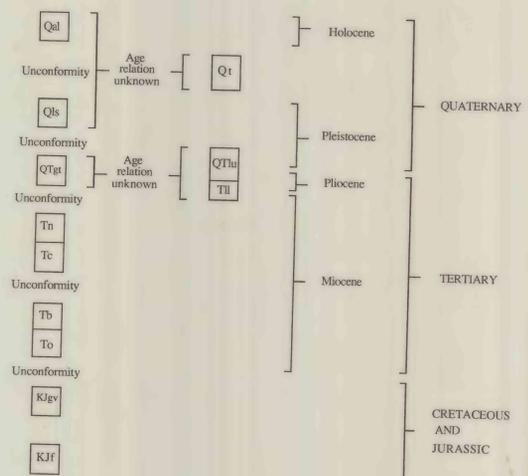


CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

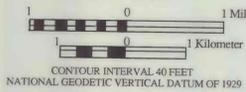
- Qal Alluvium (Holocene) - Unconsolidated sand and gravel, recent terrace deposits, stream deposits, and cemented conglomerate
- Ql Terrace deposit (Quaternary) - Terrace deposit, formerly included as Livermore Gravels. Predominantly graywacke, well imbricated, clast supported, with a westerly paleocurrent trend
- Qls Landslide deposits (Pleistocene) - Landslide deposits with clast compositions similar to those found in the Oakland Conglomerate; contains abundant clasts of granitic rocks, siliceous feldspar and quartz porphyries, chert, and metavolcanic rocks
- QTgt Tassajara Formation of Clark (1943), undivided (Pleistocene and Pliocene) - Red and maroon gravel and brown, blue, gray, and red siltstone and claystone. Also includes abundant andesitic tuff, interlayered limestone, and black, well-rounded chert nodules
- QTlu Livermore Gravels of Clark (1943), (Pleistocene, Pliocene, and Miocene) Units contacts are revised within Clark's original area. Locally divided into:
 - Upper Part (Pleistocene and Pliocene) - Moderate-brown, poorly cemented, well-imbricated, clast supported, planar-bedded gravel, with interlayered sandstone and siltstone. Contains clasts of high-grade metamorphic rocks, altered volcanic rocks, abundant graywacke, and minor lithic sandstone 3-33 cm in diameter. Fossil dates suggest an age of younger than 2.5 Ma. Strong paleocurrent trend to northeast. Member averages 70 m in thickness
 - Lower Part (Pliocene and Miocene) - Light-gray to light olive-gray gravel. Cyclical units of massive to thinly planar-bedded siltstone and mudstone, capped by paleosols; contains interlayered tuff beds and medium-scale planar-bedded gravel beds. Contains abundant clasts composed of gray, lithic sandstone and light-gray, fine-grained vein quartz. Lawlor tuff, K/Ar dated at 4.5± 0.5 Ma, as mapped by Sarna-Wojcicki (1976), and minor graywacke and traces of blueschist 2-7 cm in diameter. Strong paleocurrent trend to southwest. Locally 400 m thick
- Tn Neroly Formation (Miocene) - Blue sandstone interbedded with minor, well-rounded, andesitic, cobble and pebble conglomerate beds. Bluish nontronite covering coats the sand grains in sandstones. Cobbles range from 2 to 5 cm diameter; composed of andesitic porphyries - predominantly augite-plagioclase, hornblende-plagioclase, and hypersthene-plagioclase. Formation is locally 180 m thick
- Tc Cierbo Sandstone (Miocene) - Predominantly buff-tan to white quartzose sandstone; poorly sorted, coarse grained, massive to cross bedded. Beds are often friable and streaked with limonite. Locally 200 m thick. Black chert is common; tuff beds and carboniferous shale occur locally. *Ostrea* common
- Tb Briones Sandstone (Miocene) - Gray, calcareous sandstone; subordinate conglomerate with sparse *Ostrea* and minor chert clasts occurs throughout unit. Also includes yellow to buff-brown limestone with sparse *Ostrea*. Locally 600 m thick
- To Oursan Sandstone (Miocene) - Massive, buff sandstone containing minor, pebble to cobble-size clasts. Contains abundant shell fragments and locally 75-150 m thick
- KJgv Great Valley Group (Cretaceous and Jurassic) - Brown, massive, and, in places, concretionary sandstone with subordinate, brown, thinly laminated siltstone and shale with local conglomerate lenses. Also includes grayish black, carbonaceous shale with dark-gray to black concretionary lenses; minor fossiliferous limestone
- KJf Franciscan Complex (Cretaceous and Jurassic) - Gray, brown, and green graywacke; brown and red sandstone and shale; red and green chert interbedded with minor greenstone, conglomerate, diabase, serpentinite, limestone, and blueschist

Base from U.S. Geological Survey, 1:24,000, Altamont, 1953 (photorevised 1981); Dublin, Livermore, Niles, 1961 (photorevised 1980); La Costa Valley, 1960 (photorevised 1968); Mendonhall Springs, 1956 (photorevised 1971);

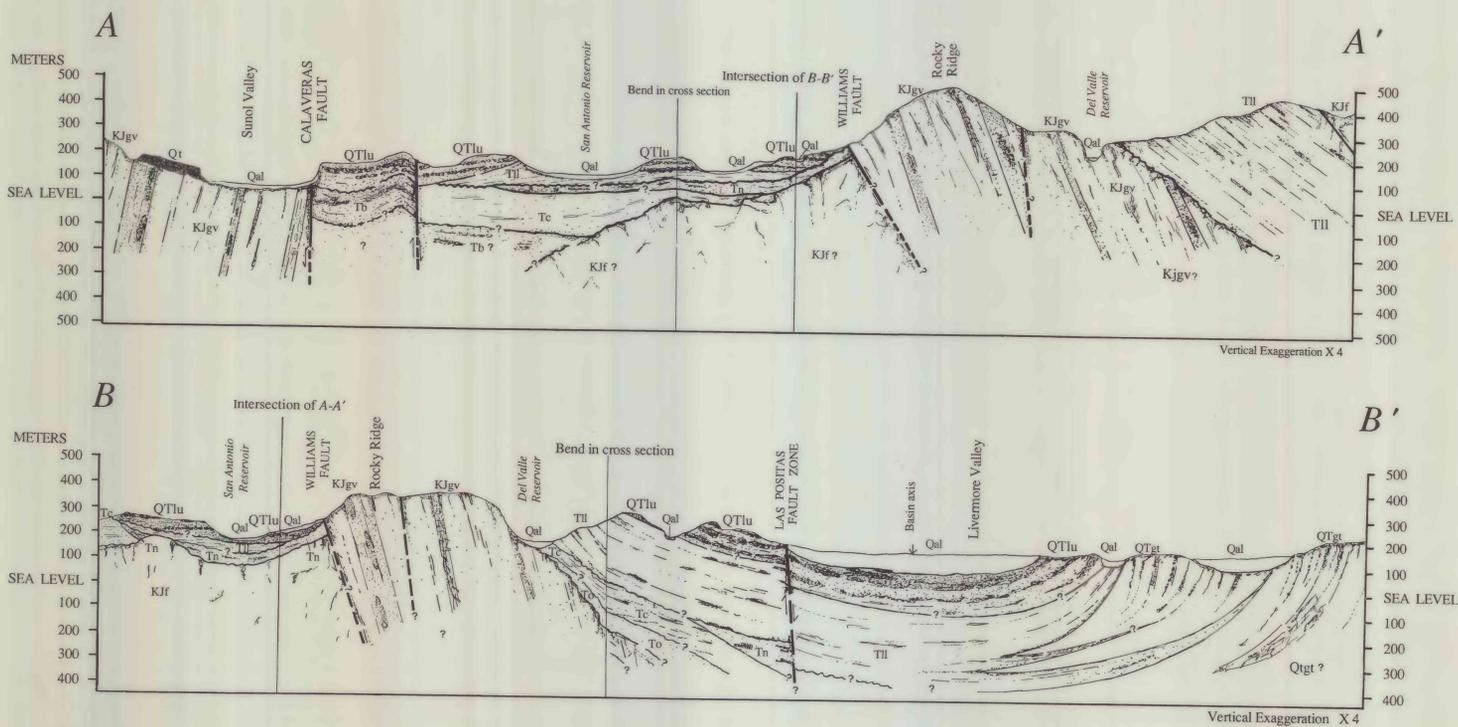
CONSTRUCTION OF MAP

The focus of this map is to revise the stratigraphy and distribution of the Livermore Gravels. This geologic map of the Livermore Valley, Sunol Valley, neighboring parts of the Diablo Range and the Altamont Hills was constructed by detailed clast composition studies of conglomerates throughout the area with emphasis on the Livermore Gravels. The stratigraphic nomenclature of previously mapped bedrock units in the Tesla quadrangle (Huey, 1948) and the Plessanton quadrangle (Hall, 1958) have been used. The structure and placement of faults in the eastern Livermore Valley (Herd, 1977) have been retained.

SCALE 1:48,000



Geology modified from Hall (1958), Herd (1977), and Dibblee (1980 a,b,c,d); field mapped by V.E. Barlock, 1985-87.



- Contact - Dashed where approximately located; dotted where concealed; queried in cross sections where uncertain
- Disconformable contact - Queried where uncertain
- - - - Fault - Dotted where concealed, dashed where inferred, queried where uncertain, ball and bar on down thrown side. In cross section, arrows indicate direction of relative movement
- Anticline - Dashed where approximately located; dotted where concealed
- Syncline - Dashed where approximately located; dotted where concealed

- Strike and dip of beds
 - Apparent
 - Inclined
 - Vertical
- Sample locations used in this study
- *M-1432 Fossil locations of Herd and Brabb (1980)
- *V-4901 Fossil locations of Savage (1951)

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GEOLOGIC MAP OF THE LIVERMORE GRAVELS, ALAMEDA COUNTY, CALIFORNIA

by
Vincent E. Barlock

1989

This map is preliminary and has not been reviewed for conformity with the U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade, product, industry, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.