GEOLOGIC MAP EXPLANATION OF THE SAN FRANCISCO-SAN JOSE QUADRANGLE, CALIFORNIA, 1991

WEST OF SAN ANDREAS FAULT

CENOZOIC — QUATERNARY — Holocene

- Q — ALLUVIUM. Unconsolidated stream and basin deposits, clay to boulder size.
- af — ARTIFICIAL FILL
- Qs — DUNE SAND
- Qls — LANDSLIDE DEPOSITS. Shown where practicable; arrows indicate direction of movement.

Pleistocene

- Qt — TERRACE DEPOSITS. Sand, silt, clay, and gravel deposited on stream and wave-cut surfaces.
- Qo — OLDER ALLUVIUM. Dissected alluvial deposits.
- QT — PLIO-PLEISTOCENE NONMARINE DEPOSITS. Conglomerate, sandstone, siltstone and claystone. (Also includes Santa Clara Formation.)
- QTm — MERCED FORMATION. Sandstone, siltstone, claystone, and conglomerate; marine.

Pliocene

- Ppu — PURISIMA FORMATION. Sandstone, siltstone and mudstone; marine.

Miocene

- Msc — SANTA CRUZ MUDSTONE. Siliceous organic mudstone; marine. (Also includes Drakes Bay Formation of Galloway, 1977.)
- Msm — SANTA MARGARITA SANDSTONE. White friable arkosic sandstone; marine.
- Mmy — MONTEREY FORMATION. Siliceous organic mudstone and sandy siltstone locally interbedded with chert and dolomite; marine.
- Mlo — LOMPICO SANDSTONE. Calcareous arkosic sandstone; marine.
- Mls — LAMBERT SHALE. Organic mudstone with phosphatic lenses in lower part; interbeds of dolomite in places; marine.
- Mmb — MINDEGO BASALT. Pillow lava, flow rock, and tuff. (Also includes Zayante Creek Basalt.)

Oligocene

- Φvq — VAQUEROS SANDSTONE. Arkosic sandstone interbedded with mudstone and shale; marine. (Also includes nonmarine Zayante Sandstone.)

Eocene

- EΦs — SAN LORENZO FORMATION. Mudstone, shale, and sandstone; marine. (Also includes Rices Mudstone and Twobar Shale members; in places cannot be distinguished from Lambert Shale.)
- Eb — BUTANO SANDSTONE. Sandstone, conglomeratic sandstone, clay, shale and conglomerate; marine.

Paleocene

- Pl — LOCATELLI FORMATION. Sandstone, siltstone, shale, and pebble conglomerate; marine. (Also includes unnamed Paleocene rocks near Pt. San Pedro.)
- Ppr — POINT REYES FORMATION. Conglomerate and interbedded sandstone; marine.

MESOZOIC — CRETACEOUS

- Kpp — PIGEON POINT FORMATION. Sandstone, siltstone, and conglomerate; marine.
- Kv — UNDIVIDED VOLCANIC ROCK. Located inland from vicinity of Pescadero and Pigeon Points.
- Kgr — GRANITIC ROCKS
- Kqd — QUARTZ DIORITE. (Includes quartz diorite of Ben Lomond Mountain and Montara Mountain.)

JURASSIC

- KJf — FRANCISCAN ROCKS. Near Pacifica (see detailed explanatory information on KJf east of San Andreas fault.)
- Mzgb — GABBROIC ROCKS

PALEOZOIC

- PzMz — METAMORPHIC ROCKS OF UNCERTAIN AGE. Schist with minor quartzite, gneiss, and crystalline limestone.

EAST OF SAN ANDREAS FAULT

CENOZOIC — QUATERNARY — Holocene

- Q — ALLUVIUM. Unconsolidated stream and basin deposits, clay to boulder size.
- Qs — DUNE AND EOLIAN SAND. Also includes Merritt Sand.
- Qi — INTERTIDAL DEPOSITS. Soft mud and peat deposited in marshes, swamps, and adjacent waterways.
- Qls — LANDSLIDE DEPOSITS. Shown where practicable; arrows show direction of movement.
- af — ARTIFICIAL FILL
- Qf — FAN DEPOSITS. Gravel, sand, silt, and clay.

Pleistocene

- QT — PLIO-PLEISTOCENE NONMARINE DEPOSITS. Conglomerate, sandstone, siltstone, and claystone with minor lignite and lake deposits. (Also includes Santa Clara Formation, San Benito, Livermore, Irvington and Packwood Gravels.)
- Qc — CONTINENTAL AND MARINE DEPOSITS. Sand, silt, clay, and gravel. (Includes Colma and Alameda Formations.)
- QTm — MERCED FORMATION. Sandstone, siltstone, claystone, and conglomerate; marine.
- Qo — OLDER ALLUVIUM. Dissected alluvial deposits.
- Qt — TERRACE DEPOSITS. Sand, silt, clay, and gravel deposited along streams.

Pliocene

- Pta — TASSAJARA FORMATION. Mudstone with lenses of sandstone and pebble conglomerate; nonmarine.
- Pt — TEHAMA FORMATION. Sandstone, siltstone and volcaniclastic rocks; nonmarine.
- Pcv — BASALTIC ROCKS. Coyote and Anderson Reservoirs.
- Plt — LAWLOR TUFF. Contains pumice fragments and angular vesicular flow rocks.

Miocene

- Mpt, Mcc, Mvb — CONTRA COSTA GROUP. Sandstone, conglomerate, shale and minor claystone, limestone and tuff; nonmarine. (Includes Orinda and Moraga Formations.) Mpt — Pinole Tuff. Mvb — Bald Peak Basalt.
- Msp — SAN PABLO GROUP. Sandstone, mudstone, siltstone and shale with minor tuff. (Includes Neroly Sandstone, Cierbo Sandstone, and Briones Sandstone.) marine.
- Mpm — PAGE MILL BASALT
- Mv — MIOCENE VOLCANIC ROCKS. Mvs — Andesitic rock of Pacheco Peak. Mvb — Basalt near San Luis Reservoir.
- Tu — UNDIVIDED TERTIARY SEDIMENTARY ROCKS. Sandstone, siltstone, and shale; marine. (Also includes shale of Mt. Pajaro area, and Oligocene San Ramon Formation.)
- Mmy — MONTEREY GROUP. (Includes Rodeo Shale, Hambre Sandstone, Tice Shale, Oursan Sandstone, Claremont Shale, and Sobrante Sandstone.) marine.
- Tvb — TERTIARY BASALT
- Mvs, Mte — TEMBLOR FORMATION. Sandstone, conglomerate, and minor shale; marine. Mvs — Dacite.
- Φk — KIRKER FORMATION. Tuffaceous sandstone and minor conglomerate; marine.

Eocene

- Eum — UNNAMED EOCENE MARINE ROCKS. Sandstone, conglomeratic sandstone and clay shale.
- Epf — POVERTY FLAT SANDSTONE. Basal conglomerate, conglomeratic sandstone, and claystone; upper part nonmarine.
- Ek, Emk, En — KREYENHAGEN FORMATION. Sandstone, siltstone, mudstone, and diatomaceous shale; marine. Ek — KREYENHAGEN FORMATION (UNDIV.) Emk — MARKLEY SANDSTONE. En — NORTONVILLE SHALE
- Ed — DOMENGINE SANDSTONE. Sandstone, mudstone, siltstone, lignite and shale; marine.
- Em — MEGANOS FORMATION. Sandstone, mudstone, minor conglomerate and coquina; marine.

Paleocene

- TKu — TERTIARY-CRETACEOUS SEDIMENTARY ROCKS. Undivided sandstone, siltstone, shale, and conglomerate; marine.
- Pmz — MARTINEZ FORMATION. Sandstone and shale; marine.
- PEt — TESLA FORMATION. Quartzose sandstone, carbonaceous shale and siltstone; marine. (Includes Laguna Seca Formation.)
- Km — MORENO FORMATION. Organic shale, siltstone and sandstone; marine.

MESOZOIC — CRETACEOUS

- Ku — UPPER CRETACEOUS MARINE SEDIMENTARY ROCKS. Ku — Undivided. Kuss — Predominantly sandstone. Kush — Predominantly shale.
- Kp, Kb — Kp — PANOCHE FORMATION. Kb — BERRYESSA FORMATION. Sandstone, shale, siltstone, conglomerate lenses; marine.
- Kl — LOWER CRETACEOUS SEDIMENTARY ROCKS. Undivided sandstone, conglomerate, siltstone, shale; marine.
- KJu — LOWER CRETACEOUS — UPPER JURASSIC SEDIMENTARY ROCKS. Undivided shale, conglomerate, limestone concretions, and minor sandstone; marine. (Also includes Knoxville Formation.)

JURASSIC

- KJf — FRANCISCAN COMPLEX. Parts of the Franciscan Complex are melange — Choatic mixtures of fragmented rock masses in a sheared matrix. Coherent masses large enough to be shown on the map are shown as follows:
  - ss — Sandstone, shale, and conglomerate; marine.*
  - ls — Calera Limestone and other limestone and marble; marine.*
  - ch — Chert; marine.*
  - gs — Greenstone (altered basalt; includes metagreenstone and local chert.)*
  - um — Serpentinized ultramafic rocks.*
  - mg — Metagraywacke and argillite; marine.*
  - ♦ — Blueschist blocks.*
  - Horizontal line pattern denotes undivided melange.
  - *Not necessarily in stratigraphic sequence.
- Jlc — LOTTA CREEK TUFF. Tuff and minor siliceous shale.
- Jvc — VOLCANIC ROCKS. Basalt near Mt. Diablo. Keratophyre near Del Puerto Canyon.
- Jgd — GABBRO, DIABASE. (Rocks of uncertain origin within the Hayward fault zone.)
- um — ULTRAMAFIC ROCKS (PERIDOTITE). Partly to completely serpentinized.
- Mzv — RHYOLITE OF UNCERTAIN AGE. (Leona rhyolite, Alum Rock Rhyolite, Northbrae Rhyolite, and rhyolite east of Mt. Diablo.)

Coast Range Fault; GREAT VALLEY SEQUENCE; COAST RANGE OPHIOLITE

SAN JOAQUIN VALLEY

BASIN DEPOSITS

- Q — ALLUVIUM. Unconsolidated stream and basin deposits, clay to boulder size.
- Qi — INTERTIDAL DEPOSITS. Soft mud and peat deposited in marshes, swamps, and adjacent waterways.
- Qs — DUNE SAND
- Qdp — DOS PALOS ALLUVIUM. Floodbasin deposits.
- Qo — OLDER ALLUVIUM. Dissected alluvial deposits.

FAN DEPOSITS — COAST RANGE SOURCE

- Qp — PATTERSON ALLUVIUM. Coarse- to fine-grained stream, fan, and mudflow deposits.
- Qsl — Qsl — SAN LUIS RANCH ALLUVIUM. Fine- to coarse-grained fan, mudflow, terrace, and floodplain deposits.
- Qlb — Qlb — LOS BAÑOS ALLUVIUM. Coarse-grained terrace, pediment, and fan deposits.
- QTt — TULARE FORMATION. Fine- to coarse-grained floodplain, fan, and terrace deposits; also includes Corcoran Clay.
- Mf — FANGLOMERATE DEPOSITS. Conglomerate, sandstone, and siltstone. (Includes Oro Lomo Formation and Carbona Formation.)

FAN DEPOSITS — SIERRA NEVADA SOURCE

- Qf — ALLUVIAL FAN DEPOSITS. Gravel, sand, silt and clay.
- Qmr, Qm, Qr — Qmr — MODESTO-RIVERBANK FORMATIONS UNDIVIDED. Arkosic alluvium. Qm — MODESTO FORMATION. Qr — RIVERBANK FORMATION
- Qtl — TURLOCK LAKE FORMATION. Sandstone, siltstone, and conglomerate derived mainly from Sierran granitic and metamorphic rocks; nonmarine. Also includes Corcoran Clay.
- QTnm — NORTH MERCED GRAVEL. Arkosic alluvial gravel, sand, silt, and clay; nonmarine.
- Pl — LAGUNA FORMATION. Alluvial conglomerate, sandstone, and siltstone composed of granitic, metamorphic, and some volcanic detritus; nonmarine.
- Tm, Mtm — MEHRTEN FORMATION. Agglomerate, conglomerate, tuffaceous sandstone and siltstone all derived from andesitic sources; some andesite mudflow breccia (lahar); nonmarine. Mtm — TABLE MOUNTAIN LATITE. Prominent flows of dark latite with abundant labradorite phenocrysts.
- Tvs — VALLEY SPRINGS FORMATION. Rhyolitic tuff, sandstone, siltstone, claystone, and conglomerate; nonmarine.
- af — ARTIFICIAL FILL
- Qls — LANDSLIDE DEPOSITS. Shown where practicable; arrows indicate direction of movement.
- t — DREDGE TAILINGS

Eocene

- Ei — IONE FORMATION. Quartzose sandstone interbedded with kaolinitic clay; mostly nonmarine.
- Tg — "AURIFEROUS GRAVEL". River channel and bench gravel; pebbles, cobbles, and boulders, of pre-Tertiary rock types, in places predominantly quartzose. (Mostly Eocene, but may include older and younger deposits.)

CRETACEOUS

- Kc — CHICO FORMATION. Sandstone, shale, siltstone, and conglomerate; marine. Located on Bachelor Valley quadrangle (east of Stockton.)

WESTERN BELT

- Jch — COPPER HILL VOLCANICS. Metamorphosed mafic to felsic pyroclastic and flow rocks.
- Jsm — SALT SPRINGS SLATE AND MERCED FALLS SLATE. Slate, metagraywacke and conglomerate; (Probably correlative with Mariposa Formation; Bogen, 1985.)
- Jgo — GOPHER RIDGE VOLCANICS. Metamorphosed mafic and felsic pyroclastic and massive flow rocks.
- um — ULTRAMAFIC ROCKS. Partly to completely serpentinized; locally includes gabbroic rocks.

Bear Mountains Fault Zone

SIERRA FOOTHILLS MELANGE

Belt of chaotically intermixed rocks.

- gb — GABBRO
- um — ULTRAMAFIC ROCKS. Partly to completely serpentinized; locally includes gabbroic and plagiogranitic rocks.
- mv — METAVOLCANIC ROCKS. Mafic pyroclastic and flow rocks.
- ls — CRYSTALLINE LIMESTONE AND DOLOMITE. May be Mesozoic in part.
- ms — METASEDIMENTARY ROCKS. Slate, graywacke, conglomerate, pebbly mudstone, some pyroclastic rocks, quartzite, and chert. (Includes Western Belt of Calaveras Formation.)

MOTHER LODE BELT

- Jm — MARIPOSA FORMATION. Slate, metagraywacke, and metaconglomerate.
- Jlv — LOGTOWN RIDGE VOLCANICS. Metamorphosed mafic breccias, flows, pyroclastic and volcaniclastic rocks.
- Jpv — PENON BLANCO VOLCANICS. Metavolcanic rocks, local mafic pillow lava and metachert.
- Jjp — JASPER POINT FORMATION OF BOGEN, 1985. Chert, tuff, pillow basalt, and minor mudstone. (Also includes Hunter Valley Chert.)
- um — ULTRAMAFIC ROCKS. Peridotite, hornblendite; locally serpentinized; includes gabbroic rocks.

Melones Fault Zone

SIERRA NEVADA AND SIERRAN FOOTHILLS

- Q — ALLUVIUM
- t — DREDGE OR MINE TAILINGS
- Tm, Mtm — MEHRTEN FORMATION. Andesitic mudflow breccia (lahar), some basalt, rhyolite and tuff, sand and silt; nonmarine. Mtm — TABLE MOUNTAIN LATITE. Prominent flows of dark latite with abundant labradorite phenocrysts.
- Tvs — VALLEY SPRINGS FORMATION. Rhyolitic tuff, sandstone, siltstone, claystone, and conglomerate; nonmarine.
- Tg — "AURIFEROUS GRAVEL". River channel and bench gravel; pebbles, cobbles, and boulders, of pre-Tertiary rock types, in places predominantly quartzose. (Mostly Eocene, but may include older and younger deposits.)
- Mzd — DIORITIC ROCKS. Quartz diorite, and diorite.
- Mzg — GRANITIC ROCKS. Granite and granodiorite.
- Mzgb — GABBROIC ROCKS. Locally includes ultramafic rocks.
- um — ULTRAMAFIC ROCKS. Peridotite, hornblendite; locally serpentinized; includes gabbroic rocks.
- JMs — JURASSIC (?) METASEDIMENTARY ROCKS. Phyllite; probably equivalent to Mariposa Formation.
- Jmv — JURASSIC METAVOLCANIC ROCKS. Greenschist; probably equivalent to the Penon Blanco Formation.
- Pzcc, ls — CALAVERAS COMPLEX. Chert, argillite, and slate. ls — Crystalline limestone and dolomite.
- Pzsf — SHOO FLY COMPLEX. Quartzite, pelitic schist, minor crystalline limestone and dolomite.

References:
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