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Base map by Topographic Division, U.S. Geological Survey, 1951

EXPLANATION

Clearly expressed | Interrupted expression | Vague expression | Probable extension

Linear features interpreted as traces of probable or possible faults, shear zones, and joints

Length of dash indicates clarity and continuity of expression on aerial photographs. The symbols emphasized by a heavier weight of line represent those features believed to have the most structural significance regionally. Dotted lines indicate probable extension beneath cover of glacial ice or debris, alluvium, or water. Arrows indicate direction of slope of the plane of linear feature. Short crossed lines indicate a local pattern of rock fractures, probably the expression of joints.

■ Mine or prospect, location accurate

□ Mine or prospect, location indefinite

Photogeologic data from vertical aerial photographs at scale 1,40,000, taken in 1950
Location data for mines and prospects taken from U.S.Geological Survey publications
Photointerpretation of linear features by W. H. Condon and J. T. Cass in 1953-1955

MINES AND PROSPECTS

Knight Island

1.	Disk I. prospect	Cu	Seward B-2[1]
2.	Singletary prospect	Cu	Do.
3.	Von Gruenther		Do.
4.	Malack		Do.
5.	Knight I. Mining and Development Co.	Cu (Zn)	Do.
6.	Big Passage Copper Mining Co.	Cu	Do.
7.	Crown Copper Co.(?)	Cu	Do.
8.	Crown Copper Co.	Cu (Zn)	Do.
9.	Malack		Do.
10.	Boyle		Do.
11.	Crown Copper Co.(?)	Cu	Do.
12.	Wallace, McPherson, Valentine (Snowstone group?)	Cu	Do.
13.	Boyle		Seward B-3
14.	Kacznowski and Wilson (Lower Herring Bay)	Cu?	Do.
15.	Ferguson, Johnson, Harvey		Do.
16.	Monarch Claim, Hubbard and Elliot	Cu	Do.
17.	Hubbard and Elliot, Knight I. Cons. Copper Co.	Cu	Seward B-3 (or B-2)
18.	Hemple		Do.
19.	Nellie group	Cu	Seward B-2
20.	Wallace, McPherson, Valentine (Pandora group)	Cu (Zn)	Do.
21.			Do.
22.	Copper Bullion Claims Rua Cove	Cu (Zn)	Do.
23.	Knight Island-Alaska Copper Co.	Cu (Zn)	Do.
24.	Twentieth Century-Knight I. Copper Mining Co.	Cu	Do.
25.	Knight Island Copper Mining Co.	Cu	Seward B-3
26.	Grove and Walters		Do.
27.	Copper Coin group	Cu	Do.
28.	Hubbard and Elliot	Cu	Do.
29.	Moore	Cu	Do.
30.	Cathead Bay	Cu	Do.
31.	Erricksen and Allen	Cu	Do.
32.	Mallard group	Cu (Au)	Do.
33.	Larson		Do.
34.	Hendrix, Reavely, McMasters		Do.
35.			Do.
36.	Graham and Harrison	Cu	Do.
37.	Graham and Harrison	Cu	Do.
38.	Sponberg, Sanberg, Simpson		Seward B-2
39.	Bettles, Snug Harbor	Cu (Zn)	Do.
40.	Harvey (of Home Camp group?)	Cu	Seward B-3
41.	Kilbourn		Do.
42.	Home Camp group	Cu (Zn)	Seward A-3
43.	Schulz, Chas.	Cu	Do.
44.	Minnie claim	Cu (Zn)	Do.
45.	Wilcox prospect	Cu	Do.
46.	Wilcox prospect	Cu	Do.
47.	Hogan, Hemple, Egan	Cu	Do.
48.	Happy Jack Mining and Development Co.	Cu (Zn)	Do.

Latouche Island

49.		Cu	Seward A-3
50.	Blackbird mine (Ladysmith)	Cu (Zn Pb)	Do.
51.	(Chenega Ore Body)	Cu	Do.
52.	Beatson mine	Cu	Do.
53.		Cu	Do.
54.		Cu	Do.
55.		Cu	Do.
56.	Bazard tunnel and prospect	Cu	Do.
57.		Cu	Do.
58.	Duchess claim (tunnel)	Cu	Do.
59.	Duke Claim (Banta shaft)	Cu	Do.
60.	Reynolds-Alaska Dev. Co. prospects(?)	Cu (Au Ag Zn)	Do.
61.			Do.
62.	Latouche I. Copper Mining Co.	Cu (Zn)	Do.
63.	Seattle-Alaska Copper Co. claims	Cu (Au Zn)	Blying Sound D-3
64.	Latouche Consolidated Copper Co.	Cu	Do.

Other Southern Occurrences

65.	Elrington Island	Cu	Blying Sound D-3
66.	Elrington Island	Cu	Seward A-3
67.	Hogg prospects, Bainbridge I.	Cu	Seward A-4
68.	Whale Bay		Do.
69.	Jackpot Bay	Au (Ag Pb Zn)	Seward B-4

Unakwik Inlet to Glacier Island

70.	Jensen, Wallace, Kilbourn	Cu	Seward D-1
71.			Do.
72.	Nelson and Rystrom	Cu	Do.
73.	Jensen	Cu	Do.
74.		Cu	Do.
75.	Chamberlain	Cu	Do.
76.			Do.
77.	Gilnow	Cu	Do.
78.			Seward D-2
79.	Cedar Bay	Cu (Zn)	Do.
80.	Byers	Cu	Do.
81.	Wagner property(?)	Cu	Do.

Eaglek Bay

82.	Stewart and Fish(?)	Au(?)	Seward D-3
83.	El Dorado Ledge	Au (As)	Do.
84.	Gray Bros.	Au(?)	Do.
85.	(Squaw Bay)(?)	Au(?)	Do.

Culross and Ester Islands

86.	John Sells	Au(?)	Seward C-4
87.	Thomas-Culross Mining Co.	Au (As Cu Pb Zn)	Do.
88.	(?)	Cu(?)	Do.
89.	Fish, Collins, Stewart	Au (As)	Seward D-3
90.			Do.
91.	Kavanaugh and Boon	Au (Pb Cu)	Do.

Golden—Avery River Area

92.	Morning Star, and Consolidated claims(?)	Au	Seward D-3
93.	Conley and McChesney claim	Au (Pb Zn Cu)	Do.
94.	Sweepstake Mining Co. prospects	Au (As Cu)	Do.
95.	North Star claim	Au	Do.
96.	Mayflower vein	Au	Do.
97.		Au	Do.
98.	Golden Wonder No. 9, and Frodenburg and Bloom	Au (Zn)	Do.
99.	Nugget claim	Au (Ag Pb Cu)	Do.
100.	Lucky Swede claim(?)	Au	Do.
101.		Au	Do.
102.	Mountain claim	Au	Do.
103.	Griset claims	Au	Do.
104.	Golden Wonder No. 1	Au (Pb)	Do.
105.	(2)[2]	Au	Do.
106.	Arrowhead claim	Au	Do.
107.	Keynote claim	Au	Do.
108.		Au	Do.
109.	Golden Eagle claim	Au	Do.
110.	Carter claims	Au	Do.
111.		Au	Do.
112.	Tolson and Stanton prospects	Au (As Zn)	Do.
113.		Au	Do.

Port Wells-Harriman Fiord Area

114.	Yannes, A. P.	Au(?)	Seward D-4
115.	Harris, Joe	Au	Do.
116.	Anderson and Yannes	Au	Do.
117.	Granite mine	Au(ZnSbPbAsCu)	Do.
118.	(?)		Do.
119.	Reed, Gauthier, Cooper	Au (Zn Cu)	Do.
120.			Do.
121.	Yakima Ledge	Au (Zn As Pb Cu)	Do.
122.	White and Jones (Skypilot)	Au	Do.
123.	Sweepstakes Mining Co.	Au(AsZnPbCuSb)	Do.
124.	Hermann and Eaton	Au (Zn Pb As Cu)	Do.
124a.		Pb	Do.
125.	George and McFarland	Au (Pb)	Do.

Port Wells-Harriman Fiord Area

125a.	Banner Group (location?)	Au (As Pb Zn)	Seward D-4
126.	Everson, Harris, Parker	Au (Pb Cu)	Do.
127.	Westburg and Domenzet (Tomboy)	Au (Pb)	Do.
128.	Lansing Mine	Au (Pb Zn)	Do.
129.	Dunklee and Reilly	Au (Cu Pb As Zn)	Do.
130.	Alaska-Homestake Mining Co.(?)	Au	Do.

Passage Canal

131.	Portage mine	Au	Seward D-5
132.			Do.
133.			Do.
134.	Collins, Fish, Barry (Golden Giant group)	Au (As Pb Zn)	Do.
135.	Bullion Ledge	Au	Do.
136.	(?)[3]		Do.
137.	Hillside vein (location?)	Au (Cu Zn Pb)	Do.
138.	(?)[3]		Do.
139.	King, Ernest	Au(?)	Do.
140.	(?)[3]		Do.

Note: Gold-qtz prospects have been located in the past on Blue Fiord, Kings Bay, and McClure Bay.

[1] 1:63,360 quadrangle in which mine or prospect is located.

[2] Two prospects, names unknown.

[3] (?) indicates that number of mines or prospects at this location is unknown.

INTRODUCTION

The linear features of the Prince William Sound area, Alaska, mapped from aerial photos, are believed to represent faults, shear zones, and joints and may be significant in the localization of ore deposits. The linear features were interpreted entirely from vertical aerial photographs at approximately 1:40,000 scale and were compiled on topographic maps of 1:63,360 scale. The area of study includes parts of the Anchorage, Blying Sound, Cordova, Seward, and Valdez sheets of the Alaska Reconnaissance Topographic Series, 1:250,000 scale, embracing an area represented by 47 quadrangles of 1:63,360 scale, or approximately 4,000 square miles. Data were recompiled to the scale of 1:125,000 for that part of the area within the Seward and Blying Sound sheets, representing 25 quadrangles of 1:63,360 scale.

The accompanying map is intended to augment previously published reports and to assist future geologic study and mineral deposits exploration of the Prince William Sound area. It shows the pattern of linear features interpreted from aerial photographs as the surface expressions of faults, shear zones, and joints. The distribution of mines and prospects is shown.

INTERPRETATION OF LINEAR FEATURES

The Prince William Sound area is in large part a heavily forested and glaciated terrain that includes numerous long, deep fiords and many large islands. Significantly, mines and prospects are concentrated along the linear features, and the rather sparse data available on trends of rock fractures at the widely distributed mines and prospects of the area correspond closely to these linear features. Linear elements of topography are variously expressed as narrow, elongate depressions, more than coincidental alignment of stream courses, and visible fractures in exposed bedrock. Clarity of expression varies from apparent to subtle, and the identification of any individual linear feature as a fault, shear zone or joint would be rather tenuous in such terrain where offset of bedding can rarely be identified on aerial photographs.

These linear features may be interpreted as probably attributable to faults, joints, and shear zones along which considerable accentuation or etching has taken place. Such accentuating factors would include the gross effect of glacial gouging and running water along these zones of weakness. Alternate interpretations of linear features are recognized. Some features mapped may be entirely, or in part, the expression of weaker rock layers within sequences of interbedded rocks of contrasting resistance to erosion and weathering. The combined effect of differential erosion and faulting parallel to or at slight angles to bedding may cause some of the linear features mapped. Glacial gouging alone may cause some of the narrow, elongate troughs along fiord slopes and on the islands.

Geology and mineral resources.—The regional structure of the rocks of Prince William Sound area trends generally northeastward. The entire area has been mapped and described geologically by Moffit (1954, p. 225) and the following data are taken from that work.

> The rocks are dominantly sedimentary deposits probably of late Mesozoic age. They include a small proportion of somewhat altered basaltic lava flows and intrusives and a still smaller proportion of light-colored granitic intrusives, occurring as dikes sills, and batholithic bodies.
>
> The sedimentary beds are generally described as slates and graywackes. In a few places they include argillite, arkosic sandstone, conglomerate, and a little limestone. The sedimentary beds and interstratified greenstones are stongly folded and locally are considerably altered, even schistose near intrusive bodies and strong faults. The rocks were divided by early geologists into two groups, the Valdez, and the Orca, which were believed to show a slight difference in petrology and metamorphism. The rocks of the older group, the Valdez, are exposed chiefly on the north and west sides of the Sound. The younger or less altered rocks of the Orca group make up most of the islands and the mainland of the southeastern part of the Sound. They were conceived as overlying the Valdez rocks unconformably.
>
> The basic lava flows and intrusives include basalt and diabase * * * somewhat altered [and] are commonly called greenstones. * * * The flows * * * are interstratified with thin beds of slate and graywacke and are believed to be restricted to the Orca group * * * except where they are faulted into rocks of the Valdez group.

Glacial deposits of Pleistocene age and alluvium of Recent age cover the bedrock to considerable depths within some valleys and low coastal areas, but their only importance to this study is their role in masking the extension of some linear features.

Concerning the mineral deposits of Prince William Sound area Moffit (1954, p. 294, 295) states:

> The lode deposits * * * may be described as copper deposits and gold [including silver] deposits. * * * Other metals are associated with the copper, gold, and silver but have little or no present commercial importance.
>
> * * * there is a definite association of copper mineralization with the altered lava flows and intrusives, [but] the largest and most productive copper deposits [Latouche Island] were in slate and graywacke adjacent to areas of greenstone * * *
>
> The gold lodes occur chiefly in the sedimentary beds of the Valdez group on the north side of the Sound. * * * Gold-and quartz-bearing solutions appear not to have met conditions favorable for deposition of gold-quartz lodes within the areas of greenstone.
>
> The deposition of both copper and gold ores is believed to have taken place in a period of metallization that followed or possibly marked the end of the instrusion of the granitic rocks * * *. Some field relations suggest that the gold lodes may be younger.

Moffit further indicates that deposition of both gold and copper deposits has taken place in large part along joints, faults, and shattered zones. The copper occurs as sulfides and the gold as free gold in association with quartz and sulfides. He states that many fault zones are indicated on the surface by rectilinear depressions resulting from weathering of material less resistant than the adjoining country rock. This fact is the main criterion used to support the supposition made in this photogeologic compilation; namely, that the pattern of linear features shown probably represents the pattern of faults, joints, and shear zones of the Prince William Sound area.

Mines and prospects and their relationship to linear features.—The accompanying list of mines and prospects is keyed by number to the map. It includes those sufficiently well located to show at least a rough distribution with respect to linear features mapped. The implication may be made that a relationship exists between mineral deposits and linear features interpreted as faults, joints, and shear zones. However, the details of such a relationship are necessarily a field problem. Location data were taken from geologic publications or topographic maps of the U. S. Geological Survey. For the most part, accurate positions in relation to individual linear features as mapped cannot be shown but locations are made as closely as available data permits. The chief sources used in locating mines and prospects and for analyzing data at these locations to aid in interpretation of the area as a whole are listed in the Selected Bibliography.

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MAP OF A PART OF THE PRINCE WILLIAM SOUND AREA, ALASKA, SHOWING LINEAR GEOLOGIC FEATURES AS SHOWN ON AERIAL PHOTOGRAPHS

By
William H. Condon and John T. Cass

Scale 1:125000
1 0 1 2 3 4 5 6 7 Miles

Contour interval 200 feet
Datum is mean sea level
Depth curves in feet—datum is mean lower low water
1955 MAGNETIC DECLINATION AT SOUTH EDGE OF SHEET VARIES FROM 26° TO 27° E

1958

For sale by U. S. Geological Survey, price 50 cents