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

OPEN-FILE REPORT 93-224

SHEET 1 OF 3

Description of Map Units

FLUVIAL DEPOSITS

Qhc Active stream channel deposits--Unconsolidated sands and silts of Coast Range origin. These deposits underlie the modern floodplain and low terraces and are reworked by relatively frequent flooding. These deposits generally exhibit no soil development.

- **Qhct** Active stream channel deposits of Lone Tree Creek
- **Qhcw** Active stream channel deposits of Corral Hollow Creek

Qhl HOLOCENE LEVEE DEPOSITS--Unconsolidated sands, silts, and gravels derived from the Coast Ranges. These deposits form long, raised landforms extending downfan. They represent the locus of deposition of the coarser component of major flows of sediment and water over the fan during flooding. Soils are weakly developed and typically belong to the Salado or Cortina soil series, as mapped by McLaughlin and Huntington (1968).

- **Qhlw** Levee deposits of Corral Hollow Creek

Qhf HOLOCENE FANS AND TERRACES, undifferentiated--Unconsolidated silts, clays, sands, and gravels derived from the Coast Ranges. Unit includes active channel deposits of smaller drainages. Deposits on the terraces in valleys of the Coast Range are dominantly gravels, sands and silts. Sediments become more fine-grained with distance downfan. Subdivisions of this unit are identified primarily in Coast Range valleys where differences in age are reflected by terrace height. These deposits are generally unweathered and undissected. Soil development ranges from none, to weak rubification and stage I-II carbonate accumulation (Birkeland, 1984). Soils typically belong to the Vernalis, Salado, Cortina, El Solyo, Stomar, Myers soil series, as mapped by McLaughlin and Huntington (1968).

- **Qhft** Holocene fan and terrace deposits of Lone Tree Creek, undifferentiated
- **Qhft2** Holocene fan and terrace deposits of Lone Tree Creek, younger
- **Qhft1** Holocene fan and terrace deposits of Lone Tree Creek, older
- **Qhfh** Holocene fan and terrace deposits of Hospital Creek, undifferentiated
- **Qhfh2** Holocene fan and terrace deposits of Hospital Creek, younger
- **Qhfh1** Holocene fan and terrace deposits of Hospital Creek, older
- **Qhfi** Holocene fan and terrace deposits of Ingram Creek
- **Qhfm** Holocene fan and terrace deposits of Martin Creek

Qpf PLEISTOCENE FAN AND TERRACE DEPOSITS, undifferentiated--Unconsolidated gravels, sands, silts, and clays derived from the Coast Ranges. Terrace deposits in valleys of the Coast Ranges are dominantly gravels, sands and silts. Sediments become more fine-grained with distance downfan. In Coast Range valleys, subdivisions of this unit are identified primarily where differences in age are reflected by terrace height. Soils are characterized by a rubified Bt horizon, overlying a Stage II-III+ carbonate horizon (Birkeland, 1984). Soils typically belong to the Zacharias and Positas soil series (McLaughlin and Huntingdon, 1968)

- **Qpft** Pleistocene fan and terrace deposits of Lone Tree Creek, undifferentiated
- **Qpft3** Pleistocene fan and terrace deposits of Lone Tree Creek, younger
- **Qpft2** Pleistocene fan and terrace deposits of Lone Tree Creek, intermediate age
- **Qpft1** Pleistocene fan and terrace deposits of Lone Tree Creek, older
- **Qpfh** Pleistocene fan and terrace deposits of Hospital Creek, undifferentiated
- **Qpfh4** Pleistocene fan and terrace deposits of Hospital Creek, younger
- **Qpfh3** Pleistocene fan and terrace deposits of Hospital Creek, intermediate age younger than Qpfh2
- **Qpfh2** Pleistocene fan and terrace deposits of Hospital Creek, intermediate age older than Qpfh3
- **Qpfh1** Pleistocene fan and terrace deposits of Hospital Creek, older
- **Qpfa** Pleistocene fan and terrace deposits of Arkansas Creek
- **Qpfm2** Pleistocene fan and terrace deposits of Martin Creek, younger
- **Qpfm1** Pleistocene fan and terrace deposits of Martin Creek, older
- **Qpfi2** Pleistocene fan and terrace deposits of Ingram Creek, younger
- **Qpfi1** Pleistocene fan and terrace deposits of Ingram Creek, older

PLEISTOCENE PEDIMENT DEPOSITS--Unconsolidated to consolidated, weakly cemented gravels and sands that veneer high erosion surfaces along the eastern flank of the Coast Ranges. These deposits are deeply weathered and highly dissected. Flat hill tops and parallel, concordant ridge crests typically define remnants of the pediment surface. Soils are characterized by a rubified Bt horizon underlain by a stage IV carbonate horizon. Soils typically belong to the Denverton soil series, as mapped by Cole et al. (1943) and McLaughlin and Huntington (1968).

Qpp Pediment deposits which cap hilltops in a 1 mile-wide band adjacent to the mountain front south of Lone Tree Creek. Remnants are present about 500 feet above the present drainages.

Qpph1 Pediment deposits at the mouth of Hospital Creek, approximately correlative with Qppt2 in the Lone Tree Creek area. The pediment truncates Pliocene to early Pleistocene fluvial gravels (QTg) derived from the Coast Range. The pediment surface is deeply dissected and is now present 100 to 200 feet above Hospital Creek.

Qppt2 Extensive pediment deposits whose remnants define a fan-shaped apron at the mouth of Lone Tree Creek. The pediment truncates Pliocene to early Pleistocene fluvial gravels (QTg) derived from the Coast Range. The pediment surface is highly dissected and is now present about 200 feet above Lone Tree Creek.

Qppt1 Small remnants of pediment deposits capping hilltops west of the Black Butte Fault. These remnants may represent portions of Qppt2 that have been uplifted by movement on the Black Butte Fault. The remnants are about 300 feet above Lone Tree Creek.

PLIOCENE TO EARLY PLEISTOCENE DEPOSITS

QTg Pliocene to early Pleistocene fluvial deposits consisting of gravels, sands, and clayey silts derived from the Coast Ranges. These sediments underlie pediment surfaces of Pleistocene age and may be the same age or considerably older than these surfaces. They were mapped as the Carbona unit by Pelletier (1951) and Raymond (1969), and as Pliocene non-marine sediments by Dibblee (1981a and b).

NON-FLUVIAL DEPOSITS

Qls Landslide deposits greater than approximately 1 hectare in area. Landslide scarp is indicated by lined pattern; arrows indicate interpreted direction of downslope movement. Landslides in the western part of the Midway quadrangle include many previously mapped by Nilsen (1972).

B Pre-Quaternary bedrock, undifferentiated. This mapping unit includes Mesozoic Franciscan Assemblage, and Mesozoic and Tertiary sedimentary rocks.

Mapping procedure and criteria

Geologic map units were identified chiefly through the interpretation of air photos and topographic maps, augmented by field reconnaissance and comparisons with published and unpublished geologic maps and published soil surveys. Mapping criteria included landform shape and relative geomorphic position, cross-cutting relationships, superposition, depth and degree of dissection, tone and texture on air photographs, and relative degree of soil development. For example, extent and thickness of deposits were used as criteria for discriminating pediments from fans and terraces. Erosion surfaces without significant deposits were also mapped as pediments.

Ages of units were estimated from a reconnaissance assessment of (1) relative degree of dissection, (2) relative degree of soil development on the surface, and (3) on regional stratigraphic correlation to mapped deposits in the west-central San Joaquin Valley (Lettis, 1982, 1985).

Designation of units

Quaternary fluvial units were named according to age (Pleistocene or Holocene), landform type, and, where possible, the drainage of origin and relative age among other units in that drainage. For example, "Qpfm2" means "Quaternary, Pleistocene, fan or terrace, Martin Creek, 2nd Pleistocene terrace on Martin Creek. All numbers are in ascending order from oldest to youngest. Fluvial landform types recognized are fan or terrace (f), levee (l), channel (c), pediment (p), basin rim (r) and basin (b).

Quaternary landslides are labeled "Qls". Lined pattern delineates the scarp of each slide and an arrow on the slide mass shows the interpreted direction of downslope movement.

Older Quaternary to late Tertiary fan deposits which no longer have original fan morphology are designated QTg, or Quaternary-Tertiary gravel, sand, and silt.

FAULTS AND LINEAMENTS

- Fault (after Dibblee, 1981)
- Fault, inferred (after Dibblee, 1981)
- Fault, concealed (after Dibblee, 1981)
- Lineament

The San Joaquin fault of Herd (1979) occurs along the base of the escarpment at the range front. It is shown as a solid line where Quaternary surfaces are offset or truncated, and a dotted line elsewhere. Its presence is inferred from (1) the height and linearity of the range front, (2) offset terraces and fans which occur at the range front at the mouths of Ingram and Lone Creek creeks, and (3) truncated pediment surfaces along the range front. The surface trace of the San Joaquin fault defines a series of en echelon right step-overs that bound thick prisms of Late Cenozoic sedimentary deposits. We interpret the fault to be a southwest-dipping reverse fault with an unknown component of lateral slip.

The Black Butte fault is a northwest-trending southwest-dipping reverse fault that offsets Tertiary and older bedrock units on the Lone Tree Creek quadrangle (Dibblee, 1981a). As mapped by Dibblee, the fault dies out southward at Hospital Creek. We interpret, however, that the fault merges into or forms a small left step with a western branch of the San Joaquin fault on the Solyo quadrangle. On the Lone Tree Creek quadrangle, the Black Butte Fault may offset early to middle Pleistocene pediments; offset of younger Quaternary deposits is not known.

Two lineaments were identified from satellite imagery on the Lone Tree Creek quadrangle between and approximately parallel to the Black Butte and San Joaquin faults. The lineaments consist of aligned drainages on dissected pediment surfaces, and may be the surface expression of Quaternary fault activity.

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AGE		THIS STUDY: Undifferentiated units	THIS STUDY: Lone Tree Creek (t)	THIS STUDY: Hospital Creek (h)	THIS STUDY: Arkansas Creek (a)	THIS STUDY: Martin Creek (m)	THIS STUDY: Ingram Creek (i)	SAN JOAQUIN VALLEY: Marchand & Allwardt (1981) NE San Joaquin Valley	SAN JOAQUIN VALLEY: Bartow et al. (1985) NW San Joaquin Valley	SAN JOAQUIN VALLEY: Lettis (1982) West-central San Joaquin Valley	DELTA REGION: (Modified from Atwater 1980) Sacramento-San Joaquin Delta Area	Approx. Age
QUATERNARY	HOLOCENE	Qls	Qhct Qhft	Qhch Qhfh	Qhfa	Qhfm	Qhfi	Post-Modesto: IV, III, II, I	Alluvium of Patterson and San Luis Ranch, undivided	Alluvium of Patterson	Intertidal alluvium Flood Plain alluvium	
	PLEISTOCENE LATE		Qhf Qpft	Qhlh Qhfh				Modesto Formation: upper member, lower member	Alluvium of San Luis Ranch: upper mbr., lower mbr.	Alluvium of San Luis Ranch: upper member, lower member	Modesto Formation: upper mbr., lower mbr.	10 ka
	PLEISTOCENE MIDDLE		Qpf Qpft3 Qpft2 Qpft1	Qpfh Qpfh4 Qpfh3 Qpfh2 Qpfh1	Qpfa	Qpfm2 Qpfm1	Qpfi2 Qpfi1	Riverbank Formation: upper unit, middle unit, lower unit	Alluvium of Los Banos: upper member, middle member, lower member	Alluvium of Los Banos: upper member, middle member, lower member	Riverbank Formation: upper unit, middle unit, lower unit Modesto and Riverbank Formations, undivided	120 ka
	PLEISTOCENE EARLY		Qppt1 Qppt2 Qpph1 QTg[1] (upper part of unit)		(no units present)	(no units present)	(no units present)	Turlock Lake Formation: upper unit, Corcoran Clay mbr., lower unit North Merced Gravel[1]	(no units present)	Tulare Formation: upper member, Corcoran Clay mbr., lower member	Turlock Lake Formation, undivided	700 ka 2.0 Ma

Table 1. Quaternary map units in the Solyo and Lone Tree Creek 7.5-minute quadrangles, correlated with nearby studies. Timing and correlation of units are approximate. Periods of non-deposition and landscape stability typically occur between depositional units.
[1] Unit age is Pliocene to early Pleistocene.

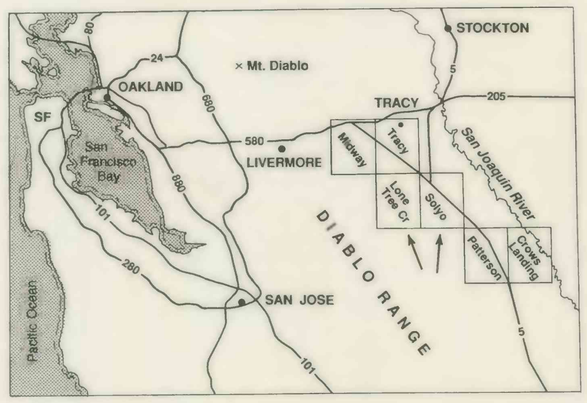

Figure 1: The Solyo and Lone Tree Creek, California 7.5-minute quadrangles are located on the east flank of the northern Diablo Range near Tracy, east of the San Francisco Bay area, California. Heavy lines denote major highways, with corresponding route number. Quaternary geologic maps of the Patterson and Crows Landing, and Tracy and Midway 7.5-minute quadrangles are available as separate USGS Open-File Reports (Sowers et al., 1993a and b)

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PRELIMINARY MAPS SHOWING QUATERNARY GEOLOGY OF THE SOLYO AND LONE TREE CREEK 7.5-MINUTE QUADRANGLES, CALIFORNIA

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