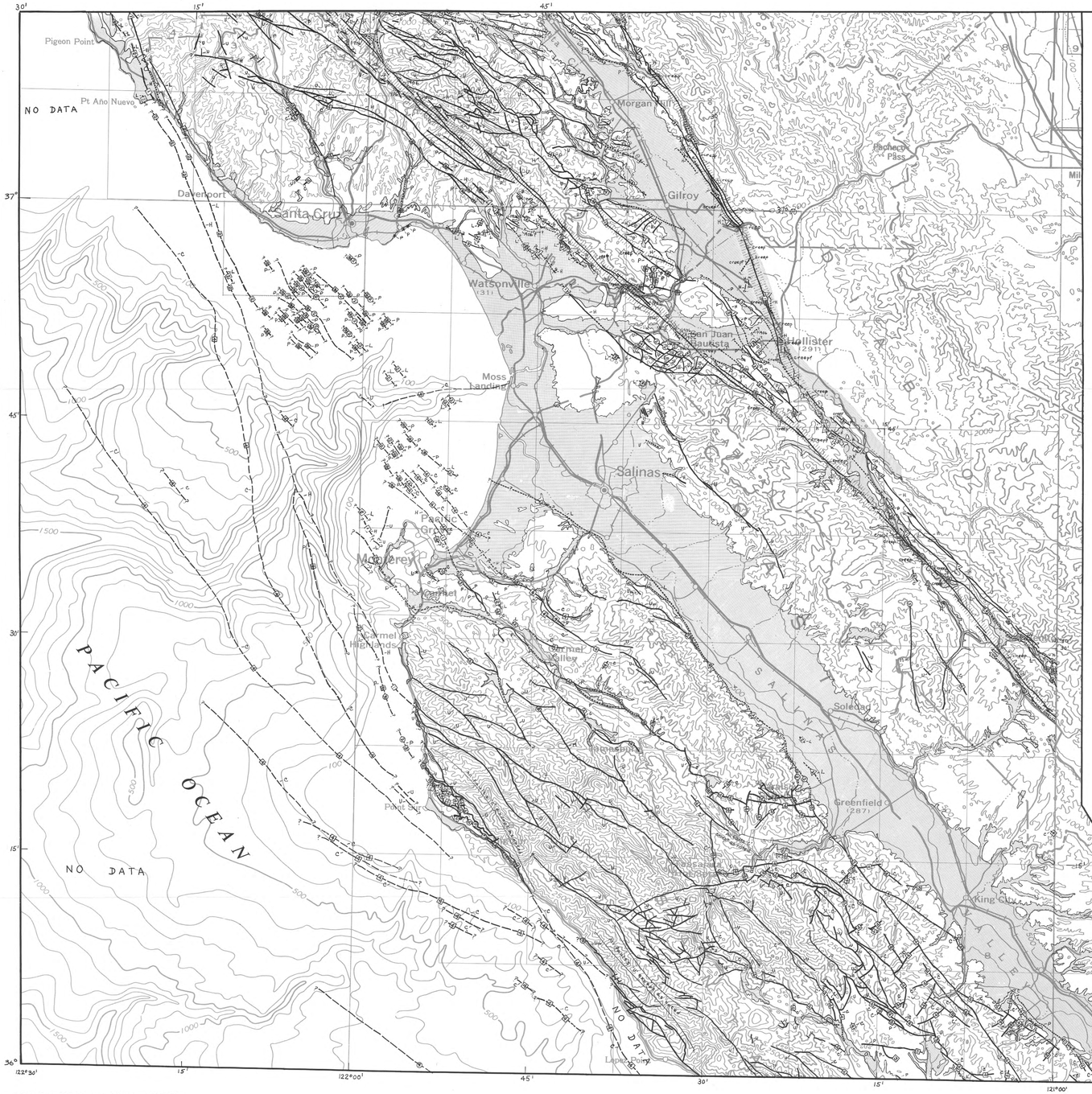
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared on behalf of the
UNITED STATES NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH

MISCELLANEOUS FIELD STUDIES
MAP MF - 910
SHEET 1 OF 3
Buchanan-Banks and others- Recency of faulting, coastal south-central Calif.



Base from U.S. Geological Survey 1:500,000
State of California,south half, 1970

EXPLANATION

INTRODUCTION

This map depicts 1) the locations of presently known or inferred faults and 2) what is currently known about the latest movement along each fault. Symbols superposed on the fault traces indicate the location of known late Cenozoic stratigraphic or geomorphic evidence of faulting. A fault is assigned to one of eight geologic ages (shown by letter symbol or date) based on the time of its latest movement inferred from the age of the youngest formation it displaces or from geomorphic features it formed (shown by a number)

MAP SYMBOLS

LINE SYMBOLS

Onshore fault

Pattern indicates fault with historic surface rupture or creep movement. Queried where connection, continuation, or existence uncertain; dotted where inferred beneath covering deposits or water. Star indicates fault with relatively young movement along it but fault trace too short to show at map scale

Offshore fault

Inferred from acoustic-reflection profiles Location approximate

GEOLOGIC CONTROL SYMBOLS

Symbols below indicate location of 1) late Cenozoic stratigraphic unit not displaced by fault movement, 2) unit displaced by fault movement, and 3) geomorphic feature formed by fault movement. Number within each symbol indicates age of each unit based on the generalized time spans of the Age Range Chart; the youngest reasonable age is assumed for deposits whose age is uncertain

- ○ Oldest known unfaulted stratigraphic unit deposited across or intruded along the fault. Latest fault movement predates age of unit
- □ Youngest known stratigraphic unit displaced by fault. Latest fault movement postdates age of unit
- ◁ Geomorphic feature formed by fault movement. Latest fault movement inferred from type of feature (see footnotes 3/ and 5/ to Age Range Chart)

AGE CLASS SYMBOLS

Each fault is assigned to one of eight age classes designated by a letter symbol (see below) based on the youngest known late Cenozoic stratigraphic or geomorphic evidence of faulting preserved along it. Faults lacking such evidence either are designated as age Unknown (U) or are assigned to another class if they can be related to other faults whose history is better understood. Faults classed as Unknown (U) could have moved as recently as those of any other age class, except for those faults of unknown age with minimum age control (Um). Faults assigned a pre-late Cenozoic age (M) are covered by unfaulted upper Miocene or older strata or intruded by middle Miocene and older volcanic rocks. The entire length of a fault is assigned to a single age class unless contrary evidence is available

Class	Symbol
Historic	creep, creep?, 1906, 1906?, 1890
Holocene	H
Late Quaternary	L
Quaternary	Q
Late Pliocene and Quaternary	P
Late Cenozoic	C
Pre-late Cenozoic	M
Unknown	U, Um

Seven of the eight age classes enclose progressively longer spans of time within which movement may have occurred (see chart). The time span containing the latest movement may be restricted further by unfaulted overlying deposits.

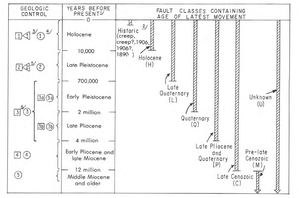
GEOLOGIC UNITS

(onshore areas only)

Chiefly bedrock at or near ground surface

Chiefly alluvial or terrace deposits generally more than 50 feet (15 m) thick

AGE RANGE CHART OF GEOLOGIC CONTROLS AND AGE CLASSES



1/ Years are approximate and are based in part on radiometric dates from strata in southern California. Column is not to scale.

2/ Queried where nature of ground rupture is questionable.

3/ Geomorphic criteria for Holocene faulting: sag depression; offset stream course in Holocene deposits; linear scarp in Holocene deposits; or, linear submarine scarp in seafloor sediments above wave base.

4/ Control from overlapping Holocene strata not shown on map except where such deposits are known to be at least 3,000 years old.

5/ Geomorphic criteria for late Quaternary faulting: offset stream course in Pleistocene or older deposits; linear scarp in Pleistocene deposits; markedly linear steep mountain front associated with adjacent concealed fault trace; or, linear submarine scarp in seafloor sediments below wave base.

6/ Numeral 3 designates nonmarine strata of late Pliocene to early Pleistocene age. Numerals 3a and 3b designate marine strata of early Pleistocene and of late Pliocene age, respectively. Except for nonmarine "Paso Robles" Formation of Hall (1973) included under numeral 3a.

EXAMPLES OF AGE CLASSIFICATION OF FAULTS AND LIMITING GEOLOGIC CONTROL

Fault is classed as late Pliocene and Quaternary (P) because unit displaced by it (square) is a marine unit of late Pliocene age - about 4 million to 2 million years (numeral 3b) but deposits that cover the fault (circle) are of late Quaternary age - about 700,000 to 10,000 years old (numeral 2) which provides a minimum limit on latest movement.

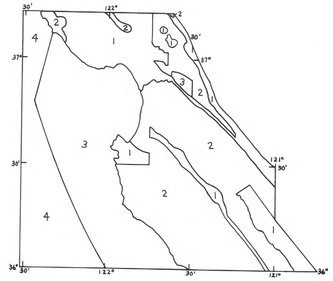
Fault is classed as Unknown (U) because no faulted late Cenozoic deposits are preserved along it. A minimum limit on age of movement is lacking.

Fault is classed as Unknown with minimum limit on age of latest movement (Um). No faulted late Cenozoic deposits are preserved along it but the unit that covers the fault (circle) is of late Cenozoic age - about 12 million to 4 million years old (numeral 4).

Fault is classed as Holocene (H) because age of both the unit displaced by the fault (square) and a geomorphic feature formed by the fault (triangle) are considered to be younger than 17,000 years (numeral 1). Minimum geologic control on the age of the most recent movement is lacking.

Fault with segments assigned to different age classes. In this example, age of unit displaced by one segment (square) is late Quaternary or from about 700,000 to 10,000 years old (numeral 2). The other segment displaces (square) a unit between about 4 million and 700,000 years old (numeral 3) but is also covered by a unit (circle) of a similar age range and thus is classed as late Pliocene and Quaternary (P). This fault cuts the lower part of the unit and is overlain by the unfaulted upper part of the same unit.

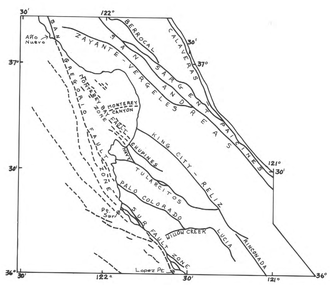
Fault is classed as pre-late Cenozoic (M) because deposits that cover the fault or were intruded into it (circle) are 12 million years or older (numeral 5), and thus provides a minimum limit on latest movement.



RELIABILITY DIAGRAM - SHEET 1

The degree of assurance that faults shown on map do exist, that important existing faults are not omitted, and that available geologic control on age of latest movement is properly depicted for each fault is indicated by numbers within area

Most reliable 1 - Few additions or modifications likely
2 - Some additions or modifications likely
3 - Many additions or modifications likely
Least reliable 4 - Additions or modifications necessary throughout area



INDEX MAP OF MAJOR FAULTS--SHEET 1

Scale 1:250,000

5 0 5 10 15 20 Statute Miles
5 0 5 10 15 20 25 30 Kilometers
5 0 5 10 15 Nautical Miles

CONTOUR INTERVAL 500 FEET
BATHYMETRIC CONTOURS IN FATHOMS

PRELIMINARY MAP SHOWING RECENCY OF FAULTING IN COASTAL SOUTH-CENTRAL CALIFORNIA

by

Jane M. Buchanan-Banks, Earl H. Pampeyan, Holly C. Wagner, and David S. McCulloch

1978

Geology compiled 1973 - 1977

INTERIOR--GEOLOGICAL SURVEY, RESTON, VA.--1978
For sale by Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225