BASE- AND PRECIOUS-METAL OCCURRENCES ALONG THE SAN ANDREAS FAULT, POINT DELGADA, CALIFORNIA

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This report is preliminary and has not
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nomenclature.

ABSTRACT

Previously unrecognized veins containing lead, zinc, and copper sulfide minerals at Point Delgada, Calif., are associated with late Mesozoic(?) and Tertiary volcanic and sedimentary rocks of the Franciscan assemblage. Sulfide minerals include pyrite, sphalerite, galena, and minor chalcopyrite, and galena-rich samples contain substantial amounts of silver. These minerals occur in a quartz-carbonate gangue along northeast-trending faults and fractures that exhibit (left?) lateral and vertical slip. The sense of fault movement and the northeasterly strike are consistent with predicted conjugate fault sets of the present San Andreas fault system. The sulfide mineralization is younger than the Franciscan rocks of Point Delgada and King Range, and it may have accompanied or postdated the inception of San Andreas faulting. Mineralization largely preceded uplift, the formation of a marine terrace, and the emplacement of landslide-related debris-flow breccias that overlie the mineralized rocks and truncate the sulfide veins. These field relations indicate that the sulfide mineralization and inception of San Andreas faulting were clearly more recent than the early Miocene and that the mineralization could be younger than about 1.2 m.y.

The sulfide veins at Point Delgada may be of economic significance. However, prior to any exploitation of the occurrence, economic and environmental conflicts of interest involving private land ownership, the Shelter Cove home development, and proximity of the coast must be resolved.

INTRODUCTION

In August and September of 1978, the U.S. Geological Survey, in cooperation with the U.S. Bureau of Mines and U.S. Bureau of Land Management, conducted a mineral resource appraisal of the King Range and Chemise Mountain primitive coastal areas of northern California. The mineral resource appraisal was part of a series of resource studies required by Congress for federal lands proposed as national wilderness areas. The Point Delgada-Shelter Cove area lies immediately outside the southeast corner of the proposed King Range Wilderness (fig. 1) and provides the main southern access to the coastal part of the King Range. In order to maintain geologic continuity and understand the complex regional geology of the King Range and Chemise Mountain areas, our mineral resource investigation was extended through the Point Delgada area.

Results of the mineral resource investigation in the King Range and Chemise Mountain areas will be released upon completion and evaluation of chemical analyses from rock and stream sediment samples and of geophysical data collected in the area. The purpose of this report is to release information of potential economic and environmental significance concerning base- and precious-metal occurrences in the Point Delgada area. More detailed studies concerning geochemistry; depth, temperature, and age of mineralization; and tectonic significance of these occurrences are in progress.

GENERAL GEOLOGY

The geology of the Point Delgada area is depicted on the geologic map (fig.2). Previous published studies in this area have generally centered upon the San Andreas fault (Lawson and others, 1908, Curray and Nason, 1967; Nason, 1968; Brown and Wolfe, 1972).

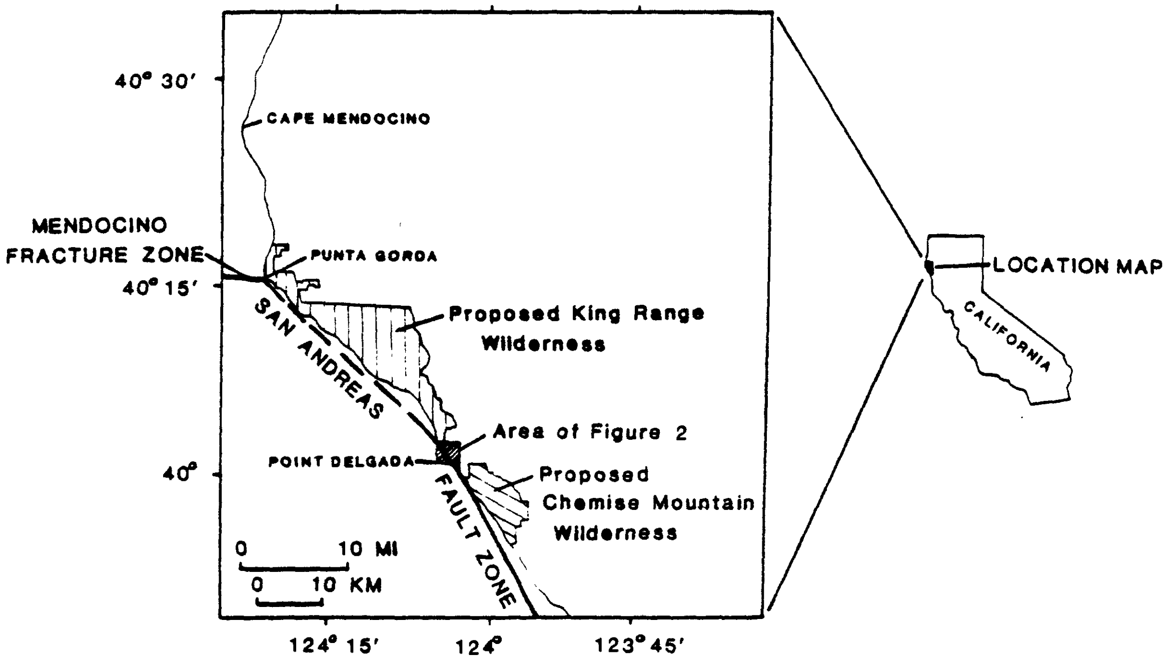

Figure 1. Map showing location of the Point Delgada area and of the Proposed King Range and Chemise Mountain Wilderness areas

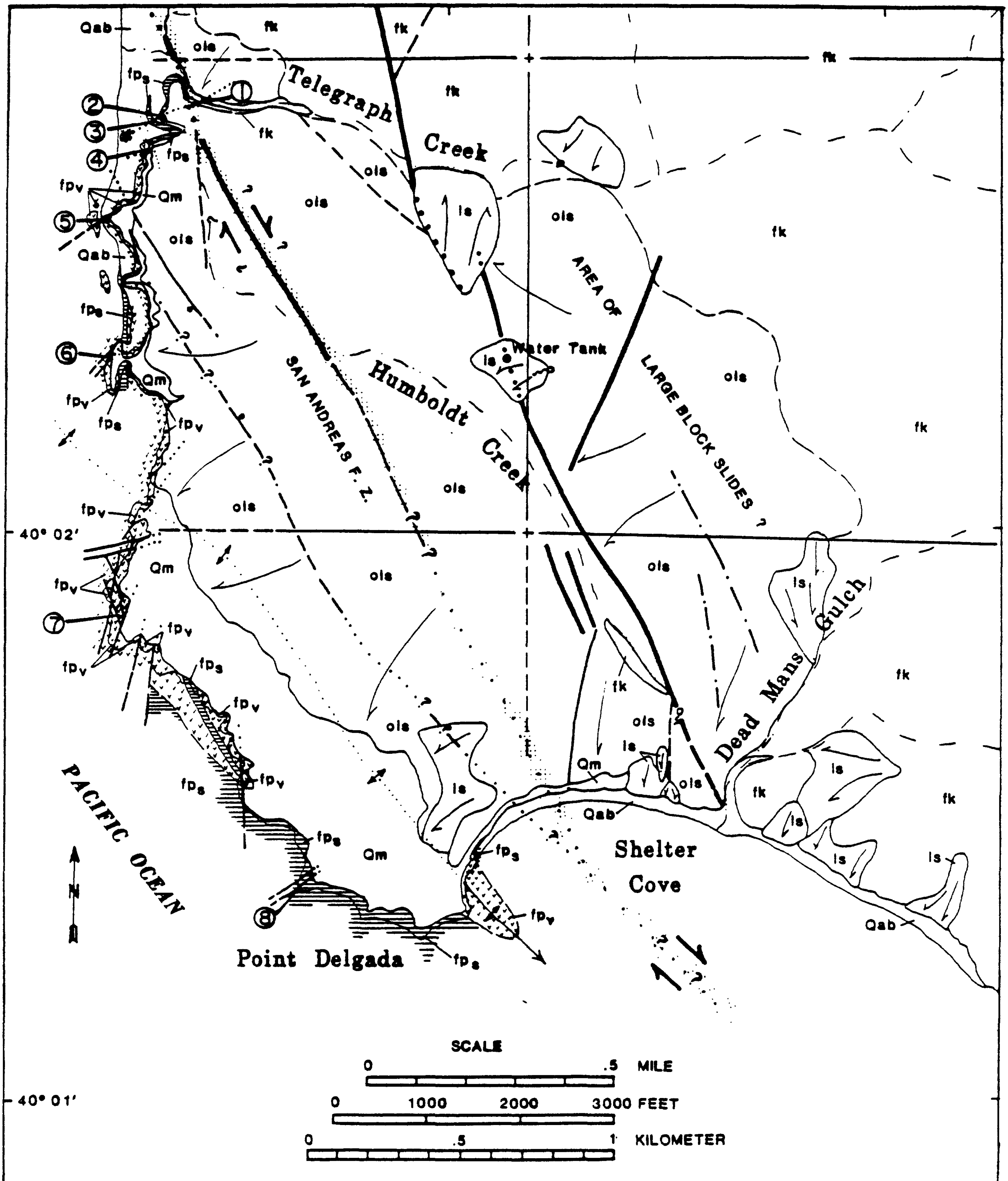

Figure 2. Generalized geologic map of the Point Delgada area showing locations of sulfide mineral occurrences described in Tables 1 and 2.

MAP EXPLANATION

Description of Map Units

ls	LANDSLIDE DEPOSITS (Holocene)--Unsorted rock fragments and soil in debris flows, rock falls, and rotational slide blocks
Qab	ALLUVIAL AND MARINE DEPOSITS (Holocene and late Pleistocene)--Poorly sorted silt, sand, gravel, and boulders in modern streams, alluvial fans, and debris flows; and well-sorted medium- to coarse-grained sand in beach and dune deposits
Qm	MARINE TERRACE AND LAGOON DEPOSITS (Holocene or late Pleistocene)-- Well-sorted granule and pebble gravel, locally with boulder lag at the base, overlain by poorly to moderately sorted angular conglomerate and interbedded gray silty carbonaceous marl
ols	OLDER LANDSLIDE, FLUVIAL, AND DEBRIS FLOW DEPOSITS (late Pleistocene)--Unsorted to poorly sorted silt, sand, gravel, boulders, and rotated blocks of rock in interfingered debris flows, alluvial fans, and landslide accumulations

Franciscan Assemblage

fk	SEDIMENTARY ROCKS OF THE KING RANGE (TERTIARY) Black argillite with minor interbedded fine-grained arkosic sandstone and conglomerate; and minor sporadic blocks of basalt, limestone, chert, and blueschist; thin bedded, penetratively sheared and isoclinally folded.
fp(s) / fp(v)	VOLCANIC AND SEDIMENTARY ROCKS OF POINT DELGADA (Tertiary or late Cretaceous)--Basaltic pillow flows, pillow breccia, and limy water-laid tuff intruded by diabase sills (fp(v)); overlain by and locally interbedded with arkosic sandstone, conglomerate, and sheared pebbly to bouldery mudstone containing rare blocks of blueschist-grade rocks (fp(s))

Map Symbols

———— – – – · · ·	Contact, dashed where approximately located, dotted where concealed
━━━━ • • •	1906 earthquake traces of the San Andreas fault, dotted where concealed
——•—— – – · ?·?	Fault, dotted where concealed, queried where uncertain; ball and bar on down-thrown side
— · — · — · —	Aerial photograph lineament
—†— · · · —†→ 60	Fold axis, dotted where concealed, indicating amount and direction of plunge
O~	Spring
①	Sulfide mineral locality

Except for bedrock exposures along the coast, and a few outcrops in Telegraph and Humboldt Creeks, most of the Point Delgada area between Dead Mans Gulch and Telegraph Creek is covered by extensive debris-flow breccias, fluvial deposits, and landslides of Pleistocene age (ols on map). Debris flows and landslides apparently were shed from the steep retreating scarp of uplifted Coastal belt Franciscan rocks northeast of the San Andreas fault, described here as the sedimentary rocks of the King Range (fk).

Volcanic and sedimentary rocks assigned to the Franciscan assemblage also crop out along the Point Delgada coastline beneath a 400-m-wide late Pleistocene marine terrace (Qm) and the base of the Point Delgada landslide complex (ols). These exposures of Franciscan rocks are lithologically distinct and unlike Franciscan rocks of the King Range (fk) immediately northeast of Point Delgada and the San Andreas fault. The volcanic and sedimentary rocks of Point Delgada (fp) consist dominantly of basaltic pillow lavas, pillow breccias, and sills, overlain by and in part interbedded with sheared pebbly to blocky mudstone, sandstone, and conglomerate derived largely from a quartzo-feldspathic source. Sedimentary rocks of the King Range typically include only rare blocks of basaltic volcanic rock, and the sandstone is typically arkosic and contains abundant andesite and felsite detritus. The volcanic and sedimentary rocks of Point Delgada may correlate with Franciscan rocks east of the San Andreas fault near Fort Bragg (Curray and Nason, 1967; Nason, 1968).

STRUCTURE

Nason (1968) suggested that Point Delgada may be bounded on the east and west by major branches of the San Andreas fault. A prominent northwest-trending fault zone across which many kilometers of offset of the bedrock is apparent, separates the volcanic and sedimentary rocks of Point Delgada from sedimentary rocks of the King Range. This fault zone is emphasized by the shaded pattern in figure 2 and is inferred to be the main onland trace of the San Andreas fault. The fault zone is largely covered by marine terrace and landslide deposits (Qm and ols) between its onshore projection on the southeast side of Point Delgada and its offshore projection again northwest of Telegraph Creek.

Latest fault activity appears to have largely shifted away from the covered main bedrock trace of the San Andreas fault to several discontinous northwest-trending subsidiary fault segments that are also mapped onshore (Lawson and others, 1908; Nason, 1968; Brown and Wolfe, 1972) and are indicated to locally cut the Point Delgada landslide complex. Several of these subsidiary fault traces were reported in Lawson and others (1908) to have ruptured during the San Francisco earthquake of 1906. These subsidiary faults apparently have components of slip on the order of a few to hundreds of meters. Late Quaternary activity along the San Andreas fault zone is also apparent along the coast on the southeast side of Point Delgada, where the marine terrace is downwarped and probably faulted (fig. 2).

The volcanic and sedimentary rocks of Point Delgada (fig. 2) are folded tightly into southeast-plunging, locally overturned folds with axes subparallel to the San Andreas fault. The sedimentary rocks of the King Range northeast of the San Andreas fault are more penetratively sheared than the Point Delgada rocks and have been isoclinally folded after shearing.

Several northeast-trending extensional faults with up to a few meters of lateral slip are evident in the Franciscan rocks below the marine terrace and landslide deposits. Several of these faults have provided structural depressions into which the base of the marine terrace deposits are draped. Evidence of faulting of the base of the marine terrace deposits by northeast-trending faults is inconclusive in the exposures examined along the beach.

Weak hydrothermal alteration and accompanying sulfide mineralization are localized in and adjacent to some of the northeast-trending faults exposed along 2.7 km of the Point Delgada coastline. The hydrothermal activity and the extensional faulting associated with it may be related to the present San Andreas fault strain system. North- to northeast-oriented compression known to be associated with right slip on northwest-trending faults within the present San Andreas fault system (Simila and others, 1975) is also consistent for left-lateral slip and extension on steeply dipping N40°-70°-E.-oriented faults such as those present on either side of the San Andreas fault at Point Delgada.

SULFIDE MINERALIZATION

Locally conspicuous lead, zinc, and copper sulfide mineralization occurs in and near the N. 40° - 70° E.-trending faults exposed along the beach at Point Delgada. Locations and descriptions of sulfide mineral occurrences at several of these localities are given on figure 2 and table 1. The most extensive and highest grade sulfide mineralization occurs at localities 1-3, where a prominent sulfide vein intersects a trace of the San Andreas fault that reportedly broke during the earthquake of 1906. The sulfide vein is exposed on either side of the fault, at the mouth of Humboldt Creek and in Telegraph Creek. The width and mineralogy of this conspicuous sulfide vein vary considerably along strike between localities 1 and 3 (see descriptions in table 1). Beyond locality 1 the vein can be traced northeastward into Telegraph Creek from the distribution of blocks of mineralized float, but it is unknown whether the vein is present northeast of Telegraph Creek (fig. 2).

Table 2 lists analyses of major, minor, and trace elements from selected sulfide-bearing assemblages from the vein localities indicated on figure 2 and in table 1.An emission spectrographic method (Bastron and others, 1960) was used to determine the major, minor, and trace elements of the samples in table 2. An emission spectrographic method recently developed by Heropoulos and Seeley (1978) for detecting concentration levels in the range <1 ppm to 1 ppm was used in supplementary analyses for low levels of mercury and gold. Because of the high concentrations of some elements (for example, lead and zinc in galena and sphalerite) and because of the variable composition of sample matrix, many sample dilutions were necessary. These dilutions made it possible to use the most linear segments of the analytical curves to determine element concentrations and to reduce spectrographic background levels produced by variable matrix composition. The dilutions also made elemental concentrations similar to synthetic and chemically analyzed rock standards.

Values in table 2 are well within the ±10 percent accuracy of the method, except those near the limits of detection, which are considered to be less accurate.

TABLE 1.--Descriptions of sulfide mineral localities in the Point Delgada area, California
(X-ray diffraction techniques were used to confirm the presence of sulfide minerals identified in the field, and for determination of gangue mineralogy. X-ray diffraction determinations are by M. B. Norman)

Map location	Description
1	A sulfide vein .3-.5 m thick striking N. 61° E. dipping 79° N.; possibly an extension of large vein system at loc. 2. The sulfide vein cuts brecciated and sheared argillite containing pods of greenstone and black chert, and the exposure is capped by debris-flow breccia. A northwest-striking trace of the San Andreas fault reported in Lawson (1908) transects area between this locality and loc. 2. The unweathered part of this vein is composed of compact medium- to coarse-grained calcite with minor ankerite, siderite, and quartz. Chalcopyrite, galena, sphalerite, and minor pyrite are evenly distributed throughout the vein. Chalcopyrite is the most abundant sulfide, occurring as irregularly distributed coarse-grained clots and aggregates up to 2 inches (5 cm) across. The less abundant galena, sphalerite, and pyrite occur as fine-grained, evenly distributed disseminations. The sphalerite and chalcopyrite have been locally oxidized to aurichalcite, $(ZN, Cu)_5 (CO_3)_2 (OH)_6$.
2.	A prominent sulfide vein cutting sheared and silicified black argillite, striking N. 67° E., dipping 82° SE. The vein is 0.6-1 m wide and is overlain by the same debris-flow breccia as at loc. 1. The sulfides of this vein consist of alternating layers of coarse-grained galena, sphalerite, chalcopyrite, pyrite, calcite and fluorite. Individual layers of galena and sphalerite are commonly as much as 5 cm thick and exhibit strong comb structure. Chalcopyrite and pyrite occur as occasional thin layers and as irregular medium- to coarse-grained aggregates distributed throughout the galena and sphalerite layers. Gangue minerals include calcite, ankerite, rhodochrosite, fluorite, and minor siderite and quartz. The vuggy central area of the sulfide vein contains calcite and very light green fluorite. Gypsum and minor cerrusite occur as coatings and encrustations throughout the weathered vein exposure. Shearing and small-scale offsets of the sulfide mineral layering by carbonate filled veinlets indicate that contemporaneous and post-sulfide fault movement has occurred.
3	A strongly sheared and brecciated zone of quartz-carbonate veins exposed at the mouth of Humboldt Creek immediately southwest of, and probably continuous with the system of sulfide veins at loc. 2. Individual veins range from 2.5-12.5 cm in width. Fine- to medium-grained pyrite, galena, and sphalerite are irregularly disseminated through the wider, more strongly developed veins. Brecciated layers of amethystine quartz accompany the sulfides locally.
4	A 3- to 10-cm-wide quartz-carbonate vein exposed along the beach, striking northeast, and cutting basalt pillow breccia and basalt sills. Interior of vein consists of intimately intergrown quartz, calcite, and dolomite. Very minor disseminated galena, sphalerite, and pyrite are evident along wallrock-vein contacts.
5	Unsampled locality southeast of loc. 4, same occurrence and mineralogy as at loc. 4; galena and sphalerite are slightly more abundant than at loc. 4. Vein is 3- to 6-cm thick.
6	A 10 cm-wide quartz-carbonate vein cutting pillow basalt. Vein strikes N. 40° E. and dips 78° N. A subparallel quartz-lined fault displays slickensides with lateral and vertical components of movement. Fine-grained sphalerite, galena, and pyrite occur locally along the margin of the quartz-carbonate vein. Vuggy areas of translucent to transparent euhedral quartz occur within the central part of the vein.
7	A prominent fault zone that cuts pillow basalt containing inter-pillow carbonate concretions, strikes N. 15° W. and dips 70° N. The fault zone and the accompanying conjugate joints and fractures in the adjacent wallrock are hydrothermally altered. A subparallel set of northwest-trending fractures are filled with a quartz-carbonate mineral assemblage. The oxidation of fine-grained pyrite, which is locally concentrated adjacent to the fault and accompanying fractures, has locally produced conspicuous iron oxide alteration.
8	A 3 m-wide network of quartz veins striking N. 58° E. dipping 81° N. Host rock is gray hydrothermally bleached graywacke deformed by shearing and later tight southeast-plunging folds. Individual quartz veins are from a few centimeters up to .3 m-wide locally, forming an intricate network of intersecting veins that follow conjugate shears exhibiting prominent lateral and vertical components of movement. The translucent to opaque, grayish white quartz veins contain abundant fine-grained pyrite which is uniformly disseminated throughout the quartz. Minor fine-grained galena, sphalerite, and chalcopyrite occur in clots and aggregates localized along the wallrock-quartz vein contacts. Clear euhedral quartz crystals up to 3.7 cm long occur in the vuggy central areas of the quartz veins and indicate the presence of open space during the later stage of vein formation.

Table 2. Emission spectroscopic analyses of major, minor, and trace elements in sulfide minerals and associated vein minerals from the Point Delgada area. Values are given in parts per million (PPM) except where indicated to be in percent (%). Values preceded by (>) symbol are considered to be in excess of indicated upper detection limit; values preceded by (<) symbol are considered to be below indicated lower detection limit [Analyses by C. Heropoulos and B. Langhrey]

MAP NO.	Loc. #2				Loc. #3		Loc. #2	Loc. #7	Loc. #6	Loc. #1	Loc. #4	Loc. #8
LAB NO.	M-137197	M-137198	M-137199	M-137200	M-137201	M-137202	M-137203	M-138352	M-138353	M-138354	M-138355	M-138356
FIELD NO.	SK 15-78	SK 15-78	SK 15-78	SK 15-78	SK 14-78	SK 14-78	SK 15-78	MK117-78	MK126-78	MK127-78	MK128-78	SK24-78
TI %-S	0.0003	0.0026	0.0003	< 0.0002	< 0.0002	< 0.0002	0.0003	0.5	0.11	< 0.0002	0.22	0.6
MN PPM-S	2400.	4400.	7200.	7000.	100.	14000.	4900.	7000. *3	5000. *3	7000. *3	5000. *3	250.*3
AG PPM-S	1400.	1900.	380.	560.	41.	64.	880.	< 1.4	3.	140.	8.	32.
AS PPM-S	< 200.	< 200.	< 200.	< 200.	1300.	< 200.	860.	< 200.	< 200.	1500.	< 200.	1300.
AU PPM-S	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1
B PPM-S	5.	5.	11.	< 4.	< 4.	< 4.	< 4.	80.	< 4.0	< 4.0	14.	30.
BA PPM-S	< 4.	< 4.	< 4.	4.	30.	10.	4.	65.	65.	100.	30.	120.
BE PPM-S	< 1.5	< 1.5	< 1.5	2.	< 1.5	2.	2.	6.	< 1.4	< 1.4	3.	< 1.4
BI PPM-S	17.	13.	22.	36.	40.	2.	30.	< 14.	< 14.	14.	< 14.	< 14.
CD PPM-S	870.	820.	1900.	2200.	< 14.	710.	1800.	< 14.	40.	52.	< 14.	< 14.
CO PPM-S	38.	44.	100.	98.	52.	57.	170.	42.	23.	20.	20.	4.
CR PPM-S	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	34.	28.	12.	190.	10.
CU PPM-S	1400.	1100.	1700.	5400.	2000.	2200.	4600.	42.	650. *3	15000. *3	500.	1000. *3
LA PPM-S	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.
MO PPM-S	< 4.	< 4.	< 4.	< 4.	< 4.	< 4.	< 4.	12.	< 4.0	< 4.0	< 4.0	< 4.0
NB PPM-S	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.
NI PPM-S	4.	4.	18.	12.	8.	12.	9.	73.	24.	28.	170.	6.
PB PPM-S	>20000.	>20000.	>20000.	*1	16000.	11000.	>20000.	< 14.	4000.	15000. *3	2700.	7800.
SB PPM-S	6300.	10000.	940.	740.	< 40.	< 40.	1700.	< 40.	< 40.	< 40.	< 40.	< 40.
SC PPM-S	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	39.	10.	< 1.4	29.	4.0
SN PPM-S	220.	210.	550.	980.	370.	310.	920.	< 4.	< 4.	130.	< 4.	< 4.
SR PPM-S	9.	9.	24.	14.	5.	60.	10.	65.	250.	180.	150.	15.
U PPM-S	< 2.	< 2.	< 2.	< 2.	< 2.	< 2.	< 2.	180.	60.	< 2.	120.	43.
W PPM-S	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.	< 20.
Y PPM-S	< 14.	< 14.	29.	59.	< 14.	170.	< 14.	26.	20.	88.	< 14.	< 14.
ZN PPM-S	*2	*2	>20000.	>20000.	2400.	>20000.	>20000.	500.	10000. *3	1500. *3	1100.	4000.
ZR PPM-S	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
CE PPM-S	< 100.	< 100.	< 100.	< 100.	< 100.	< 100.	< 100.	< 100.	< 100.	< 100.	< 100.	< 100.
GA PPM-S	< 1.5	< 1.5	< 1.5	5.	9.	6.	5.	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
GE PPM-S	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.
IN PPM-S	< 3.	< 3.	< 3.	< 3.	< 3.	< 3.	< 3.	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
RE PPM-S	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.	< 14.
TL PPM-S	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.	< 6.
YB PPM-S	< 1.4	< 1.4	2.	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	4.	< 1.4	< 1.4
HG PPM-S	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

NOTES:

*1 Greater than 20000 (56000).

*2 Greater than 20000 (82000), greater than 20000 (56000).

*3 Determined semi-quantitatively due to high concentration levels unsuited for quantitative measurements using this method.

MAP LOCALITY	LAB NO.	FIELD NO.	SAMPLE DESCRIPTION
2	M-137197	SK 15-78	GALENA-RICH MINERALIZATION
2	M-137198	SK 15-78	GALENA-RICH "
2	M-137199	SK 15-78	SPHALERITE-RICH "
2	M-137200	SK 15-78	SPHALERITE-RICH "
3	M-137201	SK 14-78	QUARTZ-CARBONATE VEIN MATERIAL

AGE OF SULFIDE MINERALIZATION

The Franciscan volcanic and sedimentary rocks of Point Delgada are of uncertain age. They are lithologically similar to other Franciscan rocks to the southwest in the Coast Ranges that are no older than Late Cretaceous age, but they could be as young as Tertiary. The sedimentary rocks of the King Range contain foraminifers and radiolarians of probable early Eocene to (early?) Miocene age (R. Poore, K. McDougall, and S. Kling, oral commun., 1979). Thus the mineralized veins cutting these Franciscan rocks must postdate the (early?) Miocene.

If, as field relations suggest, the northeast-trending faults that provided conduits for hydrothermal sulfide mineralization are conjugate faults of the San Andreas system, mineralization accompanied or post-dated San Andreas faulting at Point Delgada. The present San Andreas fault terminates at the Mendocino fracture zone west of Punta Gorda, approximately 23 mi (37 km) northwest of Point Delgada. The average slip rate on the northern segment of the San Andreas fault (Cummings, 1968; Herd, 1978) appears to have been about 3 cm/year since late Pliocene time. Plate tectonic considerations (Atwater, 1970) permit modeling of the northern San Andreas fault as a propagating transform, terminating at the triple junction of the Gorda, North American, and Pacific plates near Punta Gorda. Backward propagation of the triple junction 37 km, using a slip rate of 3 cm/yr, suggests that the San Andreas transform propagated through Point Delgada approximately 1.2 m.y.a. This reasoning suggests that the mineralization could be less than, or equal to 1.2 m.y. old. Deposition of the marine terrace covering the main trace of the San Andreas fault (radiocarbon dating in progress) and emplacement of the Point Delgada landslide complex probably occurred no earlier than upper Pleistocene time. Because the sulfide mineralization is confined to rocks upon which the marine terrace and landslide complex have been deposited, the mineralization can be dated at between 1.2 m.y.a. and late Pleistocene (c.f. .12-.01 m.y.?) time. However, if our assumption that northeast-trending mineralized faults at Point Delgada are conjugate elements of the San Andreas fault system is incorrect, then the mineralization could have occurred as early as Miocene time.

ECONOMIC SIGNIFICANCE

Base and precious metal sulfide mineralization associated with the quartz-carbonate vein system between localities 1 through 3 can be traced discontinuously for at least 700 feet (210 m) along strike. Veins are typically less than 1 foot (.3 m) thick and contain only sparse sulfides disseminated in quartz and (or) carbonate gangue. However, at locality 2, a single vein is 3 feet (1 m) wide and contains nearly 2 feet (.6 m) of massive sphalerite and galena.

The high silver content of unoxidized galena-rich (1400-1900 ppm Ag) and oxidized galena-sphalerite-rich (800 ppm Ag) samples from localities 1-3, combined with accompanying high copper (1100-4600 ppm Cu), cadmium (820-1800 ppm Cd), and tin (210-980 ppm Sn) contents suggest that this vein system, especially the large mass of sulfides at locality 2, may be of some economic importance. Other subparallel sulfide-bearing quartz carbonate veins exposed along the beach between Humboldt Creek and Point Delgada (localities 4-8) with the exception of locality 8, are thin and only sparsely mineralized with sulfides. However, lateral variability (table 1) along the Telegraph-Humboldt Creeks vein system (localities 1-3) permits speculation that some of these minor veins may increase in grade or thicken at depth. It also may be significant that the thickest and highest grade vein (localities 1-3) is adjacent to a trace of the San Andreas fault since, during faulting and mineralization, larger openings might be maintained near fault intersections, thus allowing greater circulation of hydrothermal fluids, and consequently, more extensive deposition of sulfide minerals.

Proximity of the base and precious metal sulfide occurrences to the Shelter Cove housing development and to the open coast may seriously restrict any attempts to prospect or mine the existing sulfide deposit, or to explore for others nearby. The beach and adjacent land (including mineral rights) between Telegraph Creek and Point Delgada are privately owned, and the present use of the land for summer home development may seriously conflict with the interests and activities of any mining operation. In addition, the environmental impact of a base-metal sulfide mining operation upon marine and nonmarine wildlife in the area would have to be evaluated.

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