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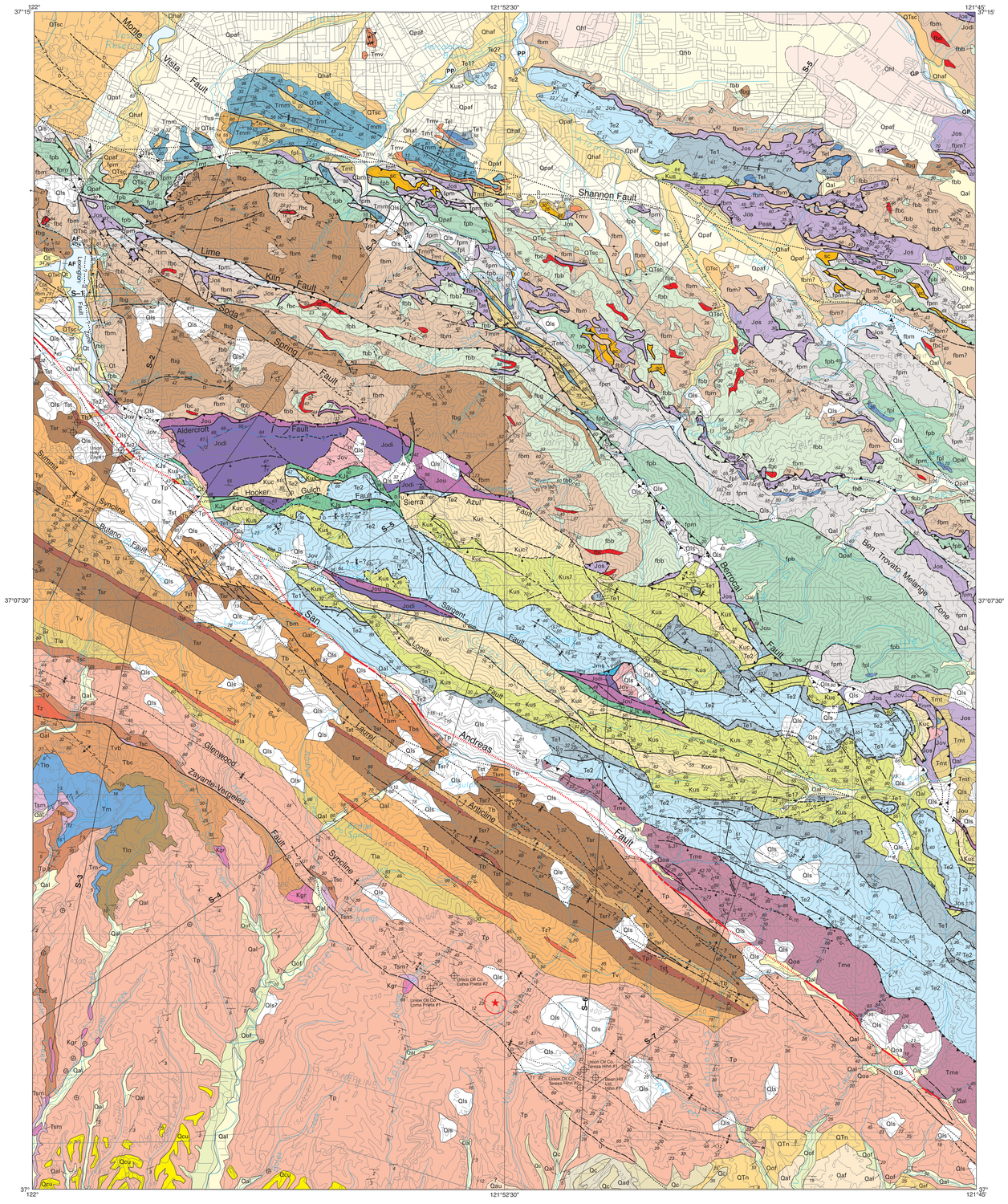
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PROFESSIONAL PAPER 1550–E
PLATE 1 OF 3



Base from U.S. Geological Survey 1:100,000 San Jose, California, topographic map (1978)
Stateplane projection

SCALE 1:50 000

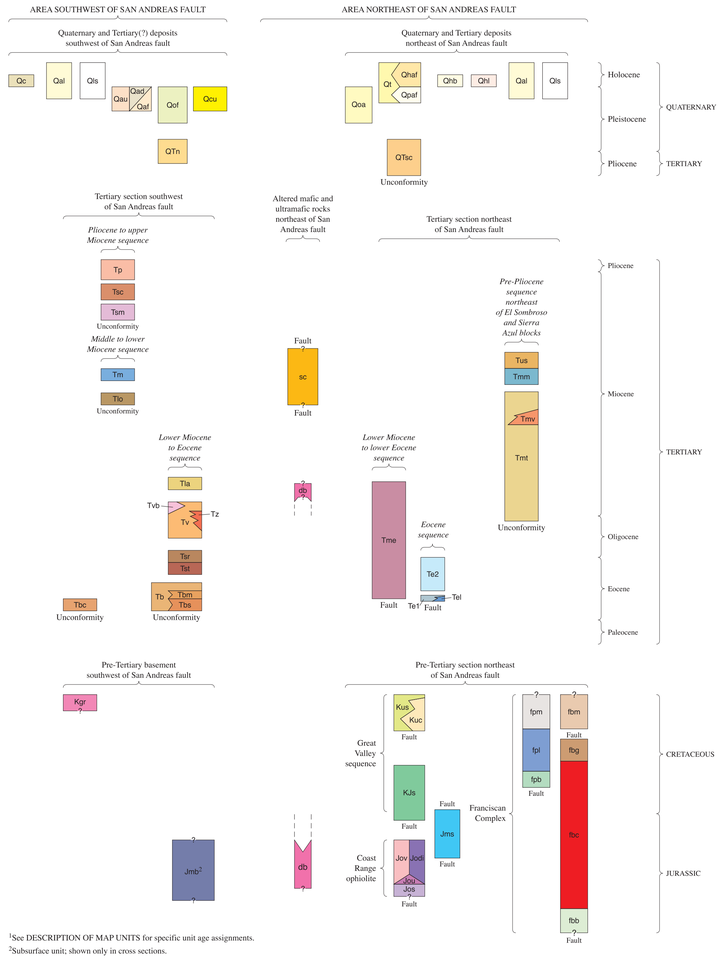
1 1/2 0 1 2 3 4 MILES
3000 0 3000 6000 9000 12000 15000 18000 21000 FEET
1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 50 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SAN ANDREAS FAULT ZONE

The geology presented here is compiled from U.S. Geological Survey Miscellaneous Field Studies Map MF–2373. The area was mapped by R.J. McLaughlin, J.C. Clark, E.E. Brabb, and E.J. Helley, 1988–1991. Geology in-part derived from Bailey and Everhart, 1964; Sarna-Wojcicki and others, 1975; and U.S. Geological Survey staff, 1989. Digital compilation and editing is by C.M. Wentworth, 1995, and Z.C. Valin, 1996–97 and 2003. Preliminary digital compilation work was by C.E. Nelson, 1994, P. Showalter, 1989–90, and T.A. Lindquist, 1988. Design and layout is by D.A. Ryan.

CORRELATION OF MAP UNITS[1]



[1]See DESCRIPTION OF MAP UNITS for specific unit age assignments.
[2]Subsurface unit; shown only in cross sections.

DESCRIPTION OF MAP UNITS

AREA SOUTHWEST OF SAN ANDREAS FAULT

Quaternary and Tertiary(?) deposits southwest of San Andreas fault

- **Qal** — **Alluvium, undivided (Holocene and Pleistocene)**
- **Qls** — **Landslide deposits (Holocene and Pleistocene)**
- **Qc** — **Colluvium (Holocene)**
- **Qau** — **Aromas Sand (Pleistocene)**—Locally divided into:
  - **Qad** — **Dune deposits**
  - **Qaf** — **Fluvial deposits**
- **Qof** — **Older floodplain deposits (Pleistocene?)**
- **Qcu** — **Marine-terrace deposits (Pleistocene)**
- **QTn** — **Fluvial deposits (Pleistocene and Pliocene?)**

Tertiary section southwest of San Andreas fault

Pliocene to upper Miocene sequence

- **Tp** — **Purisima Formation (Pliocene and upper Miocene)**
- **Tsc** — **Santa Cruz Mudstone (upper Miocene)**
- **Tsm** — **Santa Margarita Sandstone (upper Miocene)**

Middle to lower Miocene sequence

- **Tm** — **Monterey Formation (middle Miocene)**
- **Tlo** — **Lompico Sandstone (middle and lower Miocene)**

Lower Miocene to Eocene sequence

- **Tla** — **Lambert Shale (lower Miocene)**
- **Tv** — **Vaqueros Sandstone (lower Miocene and Oligocene)**—Marine sandstone. Locally includes:
  - **Tvb** — **Basalt (lower Miocene)**—Basalt flows along Zayante fault and in subsurface
- **Tz** — **Zayante Sandstone (lower Miocene and Oligocene)**—Nonmarine sandstone interbeds in Vaqueros Sandstone
- **San Lorenzo Formation, undivided (Oligocene and Eocene)**—Locally divided into:
- **Tsr** — **Rices Mudstone Member (Oligocene and upper Eocene; Zemorrian and Refugian)**
- **Tst** — **Twobar Shale Member (upper and middle Eocene; Narizian)**
- **Tb** — **Butano Sandstone, undivided (Eocene)**—Locally divided into:
  - **Tbm** — **Mudstone**
  - **Tbs** — **Sandstone**
- **Tbc** — **Conglomerate**

Pre-Tertiary basement southwest of San Andreas fault

- **Kgr** — **Granitic and associated pelitic metamorphic rocks of Ben Lomond block (Cretaceous and older)**
- **Jmb** — **Mafic basement (Jurassic)**—Subsurface unit of La Honda block. Considered to be the gabbroic rocks exposed at Logan, based on aeromagnetic and gravity data. Found only on cross sections

AREA NORTHEAST OF SAN ANDREAS FAULT

Quaternary and Tertiary deposits northeast of San Andreas fault

- **Qt** — **Alluvial-terrace deposits, undivided (Holocene and Pleistocene)**—Locally, may include alluvial-fan deposits (Qyaf, Qoaf)
- **Qhaf** — **Younger alluvial-fan deposits (Holocene)**
- **Qal** — **Alluvium, undivided (Holocene and Pleistocene)**
- **Qls** — **Landslide deposits (Holocene and Pleistocene)**
- **Qhb** — **Basin deposits (Holocene)**
- **Qhl** — **Levee deposits (Holocene)**
- **Qoa** — **Older alluvium, undivided (Pleistocene)**
- **Qpaf** — **Older alluvial-fan deposits (Pleistocene)**
- **QTsc** — **Santa Clara Formation (Pleistocene and Pliocene)**

Tertiary section northeast of San Andreas fault

Pre-Pliocene sequence northeast of El Sombroso and Sierra Azul blocks

- **Tus** — **Unnamed sandstone (Miocene)**—Lithic arkose and quartzofeldspathic sandstone, locally present overlying Monterey Shale. Unit is recognized only south of Kennedy Road in Los Gatos quadrangle
- **Tmm** — **Monterey Shale (middle Miocene)**
- **Tmv** — **Volcanic and intrusive rocks (middle Miocene)**—Dacitic tuff, breccia, and intrusive rocks in upper part of formation

Lower Miocene to lower Eocene sequence

- **Tme** — **Shale and sandstone of Highland Way (lower Miocene to lower Eocene)**

Eocene sequence

Sandstone and shale of Loma Chiquita Ridge (upper to lower Eocene)

- **Te2** — **Mottled mudstone and sandstone of Mount Chual (lower Eocene)**—Includes:
  - **Te1** — **Limestone**

Pre-Tertiary section northeast of San Andreas fault

- **Tel** — **Great Valley sequence (Cretaceous and Jurassic)**—Divided into:

Upper Cretaceous rocks—Exposed only in Sierra Azul and Santa Teresa blocks. Consist of:

- **Kus** — **Sandstone and shale**
- **Kuc** — **Conglomerate**
- **KJs** — **Lower Cretaceous and Upper Jurassic rocks**—Locally, includes fossiliferous sedimentary serpentinite north of Calero Reservoir

Franciscan Complex (Cretaceous and Jurassic)—Divided into:

Central belt—Consists of:

- **fpm** — **Permanente terrane (Cretaceous)**—Consists of:
  - **Melange and broken formation (Upper Cretaceous and younger)**—May contain high-grade blueschist and amphibolite blocks. Age of penetrative deformation is considered to be Late Cretaceous and younger
- **fpl** — **Limestone (Upper Cretaceous and mid-Cretaceous)**
- **fpb** — **Basaltic flows, breccia, and tuff (mid-Cretaceous)**

Bald Mountain-El Sombroso terrane (Cretaceous and Jurassic)—Consists of:

- **fbm** — **Melange and broken formation (Upper Cretaceous and younger)**—May contain high-grade blueschist and amphibolite blocks. Age of penetrative deformation is Late Cretaceous and younger
- **fbg** — **Lithic graywacke (mid-Cretaceous and Lower Cretaceous)**
- **fbc** — **Chert (Lower Cretaceous to Lower Jurassic)**
- **fbb** — **Basaltic flows (Lower Jurassic)**
- **Jms** — **Slate and phyllite of Loma Prieta Peak (Jurassic?)**

Coast Range ophiolite (Jurassic)—Divided into:

- **Jov** — **Basaltic to dacitic flows, flow breccias, banded tuff, and keratophyric breccia**
- **Jod** — **Diabasic to dioritic intrusive dikes and sills**
- **Jou** — **Cumulate ultramafic through gabbroic rocks**
- **Jos** — **Serpentinized ultramafic and minor gabbroic rocks**

Altered mafic and ultramafic rocks northeast of San Andreas fault

- **sc** — **Silica carbonate rock (Miocene?)**—Hydrothermally altered ultramafic rocks
- **db** — **Altered diabase (Miocene or Jurassic)**—Radiometrically undated, fault-bounded altered diabase present within San Andreas fault zone northeast of principal trace of San Andreas fault. Age is considered to be Jurassic or early Miocene

MAP SYMBOLS

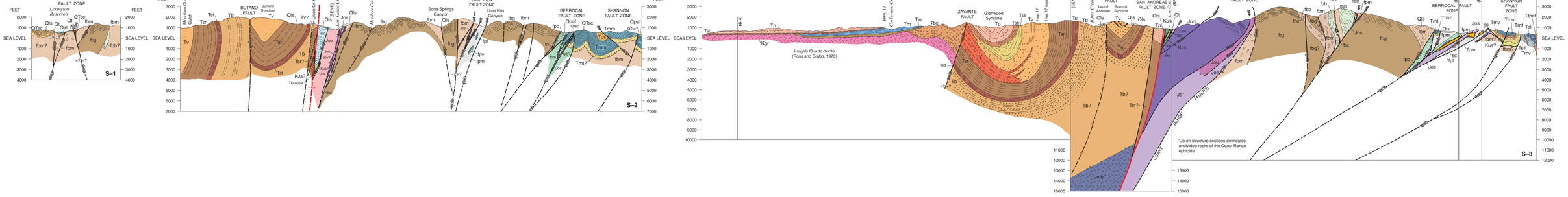
- **Contact**—Dashed where approximate, dotted where concealed, queried where uncertain
- **Fault**—Dashed where approximate, dotted where concealed, queried where uncertain. U, upthrown block; D, downthrown block. Bar and ball on down-thrown block. Arrows show relative motion
- **Low-angle normal fault**—Hachures on upper plate
- **Thrust fault**—Sawteeth on upper plate
- **Principal trace of the San Andreas fault**
- **Strike and dip of bedding**—Ball indicates top of beds known from sedimentary or volcanic structures
  - **Inclined**
  - **Vertical**
  - **Horizontal**
  - **Overturned**
  - **Volcanic flow**
- **Shear foliation or cleavage**
  - **Inclined**
  - **Vertical**
- **Folds**—Showing direction of plunge. Dashed where approximate, dotted where concealed, queried where uncertain
  - **Syncline**
  - **Anticline**
  - **Overturned syncline**
  - **Overturned anticline**
- **Drill hole**
- **Subsurface course of abandoned railroad tunnel southwest of Wright**
- **AF** — **Artificial Fill**
- **GP** — **Gravel pit**
- **PP** — **Percolation pond**
- **Mainshock epicenter, October 17, 1989 earthquake**
- **S–3** — **Cross section line**

CROSS SECTION SYMBOLS

- **Strike-slip fault**—(–) Denotes block movement away from viewer; (+) denotes block movement toward viewer. Dashed where approximate. Queried where speculative
- **Principal trace of the San Andreas fault**—Dashed where approximate
- **Dip-slip fault**—Arrows denote relative vertical motion of fault blocks. Dashed where approximate. Queried where speculative
- **Surface location**—Oil drill hole showing subsurface drill path and total well depth (T.D.) locally

CROSS SECTIONS

[Available showing more detail at 1:24,000 scale online at http://pubs.usgs.gov/mf/mf2373]



Geologic Map of the Loma Prieta Region, California

By
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Edward J. Helley, and Carl M. Wentworth

2004

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