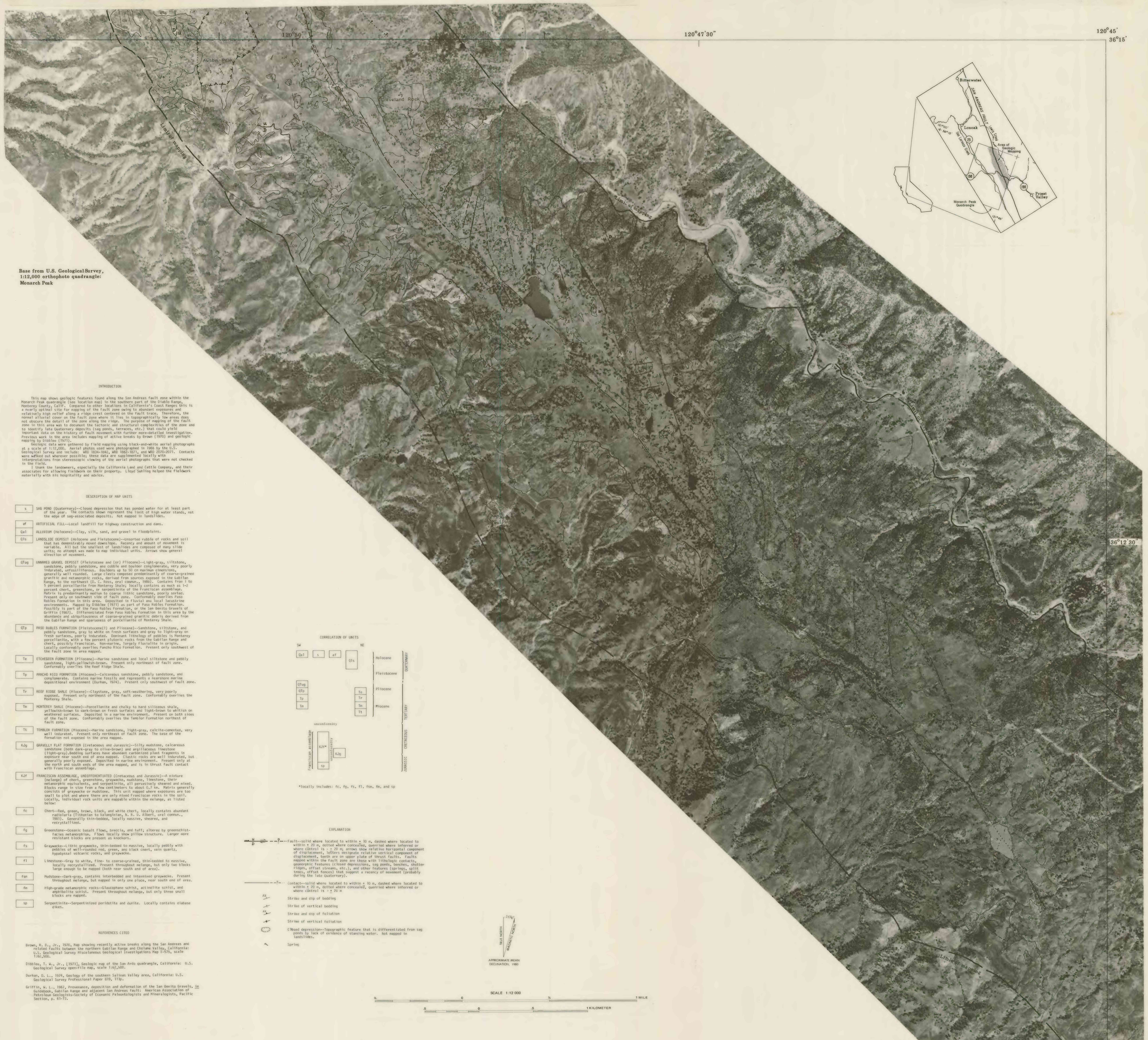

Base from U.S. Geological Survey, 1:12,000 orthophoto quadrangle: Monarch Peak

INTRODUCTION

This map shows geologic features found along the San Andreas fault zone within the Monarch Peak quadrangle (see location map) in the southern part of the Diablo Range, Monterey County, Calif. Compared to other locations in California's Coast Ranges this is a nearly optimal site for mapping of the fault zone owing to abundant exposures and relatively high relief along a ridge crest centered on the fault trace. Therefore, the normal alluvial cover on the fault zone where it lies in topographically low areas does not obscure the detail of the zone along the ridge. The purpose of mapping of the fault zone in this area was to document the tectonic and structural complexities of the zone and to identify late Quaternary deposits (sag ponds, terraces, etc.) that could yield important data on the history of fault movement with further more-detailed investigation. Previous work in the area includes mapping of active breaks by Brown (1970) and geologic mapping by Dibblee (1971).

Geologic data were gathered by field mapping using black-and-white aerial photographs at a scale of 1:12,000. Aerial photos used were photographed in 1966 by the U.S. Geological Survey and include: WAO 1834-1842, WAO 1862-1871, and WAO 2070-2071. Contacts were walked out wherever possible; these data are supplemented locally with interpretations from stereoscopic viewing of the aerial photographs that were not checked in the field.

I thank the landowners, especially the California Land and Cattle Company, and their associates for allowing fieldwork on their property. Lloyd Suhling helped the fieldwork materially with his hospitality and advice.

DESCRIPTION OF MAP UNITS

s — SAG POND (Quaternary)--Closed depression that has ponded water for at least part of the year. The contacts shown represent the limit of high water stands, not the edge of sag-associated deposits. Not mapped in landslides.

af — ARTIFICIAL FILL--Local landfill for highway construction and dams.

Qal — ALLUVIUM (Holocene)--Clay, silt, sand, and gravel in floodplains.

Qls — LANDSLIDE DEPOSIT (Holocene and Pleistocene)--Unsorted rubble of rocks and soil that has demonstrably moved downslope. Recency and amount of movement is variable. All but the smallest of landslides are composed of many slide units; no attempt was made to map individual units. Arrows show general direction of movement.

QTug — UNNAMED GRAVEL DEPOSIT (Pleistocene and (or) Pliocene)--Light-gray, siltstone, sandstone, pebbly sandstone, and cobble and boulder conglomerate, very poorly indurated, unfossiliferous. Boulders up to 50 cm maximum dimensions, generally well rounded. Large clasts composed predominantly of coarse-grained granitic and metamorphic rocks, derived from sources exposed in the Gabilan Range, to the northwest (D. C. Ross, oral commun., 1980). Contains from 1 to 5 percent porcellanite from Monterey Shale; locally contains as much as 1-2 percent chert, greenstone, or serpentinite of the Franciscan assemblage. Matrix is predominantly medium to coarse lithic sandstone, poorly sorted. Present only on southwest side of fault zone. Conformably overlies Paso Robles Formation in this area. Deposited in fluvial and local lacustrine environments. Mapped by Dibblee (1971) as part of Paso Robles Formation. Possibly is part of the Paso Robles Formation, or the San Benito Gravels of Griffin (1967). Differentiated from Paso Robles Formation in this area by the abundance and ubiquitousness of coarse-grained granitic debris derived from the Gabilan Range and sparseness of porcellanite of Monterey Shale.

QTp — PASO ROBLES FORMATION (Pleistocene(?) and Pliocene)--Sandstone, siltstone, and pebbly sandstone, gray to white on fresh surfaces and gray to light-gray on fresh surfaces, poorly indurated. Dominant lithology of pebbles is Monterey porcellanite, with a few percent plutonic rocks from the Gabilan Range and chert, possibly Franciscan. Non-marine, largely fluvialite in origin. Locally conformably overlies Pancho Rico Formation. Present only southwest of the fault zone in area mapped.

Te — ETCHEGOIN FORMATION (Pliocene)--Marine sandstone and local siltstone and pebbly sandstone, light-yellowish-brown. Present only northeast of fault zone. Conformably overlies the Reef Ridge Shale.

Tp — PANCHO RICO FORMATION (Miocene)--Calcareous sandstone, pebbly sandstone, and conglomerate. Contains marine fossils and represents a nearshore marine depositional environment (Durham, 1974). Present only southwest of fault zone.

Tr — REEF RIDGE SHALE (Miocene)--Claystone, gray, soft-weathering, very poorly exposed. Present only northeast of the fault zone. Conformably overlies the Monterey Shale.

Tm — MONTEREY SHALE (Miocene)--Porcellanite and chalky to hard siliceous shale, yellowish-brown to dark-brown on fresh surfaces and light-brown to whitish on weathered surfaces. Deposited in a marine environment. Present on both sides of the fault zone. Conformably overlies the Temblor Formation northest of fault zone.

Tt — TEMBLOR FORMATION (Miocene)--Marine sandstone, light-gray, calcite-cemented, very well indurated. Present only northeast of fault zone. The base of the formation not exposed in the area mapped.

KJg — GRAVELLY FLAT FORMATION (Cretaceous and Jurassic)--Silty mudstone, calcareous sandstone (both dark-gray to olive-brown) and argillaceous limestone (light-gray). Bedding surfaces have abundant carbonized plant fragments in exposure near south end of area mapped. Clastic rocks are well indurated, but generally poorly exposed. Deposited in marine environment. Present only at the north and south ends of the area mapped, and is in thrust fault contact with Franciscan assemblage.

KJf — FRANCISCAN ASSEMBLAGE, UNDIFFERENTIATED (Cretaceous and Jurassic)--A mixture (melange) of chert, greenstone, graywacke, mudstone, limestone, their metamorphic equivalents, and serpentinite, all pervasively sheared and mixed. Blocks range in size from a few centimeters to about 0.7 km. Matrix generally consists of graywacke or mudstone. This unit mapped where exposures are too small to plot and where there are only mixed Franciscan rocks in the soil. Locally, individual rock units are mappable within the melange, as listed below:

fc — Chert--Red, green, brown, black, and white chert, locally contains abundant radiolaria (Tithonian to Valenginian, N. K. D. Albert, oral commun., 1981). Generally thin-bedded, locally massive, sheared, and recrystallized.

fg — Greenstone--Oceanic basalt flows, breccia, and tuff; altered by greenschist-facies metamorphism. Flows locally show pillow structure. Larger more resistant blocks are present as knockers.

fs — Graywacke--Lithic graywacke, thin-bedded to massive, locally pebbly with pebbles of well-rounded red, green, and black chert, vein quartz, hypabyssal volcanic rocks, and graywacke.

fl — Limestone--Gray to white, fine- to coarse-grained, thin-bedded to massive, locally recrystallized. Present throughout melange, but only two blocks large enough to be mapped (both near south end of area).

fsm — Mudstone--Dark-gray, contains interbedded and intermixed graywacke. Present throughout melange, but mapped in only one place, near south end of area.

fm — High-grade metamorphic rocks--Glaucophane schist, actinolite schist, and amphibolite schist. Present throughout melange, but only three small blocks are mapped.

sp — Serpentinite--Serpentinized peridotite and dunite. Locally contains diabase dikes.

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Durham, D. L., 1974, Geology of the southern Salinas Valley area, California: U.S. Geological Survey Professional Paper 819, 111p.

Griffin, W. L., 1967, Provenance, deposition and deformation of the San Benito Gravels, in Guidebook, Gabilan Range and adjacent San Andreas fault: American Association of Petroleum Geologists-Society of Economic Paleontologists and Mineralogists, Pacific Section, p. 61-73.

CORRELATION OF UNITS

*locally includes: fc, fg, fs, fl, fsm, fm, and sp

EXPLANATION

Fault--solid where located to within ± 10 m, dashed where located to within ± 20 m, dotted where concealed, querried where inferred or where control is > ± 20 m; arrows show relative horizontal component of displacement, letters designate relative vertical component of displacement, teeth are on upper plate of thrust faults. Faults mapped within the fault zone are those with lithologic contacts, geomorphic features (closed depressions, sag ponds, benches, shutter ridges, offset streams, etc.), and other features (springs, split trees, offset fences) that suggest a recency of movement (probably during the late Quaternary).

Contact--solid where located to within ± 10 m, dashed where located to within ± 20 m, dotted where concealed, querried where inferred or where control is > ± 20 m

Strike and dip of bedding

Strike of vertical bedding

Strike and dip of foliation

Strike of vertical foliation

Closed depression--Topographic feature that is differentiated from sag ponds by lack of evidence of standing water. Not mapped in landslides.

Spring

APPROXIMATE MEAN DECLINATION, 1980

SCALE 1:12 000

½ 0 ½ 1 MILE

.5 0 .5 1 KILOMETER

Geology mapped 1978-1981

GEOLOGIC MAP ALONG A 12 KILOMETER SEGMENT OF THE SAN ANDREAS FAULT ZONE, SOUTHERN DIABLO RANGE, CALIFORNIA

By

Michael J. Rymer

1981