

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
Geological Survey  
Washington

PROPERTY OF DGGS LIBRARY

CHROMITE OCCURRENCES AND A NICKEL PROSPECT ON BARANOF  
ISLAND, SOUTHEASTERN ALASKA

by

Matt S. Walton, Jr. and George C. Kennedy

Introduction

This report presents the results of a brief geologic reconnaissance of some of the chromite-bearing sills between Red Bluff Bay and Silver Bay in central Baranof Island, southeastern Alaska (see figs. 1 and 2), and the results of a magnetic study of a chromite body in the ultrabasic rocks at Red Bluff Bay. Also included are the results of a brief examination of a nickel prospect near Sitka.

The field work, upon which this report is largely based, was done by the authors in the early part of August 1943 as a part of a Geological Survey project to investigate some of the ultrabasic rocks of southeastern Alaska to determine the presence or absence in them of significant nickel-copper or chromium deposits. Previous studies of some of the chromite-bearing ultrabasic rocks of Baranof Island were made by Guild and Balsley 1/ during the summer of 1941.

Sills in central Baranof Island

Guild and Balsley 2/ state:

"The chromite of Baranof Island is present as small lenses, thin layers and disseminated grains in ultramafic rocks, which intrude a sequence of phyllites and greenstone schists of Triassic (?) age. ---- The most accessible and best known of the intrusive masses is at Red Bluff Bay. Seven others are known in the central part of the island, about 10 miles west-northwest of Red Bluff Bay. ---- The masses in the interior appear to be sills, but that at Red Bluff Bay, which is less well exposed, is more complex."

The sills are more numerous and much less continuous than inferred by Guild and Balsley. 3/ They (see fig. 2) strike northwesterly, dip from nearly vertical

1/ Guild, P. W. and Balsley, J. R. Jr., Chromite deposits of Red Bluff Bay and vicinity, Baranof Island, Alaska: U. S. Geol. Survey Bull. 936-G, 1942.

2/ Guild, P. W. and Balsley, J. R., Jr., op. cit., p. 174.

3/ Guild, P. W. and Balsley, J. R., Jr., op. cit., pl. 21.

to 50° NE and are concordant with the foliation of the surrounding schists and phyllites. The sills pinch and swell abruptly along their strike and they crop out as lenticular masses. Foliation in the sills is pronounced, particularly near their contacts with enclosing rocks.

One of the larger of the sills crops out at the divide between Redoubt Lake and Red Bluff Bay as a horn-like peak about 4,600 feet high and several hundred feet higher than the general level of the divide. This sill thickens markedly in the axial portion of a major fold in the enclosing schists and phyllites.

The sills, which originally were made up largely of olivine with some pyroxene, are almost completely altered to serpentine. Some of the sills, especially near their contacts with enclosing rocks, are veined by coarsely crystalline calcite and chalky, fine-grained magnesite. These veins in places extend a few feet into the enclosing rocks.

The unweathered serpentinized dunite is mottled and streaked in various shades of greenish-black, green and white. The weathered serpentine is light buff due to surface alteration and from a distance has a distinct orange tinge that contrasts sharply with the greenish unweathered serpentine and with the gray country rock.

Contact metamorphism of the surrounding rocks by the sills is slight.

Chromite is an abundant accessory mineral in the sills. It occurs as scattered octahedral crystals, as aggregates of crystals up to 3 inches across, and as streaks and seams up to 3 feet long and a few inches wide. The streaks and seams parallel the foliation in the sills. No concentration of chromite was found of sufficient size and grade to constitute an ore body.

The sills have been prospected for chromite by the late Joe Hill. The ground, covered by Hill's old claims, is believed to be open.

#### Magnetic study of a chromite deposit at Red Bluff Bay

A body of chromite, designated deposit no. 2 by Guild and Balsley <sup>4/</sup>, crops out in the northeastern part of the ultrabasic mass at Red Bluff Bay. It is about 900 feet west of tidewater and at an altitude of about 350 feet.

According to Guild and Balsley:

"It consists of two masses of high-grade ore, apparently segments of one vertical, northward-trending body that is cut by a fault striking east and dipping 30° S. This southern segment is 50 feet long and 1 to 2½ feet wide but is cut off at the bottom by the fault. The northern segment is exposed for 40 feet horizontally and 42 feet vertically and is from 1.6 to 3.9 feet wide; it lies beneath the fault plane, so that the possibility of a southerly continuation and of a greater depth is increased."

<sup>4/</sup> Guild, P. W. and Balsley, J. R., Jr., op. cit., pp. 182-183 and plate 22.

The chromite from Red Bluff Bay contains sufficient iron to be noticeably magnetic. A series of magnetometer observations were made in a limited area immediately south of the northern segment of the deposit to detect, if possible, any southward extension of the body beneath the fault mapped by Guild and Balsley. The results are shown as isomagnetic lines of vertical intensity on figure 3.

A distinct high in vertical magnetic intensity is centered about 35 feet south of the northern segment of the deposit. This high tends to confirm the existence of a subsurface southward extension of the northern segment. However there are reasons for considerable caution in accepting this conclusion. The geologic evidence for the fault shown on the map (see fig. 3) is not conclusive. It mainly rests on the termination downward of the southern segment against a joint surface which, it is supposed, is the trace of the fault. This fault surface cannot be traced across to the point where it should cut off the northern segment of the deposit. Minor faulting in serpentized dunite and pyroxenite is commonly seen where, due to plasticity under heat and pressure, the actual plane or zone of differential movement has been obliterated. On the other hand, chromite lenses characteristically pinch out abruptly. The two segments of this deposit may be separate chromite bodies and the magnetic high may reveal the presence of a third body, or the trace of the fault may have been obliterated. Both interpretations are consistent with the magnetic effects observed.

Another factor which adds to the uncertainty of the results is that magnetite is a common alteration product in the serpentization of peridotitic rocks. Magnetite may be present locally in sufficient amount to account for the effects observed. Magnetic anomalies even larger than those found at deposit no. 2 were observed at another body of similar rocks where it was clear that the magnetic effect was produced by secondary magnetite. Insufficient magnetic and petrologic information is available to evaluate the possibility and probable magnitude of this factor in the present case.

#### Chromite deposit near deposit no. 2.

A hitherto unreported deposit of massive chromite crops out in the west wall of a small gulch about 350 feet west of deposit no. 2. The deposit consists of several short, thick, lenticular masses of chromite scattered over an area approximately 75 feet by 30 feet. The largest mass is about 15 feet long, 4 feet wide, and is estimated to contain about 60 tons of chromite. The tonnage of chromite of the entire deposit is estimated to be about 80 tons.

A small chip sample collected from this deposit by the authors and analyzed by J. E. Husted of the Geological Survey contained 43.20 percent of  $\text{Cr}_2\text{O}_3$ . The chromite in the sample had a chrome-iron ratio of 2.34. This is the highest chrome-iron ratio reported for chromite from Red Bluff Bay.

#### Nickel prospect near Sitka

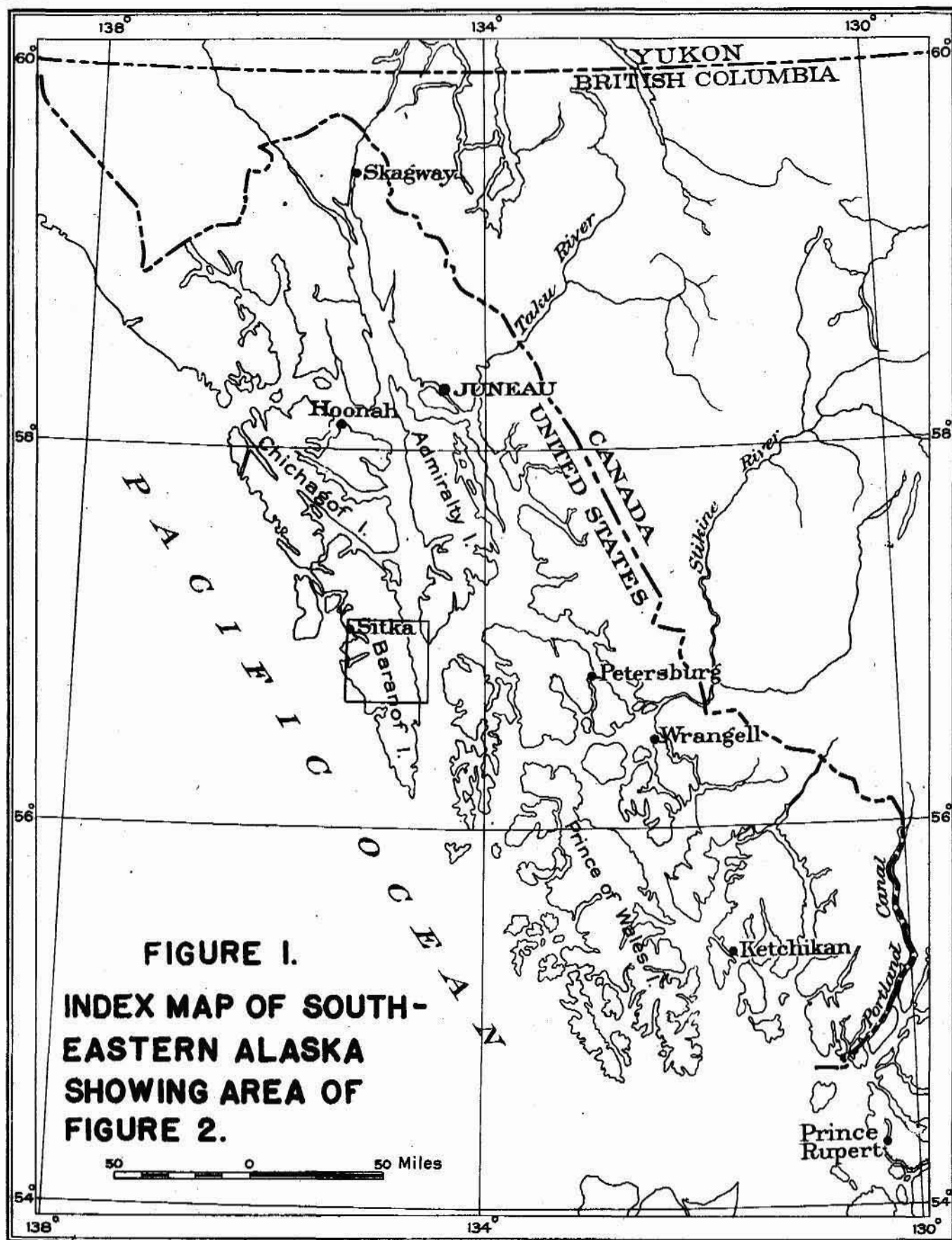
A nickel-copper prospect, said to be covered by two claims of Chas. Haley and William Hanlon of Sitka, lies at an altitude of about 850 feet about 1,500 feet from the shore of Salmon Cove, a small indentation of the northeast shore of Silver Bay about 5 miles easterly from Sitka. The deposit is in a fault that strikes N.  $10^\circ$  W and dips  $80^\circ$  E., and cuts altered graywacke. A 15-foot adit has been driven southward on this fault.

Sulfide minerals, largely pyrrhotite with minor amounts of chalcopyrite, have been introduced along the fault. The sulfides occur as small, irregularly distributed masses in the fault. The largest pod of massive sulfides seen is about 10 inches wide and 2 feet to 3 feet long. Minor amounts of pyrrhotite and chalcopyrite have been deposited in the graywacke near the fault. Slight sulfide mineralization was noted at outcrops about 50 feet southwest of the tunnel portal.

A sample of the massive sulfides in the fault was collected by John C. Reed in 1941 and analyzed by K. J. Murata of the Geological Survey. It contained 0.99 percent of copper, 0.20 percent of nickel, 0.09 percent of cobalt, and no silver.

The deposit appears to have no economic significance.

March, 1944.



UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

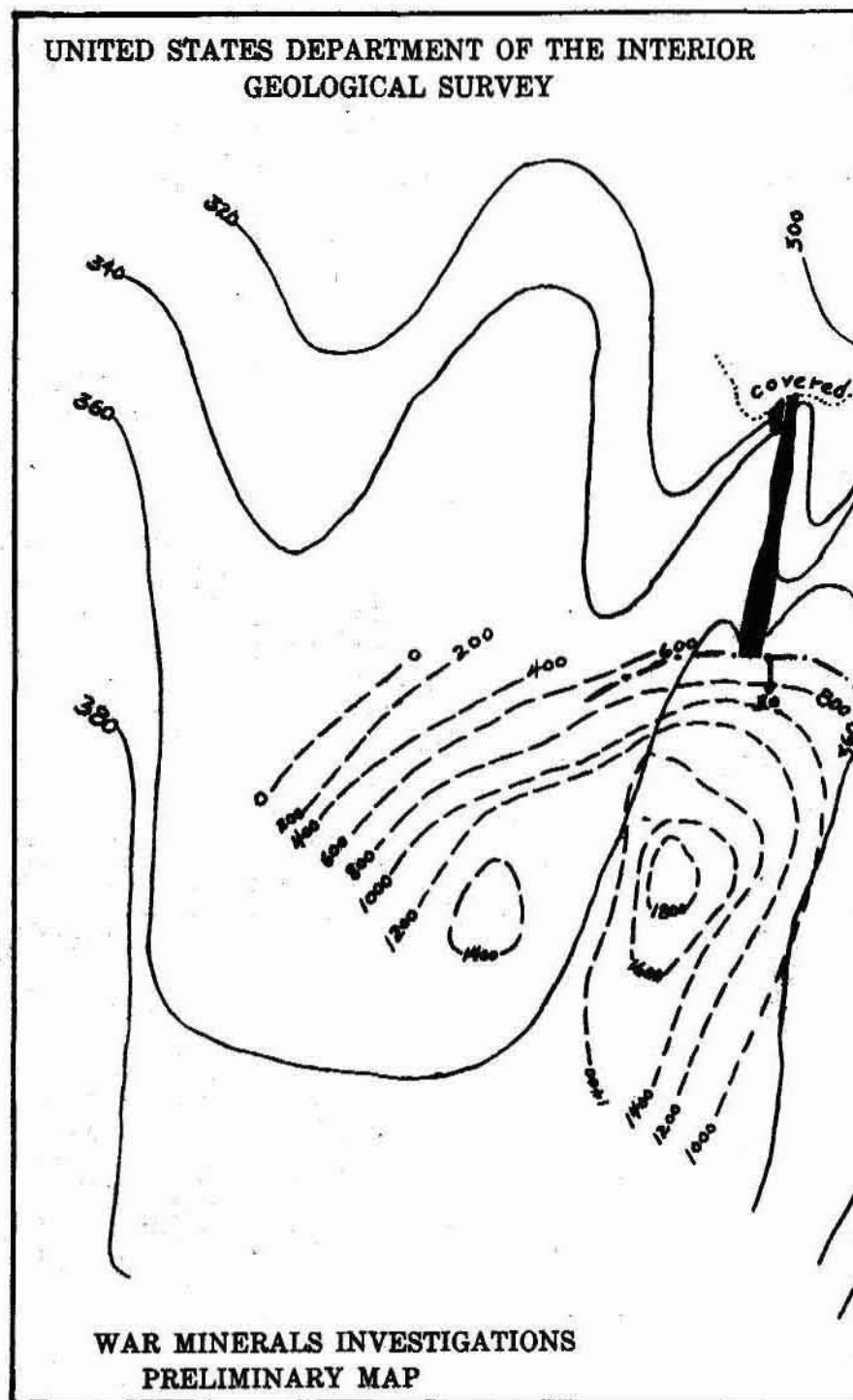


FIGURE 3, GEOLOGIC, MAGNETIC & TOPOGRAPHIC  
RED BLUFF BAY

Contour interval 20 feet, datum mean sea level

10

Isomagnetic interval 200 gammas, datum assumed

By Matt Walton, geology and topography modified from Guild & B