DESCRIPTION OF UNITS — UKIAH AND SANTA ROSA SHEETS

Qtm — MARINE TERRACES: coastal terraces of varying ages lying at elevations from 25' - 200+', and are covered by coarse, pebbly, stratified deposits which are poorly or only partially consolidated. These terraces represent wave-cut benches which have been subsequently uplifted.

Qh — HUICHICA Fm.: non-marine deposits of sand, gravel, silt, clay, and locally interbedded tuffs, poorly stratified, on elevated terraces around the margins of Napa and Sonoma Valleys.

Qge — GLEN ELLEN Fm.: fluviatile sand, gravel, mudstone, and minor interbedded tuffs and andesites, primarily northern Sonoma County and Napa County.

Tm — MERCED Fm.: late Pliocene ?, marine and continental deposits primarily well-consolidated sandstones which grade upward from conglomerates at the base to a fine siltstone at the top. The sediments are derived primarily from Franciscan detritus. Marine and brackish water ostracodes, foraminifera, and gastropods plus whale vertebrae have been found.

Tpo — OHLSON RANCH Fm.: Pliocene sandstone, medium to coarse, moderately indurated; rests as a terrace deposit on Franciscan erosion surfaces in the area of Pt. Arena and to the southeast. This formation has variable amounts of Franciscan detritus in its constituents, up to 100%. In the Pt. Arena area there is more Gualala Group and less Franciscan in the make-up of the rocks than to the southeast. The fossil marine megafauna has been described by Peck (1960).

Tmu — UPPER MIOCENE ROCKS: correlated with the Neroly Fm. of the San Pablo Group of the San Francisco Bay Area. Blue sandstone, pebble conglomerate and shale; includes a 14 ft. lignite bed, fossil marine molluscs and fossil mammals.

Tmm — MONTEREY Fm.: middle Miocene, siliceous mudstones and siltstones to nearly pure porcellanites and cherts. The silica is primarily biogenic. Some dolomite, bentonite and sandstone are present. Contains marine fossils, mainly diatoms, radiolaria and sponge spicules.

Tmsg — SCHOONER GULCH AND GALLAWAY Fms.: lower Miocene calcareous cemented medium to fine sandstones and mudstones. There are dolomite concretions scattered through these formations. "Vaqueros Age" lower Miocene megafossils have been found here, including Turritella inezana, (Addicott, 1967).

Tsr — SAN RAMON Fm.: a grayish brown marine sandstone with thin layers of conglomerate interbedded; described from Contra Costa County; poorly-preserved fossils are found occasionally in the Lake and Sonoma County outcrops of this formation; probably Oligocene age.

Tt — TEJON Fm.: white conglomerate sandstone with marine fossils indicating an age comparable to the restricted Tejon. The sandstone is medium-grained, well-sorted angular grains. The conglomerate occurs as lenses and stringers of unsorted pebbles lightly cemented with carbonate.

Ted — DOMINGENE Fm.: as exposed in the Northern Coast Ranges, this formation is sandy siltstone with interbedded clayey shales. Has Turritella inezana in a few localities.

Tec — CAPAY Fm.: friable sandstone interbedded with shale. The exposures along the Eel River are not typical of the formation as described by Weaver (1949) but have been correlated on the basis of marine fossils.

Tpb — MEGANOS Fm.: Paleocene to lower Eocene sedimentary rocks, lithology similar to Martinez (Tpa) but with distinctive Meganos marine fossil assemblage.

Tpa — MARTINEZ Fm.: Paleocene sedimentary rocks predominantly well-sorted, massive, fine-to coarse-grained arkosic and locally conglomeratic yellow and gray sandstone with detrital glauconite, mostly moderately to lightly cemented with clay or calcium carbonate; Paleocene marine fauna.

Kup — GUALALA Fm.: Cretaceous ? or Paleocene arkosic sandstone; includes Anchor Bay member and Stewarts Pt. member of Wentworth (1966). The formation is predominantly greenish-gray plagioclase rich in the north (Anchor Bay mbr.), while in the southern exposures (Stewarts Pt. mbr.) it is gray to white and K-feldspar rich. There are marine fossils which are not abundant. This is the lower part of Weaver's Gualala Group (1943).

K — GREAT VALLEY SEQUENCE (UNDIFFERENTIATED): Cretaceous rocks, primarily well-bedded marine sandstone and siltstone with some conglomerate.

Ku — UPPER GREAT VALLEY SEQUENCE: Cretaceous greenish gray thin- to thick-bedded silty marine sandstone, siltstone or mudstone with light tan to white leucite clasts, high plagioclase content, clear quartz, sanadine and siliceous volcanic fragments and carbonate concretions. Contains fossils of Cenomanian to Campanian age, especially Inoceramus schmidti.

Kl — LOWER GREAT VALLEY SEQUENCE: dark greenish gray marine sandstone and mudstone, has little K-feldspar; sodium feldspar is mostly albite; muscovite and biotite are abundant. Locally with fossils of Hautertivian to Aptian-Albian age. Buchia crassicola is a diagnostic fossil for these sediments.

Kc — GREAT VALLEY CONGLOMERATE: conglomerate beds of the Great Valley Sequence of sufficient size to be mapped as discrete units.

JK — GREAT VALLEY SEQUENCE ("KNOXVILLE"): mostly Jurassic grading into lower Cretaceous. This is the oldest part of the Great Valley Sequence made up of thin-bedded, olive-green to black shales with thin lenses of limestone and interbedded graywacke and conglomerate. Contains Buchia piochii and belemnites.

Qal — QUATERNARY ALLUVIUM: sand, silt, clay and gravel deposits, usually unconsolidated. Deposited as fan, lacustrine, or fluvial sediments.

Qs — COASTAL SAND DUNES: wind-sorted, relatively stable sand dunes along the coastal margin in restricted areas.

Qtc — CONTINENTAL TERRACE DEPOSITS (UNDIFFERENTIATED): discontinuously exposed sediments, often dissected by recent erosion. They consist of cross-bedded deposits of conglomerate, sand, silt, and clay all relatively unconsolidated. In some areas these terraces can be divided into older and younger beds based on stratigraphic position. The lithology is essentially the same.

Qtcy younger terraces
Qtco older terraces
- where superposition can be demonstrated

Ql — UNDIFFERENTIATED LANDSLIDE DEPOSITS: landslides occur throughout the coast ranges but are most common in the Central Belt Franciscan and in the vicinity of major faults. There are several varieties of landslides occurring in the area, debris slides (including debris avalanches) are probably the most common but rotational slump blocks and earth flows occur. On the maps of the Ukiah and Santa Rosa Sheets, these slide types have seldom been differentiated in mapping. They are all lumped under the general category of landslides.

Tpc — CACHE Fm.: Plio-Pleistocene lacustrine deposits, fine-grained, well-bedded deposits of sandstone, siltstone, and clay deposited on either Great Valley or Franciscan erosion surface. It is weakly consolidated. Contains fresh water diatoms of Plio-Pleistocene age and small amounts of thin-bedded tuffs. This formation underlies the Clearlake Volcanics.

Tp — UNNAMED PLIOCENE DEPOSITS: probably marine in origin.

Tpp — PETALUMA Fm.: estuarine to lacustrine clays, siltstone, and pebble conglomerate with interbedded tuff and tuffaceous siltstone; abundant Franciscan detritus; strongly deformed; has fossil vertebrates, Neohipparion gidleyi and Pliohippus cf. tantalus, plus diatoms and brackish water molluscs.

Tmx — TERTIARY MARINE (UNDIFFERENTIATED): generally Pliocene or Miocene sandstone, siltstone, shale and conglomerates; mostly moderately well consolidated.

Tmt — MIDDLE MIOCENE MARINE ROCKS: Sandstones, shales, and pebble conglomerate; has coal bodies up to 14 feet in thickness; contains Temblor (lower Miocene) fossils in moderate numbers.

Tgr — GERMAN RANCHO Fm.: massive buff to brown arkosic sandstone and buff to green mudstone. Medium to thick-bedded and sorted medium to coarse or thin-bedded and fine-grained. Paleocene to Mid-Eocene age based on microfossils at the top of the section which are Mid-Eocene age and megafossils of Martinez to Capay age found throughout the formation (Boyle, 1967).

Ty — YAGER Fm.: contains well indurated, massive, medium- to fine-grained graywacke sandstone, interbedded with conglomerate, siltstone or soft shale, and indurated mudstone and siltstone interbedded with biotitic graywacke and conglomerate. Mudstone, siltstone and shale comprise approximately 70% of total unit, sandstone about 25% and about 5% is conglomerate. Sandstone and siltstone often light-to medium-gray (weathering medium brown or olive gray) and shows signs of graded bedding; fissile shales are dark gray or olive gray. Some conglomerates with indistinct sandy laminations; often with well-rounded cobbles of red or black chert, volcanic and sedimentary rocks.

TKc — COASTAL BELT FRANCISCAN (UNDIFFERENTIATED COASTAL BELT); generally massively-bedded graywackes medium grained but with interbedded siltstone, shale and conglomerates. Cretaceous, Paleocene and Eocene ages. Rocks are more arkosic than other Franciscan rocks; contain zeolites; the most abundant feldspars are sodic--primarily albite. Minor amounts of greenstone, chert, serpentine, schist and volcanics are present. These rocks appear to be younger than the rest of the rocks referred to the Franciscan Complex. Fossils are occasionally found and include forms of late Cretaceous to Eocene ages.

KJfu / **KJfu$_{ss}$** — CENTRAL BELT FRANCISCAN (UNDIFFERENTIATED): generally massive well indurated graywacke, and green coarse-to-fine grained graywacke (separated as-ss) and softer dark gray shales. Locally includes red and green cherts, conglomerate, pillow basalts, greenstones, mafic and ultramafic intrusive rocks with contact metamorphism giving glaucophane, chlorite, and actinolite schists. Highly deformed and chaotic in many places. The melange is an incoherent mixture of the rock types listed. (includes Elk Creek, Tin Cabin, Eel River, and Laytonville **melanges** of Gucwa, 1974).

KJfs — SKUNK ROCK MELANGE: of the Department of Water Resources and U. S. Geological Survey usage which is a highly deformed melange of resistant Franciscan rocks, serpentinite glaucophane amphibolite, and eclogite in a sheared matrix of pumpellyite shales and graywackes, in the Central Belt.

KJfv — FRANCISCAN VOLCANICS: including greenstones and basalts. Dense, hard, fine-to medium-grained basic volcanic rocks, usually occurring in isolated blocks. Can include andesitic flow rocks, volcanic breccias, and pillow lavas. Some parts strongly metemorphosed.

Qcv — CLEARLAKE VOLCANICS: quartz basalt, andesite, dacite, rhyolite, and minor amounts of olivine basalts. Age .03 to 2.04 million years based on K-A dates. (Hearn et. al. 1976)

Qvcp Pyroclastic rocks of the Clearlake Volcanics.

Qv — Volcanics of late Pliocene to Pleistocene age, outside the usual areal extent of what has been mapped as Clearlake Volcanics.

SC — SILICA - CARBONATE ROCKS: Tertiary and Quaternary age - hydrothermal alteration product of serpentine and its relatives. Largely magnesium carbonate, chalcedony, opal and quartz. Locally includes concentrations of mercury. Generally outcrops along fault zones.

Tsv — SONOMA VOLCANICS: andesitic flows and tuffs, welded tuffs, minor amounts of olivine basalt and dacite. Mostly basic pyroclastics near base and rhyolite pumice and obsidian flows near top. K-A dates 2.9 to 5.3 million years (McLaughlin, 1978).

Tiv — IVERSON BASALT: dark green to reddish vesicular flows and breccias of olivine and augite basalts. Has occasional pillow structures.

Tis — A thin sandstone unit interbedded in the Iverson volcanics made up of poorly-sorted angular K-feldspar arkosics.

Kgr — CRETACEOUS GRANITE of the Farallon block, west side of San Andreas fault zone in the area around Bodega Head.

KJfe — EASTERN BELT FRANCISCAN (UNDIFFERENTIATED): metamorphosed graywacke and shale. Original bedding not noticeably disturbed to very disturbed in small local areas. Includes semi-schists, phyllites and slates. Schists have a silvery color with quartz banding, plus lawsonite, glaucophane and minor amounts of blueschist or amphibolite. Has knockers of blueschist and greenschist.

KJf$_{hm}$ — HULL MOUNTAIN METASEDIMENTS: a discrete, identifiable unit of Central Belt rocks that have undergone notably less metamorphic change than much of the rest of the Central Belt Franciscan. This unit primarily used by Department of Water Resources in their mapping in the vicinity of Hull Mountain.

KJfp — PLASKETT SCHIST: Department of Water Resources and U. S. Geological Survey usage for schistose rocks in the area of Central Belt exposures in the Eel River drainage.

KJf$_{sm}$ — SANHEDRIN MEMBER: unfoliated to moderately-foliated graywacke with interbedded shale, slate and phyllite. Chert bodies included locally. Within the Central Belt.

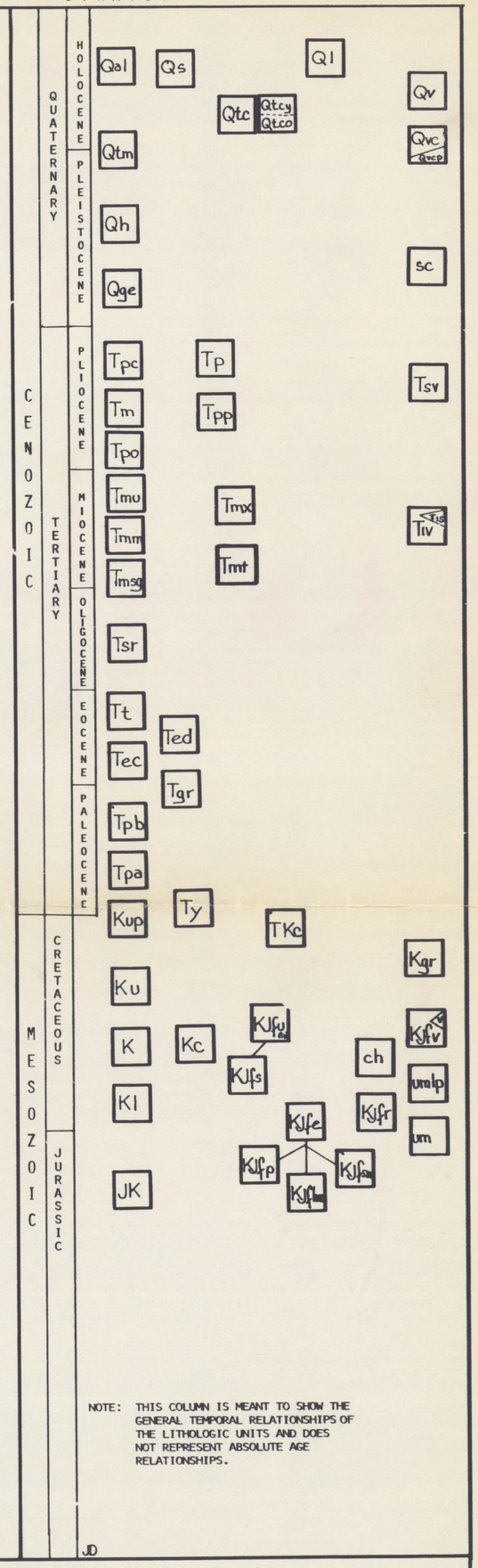
ch — FRANCISCAN CHERT: red and green, usually thinly-bedded chert, interbedded with siliceous shales and tuffs, in some places contains radiolarian fossils. Local hydrothermal alteration in some areas.

um — ULTRAMAFIC ROCKS: large lenticular bodies, either continuous or sheared. Includes peridotite grading to serpentinite. May also include blocks of gabbro, diorite, greenstone, or chert which have undergone metasomatism.

umlp — LEGGETT PERIDOTITE: large body of massive diorite and harzburgite with lesser amounts of serpentinite (O'Day, 1974).

KJfr — RATTLESNAKE SCHIST: a narrow belt of schistose rocks lying on the eastern margin of the Leggett peridotite body (O'Day, 1974). A sequence of contorted glaucophane schists, metagraywackes and shale.

STRATIGRAPHIC SEQUENCE



NOTE: THIS COLUMN IS MEANT TO SHOW THE GENERAL TEMPORAL RELATIONSHIPS OF THE LITHOLOGIC UNITS AND DOES NOT REPRESENT ABSOLUTE AGE RELATIONSHIPS.

JD

EXPLANATION OF SYMBOLS

- 30 — Strike and dip of bedding
- — Strike of vertical bedding
- 50 — Overturned bedding
- 71 — Strike and dip of foliation

- — Geologic contact; dashed where approximate, queried where existence is uncertain, dotted where concealed
- — Shear zone
- — Fault; dashed where approximately located, dotted where concealed, queried where existence uncertain
- — Faults known to be active during Pleistocene or recent time

- — Thrust fault; barbs on upper plate, dashed where approximately located
- — Axis of anticline; plunge shown by barb on long axis
- — Axis of syncline; plunge shown by barb on long axis

- — Landslide; arrow indicates direction of motion
- — Landslide - areal extent too small to map at this scale
- — Landslides mapped by aerial photographic interpretation during this investigation.
- — Indicates a generalized area of landslides and unstable soil, undifferentiated in details of size or direction of movement