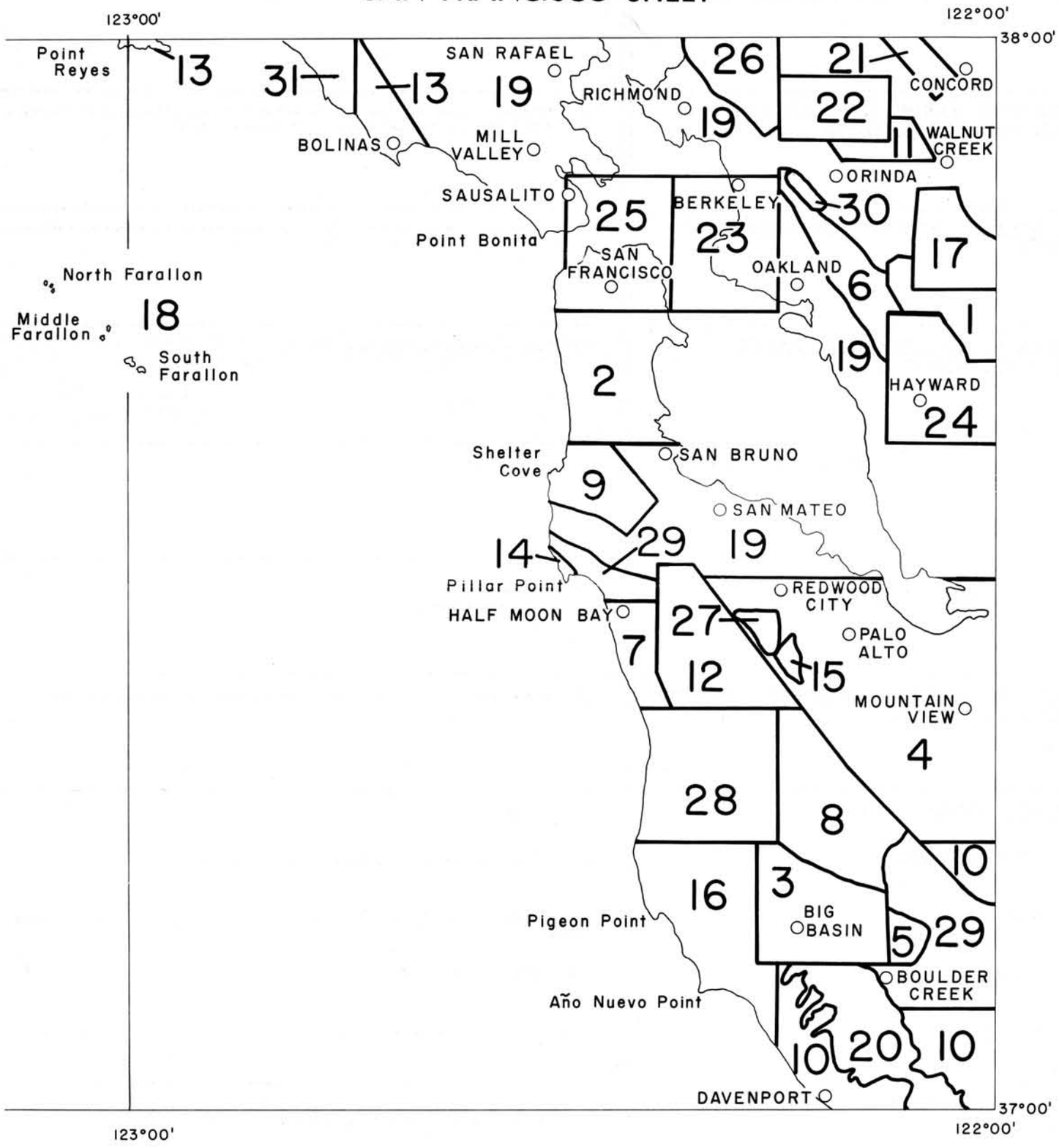
EXPLANATORY DATA
SAN FRANCISCO SHEET
GEOLOGIC MAP OF CALIFORNIA
OLAF P. JENKINS EDITION

Compiled by Charles W. Jennings, and John L. Burnett, 1961

INDEX TO GEOLOGIC MAPPING
USED IN THE COMPILATION OF THE SAN FRANCISCO SHEET



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31. Weaver, C. E., 1949, Geology and mineral deposits of an area north of San Francisco Bay, California: California Division Mines Bulletin 149, 135 pp., pl. 9: Geologic map of the Point Reyes quadrangle, scale 1:62,500.

For a complete list of published geologic maps of this area see Division of Mines Special Report 52.

STRATIGRAPHIC NOMENCLATURE— SAN FRANCISCO SHEET

AGE	STATE MAP SYMBOL	STATE MAP UNIT	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES (The formally named formations grouped within an individual State Map Unit, are listed in stratigraphic sequence from youngest to oldest.)
CENOZOIC — QUATERNARY — Recent	Qs	**RECENT DUNE SAND**	Dune sand, beach deposits.
CENOZOIC — QUATERNARY — Recent	Qal	**RECENT ALLUVIUM**	Alluvium; artificial fill; bay mud; salt marsh deposits; Temescal formation (includes Lawson's San Antonio formation)—*alluvial fan deposits* (largely Pleistocene).
CENOZOIC — QUATERNARY — Pleistocene	Qt	**QUATERNARY NONMARINE TERRACE DEPOSITS**	Stream terrace deposits.
CENOZOIC — QUATERNARY — Pleistocene	Qm	**PLEISTOCENE MARINE DEPOSITS AND MARINE TERRACE DEPOSITS**	Colma formation—*sand and clay* (San Francisco Peninsula). Merritt sand—*clayey, silty sand* (East Bay area). Marine depositional and wave-cut terraces (non-marine deposits in part).
CENOZOIC — QUATERNARY — Pleistocene	Qc	**PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS**	Alameda formation—*clay, sand and gravel* (in part marine); Campus formation—*clay, limestone, conglomerate, tuff, agglomerate, andesite, basalt flows.*
CENOZOIC — QUATERNARY — Pleistocene	QP	**PLIOCENE-PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS**	Santa Clara formation—*gravel, sand, and clay.*
CENOZOIC — TERTIARY — Pliocene	Pu	**UPPER PLIOCENE MARINE SEDIMENTARY ROCKS**	Merced formation [1]—*sand, silt, and clay.*
CENOZOIC — TERTIARY — Pliocene	Pmlc	**MIDDLE AND/OR LOWER PLIOCENE NONMARINE SEDIMENTARY ROCKS**	Mulholland formation—*shale, siltstone, sandstone;* Siesta formation—*conglomerate, sandstone, mudstone;* conglomerates of the Moraga formation (bulk of formation is volcanic—see Pv); Orinda formation—*conglomerate, sandstone, siltstone* (in part upper Miocene marine).
CENOZOIC — TERTIARY — Pliocene	Pml	**MIDDLE AND/OR LOWER PLIOCENE MARINE SEDIMENTARY ROCKS**	Purisima formation—*conglomerate, sandstone and shale* (in part upper Miocene).
CENOZOIC — TERTIARY — Pliocene		**PLIOCENE VOLCANIC ROCKS:**	
	Pv	**UNDIFFERENTIATED**	Moraga formation—*andesite and basalt flows, rhyolite tuff.*
	Pv^r	**RHYOLITIC**	Leona rhyolite—*pyritic rhyolite flows, domes, and dikes* (may be lower or middle Pleistocene, Robinson, 1953). Northbrae rhyolite—*flows of rhyolite.*
	Pv^b	**BASALTIC**	Bald Peak basalt—*flows of basalt.*
	Pv^p	**PYROCLASTIC**	Pinole tuff—*pumiceous stratified tuff* (some interbedded basalt in Las Trampas Ridge area).
CENOZOIC — TERTIARY — Miocene	Mu	**UPPER MIOCENE MARINE SEDIMENTARY ROCKS**	San Pablo group (includes Neroly, Cierbo and Briones formations)—*sandstone, shale, and conglomerate;* Santa Margarita formation—*white sandstone, shale* (in part lower Pliocene).
CENOZOIC — TERTIARY — Miocene	Mm	**MIDDLE MIOCENE MARINE SEDIMENTARY ROCKS**	Monterey group (includes Rodeo shale, Hambre sandstone, Tice shale, Oursan sandstone, Claremont shale, Sobrante sandstone). Monterey formation undifferentiated in Santa Cruz Mountains.[2]
CENOZOIC — TERTIARY — Miocene	Ml	**LOWER MIOCENE MARINE SEDIMENTARY ROCKS**	Sandholdt formation—*siltstone;* Vaqueros formation—*sandstone and siltstone.*
CENOZOIC — TERTIARY — Miocene		**MIOCENE VOLCANIC ROCKS:**	
	Mv^b	**BASALTIC**	Basalt flows, flow breccias, pillow lavas; some tuffs.
CENOZOIC — TERTIARY — Oligocene	Φ	**OLIGOCENE MARINE SEDIMENTARY ROCKS**	Kirker formation—*tuffaceous sandstone;* San Ramon formation—*tuffaceous sandstone and shale;* San Lorenzo formation—*shale and mudstone* (Eocene in part).
CENOZOIC — TERTIARY — Eocene	E	**EOCENE MARINE SEDIMENTARY ROCKS**	Butano sandstone—*sandstone and shale* (Santa Cruz Mtns.). Markley formation—*sandstone and shale* (Diablo Range). "Tejon" formation—*sandstone, shale, conglomerate.* Unnamed Eocene units (sandstone, shale, conglomerate).
CENOZOIC — TERTIARY — Paleocene	Ep	**PALEOCENE MARINE SEDIMENTARY ROCKS**	Martinez formation of Lawson [3]—*sandstone and shale* (Eocene in part). Unnamed Paleocene unit (siltstone, sandstone, conglomerates) in Santa Cruz Mtns.
CENOZOIC — TERTIARY	Tv	**TERTIARY VOLCANIC ROCKS:** **UNDIFFERENTIATED**	Rhyolite, andesite, and basalt (offshore).
CENOZOIC — TERTIARY	Tib	**TERTIARY INTRUSIVE (HYPABYSSAL) ROCKS:** **BASALTIC**	Intrusive diabase and basalt sills (middle Miocene age). Includes some lava flows locally.

STRATIGRAPHIC NOMENCLATURE — Continued

AGE	STATE MAP SYMBOL	STATE MAP UNIT	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES (The formally named formations grouped within an individual State Map Unit, are listed in stratigraphic sequence from youngest to oldest.)
MESOZOIC — CRETACEOUS	K	**UNDIVIDED CRETACEOUS MARINE SEDIMENTARY ROCKS**	Undifferentiated Cretaceous sedimentary rocks including some "Chico" *sandstone, shale and conglomerate* (San Leandro Hills).
	Ku	**UPPER CRETACEOUS MARINE SEDIMENTARY ROCKS**	"Chico" formation [4]—*sandstone and shale.* Pigeon Point formation—*sandstone, siltstone, and conglomerate.* Unnamed Upper Cretaceous sandstone, shale, and conglomerate.
	Kl	**LOWER CRETACEOUS MARINE SEDIMENTARY ROCKS**	Oakland conglomerate—*coarse conglomerate and sandstone with some shale.*
	KJf	**FRANCISCAN FORMATION**	Franciscan formation—*sandstone (graywacke), shale, chert, and conglomerate.* Minor bodies of limestone, metamorphic rocks, glaucophane schist, silica-carbonate rock, and greenstone.
	KJfv	**FRANCISCAN VOLCANIC AND METAVOLCANIC ROCKS**	Franciscan greenstone, basalt, diabase, and pyroclastic rocks.
	gr	**MESOZOIC GRANITIC ROCKS**	Quartz diorite and granodiorite.
	bi	**MESOZOIC BASIC INTRUSIVE ROCKS**	Gabbro (Santa Cruz Mountains).
	ub	**MESOZOIC ULTRABASIC INTRUSIVE ROCKS**	Serpentine, peridotite, and pyroxenite (some gabbro, diabase and small areas of silica-carbonate rock included). Sheared Franciscan rocks including serpentine in San Francisco area.
JURASSIC	Jk	**KNOXVILLE FORMATION**	Knoxville formation—*shale, some sandstone, conglomerate.*
UNDIVIDED	m ls	**PRE-CRETACEOUS METAMORPHIC ROCKS, UNDIFFERENTIATED, ls = LIMESTONE AND/OR DOLOMITE**	Sur series—*gneiss.* ls = Gabilan limestone and dolomite; marble and calcium silicate hornfels undifferentiated.
	ms	**PRE-CRETACEOUS METASEDIMENTARY ROCKS**	Sur series—*schist.*

NOTES

1. Ranges from middle Pliocene through early Pleistocene (Glenn, 1959).
2. In the Santa Cruz basin west of Ben Lomond Mountain, the area shown as Mm is considered by some geologists to be lower Purisima (upper Miocene).
3. Martinez formation of Lawson is now known to range in age from Paleocene to middle Eocene. The Paleocene portion is called Vine Hill sandstone (Weaver, C. E., 1953, Eocene and Paleocene deposits at Martinez, California: Univ. Wash. Pub. in Geol., vol. 7, pp 1-102).
4. The Chico mapped east of the San Andreas fault by Branner et al. (1909) is now considered to be Eocene, (Graham and Classen, 1955).

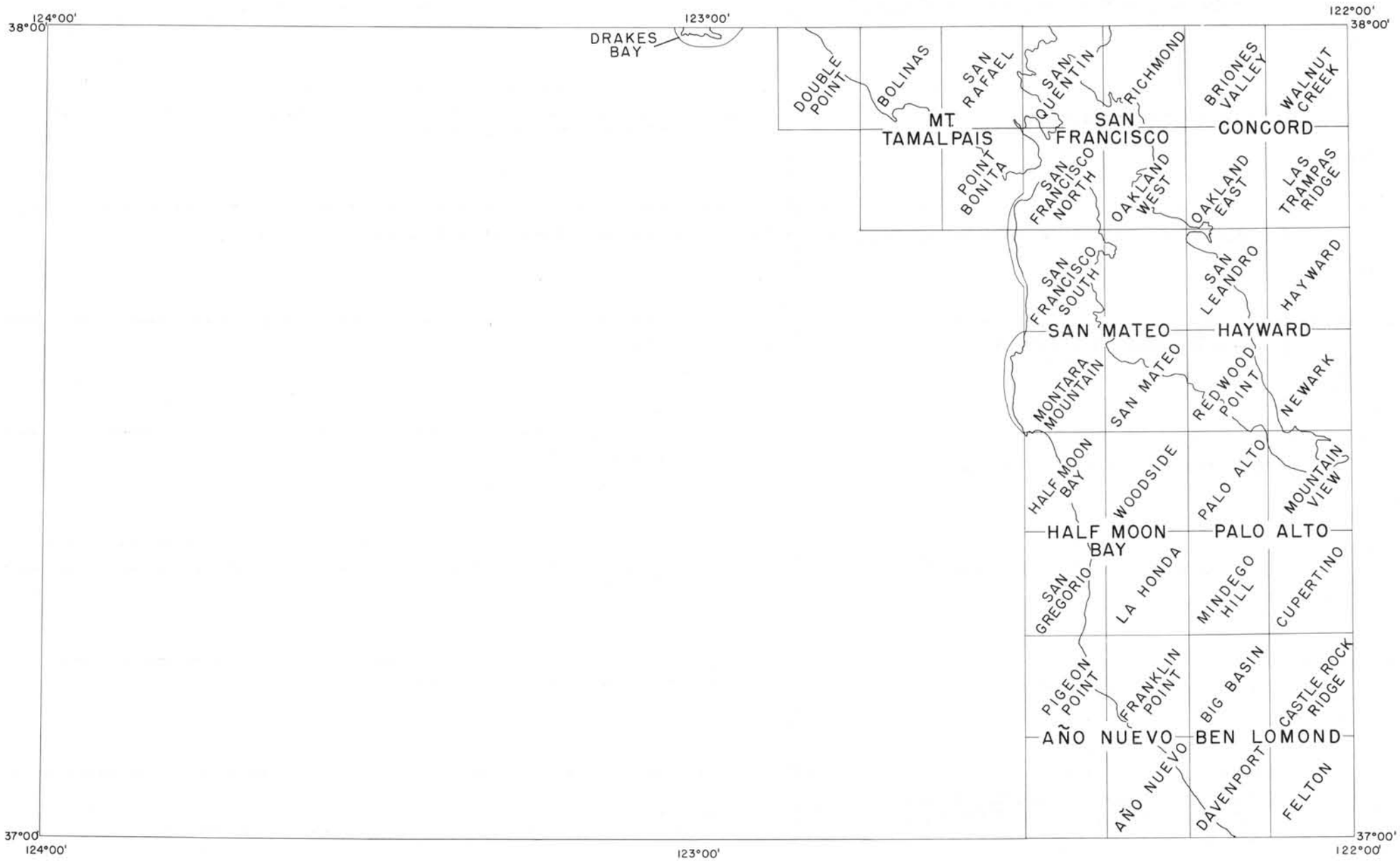
Steeply dipping Cretaceous(?) strata at Point San Pedro, San Mateo County. Rocks consist of alternating black shale and buff sandstone which display in detail many sedimentary structures formed by turbidity currents. *Photo by C. W. Jennings and R. G. Strand.*

TOPOGRAPHIC QUADRANGLES

WITHIN THE SAN FRANCISCO SHEET

AVAILABLE FROM THE U.S. GEOLOGICAL SURVEY

1961



Aerial view of the Marin Peninsula northwestward toward the San Andreas fault and Point Reyes. The dissected hills in the foreground, which culminate in Mt. Tamalpais in the right middleground, are composed of graywacke, shale, radiolarian chert, greenstone, and serpentine of the Jurassic and Cretaceous Franciscan formation. The pronounced trench of the San Andreas fault separates the Franciscan formation from Mesozoic granitic rocks and Tertiary sedimentary rocks on the Point Reyes Peninsula.
Photo by Aero Photographers, Sausalito.

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