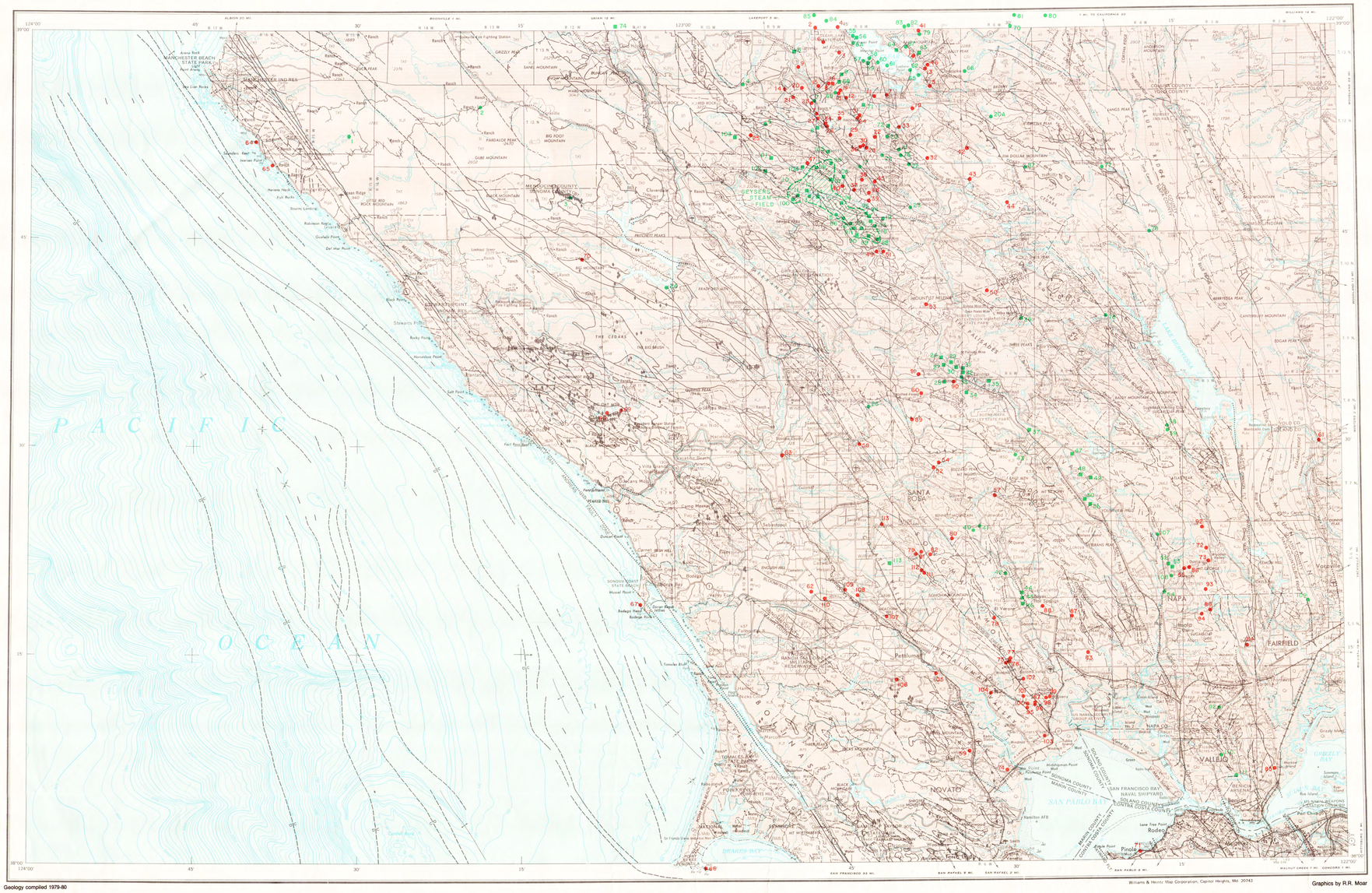



Geology compiled 1979-80

Williams & Heintz Map Corporation, Capitol Heights, Md. 20743

Graphics by R.R. Moar

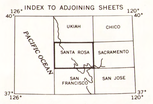
BASE MAP

PRODUCED BY THE U. S. GEOLOGICAL SURVEY AND THE NATIONAL OCEAN SURVEY

Base map prepared by Defense Mapping Agency from 1:24,000, 1:25,000, and 1:50,000-scale maps dated 1942-1955. Field checked 1958. Revised by the U. S. Geological Survey 1970.

Bathymetry compiled by the National Ocean Survey from tide-coordinated hydrographic surveys. Bathymetric survey data comply with International Hydrographic Organization (IHO) Special Publication 44 accuracy standards and/or standards used at the date of the survey. This information is not intended for navigational purposes

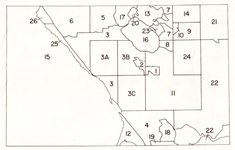
INDEX TO ADJOINING SHEETS




Scale 1:250,000

5 0 5 10 15 20 Statute Miles
5 0 5 10 15 20 25 30 Kilometers
5 0 5 10 15 Nautical Miles

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
BATHYMETRIC CONTOUR INTERVAL 10 METERS TO THE 200 METER DEPTH, 50 METERS TO MAXIMUM DEPTH
TRANSVERSE MERCATOR PROJECTION



ABBREVIATED INDEX TO GEOLOGIC SOURCE DATA
(Complete Index on Sheet 3)

1. Armstrong, C.F., and Wagner, D.L., 1977
2. Armstrong, C.F., and Wagner, D.L., 1978
3. Blake, M.C., Jr., Smith, J.T., Wentworth, C.M., and Wright, R.C., 1974
3A. Bonilla, M.G., 1961
3B. Geeslin, W.K., 1950
3C. Travis, R.B., 1952
4. Blake, M.C., Jr., Bartow, J.A., Frizzell, V.A., Jr., Schlocker, J., Sorg, D., Wentworth, C.M., and Wright, R.C., 1974
5. Bortugno, E.J., 1980
6. Bortugno, E.J., and Wagner, D.L., 1980
7. Brice, J.C., 1953
8. Carter, W.H., 1948
Yates, R.G., and Hilpert, L.S., 1946
9. Conrey, B.L., 1948
10. Fox, K.F., 1949
Fox, K.F., Jr., Sims, J.D., Bartow, J.A., and Helley, E.J., 1973
Averitt, P., 1945
11. California Department of Water Resources, 1962
11. Fox, K.F., Jr., Sims, J.D., Bartow, J.A., and Helley, E.J., 1973
12. Gudmundsen, E.H., 1979
12. Gudmundsen, A.J., 1977
13. Hearn, B.C., Donnelly, J.M., and Goff, F.E., 1976
14. Lawton, J.E., 1956
15. McCulloch, D.S., Greene, H.G., Heston, K.S., and Greene, G.W., 1976
16. McLaughlin, R.J., 1978
17. McNitt, J.R., 1963
McLaughlin, R.J., and Ohlin, H.N., 1980
18. Rice, S.J., 1974
19. Rice, S.J., Strand, R.G., and Smith, T.C., 1976
20. Rymer, M.J., 1980
21. Sarna-Wojcicki, A., and Wagner, D.L., 1980
Kirby, J.M., 1943
Kirby, J.M., 1943
Taylor, R.H., 1955
22. Sims, J.D., Fox, K.F., Jr., Bartow, J.A., and Helley, E.J., 1973
23. Sims, W., and Dickinson, W.R., 1970
Taliaferro, N.L., 1943
24. Wagner, D.L., 1980
Taliaferro, N.L., 1947
Wagner, D.L., 1975
Yates, R.G., and Hilpert, L.S., 1946
25. Wentworth, C.M., Jr., 1966
Blake, M.C., Jr., Smith, J.S., Wentworth, C.M., and Wright, R.C., 1974
Huffman, M.E., 1972
26. Wentworth, C.M., 1972

## ABBREVIATED EXPLANATION

Approximate stratigraphic relationships only; see Geologic Map Explanation for more accurate stratigraphic relationships and unit descriptions.

**CENOZOIC — QUATERNARY — Holocene**

- Ql — Alluvium
- Qln — Natural levee and channel deposits
- Qb — Basin deposits *(Alluvium)*
- Qls — Landslide deposits
- Qs — Dune and beach sand
- Qi — Intertidal deposits *(Peaty-mud)*

**QUATERNARY — Pleistocene**

- Qo — Older alluvium
- Qmr — Modesto-Riverbank Formations *(Arkosic alluvium)*
- Qt — Terrace deposits
- Qm — Millerton Formation *(Marine and nonmarine clay, silt, sand and conglomerate)*
- Qrb — Red Bluff Formation *(Gravel in reddish silty or sandy matrix)*
- Qf — Huichica and Glen Ellen Formations; Includes undifferentiated continental deposits. *(Fluvial gravel, silt, sand, and clay)*
- Qc — "Cache Formation" *(Pebbly sandstone, conglomerate, siltstone and tuff)*

**TERTIARY — Pliocene**

- Ttu — Tehama Formation *(Sand, silt, and volcaniclastic rocks)*
  - Ptu — Putah Tuff Member *(Tpt)*
- Tor — Ohlson Ranch Formation *(Marine sandstone, siltstone, and conglomerate)*
- Twg — Wilson Grove Formation *(Marine sandstone, conglomerate, and tuff)*
- Tuc — Unnamed continental deposits *(Poorly sorted sandstone and conglomerate)*
- Tp — Petaluma Formation *(Claystone, siltstone, mudstone; mostly nonmarine)*

**Miocene**

- Mo? — Orinda (?) Formation *(Pebbly sandstone and conglomerate)*
- Mdb — Drakes Bay Formation *Marine siltstone and mudstone)*
- Msp — San Pablo Group *(Marine sandstone and shale)*
- Mmy — Monterey Group *(Marine sandstone and shale)*
- Mgs — Gallaway - Skooner Gulch Formations *(Marine sandstone and mudstone)*
- Ml — Laird Sandstone *(Marine quartzose feldspathic sandstone)*

**Eocene**

- Eme — Markley Sandstone *(Marine)*
- En — Nortonville Shale *(Marine)*
- Ed — Domengine Sandstone *(Marine)*
- Ec — Capay Formation *(Marine sandstone)*
- Eum — Unnamed Eocene marine rocks

**Paleocene**

- Pgr — German Rancho Formation *(Marine sandstone and mudstone)*
- Pmz — Martinez Formation *(Marine quartzose sandstone)*
- Ppr — Point Reyes Formation *(Marine conglomerate and sandstone)*
- Tkf — Coastal Belt Franciscan *(Marine sandstone, shale, and conglomerate)*

**MESOZOIC — CRETACEOUS**

- Kgs — Gualala Formation *(Marine sandstone, mudstone, and conglomerate)*
- Ku — Upper Cretaceous *(Undifferentiated marine rocks)*
- Kfo — Forbes Formation *(Marine shale and siltstone)*
- Kg — Guinda Formation *(Marine sandstone and mudstone)*
- Kf — Funks Formation *(Marine shale and sandstone)*
- Ks — Sites Formation *(Marine sandstone)*
- Ky — Yolo Formation *(Marine shale and sandstone)*
- Kv — Venado Formation *(Marine sandstone and conglomerate)*

(Upper Cretaceous — Great Valley Sequence)

- Klsp — Lower Cretaceous Great Valley Sequence *(Marine mudstone, sandstone, and conglomerate) (Klsp - detrital serpentine)*
- KJsp — Lower Cretaceous-Upper Jurassic Great Valley Sequence *(Marine mudstone, siltstone, sandstone, and conglomerate) (KJsp - detrital serpentine)*

**JURASSIC**

- KJf — Franciscan Complex *(ss-sandstone, shale, conglomerate; ch-chert; gs-greenstone; mg-metagraywacke)*
  - sp — Serpentinized ultramafic rocks

**PALEOZOIC**

- PzMz — Metamorphic rocks of uncertain age. ls - limestone and marble *(Biotite schist and quartzite)*

- Clv — Clear Lake Volcanics *(d-dacite; a-andesite to basaltic rock; b-basalt; r-rhyolite; t-tuff and other pyroclastic rocks)* ⊛ Quaternary cinder cone or volcano.
- Psv — Sonoma Volcanics *(b-basalt; a-andesite; r-rhyolite; t-tuff and other pyroclastic rocks)*
- Mpt — Pinole Tuff
- Mtm — Volcanic rocks of Burdell Mtn. *(Andesitic mudflow breccias and flows)*
- Mpp — Putnam Peak Basalt
- Mib — Iversen Basalt
- KJgr — Granitic rocks
- ISD — Spilite near Black Point

Coast Range Ophiolite

- Jv — Volcanic rocks, mainly basalt
- Jgd — Gabbro and diabase
- uPt — Ultramafic rocks (Peridotite)-partly to completely serpentinized

## MAP SYMBOLS

- 10 — Thermal spring
- 2 — Thermal well
- 102 — Radiometrically-dated rock sample

Numbers refer to data in accompanying tables.

Contact
(Observed or approximately located; queried where gradational or inferred.)

Fault
Solid where well located; dashed where approximately located or inferred and in the offshore area; queried where continuation or existence is uncertain; except for the offshore area, faults are dotted where concealed by younger rocks or water. Arrows show relative or apparent direction of movement. U, upthrown side and D, downthrown side (relative or apparent).

Thrust fault—barbs on the upper plate. Generally dips less than 45°, but locally may have been subsequently steepened. Dashed where approximately located or inferred; dotted where concealed by younger rocks or water; queried where continuation or existence is uncertain.

CRT — Coast Range thrust (CRT)—the upper boundary of a long inactive, late Mesozoic subduction zone (barbs on upper plate); has discontinuous outcrop owing to modification by younger faults and concealment by overlying deposits; locally the Coast Range thrust is very steep.

CBT — Coastal belt thrust (CBT)—an inferred boundary between the Coastal Belt Franciscan and older parts of the Franciscan Complex (barbs on upper plate); has discontinuous outcrop owing to younger faulting; locally the Coastal Belt thrust is very steep.

Anticlinal fold
(Dashed where inferred; dotted where concealed by younger rocks, lakes or bays.)

Synclinal fold
(Dashed where inferred; dotted where concealed by younger rocks, lakes or bays.)

Strike and dip of beds
(General strike and dip of stratified rocks.)

Blueschist blocks

# MAP OF THERMAL SPRINGS AND WELLS, AND LOCATIONS OF ROCKS DATED RADIOMETRICALLY, SANTA ROSA QUADRANGLE, CALIFORNIA 1:250,000

Compilation by
Frederic R. Kelley
Published 1982