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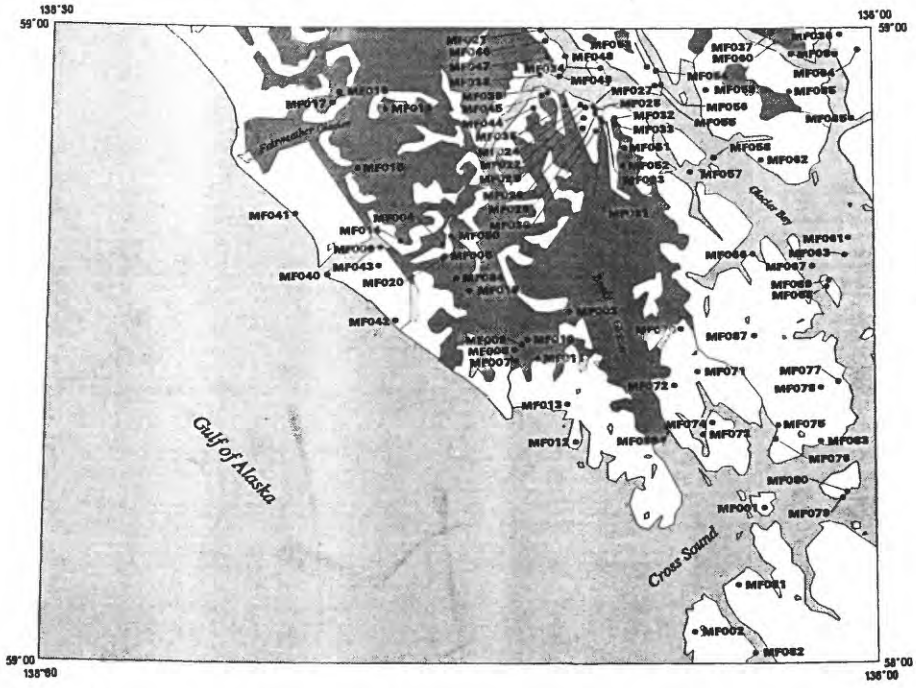
Alaska Resource Data File

Mount Fairweather quadrangle

Descriptions of the mineral occurrences shown on the accompanying figure follow. See U.S. Geological Survey (1996) for a description of the information content of each field in the records. The data presented here are maintained as part of a statewide database on mines, prospects and mineral occurrences throughout Alaska.



Distribution of mineral occurrences in the Mount Fairweather 1:250,000-scale quadrangle, southeastern Alaska

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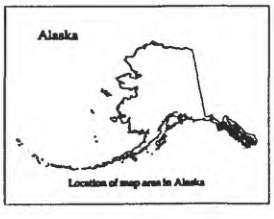

U.S. DEPARTMENT OF THE INTERIOR · MARCH 3, 1849

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OPEN-FILE REPORT 99-334

Site name(s): Unnamed (Inian Islands)

Site type: Occurrence

ARDF no.: MF001

Latitude: 58.246 **Quadrangle:** MF A-2

Longitude: 136.340

Location description and accuracy:
The site is in the Inian Island group about 1.5 miles north of Point Lavinia. Point Lavinia is at the north end of the Inian Peninsula on Chichagof Island. The location was taken from plate 16 of Rossman (1959, B 1058-E) and is probably accurate within 0.25 mile.

Commodities:

Main: Fe

Other:

Ore minerals: Magnetite?

Gangue minerals:

Geologic description:
The occurrence is in a Mesozoic terrane consisting of greenstone with minor limestone and amphibolite of Triassic age and volcanic-rich schist of Jurassic age. Foliated diorite of Jurassic or Cretaceous age crops out on the far western Inian Island, about 1/2 mile southwest of the iron occurrence (Rossman, 1959, plate 12). The occurrence is shown on plate 16 of Rossman (1959), but is not otherwise described; it could be either in the Triassic or Jurassic series. It is assumed, but not known, to be a magnetite replacement in limestone or greenschist related to the emplacement of the late Mesozoic foliated hornblende diorite.

Alteration:

Age of mineralization:
Jurassic or Cretaceous.

Deposit model:
Distal magnetite replacement body in limestone or greenschist.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings were reported.

Production notes:

Reserves:

Additional comments:
The site is Tongass National Forest; it appears to be in an area open for mineral location.

References:
Rossman, 1959 (B 1058-E).

Primary reference: Rossman, 1959 (B 1058-E)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/04/99

Site name(s): Unnamed (Northwest part of Yakobi Island)

Site type: Occurrence

ARDF no.: MF002

Latitude: 58.05 **Quadrangle:** MF A-2

Longitude: 136.55

Location description and accuracy:

The location is at sea level on the west coast of Yakobi Island about 1.5 miles west of Hoktaheen Lake (Rossman, 1959, plate 12). Location is accurate within about 0.1 mile.

Commodities:

Main: Cu, Ni, PGE?

Other:

Ore minerals:

Gangue minerals:

Geologic description:

A gabbro body on northern Yakobi Island is geologically permissive for nickel-copper deposits similar to those that occur at Takanis and Bohemia Basin in the Sitka D-8 quadrangle, about two miles south of the southern boundary of the Mt. Fairweather A-2 quadrangle. (The gabbro body on Mt. Fairweather A-2 quadrangle is about 6 miles northwest of the Takanis nickel-copper deposit.) The structural setting on the northwest part of Yakobi Island is the same as at Bohemia Basin where barren and ore- bearing gabbro occur within the same large dike-like intrusion of non-foliated light colored sodic quartz diorite of Tertiary age that hosts the gabbro body on Fairweather A-2. The dike-like quartz diorite mass crops out for about seven miles on the Mt. Fairweather quadrangle; to the south, it thickens, becomes more complex, and extends into the Sitka quadrangle for about ten more miles (Rossman, 1959, plate 12; Loney and others, 1975, plates 1 and 2).

The eastern part of the gabbro body on northern Yakobi Island is on the mainland of the island; much of the body is on an offshore island complex.

Nickel-bearing norite gabbro is unknown at the occurrence, but the intrusion is large enough to host nickel-copper deposits in the body, especially the part exposed on small islands and largely covered by sea water.

Alteration:

Age of mineralization:

Tertiary.

Deposit model:
Igneous-affiliated deposit, mafic to ultramafic.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
None.

Production notes:

Reserves:

Additional comments:
The gabbro body is in the West Chichagof-Yakobi Island Wilderness Area of the Tongass National Forest.

References:
Rossman, 1959 (B 1058-E); Loney and others, 1975.

Primary reference: Rossman, 1959 (B 1058-E)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/04/99

Site name(s): Brady Glacier nickel-copper deposit

Site type: Prospect

ARDF no.: MF003

Latitude: 58.5533 **Quadrangle:** MF C-3

Longitude: 136.9275

Location description and accuracy:

The location is approximately the discovery nunatak of the deposit at an elevation of about 3300-feet on Brady Glacier. Except for exposures on nunataks, the deposit is covered by ice. It extends for about 0.4 miles northeast of the location point and about 0.6 miles west-southwest of the location point. The deposit may extend further west , possibly northwest, but the possible extensions were not drilled because of ice thickness. The location of the coordinates is the approximate common corner of sections 23, 24, 25, 26, T. 38 S., R. 51 E., of the Copper River Meridian. (See figure 3, Himmelberg and Loney, 1981, for this location relative to the discovery nunataks, contact of the intrusion, drill holes and cross-sections of the deposit.)

Commodities:

Main: Cu, Ni

Other: Cr, Fe, Pb, PGE (Pd, Pt, and Rh), Te, Ti

Ore minerals: Altaite, bornite, chalcopyrite, chromite, cubanite, ilmenite, mackinawite, magnetite, niccolite, pentlandite, pyrite, hexagonal and monoclinic pyrrhotite, violarite

Gangue minerals:

Geologic description:

The Brady Glacier nickel-copper deposit is near the local floor of the Crillon-LaPerouse layered intrusion near an east-pointing embayment of the contact of the intrusive (Himmelberg and Loney, 1981, figs. 2 and 3, p. 4-5; Cornwall, 1971, p. 79-82). The mafic complex was intruded into hornblende schist interfingered with biotite schist. The schistose host rocks were interpreted as Alexander complex by Brew and others (1978, p. B12-13). Berg and others (1972) and Jones and others (1978) have placed the rocks in Wrangellia or Chugach terranes. The Tertiary age of the mafic intrusions (see below) is more consistent with the Chugach-Wrangellia interpretation.

The Crillon-LaPerouse host intrusion is the largest of four layered mafic-ultramafic plutons in the Fairweather Range in Glacier Bay National Park and Preserve (Brew and others, 1978). The intrusion has an exposed thickness of about 6000 feet, and consists mainly of interlayered olivine gabbro and norite. Thin layers of ultramafic rock occur

throughout the section, but are most abundant near the base. Layering and other sedimentary-like features suggest the body formed mostly by cumulus processes.

The Crillon-LaPerouse pluton, and the other layered plutons of the National Park, are probably underlain by a dike-like feature of north-northwest trend. The structure is indicated by the +30 mGal contour (Barnes, in Brew and others, 1978, p. B51-69, esp. p. 67 and figure B4; Barnes and Watts, 1977). An underlying dike-like feature is also suggested by magnetics (Griscom, in Brew and others, 1978, p. B22-37, figure B1). It appears to be thickest underneath the Crillon-LaPerouse pluton. Its probable existence is consistent with the trend of significant cumulate-type ore deposits along the Fairweather Range.

The proposed underlying dike is a megadike like the Great Dyke of Rhodesia (Zimbabwe); the overlying layered intrusions are like the major chromite-bearing mafic-ultramafic funnels that form the upper part of the Great Dyke (Worst, 1960; Bichan, 1969).

In the Crillon-LaPerouse body itself, the predominantly mafic host rocks of the deposit consist of magnesian augite and bronzite, plagioclase (An81-63) and olivine (Fo71-86), also accessory chromite, ilmenite, magnetite, and graphite. Local phases are ultramafic in composition.

The Brady Glacier nickel-copper deposit consists mainly of stratigraphically continuous disseminated-sulfide zones locally more than 400 feet thick that contain as much as 10 percent sulfide minerals. Massive sulfide zones of up to 10 feet in thickness occur locally, especially near the contacts of gabbroic and ultramafic cumulates.

The dominant ore sulfides are hexagonal and monoclinic pyrrhotite, pentlandite and chalcopyrite. Altaite, cubanite and niccolite occur as minor components of the primary ore. Bornite, mackinawite, and violarite appear to have formed by secondary reactions between the primary sulfide phases (Czamanske and others, 1977, p. 14; Czamanske and others, 1981, p. 2001-2010; Himmelberg and Loney , 1981). Thicknesses where Ni + Cu equal or are greater than 0.5 percent exceed 100 feet are common. In drill hole NUC-3, in an apparent keel-like zone, apparent ore thickness exceeds 400 feet (Himmelberg and Loney, 1981, fig. 5).

The deposit contains relatively low concentrations of PGEs (Pd, Pt, and Rh). The total PGE content of disseminated or average ore is about 0.18 ppm. Massive sulfide zones contain about 1 ppm total PGEs.

Abundant carbon (now graphite), possibly derived from the intruded sedimentary rocks, kept low-valent sulfur stable and allowed the formation of a stable immiscible ore-sulfide phase that separated from the magma (Czamanske and others, 1977).

The deposit is Tertiary in age. A mid-Tertiary age of about 30 Ma is consistent with new data reported by Goldfarb (1997) and with Ar-Ar dates reported by Himmelberg and Loney in 1981 (p. 5) The deposit appears to thicken and become richer to the west, suggesting that resources identified to date by drilling are probably minimal.

Alteration:

Age of mineralization:

Probably mid-Tertiary (Goldfarb, 1997; Himmelberg and Loney ,1981).

Deposit model:

Disseminated to massive sulfide deposit formed from immiscible sulfide fluid injected into cumulus layers of silicate minerals. Similar to Stillwater Ni-Cu and Duluth Cu-Ni-PGE (Cox and Singer, 1986; models 1 and 5a). The deposits are synorogenic to mid-Tertiary tectonic activity (Foley and others, 1997, p. 441-443).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

1, 5a

Production Status: No

Site Status: Inactive

Workings/exploration:

The deposit was discovered in a helicopter exploration conducted by Fremont Exploration Co. in 1958. Fremont covered the anticipated area of the deposit with 224 claims. Fremont drilled a total of 32 core holes in the nunataks or through the ice before turning the project over to Newmont Exploration, Ltd. Newmont drilled 14 additional holes and conducted extensive metallurgical tests on the core from the property. An additional 36 holes were drilled after 1961; drill hole total is 82 holes (Kimball and others, 1978, p. C99-101).

Twenty claims covering the core of the deposit and, supported by drill discovery data, were patented in 1965. Later Newmont joint ventured the deposit with Cities Service and Union Pacific Resources. Although Richard Ellett of Newmont (1975) considered the deposit the largest nickel-copper deposit in the United States, its location within Glacier Bay National Park and Monument precludes its development. The deposit is now owned by the University of Alaska.

Newmont and partners also did considerable project planning. The project could be developed from a ten-mile-long tunnel driven from the Boussole Bay area.

An ice-depth survey suggests a deep canyon exists about a mile or two north of the deposit (Watts and England, 1976). This canyon may limit potential of the deposit, but it does not affect currently estimated resources.

Production notes:

Reserves:

Drill-indicated reserves are about 100 million tons of rock containing 0.5 percent nickel and 0.3 percent copper. PGEs average about 0.18 ppm and exceed 1 ppm in massive sulfide units and in flotation concentrates. About 250,000 ounces of PGEs exist in the drilled Ni-Cu resource area (Czamanske and others, 1981).

Additional comments:

Brady Glacier is the largest or among the largest of nickel-copper deposits in the United States (Ellett, 1975). It also has a substantial resource of PGEs.

Extensive metallurgical work done by Newmont and followed up by Czamanski and others (1981) show that resouces are only partly recoverable. Only about 1/2 of the esti-

mated PGE resource is recoverable using the techniques tested. Distinct phases of PGEs have not been identified, but some are liberated after regrinding of the bulk flotation concentrates, and are potentially recoverable by ultrafine gravity or electrodynamic separators. Nickel recovery is about 80 percent. At low nickel concentrations, a considerable amount of the nickel is in the silicate phase and is not recoverable.

The work done suggests that recoveries in an industrial-scale operation could be maximized. Inasmuch as the deposit is not yet limited to the west, any increase in reserves could contribute towards process development and scale of operation.

Patented claims at the site are now owned by the University of Alaska; they are in Glacier Bay National Park and Preserve.

References:

Worst, 1960; Bichan, 1969; Cornwall, 1971 in MacKevett and others, 1971; Berg and others, 1972; Ellett, 1975; Watts and England, 1976; Czamanske and others, 1977; Barnes and Watts, 1977; Brew and others, 1978 (including Barnes and others on gravity and Griscom on magnetics); Kimball and others, 1978; Jones and others, 1978; Czamanske and others, 1981; Himmelberg and Loney, 1981; Foley and others, 1997.

Primary reference: Himmelberg and Loney, 1981

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/04/99

Site name(s): Unnamed (North Crillon Glacier)

Site type: Prospect

ARDF no.: MF004

Latitude: 58.66 **Quadrangle:** MF C-4

Longitude: 137.31

Location description and accuracy:

The occurrence is at an elevation of 3000-3500 feet adjacent to the south wall of North Crillon Glacier. The coordinate location is accurate within about 0.2 mile. It is approximately in the center of the SW 1/4, section 15, T. 37 S., R. 40 E., of the Copper River Meridian The occurrence is approximately that of number 79 of MacKevett and others (1971), number 4 of Cobb (1972), and the location of samples 7S011-015 of Kimball and others (1978).

Commodities:

Main: Cu, Ni

Other: Co, Fe, PGE, Ti

Ore minerals: Chalcopyrite, ilmenite, magnetite, pentlandite?, pyrrhotite

Gangue minerals:

Geologic description:

The deposit is in the Crillon-LaPerouse layered mafic-ultramafic pluton near its northwest contact with schistose rocks of probable Mesozoic age. The Crillon-LaPerouse body is the largest of four complexes within Glacier Bay National Park and it hosts the Brady Glacier nickel-copper deposit (MF003--Brew and others, 1978).

Disseminated to semi-massive sulfide minerals occur in layered gabbro on the south side of North Crillon Glacier. Conspicuous iron-stained zones estimated to be about 20 feet thick occur in the gabbro body and appear to be continuous for thousands of feet. They are separated by from 30 to 100s of feet of less-stained gabbro. Surface access was gained to one zone that contained a 1-2 foot thick vein of pyrrhotite with some chalcopyrite and ilmenite (Kimball and others, 1978, p. C106-107). The samples contained as much as 3000 ppm nickel, 980 ppm copper, and 0.7 ppm platinum.

In the same area, Kennedy and Walton (1946) reported a 5-foot thick zone traceable for thousands of teet that contained as much as 60 percent ilmenite and some sulfides; the same authors (p. 71) report that the weathered metal-rich outcrops are bright red.

Kimball and others (1978) note the similarity of mineralization with that reported on the north wall of South Crillon Glacier about one and one-half miles to the south, suggesting

similar mineralization in heavily stained but inaccessible zones between the two occurrences.

Alteration:

Conspicuous iron-stained zones that resulted from oxidation of iron-rich minerals in the oxide-sulfide segregations.

Age of mineralization:

Tertiary.

Deposit model:

Sulfide/oxide segregations in a layered mafic complex. Occurrences are of the type associated with 'Synorogenic layered mafic complexes of Tertiary age, southeastern Alaska' of Foley and others (1997, p. 441-443).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

5a?

Production Status: No

Site Status: Inactive

Workings/exploration:

The area is extremely steep, and access to the rock exposures from the glaciers is across bergschrunds. A 1 to 2 foot thick zone rich in pyrrhotite was sampled by Kimball and others (1978) at about 30 foot intervals. Nickel content was as much as 3000 ppm, copper was 980 ppm, and cobalt (probably erroneously called chromium in table C-26B) was as much as to 300 ppm. Trace amounts of platinum and palladium were found in one sample.

Kennedy and Walton (1946) reported one 5-foot thick layer in the same approximate area that contained 60 percent ilmenite.

Production notes:

Reserves:

Additional comments:

Zones possibly project southerly to occurrences on the north side of South Crillon Glacier, and north across North Crillon Glacier to other similar occurrences. The possible continuity of deposits suggests that Brady Glacier-type nickel-copper deposits could exist in the northwest part of the Crillon-La Perouse layered complex.

The site is in Glacier Bay National Park and Preserve.

References:

Kennedy and Walton, 1946; Rossman, 1963 (B 1121-F); MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978; Foley and others, 1997.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 12/15/98

Site name(s): Unnamed (north wall of South Crillon Glacier)

Site type: Occurrence

ARDF no.: MF005

Latitude: 58.640 **Quadrangle:** MF C-4

Longitude: 137.304

Location description and accuracy:

The occurrence is on the north wall of South Crillon Glacier at about 3600 feet elevation and about 1.4 miles north-northwest of hill 6902, which was called Mt. Lookout by Rossman (1963, B 1121-F). The location given is that of Kimball and others (1978, fig. C32, occurrence in fig. C33). It is probably 0.2-0.3 mile northeast of location 80 in MacKevett and others (1971) and location 3 of Cobb (1972, MF-436). (Also see MF020).

The occurrence is probably accurate to 0.1 mile.

Commodities:

Main: Cu, Ni

Other: Au, Co, Fe

Ore minerals: Chalcopyrite, magnetite, pentlandite

Gangue minerals:

Geologic description:

The copper-nickel occurrence is in the Crillon-LaPerouse layered mafic-ultramafic pluton, near its western contact. The pluton is of Tertiary age; it was intruded into biotite and hornblende schist (Brew and others, 1978). The schist units are in the upper Chugach terrane of Berg and others (1972).

At the occurrence, iron-stained zones as much as 20 feet thick and traceable visually for thousands of feet occur in layered gabbro. The zones appear to cut the layering of the gabbro at a small angle and are proposed to be shear zones (Kimball and others, 1978, p. C101-102). At one accessible location a 6-8 foot thick heavily iron stained layer was mapped and sampled over a strike length of 120 feet. The zone contains disseminated chalcopyrite and pyrrhotite. Within this zone, a thin (0.6) foot lens about 12 feet long contains semimassive sulfide concentrations of chalcopyrite, pyrrhotite and pentlandite. A sample from the zone contained 3000 ppm copper, 2500 ppm nickel, and 700 ppm cobalt. Gold was detected in two samples; the select sample contains greater than 20 percent iron (Kimball and others, 1978, p. C102 and figures C32 and C33).

Alteration:

Conspicuous iron-stained zones.

Age of mineralization:
Tertiary.

Deposit model:
Sulfide segregations in shear zones that cut layered gabbro.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrences are surface exposures with no workings. The U.S. Bureau of Mines (Kimball and others, 1978, p. C101-102, figs. C32 and 33) found as much as 0.24 percent copper, 700 ppm nickel, 150 ppm cobalt, and 0.10 ppm gold in the mineralized zone which is as much as 8 feet thick. Mineralized sheared gabbro contains as much as 0.3 percent copper, 2500 ppm nickel and 700 ppm cobalt in a narrow (0.6 foot) high grade lens within the mineralized zone.

Production notes:

Reserves:

Additional comments:
The area is near the contact of the Crillon-La Perouse stock of layered gabbro in Glacier Bay National Park and Monument. The area is extremely rugged. Other deposits could exist nearby.
The site is in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); MacKevett and others, 1971; Berg and others, 1972; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/05/99

Site name(s): Unnamed (near the mouth of Crillon Inlet to Lituya Bay)

Site type: Occurrence

ARDF no.: MF006

Latitude: 58.657 **Quadrangle:** MF C-5

Longitude: 137.484

Location description and accuracy:

The occurrence is approximately 0.2 mile south of triangulation station Berg at the mouth of Crillon Inlet to Lituya Bay at an inferred elevation of about 800 feet. A float sample was collected near 58.658 and 137.484 at the base of the cliff, and this is the location shown as number 1 of Kimball and others (1978), number 84 of MacKevett and others (1971) and location 1 of Cobb (1972). Kennedy and Walton (1946) report a stained gabbroic rock on the southwest shore of the southeast arm of Lituya Bay, presumably the same--and original location--of the occurrence.

Commodities:

Main: Cu, Ni

Other: Ag, Au, Co

Ore minerals: Chalcopyrite, goethite, pyrite, pyrrhotite (nickeliferous?)

Gangue minerals:

Geologic description:

Disseminated sulfide minerals (chalcopyrite and pyrrhotite) occur in gabbro about 0.6 mile southwest of the Fairweather fault within the eastern part of the Lituya terrane defined by Brew and others (1978). The eastern part of the Lituya terrane is similar to the adjacent Fairweather terrane in abundance of intrusive rocks and presence of schistose metasedimentary and metavolcanic rocks.

Mineralized (iron-stained) float was at the base of a cliff by the U.S. Bureau of Mines (Kimball and others, 1978, p. C93). Earlier Kennedy and Walton (1946, p. 71) had reported a gabbro dike, that contained about 1 percent chalcopyrite, also, pyrrhotite, cut granitic rock near the same location. Kimball and others (1978, p. C93) reported that the iron-stained float in scree contained as much as 1600 ppm copper, 2000 ppm nickel, 300 ppm cobalt and traces of gold and silver. Visible minerals in the scree float were quartz, chlorite, epidote, hornblende, pyrite and secondary goethite. The U.S. Bureau of Mines investigators observed a conspicuous iron-stained zone on the cliff that they inferred could be the dike reported by Kennedy and Walton, but they did not have time to investigate the possible source.

Alteration:
Limonitic staining.

Age of mineralization:
Tertiary.

Deposit model:
Lode: Disseminated copper and nickel(?) sulfide minerals in an altered mafic dike.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposure, cliff and talus. A float sample of iron-stained altered gabbro(?) from the talus contained 2000 ppm nickel, 1600 ppm copper, 300 ppm cobalt, 1 ppm silver, and 0.15 ppm gold. Kennedy and Walton (1946) reported a gabbro dike from the same area that contained disseminated chalcopyrite.

Production notes:

Reserves:

Additional comments:
Kimball and others (1978) did not recover the mineralized dike reported earlier by Kennedy and Walton (1946), but they did note iron-stained on the cliff above the mineralized scree at the base of the cliff. The Bureau of Mines party did not have time to examine the stained occurrence. The site is in Glacier Bay National Park and Preserve.

References:
Kennedy and Walton, 1946; MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978.

Primary reference: Kennedy and Walton, 1947; Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 12/15/98

Site name(s): Unnamed (northwest of Mt. Marchainville)

Site type: Occurrence

ARDF no.: MF007

Latitude: 58.476 **Quadrangle:** MF B-4

Longitude: 137.084

Location description and accuracy:

The occurrence is at an elevation of about 2000 feet about 3 miles northwest of Mt. Marchainville, and 1.5 miles southeast of Finger Glacier. It is near the approximate center of section 24, T. 39 S., R. 50 E., of the Copper River Meridian. The location is accurate to about 0.1 mile based on transposition of Rossman's (1963) sample no. 40 to the topography of the 1961 edition of the Mt. Fairweather B-4 quadrangle. The location is the same as number 15 of Kimball and others (1978), and location 7 of Cobb (1972). MacKevett and others (1971, p. 52) cite Rossman for authority on copper-staining close to this location. The approximate location of copper-staining reported by MacKevett and others (1971--location 82) is about 0.25 mile southeast of the coordinate position.

Commodities:

Main: Fe, Ti

Other: Cu

Ore minerals: Chalcopyrite?, ilmenite, malachite

Gangue minerals:

Geologic description:

The occurrence is within the Fairweather terrane of Brew and others (1978). It is in the southwest part of the Crillon-LaPerouse mafic-ultramafic body which is intruded into biotite and hornblende schist of the upper Chugach terrane of Berg and others (1972).

At the occurrence, an ilmenite-rich layer in gabbro is approximately 50-feet thick. Its strike length is uncertain because of the extremely rough topography. Rossman (1963) determined X0.0 percent titanium by spectrophic analyses (sample 52A Rm g 40). The sample also contained X0.+ percent iron, but only 0.0X percent of copper, cobalt, or nickel. Ilmenite determined by weight in mineral separates ranged from 5 to 11.4 weight percent.

A nearby copper (malachite-stained) occurrence is near or at the contact of the intrusion; possibly the occurrence represents oxidized cupriferous amphibolite schist at the contact.

Alteration:
Local iron-and copper-(malachite) staining.

Age of mineralization:
Tertiary.

Deposit model:
Possibly Bushveld Fe-Ti-V (Cox and Singer, 1986; model 3). Magmatic segregation of ilmenite in layered mafic-ultramafic intrusion. The mafic intrusion is synorogenic (Foley and others, 1997).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
3?

Production Status: No

Site Status: Inactive

Workings/exploration:
No workings, surface outcrop only.

Production notes:

Reserves:
Possibly extensive deposits are suggested by the thickness (50-feet) and by several nearby ilmenite-rich occurrences.

Additional comments:
Chugach terrane. The ilmenite locality and the nearby copper-stained sites are in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); MacKevett and others, 1971; Cobb, 1972 (MF-436); Berg and others, 1972; Brew and others, 1978; Kimball and others, 1978; Cox and Singer, 1986; Foley and others, 1997.

Primary reference: Rossman, 1963 (B 1121-F)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/04/99

Site name(s): Unnamed (south of Finger Glacier)

Site type: Occurrence

ARDF no.: MF008

Latitude: 58.494 **Quadrangle:** MF B-4

Longitude: 137.089

Location description and accuracy:

The occurrence is at 4100-foot elevation about 3.9 miles northwest of Mt. Marchainville and on the south side of the head of Finger Glacier. The location is accurate to about 0.1 mile based on transposition of sample number 43 of Rossman (1963, B 1121-F) to the 1961 edition of the Mt. Fairweather B-4 quadrangle. Location number 41, also Rossman (1963), is about 0.1 mile southwest of number 43. The location is essentially the same as number 12 (p. C111) of Kimball and others (1978) shown, incorrectly, as their location 13 on plate III.

Commodities:

Main: Pb, Ti

Other: Ag, Cu, Ni, Te?

Ore minerals: Altaite?, galena?, ilmenite

Gangue minerals:

Geologic description:

The occurrence is in layered gabbro of the Crillon-La Perouse intrusion about one-half mile from its southwestern contact (Brew and others, 1978). The country rock at the contact is hornblende and biotite schist. Both schistosity and intrusive layering in this vicinity mainly strike northwest and dip 45-65 degrees northeast (Rossman, 1963).

Possibly two distinct deposit types are represented in the area. At Rossman's site number 43 cumulus(?) layers rich in ilmenite contain as much as 2.5 percent of ilmenite; at nearby site number 41, heavy mineral sulfide-rich(?) concentrates contained X.0 percent lead, 0.X percent copper and nickel, and 0.00X percent silver. Titanium was negligible at site 41. The mineralogy is uncertain, but at X.0 percent, lead should be present as a separate phase. Galena is possible, as is a lead telluride, altaite, which occurs in the Brady Glacier deposit (MF003).

Alteration:

Age of mineralization:

Tertiary.

Deposit model:
Bushveld Fe-Ti-V (Cox and Singer, 1986; model 3). Ilmenite cumulate segregations at Rossman's (1963) site 43; uncertain lode in layered mafic intrusion at locality number 41, also Rossman.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
3

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface outcrops of a 10-foot thick layer at locality number 43 contain as much as 2.5 weight percent ilmenite (in four samples--Rossman, 1963, table 6). At nearby site number 41 (table 7) spectrographic analyses of heavy mineral concentrates from locality indicated 0.X percent copper and nickel, X.0 percent lead, and a trace of silver.

Production notes:

Reserves:
No reserves assigned, only minor concentration of ilmenite in 10 foot layer at Rossman's (1963) location number 43. Locality of number 41 is a mineralogic curiosity of unknown significance.

Additional comments:
Chugach terrane. The sites are in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); Brew and others, 1978; Kimball and others, 1978; Cox and Singer, 1986.

Primary reference: Rossman, 1963 (B 1121-F)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/05/99

Site name(s): Unnamed (southeast of upper Finger Glacier)

Site type: Occurrence

ARDF no.: MF009

Latitude: 58.502 **Quadrangle:** MF C-4

Longitude: 137.068

Location description and accuracy:

The occurrence is about 4.2 miles northwest of Mt. Marchainville on a ridge southeast of upper Finger Glacier at an elevation of about 6000 feet. The location is estimated from the location of sample number 44 of Rossman (1963). It is approximately correct based on the 6000-foot elevation; by latitude and longitude, the location is in the adjacent B-4 quadrangle. It is probably accurate to about 0.25 mile. The location in Kimball and others (1978) is uncertain.

Commodities:

Main: Fe, Ti

Other: Cu, Pb, Sn

Ore minerals: Ilmenite, magnetite, unknown sulfide phases

Gangue minerals:

Geologic description:

The ilmenite-magnetite occurrence at Rossman's (1963, B 1121-F) location number 44 is within and about 1.4 miles from the southwest contact of the Crillon-LaPerouse layered mafic-ultramafic intrusion (Brew and others, 1978). Layering in the stock near this locality strikes northwest and dips moderately steeply to the northeast.

At the locality, ilmenite and magnetite are concentrated in cumulus layers. Analysis of a heavy-mineral concentrate (Rossman, 1963, table 7) by semiquantitative spectrographic methods found X0.0+ percent iron and X.0 percent titanium. Heavy-mineral concentrates also contained 0.X percent each of copper, lead, and tin and 0.0X percent of cobalt and nickel. The concentrations of the trace metals are sufficiently low that they do not prove separate mineral phases for any of the trace metals.

Alteration:

Age of mineralization:

Tertiary.

Deposit model:
Possibly Bushveld Fe-Ti-V (Cox and Singer, 1986; model 3). Ilmenite and magnetite enriched in cumulus layers of a synorogenic (Foley and others, 1997) layered mafic-ultramafic stock.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
3?

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface outcrops only; no development.

Production notes:

Reserves:
No reserves projected. Thickness and horizontal continuity information lacking.

Additional comments:
Chugach terrane. The site is in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); Brew and others, 1978; Kimball and others, 1978; Cox and Singer, 1986; Foley and others, 1997.

Primary reference: Rossman, 1963 (B 1121-F)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/05/99

Site name(s): Unnamed (southeast of upper Finger Glacier)

Site type: Occurrence

ARDF no.: MF010

Latitude: 58.51 **Quadrangle:** MF C-4

Longitude: 137.05

Location description and accuracy:
The deposit is probably on the south slope of a 7200-foot mountain about 3.5 miles south-southeast of the peak of Mt. LaPerouse in the NE 1/4, SW 1/4, section 6, T. 39 S., R. 51 E., of the Copper River Meridian. The location is based on a description by Leo Mark-Anthony (1977), but it is uncertain because the description of the site reported in Kimball and others (1978, location 14) does not match Mark-Anthony's elevation or approximate coordinates.

Commodities:

Main: Cu, Ni

Other:

Ore minerals: Chalcopyrite?, pentlandite or nickeliferous pyrrhotite

Gangue minerals:

Geologic description:
Based on its reported location, the occurrence is in the central part of the Crillon-LaPerouse layered mafic-ultramafic intrusion of Tertiary age. The occurrences were described as 'lenses of nickel-bearing pyrrhotite in diorite within the mafic intrusion' (Mark-Anthony, 1977; also, communication Leo Mark-Anthony, 1998). A sample collected by Mark-Anthony contained 0.83 percent nickel and 0.18 percent copper. Copper is abundant enough to form a separate phase, probably chalcopyrite.

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Lode: Disseminated copper and nickel-bearing minerals in dioritic phase(?) of layered mafic intrusive.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposure of mineralized rock; no workings.

Production notes:

Reserves:
Possible reserves contained in sulfide-bearing lenses as much as 10 feet thick and traceable for 500 feet.

Additional comments:
Chugach terrane. The location is in Glacier Bay National Park and Preserve.

References:
Mark-Anthony, 1977; Kimball and others, 1978.

Primary reference: Mark-Anthony, 1977

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/05/99

Site name(s): Unnamed (north of Mt. Marchainville)

Site type: Occurrence

ARDF no.: MF011

Latitude: 58.48 **Quadrangle:** MF B-4

Longitude: 137.02

Location description and accuracy:
The occurrence is uncertainly located. It is either about two miles north of Mt. Marchainville at an elevation between 2500-3000 feet (NE 1/4, section 20, T 39 S., R. 51 E., of the Copper River Meridian) or about about 0.5 mile west-southwest of that location. The occurrence is number 83 of MacKevett and others (1971) and location 16 of Kimball and others (1978).

Commodities:

Main: Fe, Ti

Other: Cu, Ni

Ore minerals: Chalcopyrite, ilmenite, magnetite, pyrrhotite

Gangue minerals:

Geologic description:
Ilmenite and magnetite, accompanied by subordinate chalcopyrite and pyrrhotite, occur in heavily iron-stained masses near the south contact of the Crillon-LaPerouse layered mafic-ultramafic intrusion (Brew and others, 1978). The layered intrusive was emplaced in rocks of the Chugach terrane (Berg and others, 1972). The first reports of the occurrences were by Rossman (1963, B 1121-F); further reports were made by MacKevett and others (1971, p. 72-73) and Kimball and others (1978, p. C112).

Alteration:
Conspicuous secondary iron-staining.

Age of mineralization:
Tertiary.

Deposit model:
Heavy-mineral segregations near basal contact of synorogenic layered mafic intrusive of Tertiary age (Foley and others, 1997).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status:

Workings/exploration:
Surface exposures only; knowledge is partly based on aircraft fly-by because of the extremely rough topography.

Production notes:

Reserves:

Additional comments:
The occurrences are in extremely rugged country in the south part of the Crillon-LaPerouse intrusion in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); MacKevett and others, 1971; Berg and others, 1972; Brew and others, 1978; Kimball and others, 1978; Foley and others, 1997.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/05/99

Site name(s): Unnamed (Astrolabe Peninsula)

Site type: Occurrence

ARDF no.: MF012

Latitude: 58.353 **Quadrangle:** MF B-3

Longitude: 136.890

Location description and accuracy:

A magnetite deposit crops out on the east side of the southernmost peak on the Astralobe Peninsula. The deposit is exposed from about 1200 to 1600 foot elevation. The coordinates are for the approximate center, as inferred from sample numbers 38-39 of Rossman (1963, B 1121-F). Another deposit, sample 34 of Rossman, is approximately 0.3 mile southwest of the southernmost peak at an elevation of about 1000 feet. The site is equivalent to location 73 of MacKevett and others (1971) and location 9 of Cobb (1972, MF-436). The Rossman 38-39 locations are about the same as those in Kimball and others (1978, fig. C35).

Commodities:

Main: Fe, Ti

Other:

Ore minerals: Ilmenite, magnetite

Gangue minerals:

Geologic description:

These iron-titanium occurrences are in the Astralobe-DeLangle stock, the southernmost of four layered mafic intrusives in the Fairweather Range in Glacier Bay National Park and Preserve (Brew and others, 1978). The layered gabbro is mainly composed of plagioclase (An content of 55-70 percent), monoclinic and orthorhombic pyroxene, and olivine. Magnetite and ilmenite make up as much as 20 percent of some layers of the stock, and there are accessory amounts of apatite, sulfides, and graphite (Rossman, 1963, B 1121-F, p. F23-25, F44-45). Chemical analyses of four rocks typical of the stock are also given by Rossman (1963, table 2). Approximately 2000 feet of the stock is exposed without significant compositional variation (Rossman, 1963, p. F32).

The mineral occurrences exposed near the south peak of the Astralobe Peninsula are approximately central in the stock, assuming that the stock goes offshore at least as far south as Sugarloaf Island. Rossman (1963, p. F44-45) proposed that the magnetite-ilmenite rich layers were at the top or side of the stock, and that they occurred in approximately 1000 stratigraphic feet of the stock and extended through the mountain.

The deposit in the vicinity of samples of Rossman's (1963) 38-39 series contain as much as 12.5 weight percent ilmenite and 14 percent magnetite, as determined in mineral separates. The average content of 10 samples of the 38 series was approximately 8.3 weight percent magnetite and 3.6 weight percent ilmenite. Rossman believed that the deposit was very large.

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Similar to Bushveld Fe-Ti-V (Cox and Singer, 1986; model 3). Magmatic segregations in synorogenic layered mafic igneous intrusive of Tertiary age (Foley and others. 1997).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
3

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no mine workings, all data are from samples collected from natural exposures. At Rossman's (1963) location 38, magnetite averages 8.3 percent and ilmenite (nine of ten samples) averages 3.6 percent.. The rock at nearby sample site 34 contains as much as 13.5 percent magnetite; two of four samples average 2 percent ilmenite. Maximum magnetite content at the 34 site is 22 percent; maximum ilmenite is 12.5 percent (Rossman,1963, table 8, p. F45).

Production notes:

Reserves:
A resource exists based on Rossman's (1963) estimate of a 1000-foot thickness of the layered gabbro. Based on 1000 x 1000 x 500-foot (depth) and 10 cu-ft /ton , there is, conservatively, about 50 million tons of iron-titanium enriched gabbro at the upper site (samples in the 38-39 series of Rossman).

Additional comments:
Chugach terrane. The iron and titanium rich sites are in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978; Foley and others, 1997.

Primary reference: Rossman, 1963 (B 1121-F)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/05/99

Site name(s): Unnamed (DeLangle Mountain)

Site type: Prospect

ARDF no.: MF013

Latitude: 58.409 **Quadrangle:** MF B-3

Longitude: 136.931

Location description and accuracy:

Magnetite deposits occur on the southern peaks of DeLangle Mountain. Deposits are found in the SE 1/4 section 11 and the NE 1/4 section 14 (T. 40 S., R. 51 E., of the Copper River Meridian). They probably extend into adjacent parts of sections 12 and 13 of the same township and range. The coordinates are the approximate center of a group of samples collected by the U.S. Bureau of Mines (Kimball and others, 1978, samples 046-050, fig. C-35) near elevation 2700-ft on DeLangle Mountain. The occurrences are about 1.5 miles southwest of the summit of DeLangle Mountain.

Leo Mark-Anthony (1977) reported another magnetite occurrence at the head of Boussole Bay approximately in the SW 1/4 NW 1/4, section 13 and the NW 1/4 SW 1/4 of the same section (T. 40 S., R. 51 E.).

Commodities:

Main: Fe, Ti

Other: Cu, Ni

Ore minerals: Chalcopyrite, ilmenite, magnetite, pyrrhotite

Gangue minerals:

Geologic description:

The mineralized sites are in the Astrolobe-DeLangle mafic stock, the southernmost layered mafic pluton exposed in the rugged Fairweather Range of Glacier Bay National Park and Preserve (Brew and others, 1978). The magmatic oxide minerals occur in a subhorizontal hornblende-plagioclase pegmatite body that is approximately 100 feet wide and 20 feet thick. The body crops out discontinuously for 1,000 feet in gabbro near the northern contact of the Astrolobe-DeLangle layered mafic stock. Hornblende forms crystals to 1 foot in length in the pegmatitic phase. Segregations of magnetite less than 0.2 inch (5 mm) long are concentrated near larger hornblende and plagioclase crystals (Kimball and others, 1978, p. C120). The magnetite-rich body produces an extreme magnetic deviation.

Four chip samples, ranging from 18 to 40 feet in length, across the pegmatite body contained more than 10 percent iron and more than 1 percent titanium. Maximum copper

content was 500 ppm.

At Boussole Bay, about one mile south of the pegmatite occurrence, a two-foot-wide band exposed over 225 feet contained 64 percent iron, 20 percent titanium, and 0.28 percent nickel (Kimball and others, 1978, p. C122-123). At this location, Mark-Anthony (1977) reported that an intrusive exposed over an area of approximately 1500 x 4000 feet contains about 10 percent iron.

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Cumulus layered mafic intrusion with iron-titanium enriched hornblende-plagioclase pegmatites (segregations), possibly localized near the contact of the Astolobe-DeLangle synorogenic intrusion with schistose rocks of the Chugach terrane (Foley and others, 1997; Berg and others, 1972).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
A few claims are reported to have been staked on the south part of DeLangle Mountain, but there are no workings or evidence of mine activity. An occurrence chip-sampled by Kimball and others (1978, p. C120) contained greater than 10 percent iron, greater than 1 percent titanium and 150-500 ppm copper. The samples ranged from18 to 40 feet in length.

Mark-Anthony (1977) reported samples from the head of Boussole Bay to contain as much as 64 percent iron and 0.28 percent nickel.

Production notes:

Reserves:

Additional comments:
Chugach terrane. The sites are in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); MacKevett and others, 1971; Berg and others, 1972; Mark-Anthony, 1977; Kimball and others, 1978; Foley and others, 1997.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/05/99

Site name(s): Unnamed (near Cascade Glacier)

Site type: Occurrence

ARDF no.: MF014

Latitude: 58.664 **Quadrangle:** MF C-5

Longitude: 137.439

Location description and accuracy:

The occurrence is about 0.75 mile south of Cascade Glacier on a steep southwest-facing slope above Crillon Inlet. Iron-stained amphibolite crops out from about 3400 to 3600 foot elevation. The location is probably accurate to 0.15 mile. It is location 19 of Kimball and others (1978).

Commodities:

Main: Cu

Other: Ag, Au

Ore minerals: Chalcopyrite?, pyrite, pyrrhotite?

Gangue minerals:

Geologic description:

Amphibolite schist is extensively exposed in the Fairweather terrane of Brew and others (1978). The rocks probably are in the Chugach terrane of Berg and others (1972).

Amphibolite schist above Cascade Glacier is extensively iron-stained. The stain is developed on sulfidized (pyrite and pyrrhotite(?)) layers that crop out from about 3400 to 3600 feet elevation and are traceable along strike for 100s of feet. A float sample contained 1000 ppm copper. Samples representative of the schist unit contained elevated background amounts of copper--as much as 240 ppm (Kimball and others, 1978, p.C125). A heavily stained sulfide-rich lens about 0.4 feet thick and 10 feet long contained 800 ppm copper, 0.15 ppm gold and 7 ppm silver. (About 0.03 weight percent chalcopyrite is equivalent to 1000 ppm copper and chalcopyrite is the most likely copper phase in the unit.)

Kimball and others (1978) proposed that the site should be investigated more thoroughly. Iron-staining is widespread in the schistose units, and copper has been reported elsewhere in schist, as from the moraine coming out of North Crillon Glacier, where amphibolite-quartz schist fragments are stained with copper carbonates (MacKevett and others, 1971, p. 53 after Kennedy and Walton, 1946, p. 71). (The North Crillon location is 86 of plate 1 of MacKevett and others, 1971).

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Mineralized amphibolite schist.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings. Kimball and others (1978) followed up a USGS collected float sample which contained 1000 ppm copper. Select samples of the iron-stained schist contained as much as 7 ppm silver, 0.15 ppm gold, and 800 ppm copper.

Production notes:

Reserves:

Additional comments:
The area is extremely rugged; higher grade units could exist within the mineralized schist unit, an element of the Chugach terrane. The area is in Glacier Bay National Park and Preserve.

References:
Kennedy and Walton, 1946; MacKevett and others, 1971; Berg and others, 1972; Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/05/99

Site name(s): Unnamed (near Desolation Glacier)

Site type: Occurrence

ARDF no.: MF015

Latitude: 58.78 **Quadrangle:** MF D-5

Longitude: 137.57

Location description and accuracy:
The occurrence is on the north side of Desolation Glacier about 1.5 miles above its foot and between 3000 and 4000 feet elevation. The location is accurate within about 0.25 mile; it is approximately the same as number 17 of Kimball and others (1978).

Commodities:

Main: Cu, Ni

Other: Au,Ti

Ore minerals: Chalcopyrite, ilmenite?, pentlandite?, pyrite, pyrrhotite

Gangue minerals:

Geologic description:
Disseminated pyrrhotite, pyrite, chalcopyrite occur in a 'gabbro diabase' dike with average width of 5-6 ft that is exposed for 200 feet . The rock also contains a reported 2-5 percent titanium and probably contains ilmenite. An average grade reported is 0.59 percent nickel, 0.62 percent copper, and 0.010 ounce per ton in gold (Mark-Anthony, 1977). Based on the content of nickel, pentlandite is probably present .

The dike cuts the hornblende schist and gneiss unit of Brew and others (1978). Based on the mid-Tertiary age of the nickel-bearing layered mafic intrusions of the Fairweather Range (Goldfarb, 1997), the mafic dike probably is also Tertiary. Brew and others (1978) considered the pre-metamorphic age of the schist host rocks as possibly Precambrian; Berg and others (1972) interpreted it as Mesozoic.

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Mineralized mafic dike probably affiliated with layered gabbro intrusions.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:

Average value from surface exposures was reported to be 0.59 percent nickel, 0.62 percent copper, and 0.01 ounce per ton gold; titanium ranged from 2-5 percent (Mark-Anthony, 1977, cited by Kimball and others, 1978, p. C124). The occurrence was found by private prospectors.

Production notes:

Reserves:

Additional comments:

Small deposit, but worthy of additional followup because of its grade. It was not found by the Bureau of Mines investigators in 1977 (Kimball and others, 1978, p. C124) during stormy weather.

The occurrence is in Glacier Bay National Park and Preserve.

References:

Mark-Anthony, 1977; Berg and others, 1972; Brew and others, 1978; Kimball and others, 1978; Goldfarb, 1997.

Primary reference: Mark-Anthony, 1977; Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/06/99

Site name(s): Unnamed (moraine on Fairweather Glacier)

Site type: Occurrence

ARDF no.: MF016

Latitude: 58.873 **Quadrangle:** MF D-5

Longitude: 137.489

Location description and accuracy:

Glacial moraine on a north arm of Fairweather Glacier, about 2.6 miles south-southeast of Mt. Fairweather contains sulfide- and oxide-rich mineral bearing detritus derived from the Mt. Fairweather. The metalliferous detritus is at about 6500-foot elevation and probably is derived from outcrops 0.2-0.4 mile to the west. The location is accurate within 0.25 miles.

Commodities:

Main: Cu, Ni

Other: Au, Ag, Co, Cr, Fe, PGE, Ti, V

Ore minerals: Chalcopyrite, cubanite?, ilmenite, magnetite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:

Cobbles of mafic rocks containing concentrations of magnetite-ilmenite or of disseminated sulfides, including chalcopyrite and pentlandite, occur in moraine adjacent to the Mt. Fairweather layered mafic intrusion and must have been derived from mineral deposits within the intrusion.

Plafker and MacKevett (1970) found as much as 0.5 percent copper, also 0.5 percent nickel in the first sampling of the moraine occurrence. Kimball and others (1978) found as much as 0.64 percent copper and 0.2 percent nickel in samples collected from the moraine. Gold, platinum or palladium, cobalt, and chromium were also reported in assays from samples from the moraine.

Alteration:

Age of mineralization:

Recent morainal accumulation of sulfide- and heavy metallic oxide-bearing detritus derived from the Mt. Fairweather intrusion.

Deposit model:

Unconsolidated glacial moraine containing metalliferous detritus.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status:

Site Status:

Workings/exploration:

The mineralized rocks were collected from the moraine. No examination of the probable source area of the detritus was possible because of the extremely rugged terrane. Further investigations would call for trained mountaineers. The sites near Mt. Fairweather were first visited by Plafker and MacKevett (1970), who obtained materials estimated to contain as much as 0.5 percent each of copper and nickel. The sites were then resampled by the U.S. Bureau of Mines (Kimball and others, 1978, p. C108-C119). Samples 7K064 and 065 collected by the Bureau contained 0.03-0.05 ounce/ton gold, trace to 0.008 ounce/ton platinum or palladium, as much as 0.64 percent copper, 0.2 percent nickel, 200-300 ppm cobalt, and 2000-5000 ppm chromium.

Production notes:

Reserves:

Additional comments:

The site is in Glacier Bay National Park and Preserve. A search for the source of the metalliferous boulders would need mountaineering support.

References:

Plafker and MacKevett, 1970; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/06/99

Site name(s): Unnamed (between Fairweather and Sea Otter Glaciers)

Site type: Occurrence

ARDF no.: MF017

Latitude: 58.883 **Quadrangle:** MF D-5

Longitude: 137.649

Location description and accuracy:

Sulfide and heavy oxide boulders occur in the moraine about 4.5-7 miles west-southwest of the top of Mt. Fairweather on an east-heading glacier that is between Fairweather and Sea Otter Glaciers. The coordinates given above are for the approximate location of Bureau of Mines sample 7S008 (Kimball and others, 1978) collected at an elevation of about 3500 feet. The Bureau estimated the collection elevation at about 3700 feet which would be about 0.4 mile to the east of the coordinates assumed here. Sample 7S009 was collected in moraine about 0.4 mile south, slightly east, of the 7S008 location. The exact locations of the samples are not believed to be critical.

Commodities:

Main: Cu, Ni

Other: Ag, Co, Cr, PGE, V

Ore minerals: Chalcopyrite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:

This occurrence consists of boulders on a moraine about 1 mile southwest of the contact of the Mt. Fairweather layered mafic intrusion. The boulders consist of mafic intrusive rocks which contain disseminated sulfides, including chalcopyrite and nickel-bearing minerals. The boulders were derived from the intrusion. An area of bedrock about 1.5 miles northeast of the boulder field is conspicuously copper-stained and may be at or near the source of the boulders.

Samples collected from the moraine field by Plafker and MacKevett (1970) and by Kimball and others (1978)contained as much as 0. 5 percent copper, 0.2 percent nickel, a trace of silver, also as much as 0.005 ounce/ton platinum and 0.008 ounce/ton palladium. A sample collected below the copper-stained bedrock area contained 0.2 percent vanadium.

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Metalliferous glacial moraine. The metalliferous boulders are derived from primary cumulate-sulfide segregations in an layered mafic-ultramafic(?) intrusion.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: None

Site Status: Inactive

Workings/exploration:
Sampling by Plafker and MacKevett (1970) was followed up by the Bureau of Mines (Kimball and others, 1978). Samples collected by the Bureau (7S008 and 009) contain 0.002-0.005 ounce/ton platinum, 0.008-0.01 ounce/ton palladium, as much as 1.5 ppm Ag, about 0. 5 percent copper and 0.2 percent nickel, and 150 ppm cobalt. A sample of gabbro within the intrusive and below the copper-stained area contained 0.2 percent vanadium.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve. Further search for the source of the metalliferous moraine would need mountaineering support.

References:
Plafker and MacKevett, 1970; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/06/99

Site name(s): Unnamed (west of Mt. Fairweather)

Site type: Occurrence

ARDF no.: MF018

Latitude: 58.90 **Quadrangle:** MF D-5

Longitude: 137.63

Location description and accuracy:

The occurrence is on the west contact of the Mt. Fairweather mafic intrusion about 3.7 miles bearing about 263 degrees (true azimuth) from the top of Mt. Fairweather.

The location has not been occupied, but there are conspicuous copper (malachite?) stains both in the intrusion and the country rocks in the contact zone. The mineralization may extend north along the contact, because sulfide boulders were found on Sea Otter Glacier to the north, as well as on the glacier between Sea Otter and Fairweather Glaciers.

Commodities:

Main: Cu, Ni?

Other: Co?, Cr?, PGE?, Ti?

Ore minerals: Chalcopyrite?, cubanite?, malachite, pentlandite or nickeliferous pyrrhotite

Gangue minerals:

Geologic description:

This occurrence, and the occurrence of detrital mineralized mafic rocks in nearby glacial moraine (MF016 and MF017), suggests that there may be (a) Brady Glacier-type nickel-copper deposits in the Mount Fairweather layered mafic-ultramafic intrusion and (b) contact-type copper deposits in the schist country rocks. The inferred mineral deposits are in or at the contact of the Mt. Fairweather layered mafic intrusion, the northern-most of four layered mafic complexes of the Fairweather Range (Brew and others, 1978). The primary copper sulfides exposed at or near the contact have locally been oxidized to malachite, forming copper-stained zones visible from aircraft fly-by. The sites have not been occupied.

Alteration:

Local secondary alteration of copper-bearing minerals.

Age of mineralization:

Tertiary.

Deposit model:
Cumulate or sulfide segregations in layered-mafic intrusions. Contact deposits in schist. Partly oxidized.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status:

Site Status:

Workings/exploration:
Helicopter reconnaissance reported in Kimball and others (1978, Fig. C-34, p. C117-C118) found conspicuous copper staining near the western contact of the Mt. Fairweather intrusion. No landings were possible.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve. Further exploration would need mountaineering support.

References:
Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/06/99

Site name(s): Unnamed (southwest of Mt Dagelet)

Site type: Occurrence

ARDF no.: MF019

Latitude: 58.585 **Quadrangle:** MF C-4

Longitude: 137.228

Location description and accuracy:
The occurrence is on the south wall of a glacier about 2.6 miles at 248 degrees (true azimuth) from Mt. Dagelet in extremely rugged country. Rossman (1963, p. F44) reported this locality as a prominent gossan similar to those observed over nickel-copper deposits on Yakobi Island in the Sitka D8 quadrangle (also see MF002). The gossan was not examined on the ground either by Rossman or, in 1977, by the U.S. Bureau of Mines (Kimball and others, 1978, p. C110-111). The location is probably within 0.2 mile of Rossman's observed gossan.

Commodities:

Main: Ni?

Other: Cu?

Ore minerals: Limonite, Ni-Cu bearing sulfides?

Gangue minerals:

Geologic description:
Gossan similar to that observed at the Yakobi Island nickel-copper deposits on the Sitka D-8 quadrangle was observed remotely by Rossman (1963). The site is in the Crillon-LaPerouse layered mafic-ultramafic pluton within about 0.3 mile of its southwestern contact with biotite-hornblende schist (Brew and others, 1978).

Alteration:
Prominent iron-rich gossan.

Age of mineralization:
Tertiary.

Deposit model:
Magmatic segregation.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: None

Site Status: Inactive

Workings/exploration:
Surface exposures, not examined on the ground.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1963 (B 1121-F)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/06/99

Site name(s): Unnamed (north wall of South Crillon Glacier)

Site type: Occurrence

ARDF no.: MF020

Latitude: 58.637 **Quadrangle:** MF C-4

Longitude: 137.309

Location description and accuracy:
The occurrence is on the north wall of Crillon Glacier 5.35 miles west- southwest of the summit of Mt. Crillon. It is at an elevation of about 3200 feet at the contact of the Crillon-La Perouse layered complex with schist. The occurrence is accurate to about 0.2 mile. The location is approximately the same as number 80 of MacKevett and others (1971) and number 3 of Cobb (1972). The occurrence is approximately 0.2 mile southwest of MF005, an occurrence of nickel and copper.

Commodities:

Main: Cu, Ni

Other:

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals:

Geologic description:
Mineralized layered gabbro near the western contact of Crillon-La Perouse layered mafic-ultramafic body contains 5-6 percent of disseminated pyrrhotite and chalcopyrite. The sulfide minerals probably are magmatic segregations The area is near the part of the stock described by Rossman (1963, B 1121-F, p. F42-43).

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Copper-nickel(?) segregation deposit in a layered mafic-ultramafic intrusive.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:

There are no workings. Direct knowledge of this occurrence is based on sampling of R. H. Goldthwait of the Harvard-Dartmouth Expedition cited by Kennedy and Walton (1946, p. 71), who reported 5 to 6 percent of sulfides--pyrrhotite and chalcopyrite--near the contact of the intrusive. No other party has been able to reach the Goldthwait occurrence.

Production notes:

Reserves:

Additional comments:

Site has been inaccessible because of rock falls since the early examination by Goldthwait. It is close enough to the nickel-copper deposit at locality MF005 to suggest the possible continuity of mineralization in this part of the layered complex. The site is in Glacier Bay National Park and Preserve.

Kennedy and Walton (1946) cite an unpublished report by Goldthwait that may be in Dartmouth or Harvard Expedition files.

References:

Kennedy and Walton, 1946; Rossman, 1963 (B 1121-F); MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978.

Primary reference: Kennedy and Walton, 1946

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/06/99

Site name(s): Unnamed (west of Tarr Inlet)

Site type: Occurrence

ARDF no.: MF021

Latitude: 58.997 **Quadrangle:** MF D-4

Longitude: 137.015

Location description and accuracy:
The occurence is at an elevation of 700 feet about 4.5 miles from the mouth of Tarr Inlet in the NE 1/4 NE 1/4 section 23, T. 33 S., R. 50 E., of the Copper River Meridian. The occurrence is about 0.75 miles south of the Tarr Inlet prospect of Kimball and others (1978; fig. C41), which is on the Skagway A-6 quadrangle. The occurrence is located within 0.2 mile.

Commodities:

Main: Au

Other:

Ore minerals: Pyrite?

Gangue minerals:

Geologic description:
The area is underlain predominantly by foliated granitic rock of Cretaceous age (Brew and others, 1978). A sample of a 2-foot by 6-foot sulfide pod in granitic host contained 0.10 ounce per ton gold (3.5 ppm)--Kimball and others, 1978, location 4, fig. C41, table C36).

Alteration:

Age of mineralization:
Tertiary.

Deposit model:

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status:

Site Status:

Workings/exploration:
Surface exposure only; a grab sample of a 2-foot by 6-foot sulfide rich pod assayed 3.5 ppm in gold; no other element was anomalous (Kimball and others, 1978).

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve. The occurrence is south of the Tarr Inlet Knob prospect of Kimball and others (1978, fig. C41) which is in the Skagway A-6 quadrangle.

References:
Kimball and others, 1978; Brew and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/06/99

Site name(s): Le Roy; A. L. Parker; Pet (after about 1975)

Site type: Mine

ARDF no.: MF022

Latitude: 58.8767 **Quadrangle:** MF D-3

Longitude: 136.8789

Location description and accuracy:

The mine is 0.7 mile south of the mouth of Ptarmigan Creek into Glacier Bay between Reid Inlet and Lamplugh Glacier. Veins are exposed on surface or in underground workings between about 900-1100 feet above sea level. The mine is in the N1/2 SE1/4 section 34, T. 35 S., R. 51 E., of the Copper River Meridian. The location coordinates are of the main Le Roy vein. Location is accurate within 0.1 mile. The mine is location 17 of Cobb (1972, MF-436).

Commodities:

Main: Au

Other: Ag, As, Cd, Cu, Pb, Zn

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold (native), pyrite, silver (native?), sphalerite

Gangue minerals: Ankerite, quartz

Geologic description:

The LeRoy mine is within a large sheared roof pendant within a granodiorite pluton of Cretaceous age (Brew and others, 1978). The pendant, strikes northerly to north-northeast in the vicinity of the mine; to the south, strike is north-northwest. Rocks within the pendant include graphitic schist and crystalline schist that Rossman (1959, B 1058-B, p. 45) proposed was metasedimentary. Thin section studies by MacKevett and others (1971, p. 56) show, however, that much of the schistose crystalline rock is intensely sheared (cataclastic) granodiorite. South of the mine a major fault lies within and is subparallel to the cataclastic zone (Rossman, 1959, B 1058-B, pl. 4). This fault is locally mineralized, as at the Highland Chief (MF030). A mafic dike that strikes northeast crops out east of mine; it appears to form the vein wall rock in the south part of the mine.

The LeRoy vein is the thickest and most continuous of a swarm of about 15 quartz veins exposed at the mine. The veins strike north-northeast and are almost vertical. At least two other veins may have had some gold production; one is a vein developed in a short drift 25 feet east of the main workings. The so-called Pet vein was developed in a subparallel drift 100 feet northwest of the main LeRoy workings.

The LeRoy vein consisted mainly of quartz and ankerite and averaged about 2 feet thick. Locally it was as much as 4.5 feet thick. The veins of the area are banded. Typically they contain 3-5 percent, occasionally more, sulfide minerals, which in approximate order of abundance are, arsenopyrite, pyrite, sphalerite, galena, and chalcopyrite. Gold occurred both in relatively coarse native form, also finely divided within the sulfide minerals. About one-third of the gold was recovered at the mine as native gold in gravity circuit or on amalgam plates. The rest was recovered from sulfide concentrate shipped to the smelter at Tacoma. The mine was rich, averaging about 3 ounces of gold per ton. Vein material exposed in the floor of the lower LeRoy workings averages about 1.25 ounce per ton gold in a remaining unmined shoot (Holdsworth, 1955). The vein appears to terminate or lose strength in the mafic dike host, but the vein system has not been well explored to the south.

Alteration:

Rossman (1959, B 1058-B. p. 43) notes intense alteration that locally extends to 10 or 15 feet on each side of the vein, and is marked on the surface by rust-red staining. Alteration products almost certainly include ankerite and chlorite.

Age of mineralization:

The granodiorite host rock is Cretaceous in age; mineralization is inferred to be Late Cretaceous or younger.

Deposit model:

Similar to low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a). Low-sulfide gold-quartz vein, grading into a medium-sulfide type.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

36a?

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

The discovery of the LeRoy occurred rather late in the history of the district. It was found in 1938 by A. L. Parker and his son, Leslie F. Parker. The Parkers mined and milled the ore on a small scale until Mr. Parker's death in 1941 (Rossman, 1959, B 1058-B, p. 38). The most extensive mining was done on lease between 1941 and 1945 by the LeRoy Mining Co.

The LeRoy vein system has been explored by three main adits with more than 600 feet of workings. The upper LeRoy level is at a reported elevation of 987 feet; the lower LeRoy level is at about 950 feet. The workings on the Pet vein are at about 950 feet. The LeRoy vein was stoped above the upper Leroy level for about 100 feet. The vein was stoped below that level, but It has not been developed below the lower Leroy level. A 2-foot wide zone in the floor of the Lower level is reported to average 1.25 oz/ton gold for a distance of 50-feet.

The Pet vein is narrower. As exposed it generally ranges from 3-8 inches in thickness. It is about 1.5 feet thick in the face of the Pet drift. Most samples are in the 0.01 to .01 oz/ton gold range, but MacKevett obtained 0.44 ounce per ton gold on a narrow north-striking vein near the portal of the tunnel, and the Territorial Dept. of Mines found 0.22 ounce per ton gold in a raise near the face of the Pet. (MacKevett and others, 1971, p. 56-59, Pl. 9) The Pet probably was drilled in the 1970s, but the location of drill logs is unknown.

The Leroy mine was examined by several territorial engineers, including Roehm (1942), Fowler (1950) and Holdsworth (1955).

Production notes:

Production was estimated by the U.S. Bureau of Mines (Kimball and others, 1978) to be from $130-170 thousand with gold at $35.00/ounce, or about 3700-4900 ounces of gold.

During the main period of mining, the ore was crushed and ground in a mill on site. The ground ore was tabled; the dense table cut was amalgamated. The low-density table cut was then treated by flotation. The flotation concentrate was shipped to a smelter, presumably at Tacoma. The grinding limits are not known, so it is not possible to tell how much gold would have been liberated with very fine grinding. The owners reported only about 25 percent of the ore as free-milling (Kimball and others, 1978, p. C203).

The main period of mining was from 1941-45 (Twenhofel and others, 1949, p. 32-34; Rossman, 1959, B 1058-B. p. 38-39).

Reserves:

Only a very small reserve is indicated with the present data. There are only about 260 ounces indicated in the floor of the lower adit by assuming 50 x 25 x 2-feet, a tonnage factor of 12 cu-ft/ton and grade of 1.25 oz/ton based on sampling reported by Holdsworth (1955).

Several narrow quartz veins are rich; the potential for discovering at least as much ore as was produced is good.

Additional comments:

There was minor activity at the LeRoy (Pet) in the 1970s by Jeannie Trump, the daughter of A. L Parker, and associates. Reportedly mineralization was sufficiently good to uphold the validity of two unpatented claims. The deposit is in Glacier Bay National Park and Preserve and the property is believed to be inactive.

The LeRoy deposit was the most productive mine in the Reid Inlet gold area, as defined by Kimball and others, 1978).

References:

Smith, 1942 (B 933-A); Roehm, 1942; Twenhofel and others, 1949; Fowler, 1950; Holdsworth, 1955; Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978; Brew and others, 1978; Cobb, 1978.

Primary reference: Rossman, 1959 (B 1058-B); Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/06/99

Site name(s): Incas

Site type: Mine

ARDF no.: MF023

Latitude: 58.860 **Quadrangle:** MF D-3

Longitude: 136.833

Location description and accuracy:

The Incas vein crops out on the steep side-hill west of Reid Inlet at an elevation of about 1000 feet. Incas is about 0.75 mile south of the Sentinel vein (MF028) and 0.6 mile north-northwest of the Galena (MF031). The Incas is a vein-mineralized fault zone that can be traced for nearly 2000 feet. The coordinates given are the approximate location of workings on the vein; they are probably correct within 0.15 mile of the workings.

Commodities:

Main: Au

Other: As

Ore minerals: Arsenopyrite, gold (native), pyrite

Gangue minerals: Calcite, quartz

Geologic description:

The Reid Inlet gold area is mainly underlain by granitic rocks of Cretaceous age (Brew and others, 1978). The area was mapped in detail by Rossman (1959, B 1058-B).

The Incas is a productive north-striking, steeply-dipping vein fissure 1-3-feet thick with lenses of quartz and calcite in a shear zone. Rossman (1959) traced the vein for about 2000 feet and found free gold in all quartz lenses. Locally, gold may have been concentrated by supergene enrichment. Workings driven below the surface outcrops found only low grade quartz veins. The Incas structure is subparallel to and similar geologically to the Monarch vein fissure (MF026). Rossman (1959, plate 4) mapped another subparallel vein about 400-feet east of the Incas vein; the vein was partly covered by colluvium.

Alteration:

Rossman (1959) notes alteration (bleaching?) along the 2000-foot strike exposure of the vein fissure.

Age of mineralization:

Tertiary.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:
Incas was discovered in 1924 by Joe Ibach and is one of the earliest discoveries in the district. Claims were located by Ibach and famous Alaska novelist, Rex Beach, in 1936 after Glacier Bay National Monument was opened for mining (Kimball and others, 1978, p. C217). Gold, possibly enriched by supergene processes, was mined along the exposed vein fissure for about 60 feet near an elevation of 1100 feet. A crosscut tunnel was driven below the stoped area for about 170 feet. Near the face of the crosscut, the adit drifts for about 40 feet along a fissure reasonably inferred to be on the same vein mined at the surface. MacKevett found only about 0.029 oz/ton gold in narrow samples taken from the underground workings. One sample contains 20,000 ppm arsenic (MacKevett and others, table 11, location G).

Production notes:

Reserves:

Additional comments:
Small pods of gold-bearing quartz exist along an altered but weakly mineralized shear zone. Best chances for ore are believed to be in the surface pods of quartz or in secondary fissures opened near the strong north-trending vein fissure. The vein is not well explored at depth. The Incas vein is in Glacier Bay National Park and Preserve.

References:
Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1959 (B 1058-B)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): A.F. Parker

Site type: Mine

ARDF no.: MF024

Latitude: 58.881 **Quadrangle:** MF D-3

Longitude: 136.893

Location description and accuracy:
The mine is at an elevation of about 1000 feet 1.5 miles southwest of Lamplugh Glacier. It is about 0.6 mile west-northwest of the LeRoy Mine (MF023) near the center of the NW 1/4, section 34, T. 34 S., R. 51 E., of the Copper River Meridian. Twenhofel and others (1949, p. 33) give the elevation of the same prospect as 850 feet.

Commodities:

Main: Au

Other: Ag, Pb

Ore minerals: Galena, gold (native), pyrite

Gangue minerals: Quartz and altered rock material

Geologic description:
Golf-bearing veins at the A. F. Parker prospect cut granitic host rocks. The veins are discontinuous gold-rich structures which occur in gougy vein-faults of diverse strikes. Locally, the gold-bearing veins are cut off by low-angle post-mineral faults. Short vein segments also occur near a 16-foot adit driven along a gougy vein that strikes east-northeast.. Samples of gougy vein material contained only a trace of gold, but quartz vein material containing more than 2 ounces per ton gold was found on the dump, and a thin quartz vein in the face of the adit contained 5.13 ounce per ton gold (grab sample). A thin vein in an outcrop about 35 feet above the short adit contained 2.46 ounces per ton gold over 0.1 foot (Kimball and others, 1978, p. C234-236). Galena, pyrite, and free gold were reported by MacKevett and others (1971, p. 64).

Alteration:
Gougy (clay-rich?) material reported along vein-fissures.

Age of mineralization:
Late Cretaceous or younger.

Deposit model:

Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:
Veins were discovered and claims located in 1938. Some ore was produced from surface cuts or in a 16-foot drift-adit before July 1940. The ore was transported to the beach by an aerial tram.

Production notes:
Seven or eight tons of ore was shipped before July 1940, and additional sacked ore was seen by Twenhofel and others (1949, p. 33) when they visited the property in 1940.

Reserves:
No reserves.

Additional comments:
Apparently there was no production after about 1940. Mine is in Glacier Bay National Park and Preserve in the Reid Inlet gold area defined by Kimball and others (1978).

References:
Twenhofel and others, 1949; MacKevett and others, 1971; Kimball and others, 1978.

Primary reference: Kimball and others, 1978; Twenhofel and others, 1949

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Unnamed (southwest of Mt. Parker)

Site type: Occurrence

ARDF no.: MF025

Latitude: 58.8604 **Quadrangle:** MF D-3

Longitude: 136.8838

Location description and accuracy:

This occurrence consists of a locally mineralized fault or shear zone which can be traced for more than 4000-feet. The fault crosses the ridge about 0.2 mile southeast of Mt. Parker at an elevation of about 2900 feet. The coordinates, accurate within 0.1 mile, mark the point where the vein-fault crosses the ridge south of Mt. Parker. The fault continues southwesterly to Lamplugh Glacier and northeasterly into Ptarmigan Creek. Rossman (1959, B 1058-B, pl. 4, p. 55-56) reported two hydrothermally altered segments in the vein-fault, one to the northeast in Ptarmigan Creek; the second is about 2000 feet southwest of the ridge and 1000 feet east of Lamplugh Glacier.

Commodities:

Main: Au

Other: Ag, As, Zn

Ore minerals: Arsenopyrite, pyrite, sphalerite

Gangue minerals: Quartz

Geologic description:

A prominent locally mineralized fault cuts granodiorite of Cretaceous age on the ridge south of Mt. Parker, and enters the major cataclasite schist zone of the Ptarmigan basin to the northeast (Rossman, 1959, B 1058-B, pl. 4; Brew and others, 1978, pl. 1A). A 200-foot long quartz-bearing segment exposed on the west side of the Ptarmigan Creek basin is in schistose (cataclasite); a hydrothermally altered segment mapped by Rossman above Lamplugh Glacier is in granodiorite.

The vein-fault is traceable for 4500 feet. It is one of the strongest mineralized structures in the Reid Inlet gold area (Kimball and others, 1978). In addition to quartz, mineralized segments contain arsenopyrite, pyrite and black sphalerite.

Alteration:

Rossman (1959, B 1058-B, p. 56) reported alteration along the 4500-foot length of the structure. In general veins of the area are altered for as much as 10-15 feet on each side of the controlling fault structures; the alteration products include ankerite.

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: No

Site Status: Inactive

Workings/exploration:
The vein-fault has only been traced on the surface. Prospectors who examined mineralized segments of the vein thought it contained ferberite, but Rossman identified the dark mineral as iron-rich sphalerite (Rossman, 1959, p. 55-56). No assays are given, probably owing to the absence of visible free gold in the vein-fault structure.

Production notes:

Reserves:

Additional comments:
The occurrence is of interest because of the strength and continuous nature of the vein-fault structure. Possibly, gold-bearing veins could occur in subsidiary tensional structures or at vein intersections. Rossman's main map (B 1058-B) suggests that the northeast vein-fault will intersect the projection of the northwest striking Ptarmigan Creek fault under cover in Ptarmigan Creek basin. (The Ptarmigan Creek fault appears to be the fundamental control of the Highland Chief prospect--MF030) No near term exploration is expected because the occurrence is in Glacier Bay National Park and Preserve.

References:
Rossman, 1959 (B 1058-B); Brew and others, 1978.

Primary reference: Rossman, 1959 (B 1058-B)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Monarch No. 1 and No. 2

Site type: Mine

ARDF no.: MF026

Latitude: 58.8668 **Quadrangle:** MF D-3

Longitude: 136.8484

Location description and accuracy:

Monarch No. 1 is at an elevation ranging from 1850 to about 2100 feet about 0.2 mile east-northeast of triangulation station End, which has an elevation of 2480 feet. Monarch No. 1 is about one mile above the beach at the mouth of Reid Inlet. The Monarch No. 2 deposit is about 600 feet east of Monarch 1 at an elevation of about 1500 feet. Monarch No. 2's approximate latitude and longitude are, respectively, 58.8688 and 136. 8345. The locations of the prospects are known within 0.1 mile.

Commodities:

Main: Au

Other: Ag, Pb, REE

Ore minerals: Allanite, arsenopyrite, chalcopyrite, galena, gold (native), marcasite, pyrite, sphalerite

Gangue minerals: Calcite and quartz

Geologic description:

The Monarch veins occur in granodiorite of Cretaceous age (Brew and others, 1978). Rossman (1959, B 1058-B) found two phases of granodiorite within the intrusion, but the differences were too subtle to be mapped.

The Monarch vein-bearing structures belong to a steep fault set of north to north-northwest strike; faults of this are relatively continuous. (Another member of the same set is the Incas vein-fault--MF023). A quartz-vein segment developed in the Monarch No. 1 crops out for 400 feet between 1875 and 2050 feet elevation. It is 1-5 feet thick and was explored for 225 feet in the Monarch No. 1 adit. The vein outcrop locally contained about 1 oz/ton gold (Reed, 1938, p. 63), but assays from underground mostly range from 0.01 to 0.03 ounce per ton gold. There has been little stoping in either Monarch No. 1 or No. 2 underground workings.

Quartz veins or lenses at the Monarch deposits locally contain pyrite, arsenopyrite, galena and minor free gold. The maximum arsenic detected in 11 vein samples was 7000 ppm (MacKevett and others, 1971, table 11; also Kimball and others, 1978, table C42). Arsenic is much less abundant than in the Le Roy mine (MF022) where the arsenic con-

tent is occasionally more than 10 percent. Allanite is apparently a characteristic mineral of the granodiorite near the Monarch.

Alteration:
Oligoclase replaces original plagioclase; chlorite, epidote, and calcite are other alteration products (MacKevett and others, 1971, p. 61).

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:
The Monarch lodes were discovered in 1924 by Joe Ibach, while the National Monument was closed to mining. After the Monument was opened to mining in 1936, Monarch claims were staked by Ibach and Rex Beach. The adit on Monarch No. 1 is 225 eet long, mostly as a drift. Monarch No. 2 was developed with a 140-foot adit with two short drifts. Minor production came from surface cuts and possibly from a small overhand stope at 70 feet in the No. 1 adit. Reed (1938) sampled a surface exposure in the original Monarch five-claim area located by Joseph Ibach and Rex Beach; an exposed vein contained 0.97 ounce per ton gold, 0.50 ounce per ton silver and 1.08 percent zinc. Rossman (1959, p. 50) reported rich veins near the Monarch No. 1; he thought they were too narrow to be significant.

Production notes:
A small production of gold, probably from surface cuts.

Reserves:
None.

Additional comments:
The Monarch structures are weakly mineralized but relatively strong shear zones. Possibly ore might be found on short segments of northeast- striking veins exposed on the Monarch trend to the south. No prospecting is expected in the near future, because the veins are in Glacier Bay National Park and Preserve.

References:
Reed, 1938; Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-

436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1959 (B 1058-B); MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Rainbow

Site type: Mine

ARDF no.: MF027

Latitude: 58.8781 **Quadrangle:** MF D-3

Longitude: 136.8355

Location description and accuracy:

The Rainbow adit is essentially at tidewater, west of the mouth of Reid Inlet on Glacier Bay. The upper Rainbow prospect is at an elevation of about 1000 feet; it is almost on trend with the bearing of the lower Rainbow adit. The upper prospect has a latitude of about 58.8748 and longitude of 136.8343 The locations are accurate within 0.1 mile.

Commodities:

Main: Au

Other: Ag, As, Pb, Zn

Ore minerals: Arsenopyrite, galena, gold (native), pyrite, sphalerite

Gangue minerals: Calcite, quartz

Geologic description:

The Rainbow quartz (-calcite) fissure vein occurs in the part of the Reid Inlet gold area (Kimball and others, 1978) underlain by granodiorite of Cretaceous age (Rossman, 1959, B 1058-B; Brew and others, 1978). Minor amounts of alaskite are present near the mine (MacKevett and others, 1971, p. 59). The Rainbow vein-bearing fault zone strikes about N. 30 E., and dips 70 southeast to nearly vertical. The vein is narrow, generally 1 foot or less in thickness, but it is well mineralized. Arsenopyrite is common; galena and locally sphalerite are present up to a few percent each. Free gold is locally present. The vein was traced upslope for at least several hundred feet, and the vein-fault zone, nearly free of quartz, could be traced an additional 2000 feet up hill by subcropping bright red (hematitic?) altered rocks(Rossman, 1959, p.52).

The mineralization is similar to the LeRoy mine(MF022), moderately abundant auriferous sulfides in a quartz-calcite rich vein matrix. Locally the vein was rich. MacKevett found some rich parts of the vein when he sampled the Rainbow adit in 1966 (MacKevett and others, 1971, p. 59-60, table 11). Three samples collected below overhand-stoped quartz veins in the adit contained from 1.518 to 10.208 ounces per ton gold. The richest sample also contained about 2 ounces per ton silver, 1000 ppm arsenic, 100 ppm copper, 15 ppm molybdenum, 500 ppm lead, and 2000 ppm zinc. All the mineralized samples had trace amounts of molybdenum. (Bismuth, antimony, and tungsten were looked for

but not found). Major elements contained in the veins include calcium up to 2 percent and magnesium up to 0.8 percent , along with iron, suggesting the possiblity of ankerite or dolomite in the gangue.

Alteration:

Alteration was not described specifically at the Rainbow. In general for the Reid Inlet area, Rossman (1959, p. 43) says that the vein walls are altered for up to 10-15 feet from the veins. Oxidation formed a rust-red color, consistent with either sulfides or ankerite disseminated in the altered zone. MacKevett and others (1971, p. 59) noted abundant secondary iron minerals, gouge, and scattered free gold in the altered vein zones.

Age of mineralization:

Late Cretaceous or younger.

Deposit model:

Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

36a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

An adit was driven on the vein just above tide level for an estimated 190 feet. The vein was further developed by two raises and an overhand stope above adit level. Mining was in conjunction with the LeRoy vein (MF022) by the LeRoy Mining Co. The ore was hauled by barge and truck to the LeRoy mill. Shallow surface workings on the Upper Rainbow are at an elevation of about 1000 feet. Rossman mapped several veins of various strikes close to the Rainbow (Rossman, 1959, pl. 4).

Production notes:

Based on narrow vein, tonnage small, but likely multiounce per ton gold.

Reserves:

There is a resource present in the floor of the adit that could be developed with a winze. The winze would be below sea level. Inflows are uncertain but might be manageable with an adequate pillar. Reserves could likely be developed by continuing the drift. Rossman's (1959) mapping suggests the existence of vein intersections that could be targets for wider mining zones.

Additional comments:

The mine is in Glacier Bay National Park and Preserve.

References:

Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Sentinel

Site type: Mine

ARDF no.: MF028

Latitude: 58.8718 **Quadrangle:** MF D-3

Longitude: 136.8339

Location description and accuracy:
The Sentinel mine is at an elevation of about 900 feet 0.4 mile south of the Rainbow (MF027) adit on the northeast-sloping sidehill above the mouth of Reid Inlet. The location is accurate within 100 feet. The Sentinel is location 21 of Cobb (1972).

Commodities:

Main: Au

Other: Ag, Pb

Ore minerals: Galena, gold (native), hematite?, plumbojarosite?

Gangue minerals: Quartz, alteration minerals of granodiorite

Geologic description:
The Sentinel vein is hosted by granodiorite of Cretaceous age; it is locally covered by surface alluvium (Rossman, 1959, B 1058-B. pl. 4). The vein is similar in strike and characteristics to the Rainbow (MF027). The vein is steep and strikes northeast. The vein, six to 10 inches wide, is within an altered envelope about 1-foot thick. Rossman (1959, p. 54) noted that vein was quartz poor, and consisted mainly of altered granodiorite containing disseminated galena, other sulfides, and occasionally gold. The vein was discovered by Joe Ibach; it had a cavity a few feet long at the discovery cut. The floor of the cavity contained a red oxide rich in gold. The oxide has been inferred to be lead oxide (plumbojarosite?), but it probably included iron oxides, possibly hematite. The high-grade ore was mined by Ibach.

The Sentinel is at the head of a swarm of veins, also of northeast to east- northeast strike, which extend over about 1600 feet of beach front below the mine. Apparently most of the veins have not been sampled.

MacKevett and others, (1971, p. 60, also table 11, loc. D) found about 0.1 oz/ton gold in a nearby vein parallel to the Sentinel.

Alteration:
Intensely altered haloes in granodiorite around veins.

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:
The Sentinel vein was discovered and mined in shallow open cuts by Joe Ibach shortly after Glacier Bay National Monument was opened to mining in 1936. Shallow surface cuts are now obscured by overburden and vegetation.

Production notes:
Joe Ibach is reported to have transported high-grade oxidized gold-bearing ore to Lemesurier Island where it was milled.

Reserves:
None: Some potential especially if nearby vein swarm is auriferous.

Additional comments:
Ore was from a nearly quartz-free shear zone in granodiorite. Rossman (1959, p. 54) reports galena and other sulfides disseminated along vein-bearing fault. The Sentinel and Rainbow (MF027) were discovered in 1936 after the National Monument was reopened for mining. The vein is now in Glacier Bay National Park and Preserve.

References:
Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1959 (B 1058-B)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Rambler; Challenger

Site type: Prospect

ARDF no.: MF029

Latitude: 58.8441 **Quadrangle:** MF D-3

Longitude: 136.8865

Location description and accuracy:

The Rambler is about 1.25 miles south of Mt. Parker on the east side of Lamplugh Glacier at an elevation of about 1500 feet. The location is accurate within 100 feet. (The Mt. Parker of Rossman, 1959, B 1058-B, pl. 4, is about 1.6 miles north of the Mt. Parker of the Mount Fairweather D-3 quadrangle used to describe this location). The occurrence is location number 23 of Cobb (1972).

Commodities:

Main: Au

Other: Ag, Pb, Zn

Ore minerals: Arsenopyrite, galena, gold (native), pyrite, sphalerite

Gangue minerals: Barite, calcite, feldspar, quartz

Geologic description:

The Rambler vein area crops out on the east side of Lamplugh Glacier in an area underlain principally by granodiorite of Cretaceous age that encloses subordinate inclusions of metasedimentary rock. The granodiorite is cut by mafic dikes of northeast strike (MacKevett and others, 1971, p. 64). A major fault of north-northwest strike underlies and determines the linear course of Lamplugh Glacier (Brew and others, 1978); motion on that fault could have been important in opening the Rambler and nearby veins of northeast to east strike. As mapped by Rossman (1959, B 1058-B, pl. 4), the Rambler is in a vein swarm. The Rambler vein, of nearly east strike, is as much as 3-feet thick; most other veins strike about N. 60 E., pinch and swell characteristically and are traceable for 200-feet or less. The Rambler vein is pyritic; other veins, exposed or as float, contain arsenopyrite, galena, sphalerite, and sparse free gold. Of seven samples collected in the area and reported in MacKevett and others (1971, table 11), all except one contained at least 0.015 oz/ton gold. Maximum assay was 0.263 ounce per ton gold. Sampling by the Bureau of Mines (Kimball and others, 1978, p. C231) of short narrow high grade vein segments near Rambler contained as much as 6.45 ounce per ton gold in a narrow (about 0.35 foot) vein segment. Quartz, calcite, barite and feldspars are reported as vein minerals (MacKevett and others, 1971, p. 64).

Alteration:
Narrow alteration envelopes reported by MacKevitt and others (1971).

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: No

Site Status: Inactive

Workings/exploration:
The initial discovery was made by Joe Ibach before 1940. Four claims were located in 1936.

Production notes:

Reserves:
No reserves; several veins in swarm may have potential.

Additional comments:
The area is often snow covered. It has potential for further discovery. The Rambler vein area is in Glacier Bay National Park and Preserve.

References:
Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Highland Chief; Joe's Dream

Site type: Prospect

ARDF no.: MF030

Latitude: 58.8395 **Quadrangle:** MF D-3

Longitude: 136.8480

Location description and accuracy:

The Highland Chief prospect area is about 2.1 miles southeast of Mt. Parker at an elevation of about 2700 feet. The coordinate location is of the main and northernmost series of veins that can be traced southeasterly for about 2000 feet. The prospect is in a gully that drains into Reid Glacier. In some years the prospect remains snow-covered. It is location number 24 of Cobb (1972). The location is accurate within 0.1 mile.

Commodities:

Main: Au

Other: Ag, Pb, Zn

Ore minerals: Arsenopyrite, galena, gold (native), sphalerite

Gangue minerals: Calcite, quartz.

Geologic description:

The Highland Chief vein area is near the west contact of the same cataclastic-pendant zone that is the host of the LeRoy mine (MF022). Some veins are in the granodiorite of Cretaceous age; others are in amphibolite, graphitic schist, marble, and strongly sheared schistose granodiorite of the pendant (Rossman, 1959, B 1058-B, pl. 4; Kimball and others, 1978, fig. C52) . The vein system is adjacent to and may be part of a north-northwest fault zone that projects under a local glacier and extensive snow field to the main (east) fork of Ptarmigan Creek.

The area contains a complex series of quartz veins of north to north-northwest strike. Maximum thickness of veins is reported to be 6 feet. Rossman (1959, p. 54) thought the veins were thicker and more continuous than those closer to Reid Inlet. He also found widespread visible free gold in the veins of the area.

Studies of the area have been handicapped by extensive snow cover. In August 1976, the Bureau of Mines found better than usual exposures and were able to map and sample a large part of the area. The Bureau found a maximum gold content of 3. 49 ounces of gold per ton, along with 1.25 ounces of silver per ton, 2700 ppm lead, 980 ppm zinc, and greater than 1 percent arsenic. Of a total of 40 samples (Kimball and others, 1978, fig. C52, table C43), thirteen contained more than 0.1 ounce per ton gold.

Alteration:

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: No

Site Status: Inactive

Workings/exploration:
The area was discovered by Joe Ibach, probably in 1936. In 1937, the claims were leased by Newmont Mining Co. and explored for several months. 'The company gave up its lease after it was decided that the veins were too inaccessible to permit possible mining'--Rossman (1959, p. 38).
In August of 1976 and October of 1977 the area was nearly snow free, and was mapped and sampled by the Bureau of Mines (Kimball and others, 1978, fig. C52, table C43, and p. C222-230). Although the original and largest vein may not have been recovered, forty samples contained from nil to as much as 3.49 ounces per ton gold. The higher grade samples were of selected narrow veins. The veins also contained arsenic to greater than 1 percent; lead and zinc were commonly anomalous.
In 1976, the area had been restaked as Joe's Dream claims.

Production notes:

Reserves:
No reserves, but probably one of the best prospects in the district.

Additional comments:
Prospects are visible, if at all, only late in season in low snow years. The area probably could be drilled from east side of the vein area, with holes directed west-southwest. The area is in Glacier Bay National Park and Preserve and appears to be inactive.

References:
Reed, 1938; Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978.

Primary reference: Kimball and others, 1978; Rossman, 1959 (B 1058-B)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Galena

Site type: Mine

ARDF no.: MF031

Latitude: 58.853 **Quadrangle:** MF D-3

Longitude: 136.827

Location description and accuracy:
The deposit is at an elevation of about 500 feet on the west shore of Reid Inlet, about 1.5 miles south of the mouth of the Inlet. It is in the NE 1/4, section 12, T. 35 S., R. 51 E., of the Copper River Meridian. The location is accurate within 200 feet. The Galena mine is location 25 of Cobb (1972).

Commodities:

Main: Au

Other: Ag, Pb, Zn

Ore minerals: Galena, gold (native), pyrite, sphalerite

Gangue minerals: Quartz

Geologic description:
The Galena mine is largely covered by surficial deposits, inferred to be mainly lateral moraine from a more extensive Reid Glacier (Rossman, 1959, B 1058-B, pl. 4). It is within the part of the Reid Inlet gold area or district that is underlain by granodiorite of Cretaceous age. The prospect was completely sloughed when MacKevett and others (1971) searched for it. Twenhofel and others (1949) described the Galena deposit as a banded and vuggy quartz vein between 4-18 inches in width that was exposed on strike for 60 feet. The vein contained pyrite, sphalerite, and galena, and locally native gold.

Alteration:

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

Surface workings only. The vein was discovered and located in 1937 by Joe Ibach. Reed (1938) collected a one-foot sample that assayed 0.16 ounce per ton gold, 0.30 ounce per ton silver and 0.79 percent zinc. About 30 tons of ore reportedly was mined by Ibach and Tom Smith in 1939 (Twenhofel and others, 1949, p. 31). The ore had a value of about $60 per ton (about 1.7 ounces of gold per ton).

Production notes:

Thirty tons of ore--reported by Twenhofel and others (1949) who visited prospect in 1940.

Reserves:

Unknown.

Additional comments:

Typical Reid Inlet-type vein, pods of high grade ore in a quartz vein. Deposit is in Glacier Bay National Park and Preserve.

References:

Reed, 1938; Twenhofel and others, 1949; MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978.

Primary reference: Twenhofel and others, 1949

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Sunrise

Site type: Prospect

ARDF no.: MF032

Latitude: 58.86 **Quadrangle:** MF D-3

Longitude: 136.79

Location description and accuracy:

The Sunrise is on the east side of Reid Inlet about 1 mile south of the mouth of the inlet at an elevation of about 800 feet. The deposit is uncertainly located. Claims were staked by Joe Ibach and Rex Beach in 1937 between the beach to at least 800 feet elevation. Rossman (1959, B 1058-B) reports a vein at about 700 feet elevation possibly traceable for several thousand feet in badly shattered sedimentary rock. The prospect is location number 26 of Cobb (1972).

Commodities:

Main: Au

Other: Ag, W

Ore minerals: Arsenopyrite, chalcopyrite, pyrite, pyrrhotite, scheelite

Gangue minerals: Calcite, quartz

Geologic description:

Country rocks are mainly hornfels and marble of Paleozoic age (Brew and others, 1978). The rocks are cut by mafic (lamprophyric) dikes and small granitic intrusions and are badly broken. Subparallel quartz-calcite veins occur in north-striking, steeply-dipping marble and hornfels.

Veins investigated by the U.S. Geological Survey in 1966 (MacKevett and others, 1971, p. 62-63, loc. H, table 11) were discontinuous, 2-12 inches thick and 20-40 feet long. Quartz veins in the lamprophyre dikes contain pyrite, which is also disseminated in the dike rock. Reed (1938) reported a vein that contained 0.08 ounce per ton gold. Rossman (1959, p. 56) reported scheelite in a quartz vein. Negligible amounts of metals were found by Kimball and others (1978) in their study of the area.

Alteration:

Age of mineralization:

Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface workings; it is uncertain if original claims staked by Ibach-Beach were found by later workers.

Production notes:
Possibly some gold sluiced off weathered outcrops.

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
Reed, 1938; Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1959 (B 1058-B)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Hopalong

Site type: Mine

ARDF no.: MF033

Latitude: 58.85 **Quadrangle:** MF D-3

Longitude: 136.79

Location description and accuracy:
The mine is on the east side of Reid Inlet about two miles south of the mouth at an elevation of about 1350 feet. Location is accurate to about 0.15 mile. It is location number 27 of Cobb (1972).

Commodities:

Main: Au

Other:

Ore minerals: Arsenopyrite, gold (native), pyrite

Gangue minerals: Calcite, muscovite, quartz

Geologic description:
The Hopalong mine is in diorite or quartz diorite of Cretaceous age that contains inliers and irregular masses of hornfels of Paleozoic age (Brew and others, 1978). The granitic rocks are cut by north-striking nearly vertical veins, as much as 1 foot thick, that pinch and swell. Individual veins can be traced for 60 feet and contain quartz, abundant calcite, minor muscovite, pyrite and arsenopyrite.

Surface parts of some of the veins, possibly enriched by surface leaching, contained native gold.

Alteration:

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:
Surface sluicing of weathered veins produced some free gold (Rossman, B 1058-B, p. 56). The Hopalong claims were staked by Joe Ibach in 1943 (Kimball and others, 1978, p. C236).

Production notes:
Minor production of gold from ground sluicing weathered outcrops.

Reserves:
None.

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1959 (B 1058-B)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Unnamed (Russell Island)

Site type: Occurrence

ARDF no.: MF034

Latitude: 58.9414 **Quadrangle:** MF D-3

Longitude: 136.8131

Location description and accuracy:
This site is a small bight on the northeast tip of Russell Island (Kimball and others (1978, figs. C45 and C55). The location is accurate within 0.10 mile. Another vein cropped out 1000 feet west-northwest of located vein. The locality is number 29 of Cobb (1972).

Commodities:

Main: Au

Other: Ag, Pb, W, Zn

Ore minerals: Galena?, gold (native), pyrite, pyrrhotite, scheelite, sphalerite

Gangue minerals: Ankerite, calcite, dolomite, quartz, sericite

Geologic description:
Russell Island is underlain mainly by granodiorite of Cretaceous age (Brew and others, 1978). On the northeastern part of the island, quartz veins as much as about 0.5 feet wide occur in ankeritic (iron-stained) zones as much as 4 feet thick that cut the granodiorite. The main vein occurrence has an estimated length of 280 feet on the island. It strikes N. 15 degrees E. and is nearly vertical. It extends across the small peninsula between shorelines of Glacier Bay at the northeast tip of Russell Island (Kimball and others, 1978, fig. C55). The quartz veins within the ankerite shear zone contain ankerite, pyrite, pyrrhotite, sericite, dolomite, calcite, and traces of scheelite. The pyrite contains native gold particles visible microscopically. Two additional, narrow iron-stained vein zones are 1,000 feet west-northwest of the main vein zone. The Russell Island occurrences appear to represent the approximate northeast limit of the Reid Inlet gold area.

Channel samples of selected veins contained more than 5 ounces per ton gold, and a weighted sample reduced to a 4-foot mining width contained 0.35 ounce per ton gold.

Alteration:
Granodiorite has been altered; alteration products include chlorite, sericite, introduced quartz, and probably ankerite or dolomite.

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposures only. Channel samples of selected quartz veins contain as much as 5.81 ounces per ton gold, 2.64 ounces per ton silver, 890 ppm lead, 550 ppm zinc, and less than 50 ppm tungsten. (Five of fifteen samples from the veins show a trace of tungsten as does one of two samples from the vein occurrence 1000 feet to the west-northwest.) Weighted values for 4-foot mining widths range from 0.02 to 0.35 ounce per ton gold and from 0.02 to 0.17 ounce per ton silver (Kimball and others, 1978, p. C238-241).

The occurrence may have been discovered by the U.S. Geological Survey in 1966; MacKevett and others (1966) reported a narrow quartz vein at the site contained 0.844 ounces of gold per ton.

Production notes:

Reserves:

Additional comments:
Area warrants further exploration; it is within Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Churchill

Site type: Occurrence

ARDF no.: MF035

Latitude: 58.88 **Quadrangle:** MF D-3

Longitude: 136.94

Location description and accuracy:
Occurrence and claims are near the west foot of Lamplugh Glacier. Claim location is uncertain. Data cited by MacKevett and others (1971, p. 56) places the location 2 miles west of Ptarmigan Creek and 1200 feet south of Glacier Bay.

Commodities:

Main: Au?

Other:

Ore minerals: Gold? (native)

Gangue minerals:

Geologic description:
Occurrence is an unconfirmed report of a gold vein in the western part of the Reid Inlet gold area. The reported occurrence is on or very close to a major fault that strikes north-northwest (Brew and others, 1978). The fault separates granitic rock of Cretaceous age (which underlies most of the Reid Inlet gold area), from dominantly Mesozoic rocks west of the fault.

Alteration:

Age of mineralization:
Cretaceous or younger.

Deposit model:

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status:

Site Status:

Workings/exploration:

Claim activity (consisting of claim location by Terry Richtmeyer) was reported in 1966 by Alaska Division Mines and Minerals and was cited by MacKevett and others (1971). The occurrence is apparently the same one shown by Kimball and others (1978, fig. C45) as the Churchill claim.

Production notes:

Reserves:

Additional comments:

The claim is in the westernmost part of the Reid Inlet gold area. The site is in Glacier Bay National Park and Preserve.

References:

MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Nunatak (Muir Inlet)

Site type: Prospect

ARDF no.: MF036

Latitude: 58.990 **Quadrangle:** MF D-1

Longitude: 136.103

Location description and accuracy:

The Nunatak molybdenum deposit is on the east side of upper Muir Inlet, about one mile north of Nunatak Cove. The Cove furnishes a good anchorage for access to the deposit. The deposit trends north to northwest; the coordinates are the approximate center of the outcrop of the deposit. The deposit is mainly on the west flank of the geographic feature named the Nunatak. Mineralization extends from about 1200 feet elevation on the Nunatak northwest to the shoreline.

The deposit is number 43 of Cobb (1972).

Commodities:

Main: Mo

Other: Ag, Au, Cu

Ore minerals: Bornite, chalcopyrite, chrysocolla, enargite, magnetite, malachite, molybdenite, pyrite, pyrrhotite, tetrahedrite

Gangue minerals: Calcite, quartz and various rock and alteration minerals

Geologic description:

The deposit is in the Muir province dominated by volcanic rocks of Silurian and Devonian age and clastic, carbonate, and volcanic rocks of Permian age. Hornfels is widespread in the terrane, especially near foliated granitic rocks of Cretaceous age (Brew and others, 1978, p. B20-21).

At the deposit , calc-hornfels developed in calcic argillite and limestone of probable Paleozoic age is intruded by a quartz granodiorite (rhyodacite) porphyry, generally termed quartz monzonite porphyry (MacKevett and others, 1971, p. 74). The quartz granodiorite is a massive rock composed of phenocrystic oligoclase and lesser quartz, and hornblende in a microcrystalline background of K-feldspar, plagioclase and quartz. The largest body of the granodiorite porphyry is about 1200 feet long by as much as 400 feet across. It is aligned northerly and crops out on the northwest flank of the Nunatak. The deposit and older country rocks are cut by numerous post-mineral dikes of hornblende andesite and dacite porphyry.

The quartz granodiorite porphyry is enveloped by a silicfied zone that grades outward

into tactitic calc-hornfels. The hornfels is succeeded outward by fine-grained 'chert' silica rock (Moerlein, 1968; Kimball and others, 1978, pl. IV, p. C275). Moerlein proposed that these facies were alteration zones or haloes related to the intrusion of the porphyry and mineralization. Previously some of the units had been mapped as primary sedimentary facies (Twenhofel, 1946).

The deposit is mainly composed of quartz-molybdenite stockworks in the silicic and tactitic zones, hornfels, and quartz porphyry. Molybdenite also locally occurs in fault zones, as rosettes on joint and fracture planes in the tactized rock, and as fine-grained disseminations in the porphyry. Chalcopyrite locally occurs with molybdenite but appears to be relatively more abundant outside the main molybdenite zone. Small amonts of enargite and bornite occur locally. Chrysocolla and malachite are developed in partly oxidized facies. Rossman (1963, B 1121-K, p. K49) reported a sample from the northeast side of the Nunatak that contained 0.04 oz/ton gold and 7.07 oz/ton silver. The silver-bearing phase is uncertain, but tetrahedrite has been reported from the property. Possibly gold forms a weak distal halo, as in many other molybdenum deposits. MacKevett and others (1971, p. 75) cite communications from Amex (American Exploration & Mining) indicating the prescence of gold and silver in Amex drill holes (1971, p. 75). Diamond drill holes of the U.S. Bureau of Mines (Sanford and others, 1949) and private exploration companies indicate mineralization extends downward to at least 300 feet below sea level.

The deposit is probably of Tertiary age and is genetically related to the intrusion of a high level quartz granodiorite porphyry. The haloes and pattern of alteration suggest that the intrusive is barely unroofed.

Alteration:

The alteration consists of minor K-feldspar and pyrometasomatic conversion of calc-units to calc-hornfels and skarn. Actinolite is locally developed in the skarn and actinolitic skarns appear to be more favorable for ore The tactitic skarn consists mainly of orthoclase and clinozoisite, with lesser amounts of diopside, garnet, quartz, and plagioclase. Rocks adjacent to the quartz granodiorite porphyry are silicified. Phlogopite, montmorillonite, calcite, and feldspar occur in the altered zones flanking some veins (MacKevett and others, 1971, p. 75).

Age of mineralization:

Tertiary.

Deposit model:

Porphyry molybdenum (Cox and Singer, 1986; model 21b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

21b

Production Status: No

Site Status: Inactive

Workings/exploration:

The area was first mapped by Reed (1938) in 1936, who recognized abundant quartz veins and described hornfels, granitic dikes, and chalcopyrite and copper-iron stained veinlet mineralization. The molybdenum deposit was found in 1941 by prospectors John Johnson and Tom Smith. It was studied jointly by the U.S. Geological Survey and Bureau of Mines in 1942 (Twenhofel, 1946; Sanford and others, 1949). The first two core holes were drilled by the Bureau of Mines in 1943 (Sanford and others, 1949). The first studies recognized and concentrated on relatively rich veins or lodes within the deposit. The area was relocated by James Walper in 1964. Amex drilled three diamond core holes in 1966. In 1968, the area was remapped by consultant George M. Moerlein (1968) for Superior Oil Company. Superior drilled seven core holes with a total footage of 5,430 feet. Maximum drill hole depth of any hole was 892 feet.

Limited surface mapping and sampling, including a geochemical soil survey, was carried out by MacKevett and others, 1971 (plates 11 and 12 and p. 74-78). The area was visited and studied briefly by the U.S. Bureau of Mines in 1975 and 1977 (Kimball and others, 1978, p. C274-295).

Production notes:

No production.

Reserves:

Approximately 145 millon tons of mineralized rock configured for surface mining and containing from 0.04 to 0.06 percent molybdenum and 0.02 percent copper exist at the Nunatak deposit. There is an inferred 9.1 million tons at or below sealevel near Muir Inlet with grades up to about 0.06 percent molybdenum and 0.02 percent Cu. The total figure (145 million tons) represents the combination of the Bureau of Mines area #1 with conspicuous molybdenite and area #2 with inconspicuous molybdenite. Rock with more molybdenum was found in the Amex No. 2 and Muir Nos. 1 & 2 drill holes. These holes indicate a discontinuous halo around the quartz granodiorite porphyry stock from 50 to 160 feet wide that grades from 0.11 to 0.143 percent molybdenum (Kimball and others, 1978, table C-53).

Additional comments:

The site is in Glacier Bay National Park and Preserve.

References:

Reed, 1938; Twenhofel, 1946; Sanford and others, 1949; Rossman, 1963 (B 1121-K); Moerlein, 1968; MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978; Brew and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/04/99

Site name(s): Unnamed (Bruce Hills)

Site type: Prospect

ARDF no.: MF037

Latitude: 58.983 **Quadrangle:** MF D-2

Longitude: 136.341

Location description and accuracy:

The deposit is in the Bruce Hills between Wachusett Inlet and Burroughs Glacier. It occupies parts of sections 23, 24, 25, and 26, T. 33 S., R. 54 E., of the Copper River Meridian. The location given is the approximate midpoint of the outcrop of the deposit on the ridge between the inlet and glacier, at an elevation of about 2300 feet. The deposit is mainly in the Mt. Fairweather D-2 quadrangle but it extends easterly into the D-1 quadranagle.

The deposit includes two occurrences investigated in detail by the U.S. Bureau of Mines (Kimball and others, 1978, figs. C62 & 63).

Commodities:

Main: Cu, Mo

Other: Ag, Pb, Zn

Ore minerals: Chalcopyrite, galena, hematite, malachite, molybdenite, molybdite, pyrrhotite, sphalerite

Gangue minerals: Chlorite, K-feldspar, limonite, montmorillonite, quartz

Geologic description:

The deposit is in foliated granodiorite that is part of a batholithic mass that underlies much of the northeast part of the National Park. The intrusion, of Cretaceous age, has invaded a shale-carbonate sequence of Paleozoic age now mainly converted to marble and schist (Brew and others, 1978).The deposit is about two miles west of the main batholithic contact. Occasional masses of hornfels (roof pendants?) included in the granitic rock suggest that the deposit could lie fairly close to the roof of the intrusion. A strong fault which strikes about N. 30-40 E. seems to form the southeast limit of the deposit. (MacKevett and others, 1971, fig. 10). Andesite dikes that strike east-northeast cut through the deposit.

The main ore minerals, chalcopyrite and molybdenite, occur in quartz and quartz-feldspar veinlets, as disseminations and as fracture coatings. Galena, pyrrhotite, and sphalerite occur locally. Locally the sulfide minerals have been oxidized to secondary malachite, molybdite, and limonite. The deposit is in heavily iron-stained granodiorite.

The deposit appears to be low grade, on an average, but has the potential for the occurrence of substantial local zones of higher grade. The average grade is about 0.05 percent copper and less than 100 ppm molybdenum. Parts of the deposit, however, contain about 2000 ppm copper and 200 ppm molybdenum, and selected veins contain as much as 3400 ppm copper and 1000 ppm molybdenum. The area is partly soil covered.

Alteration:

K-feldspar occurs as a secondary mineral in and near quartz veins, and the host granodiorite is anomalously rich in K-feldspar, particularly south and east of the deposit (Kimball and others, 1978, p. C306). Feldspathization was noted elsewhere in the area. Montmorillonite is developed locally. The deposit itself is propylitically altered, with chlorite replacing primary mafic minerals.

Age of mineralization:

Tertiary.

Deposit model:

Porphyry copper-molybdenum similar to porphyry copper (Cox and Singer, 1986; model 17).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

17

Production Status: No

Site Status: Inactive

Workings/exploration:

The occurrence of copper and molybdenum in the Bruce Hills was first reported by Rossman (1963, B 1121-K). Seven claims were staked in 1967 and the deposit was blanketed by 55 claims located in 1969. At the time of the U.S. Bureau of Mines investigation in 1977 (Kimball and others, 1978, p. C297) all claims were inactive. Mineralization is exposed on the surface and possibly in shallow hand-dug trenches. The average grade of the deposit is about 0.05 percent copper and 75 ppm molybdenum. An exposure at about 1750 to 1950 on the northeast side of the deposit, possibly the one originally noted by Moerlein (1971), appears to be somewhat richer. Samples collected along a northeast line about 330 feet long averaged 0.17 percent copper and 0.026 percent molybdenum (Kimball and others, 1978, p. C300-305). The values are close to Moerlein's estimate of 0.2 percent copper and 0.017 percent molybdenum. The U.S. Geological Survey sampled the southwest part of the deposit because, at the time of their investigation, the ridge and north areas were snow covered; maximum values reported were 3000 ppm copper and 1000 ppm molybdenum (MacKevett and others, 1971, p. 48-50). The USGS also conducted a soil survey.

Both USGS and USBM investigators report higher-grade type samples with values to 4000 ppm Cu and 2000 ppm molybdenum.

Production notes:

Reserves:

A resource exists in the mid 0.0X percent range for copper and low 0.0X range for molybdenum; local zones are of higher grade.

Additional comments:

The Bruce Hills prospect is about 8.5 miles west of the Nunatak molybdenum deposit (MF036) and only about 2 miles north of the Wachusetts copper-molybdenum vein (MF060).

The site is in Glacier Bay National Park and Preserve.

References:

Rossman, 1963 (B 1121-K); MacKevett and others, 1971; Moerlein, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Orange Point Deposit

Site type: Prospects

ARDF no.: MF038

Latitude: 58.9229 **Quadrangle:** MF D-3

Longitude: 136.9992

Location description and accuracy:

The Orange Point deposit is on a south-facing point on the north side of Johns Hopkins Inlet in section 13, T. 34 S., R. 50 E., of the Copper River Meridian. The main mineral occurrence is about 290 feet above sealevel on Hill No. 2 (Kimball and others, 1978, fig. C36), and this is the location of the coordinates given. Mineralization on Hill No. 3 is at about 490 feet elevation; it probably extends into the Mount Fairweather D-4 quadrangle. Discontinuous sulfide layers also occur on Hill No. 1 at an elevation of about 120 feet above the Inlet.

The location of the main deposit at Hill No. 2 is accurate to within about 100 feet. The Orange Point deposit location is essentially that of number 64 of MacKevett and others (1971) and number 11 of Cobb (1972).

Commodities:

Main: Ag, Au, Cu, Zn

Other: Pb

Ore minerals: Chalcopyrite, galena, pyrite, pyrrhotite, sphalerite

Gangue minerals:

Geologic description:

The deposit is a semicondordant disseminated and massive sulfide deposit contained in a mixed volcanic-sedimentary rock package of Permian and Permian (?) age (Brew and others, 1978). The volcanic units include greenstone and meta-andesite and basalt. The strata strike north-northwest and dip steeply, with stratigraphic top to the east (Kimball and others, 1978, p. C132). A sill-like diorite intrusion of Cretaceous age, semi-concordant to the Permian package, crops out about 400 feet west of the deposit. Igneous dikes locally parallel, but also cut across the deposit..

The deposit consists of disseminated and massive sulfide zones approximately concordant to the metavolcanic-volcaniclastic layers. Disseminated sulfide zones in andesitic strata appear to grade into massive sulfide layers. On Hill No. 2, a zone 80 feet across, that contains both massive and disseminated sulfides, is interrupted by an east-striking fault but can be followed on strike for about 500 feet.

Resources have been estimated for a 400-foot long zone. The maximum grades are about 19 percent zinc, 5. 2 percent copper, 2 ounces per ton of silver and 0.1 ounce per ton gold. The average composition of the best zone is 5.2 percent zinc, 2.7 percent copper, 1 ounce per ton silver and 0.03 ounce per ton gold.

The origin of the deposit is uncertain. Kimball and others (1978), based on detailed work done by Mary Ann Parke, argued for a volcanogenic (syngenetic) origin. Bases of the argument were mainly concordancy, copper concentrated near the stratigraphic base of the deposit, and trace elements--both present in and absent from in the deposit. The apparent absence of arsenic, antimony, bismuth, tin, and tungsten was a criterion cited for a volcanigenic origin. The common presence of molybdenum, cadmium, and relative enrichment in barium were also thought to favor the syngenetic hypothesis.

The gradation between disseminated and massive sulfides, local discordancy, and relatively coarse size of sulfides--and the regional setting--in a mixed intrusive-metamorphic series with widespread weak epigenetic mineralization--argues for a replacement origin. Absence of certain components, such as arsenic and bismuth, could be a function of relatively high analytical detection limits rather than real absence.

Alteration:

Country rocks are extensively sulfidized between the diorite and the occurrence. Sericite, epidote, and actinolite also occur as possible alteration products in metavolcanic rocks.

Age of mineralization:

Permo-Triassic or Cretaceous.

Deposit model:

The choice is either epigenetic skarn or syngenetic volcanogenic massive sulfide, that is polymetallic replacement or Besshi massive sulfide (Cox and Singer, 1986; model 19a or 24b). The compiler favors an epigenetic origin (also see Additional comments).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

19a or 24b

Production Status: No

Site Status: Inactive

Workings/exploration:

There are no workings. Mineralization in the area was first reported by Reed (1938). MacKevett and others (1971) found copper in excess of one percent at or near the site in 1966. The massive sulfide mineralization was discovered in 1976 by a field party of the U.S. Bureau of Mines, who then began detailed mapping and surface sampling of area (Kimball and others, 1978).

Production notes:

Reserves:

The tonnage of the main deposit at Hill No. 2 body has been estimated at 800,000 tons on assumptions of average width of 65 feet, length of 400 feet, depth of 300 feet and average density of 9.5 cubic feet per ton. The richest part of this resource consists of about 270,000 tons having an estimated average grade of 2.7 percent copper, 5.2 percent zinc, and byproduct gold and silver.

The approximate size of the resource of the Hill No. 3 zone is estimated at about 160,000 tons based on an assumed volume of 560 x 280 x 10 feet and a tonnage factor of 10. The No. 3 zone contains approximately 1.6 percent copper and 0.4 percent zinc.

Additional comments:

A strong case for a syngenetic volcanogenic origin was made by Kimball and others (1978, p. 129-147), with considerable input from Mary Ann Parke (Kimball and others, 1978, p. 129-147) based on the concordant or nearly concordant nature of the deposit, and its occurrence in a mixed marine volcanic-sedimentary package. The authors also emphasized the absence of trace elements arsenic, antimony, bismith, tin and tungsten. An alternative origin as a polymetallic igneous-affiliated epigenetic replacement deposit is the irregular and poddy character of the deposit and lack of good stratigraphic definition. Furthermore, the limits used in analysis are not sufficiently low to prove that arsenic, antimony, and bismuth are absent, and tungsten and tin content arguably are appropriate to distinguish between volcanogenic and replacement deposits. Molybdenum is widespread in the area and probably also is not diagnostic either way.

As presently defined, the deposit is subeconomic because of its small size and because recovery of copper and zinc would require a complex flow sheet not justified by the small size of the deposit. The deposit is worth drilling and more geologic study; it is within a belt that could contain other massive sulfide deposits as well as porphyry-type copper-molybdenum deposits, as at Margerie Glacier, which is only a few miles north of Orange Point in the Skagway quadrangle.

The deposit is in Glacier Bay National Park and Preserve and is inactive.

References:

Reed, 1938; MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978; Cobb, 1981 (OFR 81-249A); Cobb, 1981 (OFR 81-249B); Cox and Singer, 1986.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Unnamed (Johns Hopkins Inlet)

Site type: Occurrence

ARDF no.: MF039

Latitude: 58.900 **Quadrangle:** MF D-3

Longitude: 136.993

Location description and accuracy:

The occurrence is on a north-facing point into Johns Hopkins Inlet, almost due south of Orange Point; it is in section 24, T. 34 S., R. 50 E., of the Copper River Meridian. The location is accurate to within 0.25 mile. The location is approximately the same as number 65 of MacKevett and others (1971), number 15 of Cobb (1972) and number 29 of Kimball and others (1978).

Commodities:

Main: Cu

Other: Ag, Au, Co, Mo

Ore minerals: Chalcopyrite, chrysocolla, limonite, malachite, molybdenite

Gangue minerals:

Geologic description:

Argillite, phyllite, and slate of Permian and Permian (?) age are cut by a small foliated granite pluton of Cretaceous age (Brew and others, 1978, plate IA). Kimball and others (1978, p.C149, fig. C38) reported volcanic rock, chert, and sulfides. MacKevett and others (1971, table 9, p. 52) reported a 100- to 200-foot wide altered zone in granitic rocks which extended several hundred feet on strike: fracture surfaces were stained with malachite, chrysocolla, and limonite.

A grab sample collected by the U.S. Geological Survey contained 1500 ppm copper and 30 ppm molybdenum. Float samples collected by the U.S. Bureau of Mines (Kimball and others, 1978) contained as much as 4,600 ppm copper, 7 ppm silver, and 0.05 ppm gold. A rock sample collected by the Bureau contained more than 2000 ppm molybdenum and 610 ppm copper.

Alteration:

Age of mineralization:

Cretaceous (?).

Deposit model:
Mineralized shear zone; possible volcanogenic mineralization.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no mine workings. A grab sample representative of a shear zone in granitic rock contained 1500 ppm copper and 30 ppm molybdenum (MacKevett and others, 1978, sample 65, table 9). The U.S. Bureau of Mines (Kimball and others, 1978) collected float samples at about 150 feet elevation, in an area underlain by hornfels, that contained 4600 ppm copper, 300 ppm cobalt, 7 ppm silver, and 0.05 gold (p. C-172). A selected sample of a veinlet in hornfels at about 300 feet elevation contained greater then 2000 ppm molybdenum and 610 ppm copper.

Production notes:

Reserves:

Additional comments:
The area has numerous iron-stained areas, contact zones, and has widespread weak geochemical anomalies in copper and molybdenum. Favorable area for contact or intrusive-related shear zone-type deposits. The area is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978; Cobb, 1981 (OFR 81-249A); Cobb, 1981 (OFR 81-249B);

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Unnamed (Gulf of Alaska coast)

Site type: Mines

ARDF no.: MF040

Latitude: 58.61 **Quadrangle:** MF C-5

Longitude: 137.66

Location description and accuracy:

Beach placers, related inland buried beaches, and probably related offshore marine deposits extend from the north edge of land on the Mt. Fairweather quadrangle at 59.000 and 138.164 southeasterly for about 64 miles to 58.383 and 136.889 at the head of Astrolabe Bay. The placers are interrupted by occasional inlets, especially Lituya Bay, a few bold headlands and by La Perouse glacier, but they are remarkably continuous.

The coordinates for this site are for Harbor Point on the southeast side of the entrance to Lituya Bay--the approximate center of the beach placer deposits on the Mt. Fairweather 1:250,000 quadrangle. Two individual placer deposits, immediately northwest and southeast of Lituya Bay (respectively MF041 and MF 042), are also described separately.

The deposits extend southeasterly from the Mt. Fairweather C-5 quadrangle into the B-4 and B-3 quadrangles, the latter point at the head of Astolobe Bay. They extend northwesterly into the C-6, D-6, and D-7 quadrangles, thence into the Yakutat 1:250,000 quadrangle.

The presence of extensive placers in the Mt. Fairweather quadrangle was noted by MacKevett and others, 1971, p. 83, pl. 1, locations 87 and 88, also by Cobb, 1972 (MF-436), and by Kimball and others, 1978.

Commodities:

Main: Au, Fe, PGE, Ti

Other: Cr, Zr

Ore minerals: Gold (native), ilmenite, magnetite, PGE, rutile, zircon

Gangue minerals: Garnet

Geologic description:

A series of beach placer deposits extends for about 64 miles from the north edge of the Mt. Fairweather quadrangle south to the head of Astrolobe Bay on the Mt. Fairweather B-3 quadrangle (Rossman, 1957; Rossman, 1963, B 1121-F, p. F45-47; Kimball and others, 1978, p. C28-C91). Related deposits formed at higher sea stands extend inland, in places for more than one mile. Economic production from the beaches has been limited to transient deposits rich in gold that form lenses and layers as much as 1-foot thick, especially

after heavy spring and winter storms. More common economic heavy minerals, such as ilmenite, magnetite, and zircon, are enriched in layers up to several feet thick, that locally extend along the beach for miles and in widths of several hundred feet. Similar deposits are locally preserved in back beaches.

The ultimate source of heavy minerals, particularly ilmenite, magnetite, PGEs and some of the gold is in the layered mafic complexes of the Fairweather Range. Gold and other resistant minerals as zircon were also derived from other bedrock sources. Littoral processes winnowed out light minerals and left layers and lenses of black and ruby sands that contain most of the valuable dense minerals. The deposits are products of a dynamic, high-energy coastal environment--essentially single cycle (Foley and others, 1995).

The beaches range in sedimentary character from well-sorted sandy to gravelly sand to sandy cobble and sandy boulder. Dunes cover some ancient beaches in the back beach area, and forested terraces mark the location of beaches that either formed at higher sea-stands or were uplifted tectonically (Yehle, 1979).

The beach deposits were exploited on a small scale from at least as early as 1894 until World War II, with lesser activity since then.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Modern and fossil beach placers.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: Yes; small

Site Status: Probably inactive

Workings/exploration:
The beaches in the Mt. Fairweather quadrangle were probably first exploited by the Russians. The most extensive American mining occurred from about 1894 to 1917 (Mertie, 1933), but small scale mining took place almost continuously until World War II. Essentially continuous small-scale mining is documented in the annual resource reports prepared by the U.S. Geological Survey, including the 1904, 1918, 1919, 1922, 1923, and 1925 reports of Brooks, also the resource reports of Brooks and Martin in 1921 and Brooks and Capps in 1924. Brook's successor, P. S. Smith documented acctivity in 1926, 1934, including B 857-A, also 1936, 1937, 1938, 1939--B 910A, and 1941 and 1942. Much of the mining was by small scale methods, but from 1901 to 1903 Lituya Bay Gold Mining Co. used hydraulic lifts that fed sluice boxes, the process water was brought down down to the beach in timbered flumes (Wright and Wright, 1907). There was some claim activity in the 1960s, and Kimball and others (1978) reported 136 twenty-acre placer claims still active in 1978 .

The area has also been explored by the USGS and USBM. In 1952, Rossman (1957)

examined the area between Sea Otter Creek and Dixon Harbor. Miller (1961) reported on the geology of Lituya district, after earlier reporting on the Tertiary rocks that are a possible intermediate source of the placer materials (Miller, 1953). Thomas and Berryhill (1962) sampled beaches between Sea Otter Creek and Icy Point in 1957 and 1958. Kimball and others (1987) studied the entire area between 1975-1977. Because of budget and permitting limits, only the modern beaches were studied, but 26 sample lines at 20 localities and 241 holes were drilled over the approximate 64 mile length of the deposits, in addition to collecting surface channel and grab samples. The core samples were collected with small diameter (0.17 to 0.25 foot) augers or split tubes. Swell factor was measured in the field. The samples were processed following a standard flow sheet, that included size splitting at 20 mesh. The minus-20-mesh fraction was stripped with a hand magnet to separate magnetite, then further separated by electromagnetic and heavy liquid methods. In the coarser fraction gold was determined by fire assay of a panned concentrate (Kimball and others, 1978, p. C49-53). The sample size was recognized as too small to give reliable average gold contents. Ilmenite was determined accurately. In 1992 and 1993, the Bureau again sampled the area. This work by Foley and others (1995) concentrated on 'valuable heavy minerals'--defined as ilmenite + rutile + zircon--but obtained data on other heavy minerals including gold and PGEs. Earlier, the content of PGEs reported from beach and other deposits in the province were summarized by Foley and others (1989).

Production notes:

Mertie (1933) estimated that about 4000 ounces of gold were produced between 1890 and 1917. Probably at least 1000 more ounces were produced between 1917 and World War II when there was small-scale placer activity almost every year. Total PGE production has been about 100 ounces or less.

Reserves:

Kimball and others, 1978 (p. C86-89) estimated 6 million cubic yards of material in resource blocks scattered along the 64-mile length of the placer field. The material had an average grade of 1 percent ilmenite and less than 2 cents per cubic-yard of gold, assuming a gold price of $300/ounce.

Extrapolating to the unsampled areas outside the blocks suggested a resource of 90 million cubic yards of material in the belt, with grades similar to those determined by Kimball and associates. Locally some beaches are appreciably richer.

Foley and others (1995) determined an average of 2.43 percent ilmenite and 0.01 percent rutile in their Fairweather samples (p. 2). Zircon is less abundant in the Fairweather than the Yakutat and Yakataga areas (p. 48).

A sample collected east of Icy Point near the mouth of Kaknau River contained 14.88 percent titanium in the spiral concentrates. Sample 310, collected northwest of LaPerouse Glacier, contained significant gold in the head and spiral concentrate samples.

Additional comments:

The ilmenite from the beach placers is a high-iron type that needs special processing (Foley and others, 1995). Much of the gold is very fine-grained and difficult to recover. Cook (1969) studied the recovery of the very fine gold of the beach placers by less con-

ventional methods, including flotation.

The beach placers in the Fairweather area are part of the extensive Pacific Coast heavy-mineral placer system recognized by Clifton and Luepke (1987). The entire beach placer resource centered on Lituya Bay in the Mt. Fairweather quadrangle is in Glacier Bay National Park and Preserve. The Park extends offshore to about 3 miles northerly to about Sea Otter Creek; north of that point, offshore lands out to the three-mile limit belong to the State of Alaska.

References:

Wright and Wright, 1907; Brooks, 1904; Brooks, 1918; Brooks, 1919; Brooks and Martin, 1921; Brooks, 1922; Brooks, 1923; Brooks and Capps, 1924; Brooks, 1925; Smith, 1926; Mertie, 1933; Smith, 1934 (B 857-A); Smith, 1934 (B 864-A); Smith, 1936; Smith, 1937; Smith, 1938; Smith, 1939 (B 910-A); Smith, 1939 (B 917-A); Smith, 1941; Smith, 1942; Kennedy and Walton, 1946; Miller, 1953; Rossman, 1957; Miller, 1961; Thomas and Berryhill, 1962; Rossman, 1963 (B 1121-F); Berg and Cobb, 1967; Cook, 1969; MacKevett and others, 1971; Cobb, 1973; Kimball and others, 1978; Yehle, 1979; Clifton and Luepke, 1987; Foley and others, 1989; Foley and others, 1995.

Primary reference: Kimball and others, 1978; Thomas and Berryhill, 1962; Foley and others, 1995

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/04/99

Site name(s): Lituya Bay Gold Mining Co.

Site type: Mine

ARDF no.: MF041

Latitude: 58.707 **Quadrangle:** MF C-6

Longitude: 137.760

Location description and accuracy:

The beach placer extends for about 17 miles from Cape Fairweather southeasterly to La Chausee Spit at the north side of the mouth of Lituya Bay. Coordinates are the approximate mid-point of the placer deposit. The location is essentially that of figure C5 of Kimball and others (1978) which includes their blocks 2, 3, and 4 and sample lines 3-12. The northwest part of the placer deposit is in the Mt. Fairweather D-6 quadrangle.

Commodities:

Main: Au, Fe, Ti

Other: PGE

Ore minerals: Gold (native), ilmenite, magnetite, PGE, rutile, zircon

Gangue minerals: Garnet

Geologic description:

The beach, and related older upland placer deposits that were produced at higher sea stands, occur as layers and lenses of heavy minerals concentrated as lighter materials are washed away by alluvial and littoral processes. On the modern beach valuable transient deposits are formed, especially during heavy spring storms.

The economically valuable minerals occur in ruby and black sands that , respectively, are rich in garnet and in magnetite or ilmenite. The heavy sands also contain epidote, olivine, pyroxene, sphene and staurolite as well as remnant amounts of quartz, feldspar, and light rock fragments. Some of the richest deposits exploited in the early years of the Twentieth century were near Eagle and Echo Creeks. Wright and Wright (1907, p. 64-65) proposed that these creeks brought down weakly metalliferous sediments that were further concentrated by surf action into transient valuable heavy sand deposits. Other deposits probably form by reworking of glacial outwash and gravels brought down from the Fairweather Range and adjacent hard bed hills.

Some platinum has been reported (Mertie, 1918, p. 23). PGEs and ilmenite and magnetite have their ultimate source in deposits associated with the layerered gabbro intrusions of the Fairweather Range.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Beach placer and related upland buried placers; possibly offshore deposits.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: Yes

Site Status: Undetermined

Workings/exploration:
The area was first mined by Americans in about 1886 (Brooks, 1918, p. 41). About $15,000 worth of gold was mined in 1891 (Wright and Wright, 1907, p. 64-65). In 1901, Lituya Bay Gold Mining Company tried to establish large-scale placer operations near the mouths of Eagle and Echo Creeks, but were unsuccessful because of the limited size of the pay streaks and difficulties in moving equipment and hydraulic systems (Wright and Wright, 1907, p. 64-65). Nonetheless, the area was mined on a small scale amost continuously from 1891 until World War II.

In addition to the reports cited above, yearly resource reports by the U.S. Geological Survey indicate nearly continuous small scale mining. These reports include Brooks (1919, 1922, 1923, and 1925), Brooks and Martin (1921), Brooks and Capps (1924), Martin (1920) and Mertie (1933). P. S. Smith reported activity in the reports issued in 1934, 1936, 1937, 1938, two reports in 1939, 1941 and 1942. There was a lesser amount of gold activity after World War II, but claims were probably maintained. Summary reports include those by Cobb in 1972 (MF-436 and OFR-508), Berg and Cobb in 1967, and Cobb in 1973. More recent work has concentrated on valuable industrial minerals, notably ilmenite. Extensive sampling programs for the U.S. Bureau of Mines were undertaken by Thomas and Berryhill (1962), Kimball and others (1978, figure C5 and C11 to C18, tables C8 to C12), and Foley and others, (1995, fig. 17). Rossman (1957) and MacKevett and others (1971) studied the area for the U.S. Geological Survey.

Production notes:
Production in 1891 $15,000 was reported by Wright and Wright (1907), who also noted 'In later years even higher returns are said to have been maintained, but no authentic statements could be obtained..' Mertie (1933) proposed that about 4000 ounces of gold had been produced between 1890 and 1917.

Reserves:
Kimball and others (1978, table C23) calculated about 2,732,000 cubic yards of material from sample lines 3-12 and blocks 2-3. The largest resource, however, 1,809,000 cubic yards, contains less than 1 percent of ilmenite and only about .0003 ounce/cubic yard in gold. Small blocks totaling about 43,000 cubic yards near Eagle and Echo Creeks con-

tain about 2.5 percent ilmenite and average as much as 0.0008 ounce per cubic yard gold.

Foley and others (1995) reported 0.564 ppm gold and 4.09 percent ilmenite in a spiral concentrate split of sample 301.

Additional comments:

The beach placers are in Glacier Bay National Park and Preserve. Claims could still exist, but probably the site is inactive.

The recovery of the very fine-grained gold of the Lituya area by flotation and non-traditional gravity methods has been studied by Cook (1969). The beach system is part of a very extensive system of heavy-mineral beaches along the west coast of North America (Clifton and Luepke, 1987).

References:

Wright and Wright ,1907; Brooks, 1918; Brooks, 1919; Martin, 1920; Brooks and Martin, 1921; Brooks, 1922; Brooks, 1923; Brooks and Capps, 1924; Brooks, 1925; Mertie, 1933; Smith, 1934 (B 857-A); Smith, 1934 (B 864-A); Smith, 1936; Smith, 1937; Smith, 1938; Smith, 1939 (B 910-A); Smith, 1939 (B 917-A); Smith, 1941; Smith, 1942; Rossman, 1957; Thomas and Berryhill, 1962; Rossman, 1963 (B 1121-F); Berg and Cobb, 1967; Cook, 1969; MacKevett and others, 1971; Cobb, 1972 (OFR-508); Cobb, 1972 (MF-436); Cobb, 1973 (B 1374); Kimball and others, 1978; Clifton and Luepke, 1987; Foley and others, 1995.

Primary reference: Kimball and others, 1978; Foley and others, 1995

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Unnamed (Gulf of Alaska coast: Includes Topsy Creek, Dagelet River, and Oregon King Consolidated claims)

Site type: Mines

ARDF no.: MF042

Latitude: 58.54 **Quadrangle:** MF C-5

Longitude: 137.45

Location description and accuracy:

The deposit is a beach placer that extends southeasterly for about 13.5 miles, from 2.5 miles southeast of Harbor Point, at the south side of the mouth of Lituya Bay, to the northwest foot of LaPerouse Glacier. The approximate coordinates of the northwest limit are 58.60 and 137. 59. The southeast limit in the Mt. Fairweather B-4 quadrangle is approximately at 58.48 and 137.31. The coordinates for this site are for the approximate mid-point of the placer which is 2.25 miles southeast of the mouth of Topsy Creek, reported to be its most productive area.

The site includes location numbers 66 and 67 of Cobb (1972, MF-436). Location 67 was reported as the Oregon King Consolidated placer by MacKevett and others (1971, p. 67-68); it is the part of the placer immediately northwest of LaPerouse Glacier.

Commodities:

Main: Au, Fe, Ti

Other: Cr?, PGE, Zr

Ore minerals: Gold (native), ilmenite, magnetite, PGE, rutile, zircon

Gangue minerals: Garnet and other dense common rock minerals

Geologic description:

A nearly continuous beach placer is exposed for about 13.5 miles northward from LaPerouse Glacier to the headland south of Harbor Point. Associated fossil beach placers occur on an approximate an 1/2-mile wide plain northeast of the beach placers. The modern beaches were produced by winnowing of deposits brought down by LaPerouse Glacier and the Crillon River. The glacier and river tap the Crillon-LaPerouse and related layered mafic complexes, which are the ultimate source of much of the titanium, iron, and PGEs contained in the placer deposits. Some gold may have been brought down from the hydrothermally altered zones at the head of Topsy Creek reported by Rossman (1959); these zones appear to be the continuation of the auriferous hydrothermal areas in Fall Creek in Lituya Bay (MF043).

Economic deposits of gold are thin, lenticular transient deposits related to storm con-

centration of the heavy sands. Deposits of ilmenite, magnetite, and small amounts of rutile and zircon occur in substantially thicker deposits, which have been sampled in several studies conducted by the Bureau of Mines and by Rossman (1957) of the Geological Survey. (Related deposits are described in MF040 and MF041.)

Kimball and others (1978, p. C72-73) reported a maximum of 1.9 percent ilmenite and a trace of gold in samples contained on line 15. This location is at the mouth of Topsy Creek. At line 16, which corresponds closely to the mid-point coordinates of the placer deposit , as much as 15.2 percent ilmenite was found in a tube sample, and 30.3 percent ilmenite in a grab sample. Maximum gold content at line 16 in a tube sample was 0.0009 ounce per cubic yard. At the Bureau's line 17 near the mouth of the Dagelet River (p. C74-75) as much as 3 percent ilmenite was found in a channel sample and as much as 11.5 percent in a tube sample. Gold was found in a grab sample (0.0043 ounce of gold per cubic yard). Trace amounts of gold and as much as 1.7 percent ilmenite were found in line 18, one mile northwest of LaPerouse Glacier.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer: Modern beach, active beach, back beach; marine terrace and possibly fluvial.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: Yes; small

Site Status: Probably inactive

Workings/exploration:

Surface workings: Sluice box, rockers, long toms on mostly transient deposits. Workings date back to at least 1894 (Mertie, 1933). Probably, small-scale activity continued every year until World War II, as documented in Annual resource reports by Brooks, Smith, Mertie, and a few others.

Government investigations include those by Rossman in 1952 (Rossman, 1957), Thomas and Berryhill (1962), Kimball and others (1978), and Foley and others (1995). Thomas and Berryhill (1962) found relatively good values of titania in the beaches south of Lituya; one sample (no. 123) collected below a northern outlier of LaPerouse Glacier contained 89.5 pounds/cubic yard of titania.

The most extensive and detailed investigations were conducted from 1975 to 1977 by the U.S. Bureau of Mines (Kimball and others, 1978). In those investigations, sample lines were run about 3 and 3.5 miles south of Harbor Point (lines 13 & 14), at Topsy Creek (line 15), two miles south of Topsy Creek (line 16), about 1/2 mile north of the Dagelet River (line 17), and about one mile north of LaPerouse Glacier (line 18).

In the Harbor Point north line (13), as much as 2.8 pounds/cubic yard of ilmenite was recovered in auger or PVC tube from fine to medium sand. Maximum gold was reported

as 0.0003 ounce/cubic yard. Ilmenite and gold were much more abundant two miles south of Topsy (line 16). Gold was present there in four tube samples and was reported as 0.0024 ounce/cubic yard in a select grab sample. Ilmenite content was more than 2 pounds/cubic yard in 8 of 10 tube samples and was a maximum of 15.2 percent (495 pounds/cubic yard). The gold-bearing grab sample contained 30.3 percent ilmenite. Ilmenite is also relatively abundant near Dagelet River, with a maximum of 11.5 percent in one tube sample. Gold content there was 0.0043 ounce/cubic yard in a grab sample. Ilmenite content was as much as 1.7 percent in line 18 north of LaPerouse Glacier .

Foley and others (1995) collected 7 samples along the placer, beginning with sample no. 303 near line 14 and continuing through numbers 305-310. Sample 303 had 0.056 gram/tonne gold in the head split. Sample 307 contained 4.37 percent ilmenite in the head split and 10.48 percent ilmenite in the spiral concentrate. Gold was present in several of the samples.

Production notes:

Gold production is probably in the thousand-ounce range. Minor amounts of platinum have been recovered.

Reserves:

The Bureau of Mines (Kimball and others, 1978) calculated about one million cubic yards of material based on the sampled lines representative of this placer. Block 7 (line 16) has a calculated resource of about 664,000 cubic yards of material containing 4 percent ilmenite and 0.0002 oz/yd gold.

Additional comments:

There is a large resource of ilmenite, but probably less than at Yakutat (Foley and others, 1995). Gold and platinum would be recovered from an industrial sand operation. Recovery of very fine gold near Lituya Bay has been studied by Cook (1969). The heavy mineral beach system is part of the Pacific coast province of heavy mineral beaches studied by Clifton and Luepke (1987).

The beach placer and related upland sites are within Glacier Bay National Park and Preserve. The Park and Preserve extend to three miles offshore.

References:

Mertie, 1933 (B 836-B); Rossman, 1957; Rossman, 1959 (B 1058-B); Thomas and Berryhill, 1962; Rossman, 1963 (B 1121-F); Cook, 1969; MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978; Cobb, 1978; Clifton and Luepke, 1987; Foley and others, 1995.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Unnamed (area near Fall Creek, Mudside Creek, Coal Creek, and upper Topsy Creek)

Site type: Occurrence

ARDF no.: MF043

Latitude: 58.625 **Quadrangle:** MF C-5

Longitude: 137.504

Location description and accuracy:

A lode containing gold is in Fall Creek about 1.25 miles upstream from its mouth into Lituya Bay. The coordinates are for the approximate location of the best sample collected by Rossman (1959, fig. 9) from a hydrothermal zone about 0.5 mile long that approximately parallels Fall Creek. The location is accurate to about 0.1 mile. This site also includes lodes described by Rossman in Mudslide Creek (about 58.639; 137.492), also in the north fork of Fall Creek, Coal Creek, and in the upper Topsy Creek drainage area.

Commodities:

Main: Au

Other: Ag, Mo, W

Ore minerals: Powellite, pyrite

Gangue minerals:

Geologic description:

Red- and yellow-stained hydrothermally altered zones as much as one-half mile long occur in sedimentary and volcanic rocks of Tertiary and Mesozoic age southeast of Lituya Bay (Brew and others, 1978). The zones, which are rich in clay, possibly are the result of alteration by thermal springs localized by faults. The faults subsequently localized Fall Creek and other drainages.

Rossman (1959) found a maximum of 0.24 ounce per ton gold in one sample from the zone in Fall Creek. The Bureau of Mines found 0.02 ounce per ton silver in a jasper-rich zone in greenstone in upper Fall Creek. The rock contained fine disseminated pyrite and a trace of powellite (Kimball and others, 1978, p. C94).

Alteration:

Solfataric (?) hydrothermal alteration.

Age of mineralization:

Tertiary.

Deposit model:
Epithermal (?) low-sulfide gold deposit.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Hydrothermal zones were first observed by D.J. Miller of the U.S. Geological Survey in mapping of the Lituya area (Miller, 1953); the mapping was followed up by sampling in 1954 (Rossman, 1959). In addition to the location in Fall Creek that assayed 0.24 ounce per ton gold and 0.06 ounce per ton silver, Rossman found 0.06 ounce per ton gold about 0.5 mile upstream in Fall Creek and at another location in the north fork of Fall Creek. Miller reported addtional hydrothermal zones in upper Topsy Creek about 1 mile to the SE; these occurrences are in rocks of Mesozoic age and were shown by Rossman in his report (fig. 9).

In later follow up, the U.S. Bureau of Mines detected silver in one sample in upper Fall Creek; the sample contained fine disseminated pyrite and a trace of powellite in jasperoid in greenstone (Kimball and others, 1978, p. 94).

Production notes:

Reserves:

Additional comments:
The Tertiary and Mesozoic country rocks of the hydrothermal zones are in the Lituya terrane of Brew and others (1978). The sites are in Glacier Bay National Park and Preserve.

References:
Miller, 1953; Rossman, 1959 (B 1058-B); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978; Cobb, 1981 (OFR 81-249A); Cobb, 1981 (OFR 81-249B).

Primary reference: Rossman, 1959 (B 1058-B)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/99

Site name(s): Unnamed (east of Kashoto Glacier)

Site type: Occurrence

ARDF no.: MF044

Latitude: 58.875 **Quadrangle:** MF D-4

Longitude: 137.036

Location description and accuracy:

The most probable location of this occurrence is near tidewater in Johns Hopkins Inlet, north and east of the foot of Kashoto Glacier; the coordinates are probably within a 0.25 mile radius of the occurrence. An element of uncertainty is present because MacKevett and others (1971) say the location is east of Hoonah Glacier, the next glacier to the south. It is apparently the same location as number 33 of Kimball and others (1978). Location number 32 of Kimball and others (1978) is about 0.75 mile to the north.

Commodities:

Main: Cu

Other: Au, Mo

Ore minerals: Chalcopyrite, 'gray' sulfides, pyrite

Gangue minerals:

Geologic description:

Disseminated pyrite and a trace of chalcopyrite occur in an altered zone several hundred feet thick of biotite hornfels adjacent to a granodiorite intrusion of Cretaceous age (Brew and others, 1978). The altered zone is conspicuously iron stained. The area was not well examined; grab samples contained as much as 700 ppm copper. The U.S. Bureau of Mines (Kimball and others, 1978, location 32, p. C173) reported disseminated pyrite, pyrrhotite and occasional bornite at a location about 0.75 miles north of the probable location of the occurrence. Copper content was less than 200 ppm in two chip samples collected from that area, and the report of bornite may be erroneous.

Alteration:

Contact metamorphism and formation of hornfels. Sulfidation; abundant secondary iron-staining.

Age of mineralization:

Tertiary.

Deposit model:
Disseminated deposit, igneous-affiliated contact metamorphism.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings or pits. Two samples of hornfels (Location 77, MacKevett and others, 1971, table 9) contained 300 and 700 ppm copper.

Production notes:

Reserves:

Additional comments:
Only a small part of altered zone was examined, hence there may be richer sites. The U. S. Bureau of Mines party failed to thoroughly examine the occurrence because of attacks by vicious seagulls. The occurrence is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/08/94

Site name(s): Unnamed (Johns Hopkins Inlet)

Site type: Occurrence

ARDF no.: MF045

Latitude: 58.8958 **Quadrangle:** MF D-4

Longitude: 137.0115

Location description and accuracy:

The occurrence is at an elevation of about 850 feet on the east side of Johns Hopkins Inlet on a north-facing point where the inlet turns to the southwest. The location is approximately 0.25 mile south of the common corner of sections 23, 24, 25, and 26, T. 34 S., R. 50 E., of the Copper River Meridian. The location is accurate within 250 feet. It is approximately location number 30 of Kimball and others (1978, fig. C38, p. C172); it is near number 74 of MacKevett and others (1971).

Commodities:

Main: Cu

Other: Ag, Au, Mo, Sn, W

Ore minerals: Cassiterite?, chalcopyrite, molybdenite, pyrrhotite

Gangue minerals:

Geologic description:

Interlayered volcanic and sedimentary rocks of Permian age occur west of an approximately concordant granitic intrusion of Cretaceous age that extends northerly across Johns Hopkins Inlet (Brew and others, 1978, plate 1A). Kimball and others (1978) note intermixed diorite and mixed sedimentary and volcanic rocks in the area, and, at this occurrence, there is a conspicuous iron-stained zone about 0.25 mile wide. Grab samples (rock in place) contained from 10 to more than 30 ppm molybdenum (Kimball and others, 1978, fig. C38, p. C147-149). A selected sample (7S044) from a thin (0.2 foot) lens of pyrrhotite in sulfidized volcanics contained 1300 ppm copper, 30 ppm molybdenum, 1.5 ppm silver, and >0.05 ppm gold. A float sample of hornfels (Kimball and others, 1978, location 30, p. C172) from the same area contained 4100 ppm copper, 7 ppm silver, 0.15 ppm gold, 700 ppm tin and 793 ppm tungsten. The sample contained visible chalcopyrite and pyrrhotite.

Alteration:

Widespread sulfidation of intrusive and volcanic rocks, now reflected in iron-stained rocks.

Age of mineralization:
Possibly Cretaceous, based on age of granitic plutons in the area.

Deposit model:
Skarn, massive sulfide type.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface occurrence only. A Bureau of Mines select sample (7SO44) of a pyrrhotite lens contained 1,300 ppm copper. 30 ppm molybdenite, 1.5 ppm silver and greater than 0.05 ppm gold; also reported from the same area is a float sample of hornfels that contained 0.41 percent copper, 250 ppm zinc, 7 ppm silver, 700 ppm tin and 793 ppm tungsten (Kimball and others, 1978, p. C147, C172). MacKevett and others (1971, table 9, no. 74) found 150 ppm copper and 30 ppm molybdenum in a grab sample of an iron-stained granitic intrusion in the area.

Production notes:

Reserves:

Additional comments:
Moderately large occurrence of iron-stained granitic pluton and hornfelsed volcanic and sedimentary rocks, not adequately prospected. The area is Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (west of Tarr Inlet)

Site type: Occurrence

ARDF no.: MF046

Latitude: 58.98 **Quadrangle:** MF D-3

Longitude: 137.00

Location description and accuracy:

The occurrence is at an elevation of 1700-1800 feet about 0.75 miles southwest of the shore of Tarr Inlet and about 5 miles northwest from the mouth of the inlet. It is in the NE 1/4 SW 1/4, section 28, T. 33 S., R. 51 E., of the Copper River Meridian. The occurrence is the same as number 63 of MacKevett and others (1971, table 9), and is probably in the same general area as number 26 of Kimball and others (1978), which is in the adjacent Mt. Fairweather D-4 quadrangle. The location is probably accurate within a radius of 0.25 mile.

Commodities:

Main: Cu

Other: Ag, Zn

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:

The country rocks in the area of this occurrence consist of a granitic batholith of Cretaceous age that intrudes volcanic and volcaniclastic strata of Permian age, and an intermediate area of mixed granitic and metamorphic rocks (Brew and others, 1978).

The mineral occurrence consists of quartz monzonite that is cut by veins and veinlets of quartz which contain pyrite and chalcopyrite. MacKevett and others (1971) reported a grab sample of sericitically altered quartz monzonite contained 1000 ppm copper, 300 ppm zinc, and 1 ppm silver. The ore mineralogy, alteration, and geologic setting suggest that the occurrence is part of a porphyry copper deposit.

Alteration:

Greenish, sericitic alteration reported by MacKevett and others, (1971, table 9).

Age of mineralization:

Cretaceous or younger, related to quartz monzonite intrusions.

Deposit model:
Porphyry copper (Cox and Singer, 1986; model 17).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
17

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposure; one sample (Hx-391, table 9, MacKevett and others, 1971) contained 1000 ppm copper, 1 ppm silver , and 300 ppm zinc).

Production notes:

Reserves:

Additional comments:
The occurrence is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (3850 Nunatak west of Tarr Inlet)

Site type: Occurrence

ARDF no.: MF047

Latitude: 58.954 **Quadrangle:** MF D-3

Longitude: 136.992

Location description and accuracy:
The occurrence is on a nunatak on a 3850-foot largely ice-mantled mountain two miles southwest of Tarr Inlet and three miles northwest of the point between Johns Hopkins Inlet and Tarr Inlet. It is in the NE 1/4 of section 1, T. 34 S., R. 50 E., of the Copper River Meridian and is located within 0.25 mile accuracy. The location is number 27 of Kimball and others (1978).

Commodities:

Main: Cu

Other: Ag, Zn

Ore minerals: Chalcopyrite, pyrite, pyrrhotite

Gangue minerals: Quartz

Geologic description:
The occurrence area is extensively ice-mantled. Generally it is in an area where the country rocks are volcanic rocks of Permian age intruded by granitic rocks of Cretaceous age (Brew and others, 1978). At the occurrence, skarn-like pods of massive sulfide as much as 0.5 foot across occur in marble and volcanic rocks at a granitic contact. Silicate minerals in the skarn include actinolite, chlorite, diopside, epidote, and garnet. The sulfides are mainly pyrite and pyrrhotite, and minor chalcopyrite. Chip samples (Kimball and others, 1978, table C37, location 27) contained as much as 770 ppm copper, 190 ppm zinc, and 1.5 ppm silver.

Alteration:
Skarn developed in calc-magnesian rocks. Skarn minerals include garnet and epidote.

Age of mineralization:
Tertiary.

Deposit model:
Skarn, massive sulfide -- similar to porphyry copper, skarn related (Cox and Singer, 1986;

model 18a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
18a

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface occurrence only; samples of massive sulfide pods as much as 0.5 foot thick contained anomalous amounts of copper, zinc, and silver (Kimball and others, 1978, table C37, sample--location--number 27).

Production notes:

Reserves:

Additional comments:
Extensive ice cover which could conceal skarn- or porphyry copper-type deposits. The occurrence is in Glacier Bay National Park and Preserve.

References:
Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (west of Tarr Inlet)

Site type: Occurrence

ARDF no.: MF048

Latitude: 58.956 **Quadrangle:** MF D-3

Longitude: 136.932

Location description and accuracy:
The occurrence is on the west side of Tarr Inlet, about 0.15 mile west of the shore line and about 2.75 miles north of the mouth of Johns Hopkins Inlet. The elevation is approximately 500 feet. The location is known within about 0.25 mile. The location is same as number 41 of Kimball and others (1978), number 62 of MacKevett and others (1971), and number 13 of Cobb (1972).

Commodities:

Main: Cu

Other: Au, Co, Ni

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Calcite, quartz

Geologic description:
The area is mostly underlain by granitic rocks of Cretaceous age (Brew and others, 1978). At the mineral locality, a dike of pegmatitic hornblende diorite 6 feet thick cuts heterogenous diorite. In turn, the pegmatitic diorite contains quartz-calcite veins as much as 0.5 foot thick that contain pyrite and chalcopyrite. The veins contain as much as 2000 ppm copper, a trace of gold, and 300 ppm each of cobalt and nickel (MacKevett and others, 1971, table 9, location 62).

Alteration:

Age of mineralization:
Cretaceous or younger.

Deposit model:
Lode associated with an intrusive of intermediate to mafic composition.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposures only. A grab sample of a quartz-calcite vein in pegmatitic diorite contained 2000 ppm Cu, a trace of gold, and 300 ppm each of cobalt and nickel (MacKevett and others, location 62, table 9).

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (mouth of Johns Hopkins Inlet)

Site type: Occurrence

ARDF no.: MF049

Latitude: 58.921 **Quadrangle:** MF D-3

Longitude: 136.930

Location description and accuracy:
The occurrence is about 0.3 mile north of the point that separates Tarr and Johns Hopkins Inlets. It is close to the shore line, and is known within a few hundred feet. The location is number 45 of Kimball and others (1978).

Commodities:

Main: Zn

Other: Ag, Au, Cu, Pb

Ore minerals: Chalcopyrite, galena?, pyrite or pyrrhotite, sphalerite

Gangue minerals: Calcite, quartz

Geologic description:
The area is mainly underlain by heterogenous granitic rocks of Cretaceous age (Brew and others, 1978). The granitic rocks are cut by a quartz-calcite vein as much as 3.5 feet thick which contains lenses of iron sulfide-rich massive sulfide. Sphalerite and chalcopyrite are also present in the sulfide lenses. The quartz-calcite vein can be traced for about 100 feet to overburden cover. A sample across the widest part of the vein contained 4,300 ppm zinc and lesser quantities of other base and precious metals.

The vein occurrence probably has one of two affinities. It may be related to the Orange Point (MF038) base metal-type mineralization, or it could represent the northwest limit of the Reid Inlet gold area, whose major deposits are the LeRoy (MF022), Rainbow (MF027), Rambler (MF028) and Highland Chief (MF030). Although the most productive veins of the Reid Inlet area were gold-rich, sphalerite occurs widely and in some veins is predominant.

Alteration:

Age of mineralization:
Cretaceous or younger.

Deposit model:

Polymetallic quartz-calcite vein -- similar to polymetallic veins (Cox and Singer, 1986; model 22c).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposure, no workings. A chip sample of the full width of the vein (3.5 feet) contained 4,300 ppm zinc, 770 ppm copper, 250 ppm lead,15 ppm silver, and 0.03 ppm gold (Kimball and others, 1978, table C39, p. C191).

Production notes:

Reserves:

Additional comments:
Worth additional prospecting, as possibly related to Orange Point or Reid Inlet mineralization. Prospect is in Glacier Bay National Park and Preserve.

References:
Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (upper North Crillon Glacier)

Site type: Occurrence

ARDF no.: MF050

Latitude: 58.672 **Quadrangle:** MF C-4

Longitude: 137.284

Location description and accuracy:
The occurrence is on a northwest-facing slope, at an approximate elevation of 3500 feet adjacent to North Crillon Clacier, SW 1/4SW 1/4, section 11, T. 37 S., R. 40 E., of the Copper River Meridian. The location is near sample 38b of Rossman (1963, B 1121-F), location number 6 of Kimball and others (1978), location number 79 of MacKevett and others (1971), and at or near location number 4 of Cobb (1972 MF-436). Kennedy and Walton (1946) reported copper minerals near here. The location is accurate within 0.1 mile.

Commodities:

Main: Fe, Ti

Other: Cu

Ore minerals: Chalcopyrite?, ilmenite, magnetite?

Gangue minerals:

Geologic description:
The occurrence is in the northwestern part of the Crillon-LaPerouse layered mafic complex (Brew and others, 1978). It is probably about 0.4 miles from the contact of the intrusive, which, in this area, is concealed by the glacier. The occurrence, of heavily disseminated ilmenite in layered mafic rock, is marked by an extensive iron-stained zone. Samples collected by Rossman (1963, B 1121-F, p. F42-F43) from this area contained 7 to 10 percent ilmenite. (The location is somewhat uncertain; sample number 38b is the farthest north sampe locality shown by Rossman (1963) in the intrusion, but it has no analytical data. The location is very close to number 79 of MacKevett and others (1971). These authors cite Rossman, also Kennedy and Walton, 1946, for information on mineral occurrences at or near this site).

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Similar to Bushveld Fe-Ti-V (Cox and Singer, 1986; model 3). Segregations of ilmenite-magnetite(?) in a in a layered mafic-ultramafic intrusion.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
3

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposures only. Several investigators, including Kennedy and Walton (1946), Rossman (1963 B 1121-F, MacKevett and others (1971), and Kimball and others (1978) reported occurrences of valuable oxide and sulfide minerals in the northwestern contact zone of the Mt. Crillon-LaPerouse complex in rugged country. There is extensive ice cover.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
Kennedy and Walton, 1946; Rossman, 1963 (B 1121-F); MacKevett and others, 1971; Cobb, 1972 (MF-436) ; Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1963 (B 1121-F)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (near Scidmore Glacier)

Site type: Occurrence

ARDF no.: MF051

Latitude: 58.813 **Quadrangle:** MF D-3

Longitude: 136.760

Location description and accuracy:
The occurrence is on the east side of Hill 4650 at an elevation of about 4000 feet at the head of Scidmore Glacier. It is about 1 mile east of Reid Glacier, at a point approximately 2.3 miles above the nose of the glacier. The location is probably accurate to within 200 feet vertically and about 0.1 mile horizontally. The location is number 69 of MacKevett and others (1971) and number 48 of Kimball and others (1978).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals:

Geologic description:
The area is underlain by mixed schist, phyllite, and marble of Paleozoic age within a terrane intruded by granitic rocks of Cretaceous age (Brew and others, 1978, pl. 1A). In the area of the mineral occurrence, two conspicuously iron-stained zones as much as 25 feet thick cut tightly folded metasedimentary rocks, mostly marble. Pyrite-bearing quartz veins 1-2 feet in thickness locally cut the iron-stained zones. Chalcopyrite is present locally; a float sample of quartz vein contained 1000 ppm copper, and a 15-foot chip sample of a sulfidized zone contained 300 ppm copper and 7 percent iron; gold and silver were not detected.

Alteration:

Age of mineralization:
Probably Cretaceous, related to the intrusion of granitic rocks.

Deposit model:
Low-sulfide quartz vein and disseminated sulfides in altered rock.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposures only; an iron stained zone 15 feet thick contained 300 ppm copper; a quartz vein (float) contained 1000 ppm copper (MacKevett and others, 1971, table 9).

Production notes:

Reserves:

Additional comments:
Mineralization related to Cretaceous granitic event. The area is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (west head of Hugh Miller Glacier)

Site type: Occurrence

ARDF no.: MF052

Latitude: 58.785 **Quadrangle:** MF D-3

Longitude: 136.765

Location description and accuracy:
The occurrence is on a ridge west of the head of Hugh Miller Glacier at an elevation of about 4100 feet. It is about 0.75 mile east of Reid Glacier at a point about 4 miles above the terminous of the glacier at Reid Inlet. The location is accurate within 0.1 mile. The site of the occurrence is location number 50 of Kimball and others (1978).

Commodities:

Main: Cu

Other: Ag, Au, Fe, Mn

Ore minerals: Arsenopyrite, chalcopyrite, pyrite

Gangue minerals: Epidote, garnet

Geologic description:
The occurrence is in the middle Geickie province of Brew and others (1978). Rocks are mainly hornfels, phyllite, semischist and marble of Paleozoic age which are cut and locally contact metamorphosed by granitic bodies of Cretaceous age. At the mineral locality, pyrite-rich epidote-garnet skarn layers are as much as 3 feet thick. Locally, chalcopyrite and arsenopyrite are present in the skarn. Massive pyrite skarn contains as much as 1100 ppm copper, 1.5 ppm silver, 0.15 ppm gold, 5000 ppm manganese and greater than 20 percent iron (Kimball and others, 1978, p. C248, location 50).

Alteration:
Marble has been converted to pyritic garnet-epidote skarn.

Age of mineralization:
Cretaceous.

Deposit model:
Iron-copper skarn somewhat similar to Cu skarn and Fe skarn (Cox and Singer, 1986; model 18b and 18d).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
18b and 18d

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no mine workings; exposures limited to surface outcrops. Chip samples of pyrite-rich sulfide layers showed > 20 percent iron, from 730 to 1100 ppm copper and trace amounts of silver and gold (Kimball and others, 1978).

Production notes:

Reserves:

Additional comments:
Cretaceous-aged mineralization of a terrane of Paleozoic age. The area is in Glacier Bay National Park and Preserve.

References:
Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (west of Rendu Inlet)

Site type: Occurrence

ARDF no.: MF053

Latitude: 58.94 **Quadrangle:** MF D-3

Longitude: 136.69

Location description and accuracy:
The occurrence is at about 2500 feet elevation near or on the ridge between Rendu Inlet and Tarr Inlet about 4.2 miles southeast of Mt. Abdallah. Precision of location is poor; it is probably accurate within 0.5 mile. The occurrence is number 60 of MacKevett and others (1971) and number 42 of Kimball and others (1978).

Commodities:

Main: Mo

Other: Cu

Ore minerals: Chalcopyrite, molybdenite, pyrite, pyrrhotite

Gangue minerals: Quartz, feldspar

Geologic description:
The area is mainly underlain by foliated granitic rock of Cretaceous age, subordinate marble of Paleozoic age and possibly argillic metasedimentary rocks of Devonian and Silurian age (Brew and others, 1978, pl. IA). Molybdenite, chalcopyrite, pyrite and pyrrhotite occur in quartz veins, less than 3 inches thick, at a spacing of several feet. Veins also occur in quartz-rich pegmatic dikes in a 25-foot thick zone in granitic rocks. The veins and dikes have variable strikes, but most strike northward and dip to the east (MacKevett and others, 1971, p. 79; also table 9). No analyses were reported by either MacKevett and others or by Kimball and others, 1978).

Alteration:

Age of mineralization:
Probably Cretaceous.

Deposit model:
Copper-molybdenum stockwork mineralization. Porphyry Cu and porphyry Mo (Cox and Singer, 1986; model 17 and 21b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
17 and 21b

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposure, no workings. No analyses reported.

Production notes:

Reserves:

Additional comments:
Isolated occurrence of molybdenum and copper minerals in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Silver Dick and Jennie claims

Site type: Prospect

ARDF no.: MF054

Latitude: 58.936 **Quadrangle:** MF D-2

Longitude: 136.648

Location description and accuracy:
The occurrence is about 30 feet above high tide on the west side of Rendu Inlet, about 3 miles above the mouth and 0.25 miles north of VABM Grey. The location of workings that date back to the 1890s was described by Rossman (1963-B 1121-K); it is probably accurate within 0.2 mile. It is location number 31 of Cobb (1972).

Commodities:

Main: Ag

Other: Cu

Ore minerals: Silver (native), tetrahedrite

Gangue minerals: Ankerite, calcite, quartz

Geologic description:
The deposit occurs in a hornfels- and marble-rich section of post-Silurian Paleozoic age, south of a large granite mass of Cretaceous age (Brew and others, 1978). Copper and silver minerals are associated with ankeritic quartz veins as much as 6 inches thick. The occurrence is in a north striking, west dipping vein that can be traced for several hundred feet on trend and about 100-ft vertically (Rossman, 1963, p. K48-49). Wire silver and tetrahedrite were found in veinlets in quartz at the property. MacKevett and others (1971, p. 69) reported barren ankerite-quartz and quartz-calcite veins in the same area. One ankeritic vein was described on the contact between marble and a 20-ft wide dioritic dike.

Alteration:
Rossman (1963, B 1121-K, p. K48) reports 'the country rock is extensively altered on each side of the fault [vein]', also that similar alteration is widespread. Rossman does not describe the alteration, but it likely is partly ankeritic.

Age of mineralization:
Cretaceous.

Deposit model:

Low-sulfide silver-copper-bearing vein.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: Undetermined.

Site Status: Inactive

Workings/exploration:
The deposit was discovered about 1893 and two claims were patented in 1894. A sixty-five foot adit was driven on the Silver Dick claim; there were trenches on both claims (Kimball, and others 1978, p. C187-188). Landslides and rock falls have apparently partly covered the old prospect area.

Production notes:
Possibly some hand-picked silver ore was mined in the 1890s.

Reserves:

Additional comments:
Paleozoic terrane; nearby intrusions of Cretaceous age. The occurrence is in Glacier Bay National Park. and Preserve.

References:
Rossman, 1963 (B 1121-K); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1963 (B 1121-K)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (west of Rendu Inlet)

Site type: Occurrence

ARDF no.: MF055

Latitude: 58.913 **Quadrangle:** MF D-2

Longitude: 136.650

Location description and accuracy:
The occurrence is at an elevation of about 2000 feet on the top of the ridge between Rendu Inlet and Glacier Bay about 0.7 miles northwest of VABM Rendu. The location is accurate within a few hundred feet. The location is number 39 of MacKevett and others (1971), number 32 of Cobb (1972), and number 44 of Kimball and others (1978).

Commodities:

Main: Fe

Other:

Ore minerals: Magnetite, pyrite

Gangue minerals: Calcite, quartz

Geologic description:
Poddy magnetite-rich skarn deposits occur in limestone-marble units of Devonian-Silurian age at or near medium-coarse-grained intrusions of hornblende quartz diorite of Cretaceous age (Rossman, 1963 B 1121-K; Brew and others, 1978). Calc-silicate rich phases of the skarn consist of tactite composed of grossularite-rich garnet and epidote accompanied by quartz, chlorite, and calcite. Magnetite and pyrite locally form poddy masses. The area is poorly exposed and other deposits--inferred from magnetic anomalies--could be buried by overburden. Based on three samples reported by MacKevett and others, 1971 (locality 39, table 9) the iron content of the skarn ranges from about 5 percent to more than 10 percent. No precious metals were detected and copper and other valuable metals are present at near background levels. Titanium values are low, so magnetite is inferred to be an essentially pure phase.

Alteration:

Age of mineralization:
Cretaceous.

Deposit model:

Pyrite-magnetite (Fe) skarn (Cox and Singer, 1986; model 18d).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
18d

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings. MacKevett and others (1971) collected samples and ran magnetic traverses in the occurrence area. Magnetic anomalies of as much as 5500 gammas are attributed to concealed masses of magnetite skarn.

Production notes:

Reserves:

Additional comments:
Deposits appear to be small, but the mixed marble-quartz diorite area is favorable for other deposits.
The area is in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-K); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (west mouth of Rendu Inlet)

Site type: Occurrence

ARDF no.: MF056

Latitude: 58.913 **Quadrangle:** MF D-2

Longitude: 136.628

Location description and accuracy:
The occurrence is near sea level at the west mouth of Rendu Inlet 0.45 miles northeast of VABM Rendu. It is about 1.5 miles north of the point between Rendu Inlet and Glacier Bay. The location is probably accurate within 0.1 mile. The location is number 38 of MacKevett and others (1971), number 33 0f Cobb (1972), and number 43 of Kimball and others (1978).

Commodities:

Main: Cu

Other: Co, Ni

Ore minerals: Chalcopyrite, pyrite, pyrrhotite?

Gangue minerals:

Geologic description:
Iron-stained pyritic zones up to 20 feet long and 1 foot thick occur in bleached marble of the Paleozoic marble and hornfels unit of Brew and others (1978). The unit is probably correlative with post-Silurian pre-Triassic limestone of Seitz (1959). The bedded rocks are intruded by granitic rocks of Cretaceous age. A pyritic zone containing minor chalcopyrite and possibly pyrrhotite was sampled by MacKevett and others (1971, table 9). A selected sample from a thin pyrite-rich lens contained 1500 ppm copper, 700 ppm cobalt, and 1000 ppm nickel, suggesting the prescence of nickeliferous pyrrhotite as an additional phase.

Alteration:
Bleaching of marble near sulfidized zones.

Age of mineralization:
Cretaceous or younger.

Deposit model:

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface exposures only, 2 samples collected (MacKevett and others, 1971).

Production notes:

Reserves:

Additional comments:
Paleozoic marble invaded by granitic plutons of Cretaceous age. The area is in Glacier Bay National Park and Preserve.

References:
Seitz, 1959; MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (southwest Gilbert Peninsula)

Site type: Occurrences

ARDF no.: MF057

Latitude: 58.775 **Quadrangle:** MF D-2

Longitude: 136.561

Location description and accuracy:

Numerous occurrences of copper and molybdenum minerals are near the southwest tip of Gilbert Peninsula and on an unnamed island south of the southwest tip of the peninsula. The coordinates are the approximate center of these occurrences on the southwest part of Gilbert Peninsula at an elevation of about 100 feet. The location includes location numbers 44 and 45 of MacKevett and others (1971) amd locations 35 and 36 of Cobb (1972-MF-436), and location number 54 of Kimball and others (1978). Kimball and others also reported nearby occurrences (locations 53 and 55) respectively across Hugh Miller Inlet (on Gilbert Peninsula) and across Scidmore Inlet.

Commodities:

Main: Cu, Mo

Other: Ag, Bi, Zn

Ore minerals: Chalcopyrite, molybdenite, pyrite, sphalerite

Gangue minerals: Quartz and alteration products of quartz diorite and alaskite

Geologic description:

Southern Gilbert Peninsula and nearby areas are mainly underlain by granitic rock of Cretceous age containing local inliers of metamorphosed hornfels and marble of Paleozoic age (Brew and others, 1978). On the southwest tip of Gilbert Peninsula,stockworks of quartz veins in altered quartz diorite--cut by light colored aplite (alaskitic) dikes--occur in a silicified zone at least 50 feet wide and several hundred feet long. The quartz veins contain minor amounts of chalcopyrite and molybdenite close to vein selvages. The mineralogy and intrusive setting suggests a porphyry copper-molybdenum model. Pyritic stockworks and somewhat younger crosscutting pyritic veins also occur to the east across Hugh Miller Inlet and west across Scidmore Inlet. Selected vein samples from location 45 contained as much as 10 ppm silver, 7000 ppm copper and 2000 ppm molybdenum (MacKevett and others, 1971); chip samples collected across 52- and 100-foot long lines were nearly barren. Samples collected in pyritic stockwork vein areas on the west side of Scidmore Inlet contained a trace of molybdenum and as much as 70 ppm bismuth, and 1500 ppm zinc (Kimball and others, 1978, location 55).

Alteration:
Silicification in stockwork zones.

Age of mineralization:
Tertiary.

Deposit model:
Porphyry copper-molybdenum (Cox and Singer, 1986; model 21a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
21a

Production Status: No

Site Status: Inactive

Workings/exploration:
The mineralized area was described briefly by Rossman (1963, B 1121-K) and investigated in 1966 in conjunction with the Geological Survey's study of Glacier Bay (MacKevett and others, 1971). There are no mine workings. A 0.5 foot quartz vein collected on the southwest tip of Gilbert Peninsula contained 1000 ppm copper; a selected high-grade piece of quartz float contained 10 ppm silver, 7000 ppm copper and 2000 ppm molybdenum (MacKevett and others, 1971, p. 50-51, table 9). To the west, across Scidmore Inlet, a selected sample contained 1500 ppm zinc and 70 ppb bismuth. The average grade of exposed materials is very low, as long chip samples contained only near background amounts of valuable metals.

Production notes:

Reserves:

Additional comments:
Fairly large but very low grade quartz vein and stockwork system. It is in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-K); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/09/99

Site name(s): Unnamed (Blue Mouse Cove)

Site type: Occurrence

ARDF no.: MF058

Latitude: 58.797 **Quadrangle:** MF D-2

Longitude: 136.489

Location description and accuracy:
The general location is near sealevel on the far southeastern point of Gilbert Peninsula north of Blue Mouse Cove. The exact location is uncertain but may instead be about 0.25 mile northwest of the coordinate position, also near sea level. The location is number 37 of Cobb (1972).

Commodities:

Main: Pb, Zn

Other: Ag

Ore minerals: Arsenopyrite?, galena, sphalerite

Gangue minerals: Calcite, quartz

Geologic description:
The area is underlain by granodiorite and quartz diorite of Cretaceous age, separated from other granite by a strong fault of northwest strike about 0.5 mile west of the occurrence (Brew and others, 1978, pl. 1A). Mineralization occurs in steep faults and shear zones that strike east-northeast strike and locally contain andesite dikes. MacKevett and others (1971, table 9) reported quartz-calcite veins as much as 1.5 feet thick within a 12-foot-thick shear zone. A 2-foot sample contained 1 ppm silver, 200 ppm copper, 300 ppm lead, and 700 ppm zinc. Bureau of Mines samples of a second zone contained as much as 7 ppm silver, 680 ppm zinc, 220 ppm lead and 3000 ppm arsenic (Kimball and others, 1978, p. C248-249). Two or more vein zones are inferred by Kimball and others (1978); the one they sampled is at least 1000-feet long.
The vein zone was at least 1000 feet long.
The presence of weak lead-zinc values, and anomalous amounts of silver in quartz-calcite vein, suggests that the veins are distal structures related, generally, to Cretaceous or younger intrusive activity.

Alteration:

Age of mineralization:

Probably Cretaceous.

Deposit model:
Low-sulfide quartz-calcite veins.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings. A Geological Survey selected 2-foot sample contained 1 ppm silver, 200 ppm copper, 300 ppm lead, and 700 ppm zinc (MacKevett and others (1971, table 9). The sample reported by Kimball and others (1978) from about the same locality contained 3000 ppm arsenic, 7 ppm silver, 220 ppm lead, and 680 ppm zinc. The vein sampled by the Bureau of Mines is projected for more than 1000 feet.

Production notes:

Reserves:

Additional comments:
Veins are possible distal structures related to Cretaceous or younger magmatism. Because of their strength and type of mineralization, they deserve more work.
The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971; Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/13/99

Site name(s): Unnamed (east side of Queen Inlet)

Site type: Occurrence

ARDF no.: MF059

Latitude: 58.904 **Quadrangle:** MF D-2

Longitude: 136.512

Location description and accuracy:

The location is an area on the east side of Queen Inlet near its mouth, and about 2 miles east-northeast of the north end of Composite Island. Mineralization extends about 400 feet along the shore line and extends uphill to at least 1000 feet above sealevel. The coordinates are for the approximate center of the area. The deposit is accurately located. The location is number 39 of Cobb (1972) and number 40 of MacKevett and others (1971).

Commodities:

Main: Fe

Other: Co, Cu, Mo, Sn

Ore minerals: Chalcopyrite, magnetite, pyrite

Gangue minerals: Calcite, garnet, quartz

Geologic description:

The area is underlain by a mixed beded unit of Devonian and Silurian age that is mostly volcanic. Minor amounts of slate, argillite, and marble occur with andesitic volcanics. A major fault that strikes northwest separates the Devonian-Silurian unit from hornfels and marble of undivided Paleozoic age--this fault may mark the uphill termination of the mineral occurrence (Brew and others, 1978, pl. 1A). The bedded rocks are cut by alaskite and porphyritic dikes, probably of Tertiary age. Detailed mapping shows very complex relations (MacKevett and others, 1971, pl. 10). Magnetite occurs in tactite and marble interleaved with alaskite; the marble units generally strike east-northeast and are cut by dark porphyritic andesite dikes that strike northwest. The magnetite-rich bodies are as much as 20 feet thick. The alaskite contains numerous irregular quartz veins and irregular clots, masses and disseminations of sulfides, mainly pyrite and minor chalcopyrite. The andesite dikes also contain disseminated and blebby pyrite. Except for one sample, which contained 7 percent iron, all samples (eight total) contained greater than 10 percent iron. An 18-foot chip sample of the richest magnetite zone contained 23.4 percent iron reported as ferric oxide. The samples were anomalous in copper, cobalt, and tin.

The magnetite bodies are marked by anomalies of about 1000 gammas. Exposure is poor; magnetic anomalies on an uphill traverse were as much as 1300 gammas, probably

indicating buried magnetite lenses.

Alteration:
Calc-rocks have been altered to tactite composed mainly of calcite, garnet, hornblende, pyroxene and quartz. Propylitic alteration of alaskite has introduced actinolite, calcite, chlorite, and epidote. Actinolite and chlorite, with plagioclase, have also formed in the alteration of the andesite dikes.

Age of mineralization:
Tertiary.

Deposit model:
Contact and porphyry mineralization, magnetite (Fe) skarn (Cox and Singer, 1986; model 18d).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
18d

Production Status: No

Site Status: Inactive

Workings/exploration:
Poorly exposed bodies of magnetite and disseminated and blebby pyrite occur in tactite, marble and alaskite. An 18-foot chip sample of the richest-appearing magnetite body contained 23.4 percent iron as ferric oxide. Seven other samples showed major (greater than 10 percent) iron. Copper, cobalt, molybdenum, tin, and zinc were detected in anomalous amounts, respectively 300 ppm, 300 ppm, 20 ppm, 30 ppm, and 300 ppm. There are no mine workings. The most detailed investigation was conducted by the Geological Survey in 1966 (MacKevett and others, 1971).

Production notes:

Reserves:

Additional comments:
Lenses are too small for development, but mineralization is widespread and better deposits could exist in the same system. The mineralized area is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 12/22/98

Site name(s): Unnamed (upper Wachusett Inlet)

Site type: Occurrence

ARDF no.: MF060

Latitude: 58.9549 **Quadrangle:** MF D-2

Longitude: 136.3529

Location description and accuracy:

This occurrence is in upper Wachusett Inlet, about 3 miles below the head of the inlet. The occurrence is on the shore line on the east side of the inlet. The location is accurate within 0.1 mile.

Most of the slope above the deposit is covered by Plateau Glacier or its morainal deposits. The occurrence is about 2 miles south-southwest of the Bruce Hills copper-molybdenum deposit (MF037). The location of the prospect is shown on an inset to figure C64 (Kimball and others, 1978). It is incorrectly located by Cobb (1972) and by MacKevett and others (1971).

Commodities:

Main: Cu, Mo

Other: Ag

Ore minerals: Chalcopyrite, molybdenite, pyrite

Gangue minerals: Quartz

Geologic description:

A copper-molybdenum-bearing vein cuts quartz diorite of Cretaceous age. The area is only recently free of glacial ice, and mapping is of reconnaissance type. Brew and others (1978, pl. 1A) show most of the area as granitic rock of Cretaceous age. The quartz diorite is cut by andesite and pegmatite dikes and by quartz veins.

At the prospect, which is at the shore line, a narrow quartz -sulfide vein can be traced for about 50 feet, and projected as a brecciated iron-stained vein for another 75 feet. The vein is up to 0.7 foot thick and contains about 25 percent chalcopyrite by volume. Molybdenite and pyrite are also present. Selected vein samples contain as much as 7.4 percent copper and 1500 ppm molybdenum. The vein strikes north-northeast, subparallel to the shore line, and dips steeply to the northwest.

Alteration:

Age of mineralization:

Cretaceous or younger.

Deposit model:

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:

The area has been explored by surface pits and trenches cut for samples. As sampled by the Bureau of Mines (Kimball and others, 1978, p. C307-C310), a chalcopyrite rich vein 0.7 foot thick contained 7.4 percent copper and 0.02 percent molybdenum. Other select samples ranged from 0.2 to 4.7 percent copper and contained from 0.03 to 0.15 percent molybdenum. Silver ranged from 5 to 30 ppm.

Production notes:

Reserves:

Based on the surface samples, and calculated over a 4-foot width, the occurrence is an 800-ton resource containing 0.44 percent copper, 0.05 percent molybdenum, and 0.034 ounce per ton silver (Kimball and others, 1978).

Additional comments:

Area has been very recently deglaciated by recession of Plateau Glacier. The area contains other copper-molybdenum deposits and occurrences and is favorable for prospecting.

The site is within Glacier Bay National Park and Preserve.

References:

MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 12/22/98

Site name(s): Unnamed (North Marble Island)

Site type: Prospect

ARDF no.: MF061

Latitude: 58.672 **Quadrangle:** MF C-1

Longitude: 136.061

Location description and accuracy:

The prospect site is on North Marble Island in Glacier Bay about 3.5 miles southwest of Sandy Cove. The location is uncertain; MacKevett and others (1971) did not find Reed's (1938) or Rossman's (1963) locations. The island is only about 0.4 mile long and 0.2 mile wide, and the location is probably correct to about 0.10 mile. The occurrence is location number 50 of Cobb (1972).

Commodities:

Main: Fe, Ni?, Zn

Other: Cu

Ore minerals: Chalcopyrite, covellite, magnetite, pyrite, pyrrhotite?, sphalerite

Gangue minerals:

Geologic description:

North Marble Island is underlain mainly by crystalline marble that is part of a major marble unit exposed on several islands in Glacier Bay. They include Willoughby, Francis, and Drake Islands as well as North and South Marble Islands. The carbonate-rich section is primarily Devonian in age (MacKevett and others, 1971; Brew and others, 1978). The age of metamorphism and mineralization is probably Cretaceous. Assuming that the area is underlain by the granitic batholith of Cretaceous age that characterizes this province.

Small sulfide (chalcopyrite, covellite, magnetite, pyrite, pyrrhotite?, and/or sphalerite) pods, commonly associated with mafic dikes, are widely distributed throughout the province. On North Marble Island, sulfide pods as much as 1.5 ft wide and 15 feet long occur in marble near mafic dikes. The sulfides also occur on joint faces within the dikes (Reed, 1938, p. 69). A mass of sphalerite and magnetite at an unspecified contact (?) was reported by Rossman (1963, p. K51).

Alteration:

Age of mineralization:

Cretaceous?

Deposit model:
Distal hydrothermal replacement possibly related to subjacent granitic intrusions of Cretaceous age.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
No workings. One claim reportedly located for nickel by S. H. Vevelstad before 1930. Burchard (1914, 1920), who investigated the area for the marble resource, reported mafic or lamprophyric dike rocks cutting marble.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.
The first known metallic prospect staked on the island was by S. H. Vevelstad before 1930, who reportedly staked it for nickel. Mr. Vevelstad was an experienced prospector, better known for his discoveries of nickel-copper deposits in the Bohemia Basin area in the Sitka quadrangle.

References:
Burchard, 1914; Burchard, 1920; Reed, 1938; Rossman, 1963 (B 1121-K); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1963 (B 1121-K)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 01/03/99

Site name(s): Unnamed (south of Tidal Inlet)

Site type: Occurrence

ARDF no.: MF062

Latitude: 58.793 **Quadrangle:** MF D-2

Longitude: 136.346

Location description and accuracy:
The site is near tidewater about 2.55 miles south of the mouth of Tidal Inlet. The location of the site is accurate wihtin abount 0.1 mile. It is location number 41 of MacKevett and others (1971) and location number 87 of Kimball and others (1978).

Commodities:

Main: Cu

Other: Co, Ni

Ore minerals: Chalcopyrite, pyrite, pyrrhotite

Gangue minerals: Calcite, quartz

Geologic description:
The site is mainly underlain by marble and argillite and graywacke of Silurian and Devonian age that are intruded by hornblende diorite of Cretaceous age (Brew and others, 1978). At the site, thin quartz veins in marble contain pyrite, pyrrhotite, and chalcopyrite. A representative sample collected by MacKevett and others (1971, p. 50) contained 1000 ppm copper and 300 ppm each of cobalt and nickel.

Alteration:

Age of mineralization:
Probably Cretaceous.

Deposit model:
Contact deposit in marble near quartz diorite. Sulfide veins in marble.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:

Representative surface sample of veins contained 1000 ppm copper, and 300 ppm each of cobalt and nickel (MacKevett and others, 1971). Trace of gold, no silver detected. Wright and Wright (1937) reported claims staked for copper at or near this locality.

Production notes:

Reserves:

Additional comments:

Wright and Wright (1937) report claim activity (copper) at or near this location. The site is in Glacier Bay National Park and Preserve.

References:

Wright and Wright, 1937; MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 01/03/99

Site name(s): Unnamed (South Marble Island)

Site type: Prospect

ARDF no.: MF063

Latitude: 58.643 **Quadrangle:** MF C-1

Longitude: 136.042

Location description and accuracy:

The site is on South Marble Island in Glacier Bay. Its location is approximate, but probably correct within 0.1 mile. It is location number 51 of Cobb (1972) and number 25 of MacKevett and others (1978).

Commodities:

Main: Cu, Fe, Ti

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:

The site is within the marble-rich province of Devonian and Silurian age that extends northwesterly from Willoughby Island to Queen Inlet (MacKevett and others, 1971; Brew and others, 1978). Bathymetric contours near South and North Marble Island indicate a barely submerged mass, inferred to be mostly marble, that is also aligned northwest. The exposures on the two small islands are the surface expressions of the inferred marble mass.

The island was investigated as a marble prospect Burchard (1914 and 1920).

The marble on South Marble island is locally cut by mafic dikes as much as 50 feet across that contain disseminated pyrite; pyrite also occurs in silicified marble near the dike rocks. Reed (1938) reported copper sulfide (chalcopyrite) occurrences.

Of four pyritic samples collected by the U.S. Geological Survey, three contained more than 10 percent iron and one contained about 7 percent iron; titanium content ranged from 0.5 to 1 percent in the same samples (MacKevett and others, 1971, table 9).

The sulfide deposits and silicification probably are related to the emplacement of the mafic dikes, possibly in Cretaceous or Tertiary time (Brew and others, 1978).

Alteration:

Marble is locally silicified.

Age of mineralization:
Cretaceous or younger.

Deposit model:

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Probably inactive

Workings/exploration:
No workings. MacKevett and others (1971) reported iron content as greater than 10 percent in three of four selected samples of marble and dike material. Maximum titanium content is 1 percent. All four samples contained 100 ppm nickel, and ranged from 150-200 ppm copper. It is doubtful if any of the samples reported by MacKevett and others represent the copper sulfide-bearing material seen by Reed (1938).

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
Burchard, 1914; Burchard, 1920; Reed, 1938; MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Reed, 1938

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 01/03/99

Site name(s): Unnamed (southwest of Red Mountain)

Site type: Occurrence

ARDF no.: MF064

Latitude: 58.966 **Quadrangle:** MF D-1

Longitude: 136.048

Location description and accuracy:

The deposit is near the 1000-foot elevation on an outlier to Red Mountain in section 35, T. 33 S., R. 56 E., of the Copper River Meridian. The crest of Red Mountain is about 2.5 miles to the northeast of the site which is also about 2 miles east of the anchorage at Goose Cove. It is probably located within 0.2 mile.

The site is the same as number 20 of MacKevett and others (1971), number 44 of Cobb (1972), and number 72 of Kimball and others (1978).

Commodities:

Main: Zn

Other: Ag, Cd, Mo, Pb

Ore minerals: Galena?, hydrozincite?, pyrite, smithsonite?, sphalerite

Gangue minerals: Calcite

Geologic description:

The occurrence is in the Black Cap Limestone of Devonian age, near a granodiorite cupola of probable Cretaceous age (MacKevett and others, 1971, p. 55). Pyrite-rich pods and impregnations as much as 10 feet long and 1 foot diameter occur in the limestone.

A representative sample collected by MacKevett and others (1971, table 9) contained 7000 ppm zinc, 500 ppm lead, 70 ppm cadmium, 1.5 ppm silver and an anomalous amount (30 ppm) of molybdenum. At the site, white incrustations, either hydrozincite or smithsonite, occur as secondary minerals on the pyrite-rich mass. Sphalerite is assumed to be the primary zinc mineral. Lead is abundant enough so that galena could exist as the primary lead mineral.

The pods are too small and lean to be of significance, but they are probably distal phases of the igneous-affiliated mineral deposits of the area. The existence of anomalous quantities of molybdenum suggests a distal relation to nearby molybdenum deposits, as at the Nunatak (MF036).

Alteration:

Age of mineralization:
Cretaceous or younger.

Deposit model:
Distal sulfide-rich replacement pods in limestone.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings. A sample of a partly oxidized sulfide pod in limestone exposed at the site contained 7000 ppm zinc, 500 ppm lead, 70 ppb cadmium, 30 ppm molybdenum and 1.5 ppm silver (MacKevett and others, 1971).

Production notes:

Reserves:

Additional comments:
MacKevett and others (1971, p. 55) thought that the deposits were too small to be of economic significance. The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (Adams Inlet)

Site type: Prospect

ARDF no.: MF065

Latitude: 58.85 **Quadrangle:** MF D-1

Longitude: 136.05

Location description and accuracy:

A molybdenite occurrence was reported by Buddington and Chapin (1929, p. 330) on the north side of Adams Inlet; apparently the same locality was cited by Smith (1942, p. 178). MacKevett and others (1971) found altered amygdaloidal basalt with somewhat anomalous molybdenum for a distance of about 500 feet on the north shore about 2.3 miles up the Inlet in the Juneau D-6 quadrangle, but apparently did not find the locality referred to by Buddington and Chapin. The coordinates are for a point just east of Pt. George, about at the point shown by Cobb (1972). The location is uncertain but is geologically reasonable.

Commodities:

Main: Mo

Other:

Ore minerals: Molybdenite

Gangue minerals:

Geologic description:

Granite of Cretaceous age forms a batholithic mass that crops out on Point George and extends northerly to the Klotz Hills. Another granitic intrusion, about 1 mile across, occurs on the north side of Adams Inlet 1 mile east of the granite exposed on Point George. The two granitic intrusives are separated by volcanic and sedimentary rocks of Devonian and Silurian age (Brew and others, 1978, pl. 1A).

Buddington and Chapin (1929, p.330) reported molybdenite as coatings on fracture surfaces in metamorphic rocks, mainly hornfels and tactite, on the north side of Adams Inlet. The molybdenite occurrence is inferred to be in the belt of sedimentary and volcanic rocks that separates the major granitic intrusion exposed on Point George from the smaller mass exposed in Adams Inlet about two miles east of Point George.

Alteration:

Age of mineralization:

Cretaceous or younger.

Deposit model:
Tactite or skarn molybdenum occurrence.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Ten claims reported in 1912 (Kimball and others, 1978, p. C351); there are no obvious workings.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
Buddington and Chapin, 1929; Smith, 1942; Cobb, 1972 (MF-436); Cobb, 1978 (OFR 78-316); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Buddington and Chapin, 1929

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (west mouth of Shag Cove)

Site type: Occurrence

ARDF no.: MF066

Latitude: 58.645 **Quadrangle:** MF C-2

Longitude: 136.345

Location description and accuracy:

This occurrence is at an elevation of about 100 feet on the west side of Shag Cove at the mouth of Geikie Inlet, and on a small island just offshore. The location is accurate within 0.1 mile. The site location number 49 of MacKevett and others (1971), number 46 of Cobb (1972), and number 93 of Kimball and others (1978). Kimball and others (1978) reported other mineral occurrences in the area.

Commodities:

Main: Cu

Other: Ag, Co, Zn

Ore minerals: Azurite, bornite, chalcopyrite, cuprite?, malachite, pyrite, pyrrhotite

Gangue minerals: Quartz, sheared wall rock minerals

Geologic description:

Schist, marble, and hornfels derived from sedimentary and volcanic rocks of Paleozoic age crop out west of Shag Cove. A major northwest-striking fault underlies the Cove and is one of the major faults of the Glacier Bay area. A splay off the master fault appears to separate the metamorphic terrane from granitic rocks of Cretaceous age about 0.3 mile southwest of the cove (Brew and others, 1978).

The mineralized structure is a 65-foot-wide shear zone that strikes northeast and dips steeply northwest--apparently between the master and splay faults, both of which strike northwest.

The shear zone contains quartz veins and subparallel sulfide-rich pods. Pyrrhotite and pyrite are the most abundant sulfide minerals. Chalcopyrite and bornite, partly oxidized to azurite, malachite and cuprite (?), occur in lesser amounts. Sulfide-rich pods of pyrite, pyrrhotite and bornite also occur on the small island off the point at the north end of Shag Cove. A sample from a 3-foot-long sulfide pod in the shear zone contained 3000 ppm copper, 700 ppm zinc, 200 ppm cobalt, and 1 ppm silver (MacKevett and others, 1978, p. 51, table 9).. A selected sample from a pod exposed on the island contained 1.5 ppm silver, 260 ppm copper, and 100 ppm cobalt (Kimball and others, 1978, p. C366-367).

Alteration:
Local oxidation of copper minerals.

Age of mineralization:
Cretaceous or younger.

Deposit model:
Polymetallic vein of probable igneous affiliation (Cox and Singer, 1986; model 22c).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings. The occurrence on the mainland contains as much as 3000 ppm copper, 700 ppm zinc, 200 ppm cobalt, and 1 ppm silver. A selected sample of a sulfide pod which crops out on the island contained 1.5 ppm silver, 260 ppm copper and 100 ppm cobalt. Kimball and others (1978) reported occurences of sulfide-bearing quartz veins 1/2 mile from the mouth of the cove and of sulfide-rich pods and sulfide-bearing quartz veins about 1 1/2 miles from the mouth of the cove.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Cobb, 1978 (OFR 78-316); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (Francis Island)

Site type: Mine

ARDF no.: MF067

Latitude: 58.626 **Quadrangle:** MF C-1

Longitude: 136.177

Location description and accuracy:

The Francis Island mine site is on the southwest side of the island. The original site, described in several older reports (Buddington, 1926; Smith, 1933; Reed, 1938; Rossman, 1963) is now, apparently, largely covered by landslide debris. The occurrence is number 28 of MacKevett and others (1971), number 47 of Cobb (1972), and number 94 of Kimball and others (1978). It is accurate within 0.1 mile.

Commodities:

Main: Ag, Au, Cu, Zn

Other: Bi, Sb

Ore minerals: Bornite, chalcocite?, chalcopyrite, magnetite, malachite, pyrite, pyrolusite, sphalerite, tetrahedrite?

Gangue minerals: Calcite, tremolite

Geologic description:

The Francis Island occurrence is on the easternmost contact of a granitic intrusion of Cretaceous age. The intrusion is mostly underwater, but a substantial granitic mass, inferred to be part of the same pluton, is exposed on the south part of Marble Mountain across Whidbey Passage from Francis Island. The granitic rock is intruded into marble of Devonian and Silurian age (Brew and others, 1978; pl. IA).

Mineral deposits occur in sheared tremolitic marble and in pyroxene-garnet tactite about 5-feet thick at the granitic (quartz diorite) contact. Small rich pods of bornite and other minerals in tactite were described in older reports, including Buddington, (1926, p. 56), Buddington and Chapin (1929, p. 323), Smith, (1933, p. 323), Reed (1938, p.69) and Rossman (1963-B 1121-K, p. K51). Some of the material was mined. This site has apparently been covered by landslide debris. A mineralized fault zone 10 feet thick can be followed for 50 feet before it is covered with surficial debris; MacKevett and others (1971, fig. 8) show the probable relation of the original site to the fault zone, which locally contains chalcopyrite, bornite, tetrahedrite (?), chalcocite (?), pyrite, and probably sphalerite. Malachite and pyrolusite occur as secondary minerals. MacKevett and others (1971) reported 7000 ppm copper, 1000 ppm zinc, 200 ppm antimony, 150 ppm bismuth,

20 ppm tin, and 1.46 ounce per ton silver in a selected sample of copper-stained metamorphic rock collected at or near the fault zone. Magnetite occurs locally in the tactite. A soil survey suggests the possibility of buried mineral deposits in the area (MacKevett and others, 1971, fig. 8).

The U.S. Bureau of Mines (Kimball and others, 1978) reported a trace of tungsten and 7 ppm silver in float samples from the area.

Alteration:

Marble locally contains tremolite, and at intrusive contacts is altered to pyroxene - garnet skarn. Chlorite and tremolite also occur in calc-hornfels.

Age of mineralization:

Cretaceous (?).

Deposit model:

Copper skarn or tactite (Cox and Singer, 1986; model 18b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

18b

Production Status: No

Site Status: Inactive

Workings/exploration:

Surface cuts, now concealed by landslide debris, probably date back to 2 claims staked on the island in 1923, as reported by Buddington (1926) and repeated by Smith (1933) and Reed (1938). Buddington reported gold-silver-bearing bornite in a rich sulfide pocket in the tactite. MacKevett and others (1971) obtained maximum values of 7000 ppm copper, 1000 ppm zinc, 200 ppm antimony, 150 ppm bismuth, and 1.46 ounce/ton silver in a selected sample of copper-stained rock found near the inferred buried site.

Production notes:

Possible small production, no records.

Reserves:

Additional comments:

The deposit size is limited by the size of the island. A tactite or skarn affiliation is consisted by the high bismuth content found by MacKevett and others(1971).

The site is in Glacier Bay National Park and Preserve.

References:

Buddington, 1926; Buddington and Chapin, 1929; Smith, 1933; Reed, 1938; Rossman, 1963 (B 1121-K); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Smith prospect; Treadwell Yukon Co.; Willoughby Island

Site type: Mine

ARDF no.: MF068

Latitude: 58.592 **Quadrangle:** MF C-1

Longitude: 136.141

Location description and accuracy:

The deposit is on the west side of Willoughby Island at an elevation near 450 feet and about 1.5 miles south of the north tip of the island. Accuracy is uncertain. The prospect was not located by MacKevett and others (1971) in 1966. The map site is about the same as location number 96 (Kimball and others, 1978). It is probably correct within 0.1 to 0.2 mile. The site is also about the same as location number 48 of Cobb (1972). Rossman (1963, p. K51) was also uncertain of the location of the deposit, but the prospect was found by Reed (1938).

Commodities:

Main: Ag, Au

Other: Cu, Pb, Sb

Ore minerals: Chalcopyrite, jamesonite?, pyrite, tetrahedrite

Gangue minerals: Calcite

Geologic description:

Mineral deposits on Willoughby Island occur in a reefoid marble of Devonian or Silurian age that is part of a large carbonate package that underlies much of central Glacier Bay (Brew and others, 1978). At the mine, sulfide-rich replacement veins, as much as 1 foot thick, occur in marble at and near the intersection of lamprophyre dikes (Reed, 1938, p. 70-71). The lamprophyre dikes are relatively young, probably Tertiary in age. One vein was traced for about 100 feet. Sulfide minerals also occur as joint-fillings in the marble host rock.

Buddington (1924) reported very high grade ore from the property, which was optioned by Treadwell Yukon Co. in 1925. Assays of as much as 1.74 ounces of gold and 42 ounces of silver were reported, in addition to 25 percent each of lead and antimony, suggesting the presence of jamesonite or a similar sulfantimonide at the property. Buddington reported jamesonite at another occurrence on western Willoughby Island. Chalcopyrite and tetrahedrite have also been reported from the prospect site.

Alteration:

Extensive pyritic and ankeritic alteration of lamprophyre.

Age of mineralization:
Tertiary.

Deposit model:
Replacement sulfide veins.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:
The deposit was located in 1907 and leased to Treadwell Yukon Co. in 1925 (Shephard, 1926). Probably about that time, a forty-four foot long adit was driven, but it failed to hit the dike intersection that appeared to localize the ore on the surface. Buddington (1924) reported that a high-grade sample contained 1.74 ounces of gold and 42 ounces of silver per ton, and 25 percent each of lead and antimony, suggesting the possibility of jamesonite, which Buddington reported at another site on western Willoughby Island. Shephard (1926) sampled a 1-foot-thick massive sulfide vein at the property; the sample contained 0.12 ounce per ton gold, 11.9 ounces of silver per ton, 13.4 percent antimony, and 29.75 percent lead.

The U.S. Geological Survey failed to find the prospect in 1966 (MacKevett and others, 1971), but the party mostly searched south of this location and the country is steep and overgrown with vegetation.

Production notes:
Probable small production of high-grade ore.

Reserves:

Additional comments:
Dike-associated replacement mineralization in Paleozoic carbonate terrane. The site is in Glacier Bay Park and Preserve.

References:
Buddington, 1924 (written communication cited by MacKevett and others, 1971); Shephard, 1926; Reed, 1938; Rossman, 1963 (B 1121-K); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Reed, 1938; Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (northeast side of Willoughby Island)

Site type: Prospect

ARDF no.: MF069

Latitude: 58.60 **Quadrangle:** MF C-1

Longitude: 136.13

Location description and accuracy:
The deposit is reported to be on the northeast side of Willoughby Island at an elevation of 450 feet. It is assumed to be about 0.5 mile southwest of Johnson Cove. Accuracy is uncertain. The site is about the same as locality 49 in Cobb (1972) and locality 95 in Kimball and others (1978). The deposit was not found by the U.S. Geological Survey in 1966 (MacKevett and others, 1971).

Commodities:

Main: Cu

Other: As?, Co?

Ore minerals: Chalcopyrite, loellingite?, pyrite

Gangue minerals: Calcite

Geologic description:
The northeastern part of Willoughby Island is underlain by massive and bedded limestone of Devonian and Silurian age, part of a major reefoid mass (Brew and others, 1978). Locally the marble is cut by mafic dikes of Late Cretaceous or Tertiary age. At this prospect, pyrite, loellingite (?) and chalcopyrite form massive replacement layers or lenses in marble. One such massive sulfide deposit was described as 5-feet-thick and traceable on strike for 15 feet (Reed, 1938). At least three other similar occurrences were reported nearby by Reed.

Alteration:

Age of mineralization:
Late Cretaceous or younger.

Deposit model:
Massive sulfide replacement in marble. Distal deposit related to subjacent intrusive; deposits formed after late emplacement of mafic dikes.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:

The deposit has not been found since Reed's visit in the 1930s (Reed, 1938). Workings are unknown, but there probably were shallow pits and trenches on the eight claims staked on the deposit before 1902.

Production notes:

Reserves:

Additional comments:

The deposit is in marble of Devonian and Silurian age; mineralization followed emplacement of mafic dikes of probable Late Cretaceous or Tertiary age.

The site is in Glacier Bay National Park and Preserve.

References:

Reed, 1938; MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Reed, 1938

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (on Threesome Mountain)

Site type: Prospect

ARDF no.: MF070

Latitude: 58.5319 **Quadrangle:** MF C-2

Longitude: 136.5658

Location description and accuracy:

The deposit is on the east flank of Threesome Mountain, about 1.5 miles northeast of the head of Abyss Lake. Elevation of the deposit ranges from about 2000 to 2800 feet. The deposit is about one-half mile long, elongated east-west. The coordinate location is the approximate mid-point of the deposit, and is accurate to about 0.1 mile.

Commodities:

Main: Mo, W

Other: Ag, Cu

Ore minerals: Chalcopyrite, molybdenite, scheelite, silver mineral?

Gangue minerals: Quartz

Geologic description:

This molybdenum-tungsten prospect is in a terrane composed mainly of Paleozic sedimentary rocks. The prospect is east of a major fault that separates the Paleozoic strata from granitic rock of Mesozoic age. The fault is concealed by Brady Glacier and is inferred to control the course of Taylor Bay to the south (Brew and others, 1978). The deposit is of porphyry-type. Molybdenite and scheelite, with minor chalcopyrite, occur in the roof-zone of a Tertiary granodiorite stock that intrudes volcanic and sedimentary rocks (limestone) of Devonian age. The molybdenite and scheelite occur in quartz veins and as fracture coatings on joints in the intrusion. Molybdenum-bearing vein density measured by the U.S. Bureau of Mines (Kimball and others, 1978, p. C-253-C256) was about eight veins per 100 feet. The maximum observed vein thickness was 0.2 foot, with an average of about 0.08 foot. Mineralized veins and fractures strike east-northeast and dip from 25 to 76 degrees northwest. Selected vein samples contained as much as 2000 ppm molybdenum, 4917 ppm tungsten, 7 ppm silver, and 330 ppm copper. Iron-stained hornfels near the granitic stock contains as much as 200 ppm copper and 50 ppm tungsten. The deposit has been drilled, and is a resource on the order of 0.0X percent equivalent molybdenum.

Richer tactite deposits could occur in nearby contact zones between the stock and the limestone.

Alteration:
Local iron staining.

Age of mineralization:
Tertiary.

Deposit model:
Porphyry molybdenum-tungsten deposit, similar to W skarn and porphyry Mo of Cox and Singer (1986; model 14a and 21b). Associated tactite. Porphyry deposit is mainly mineralized fracture surface type.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
14a, 21b

Production Status: No

Site Status: Inactive

Workings/exploration:
The deposit was discovered by Alvenco, Inc. in 1968, who staked 24 claims to cover it. Alvenco drilled three diamond drill holes to evaluate the deposit. The grades were in the low 0.0X range molybdenum equivalent . Selected samples collected by the Bureau of Mines contained as much as 2000 ppm molybdenum and more than 4000 ppm tungsten (Kimball and others, 1968).

Production notes:

Reserves:

Additional comments:
The deposit is in Glacier Bay National Park and Preserve.

References:
Brew and others, 1978; Kimball and others, 1978; Cobb, 1981 (OFR 81-249A); Cobb, 1981 (OFR 81-249B).

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (upper Dundas Bay)

Site type: Occurrence

ARDF no.: MF071

Latitude: 58.46 **Quadrangle:** MF B-2

Longitude: 136.54

Location description and accuracy:

The site consists of an area near the head of Dundas Bay (sections 29-30, T. 39 S., R. 54 E., of the Copper River Meridian). The coordinates are the approximate location of a metallized skarn; they are at the approximate midpoint of sections 29 and 30.

Commodities:

Main: Ag, Mo, Sn, W

Other: Au, Bi

Ore minerals: Cassiterite?, molybdenite, powellite, scheelite, unknown Bi-bearing mineral

Gangue minerals: Diopside, epidote, garnet

Geologic description:

The country rocks in the area of this occurrence consist mainly of sedimentary rocks of Paleozoic age and sedimentary and granitic intrusive rocks of Paleozoic age. The area is east of the major fault that separates Mesozoic from Paleozoic terrane in southwest Glacier Bay National Park and Preserve (Brew and others, 1978). A granitic (granodiorite) pluton of Tertiary age invades older sedimentary and granitic rock, including pendants of Paleozoic limestone, partly converting the limestone to skarn.

This occurrence encompasses an area characterized by anomalous amounts of molybdenum, tin, and tungsten in stream-sediment samples, rock samples, and in outcropping metaliferous skarn. The anomalous area is elongated east-west on the contact between Tertiary granodiorite to the south and Cretaceous and older sedimentary and igneous rocks to the north. The skarn, mainly developed in limestone of Paleozoic age, contains powellite and as much as 150 ppm tin , 200 ppm bismuth, 79 ppm tungsten and 8.5 ppm gold (Kimball and others, 1978, p. C257-C263). Scheelite and molybdenite also occur locally and scheelite is relatively abundant in panned concentrates. The sources of the anomalies are not fully known, but they probably include both the granitic rocks and the contact skarn zones.

Alteration:

Contact metasomatism, development of skarn.

Age of mineralization:
Tertiary.

Deposit model:
Skarn and molybdenum-tungsten-tin porphyry similar to Sn skarn and porphyry Mo of Cox and Singer (1986; model 14b and 21b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
14b, 21b

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no known workings. MacKevett and others (1971) reported anomalous concentrations of tungsten in stream sediments in 1966. I followed up these anomalies in 1972 for Union Carbide. We confirmed the results and found abundant scheelite in panned concentrates, but did not proceed because the location was then in the National Monument; the future of development was uncertain. More samples were collected by the Bureau of Mines (Kimball and others, 1978, p. C257-C263). Apparently the Bureau concentrated more on the skarn and Cretaceous rocks than on the Tertiary intrusive.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay Park and Preserve.

References:
MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978; Cobb, 1981 (OFR 81-249A); Cobb, 1981 (OFR 81-249B).

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (east of Brady Glacier)

Site type: Occurrence

ARDF no.: MF072

Latitude: 58.440 **Quadrangle:** MF B-2

Longitude: 136.609

Location description and accuracy:

This iron occurrence is at an elevation of about 1350 feet about 0.25 mile south of the southeast edge of an east-pointing arm of Brady Glacier and approximately 3.5 miles north-northwest of the head of the west arm of Dundas Bay. It is in the SW 1/4 SE 1/4 section 35, T. 39 S., R. 53 E., of the Copper River Meridian. (Kimball and others, 1978, report iron-rich skarn lenses in this vicinity from 1300 to 1700 feet elevation.) Location is accurate within 0.1 mile.

The occurrence is the same as number 54 of MacKevett and others (1971), number 53 of Cobb (1971), and number 63 of Kimball and others (1978).

Commodities:

Main: Fe

Other: Ag, Cu, Mo

Ore minerals: Chalcopyrite, magnetite, molybdenite?, pyrite

Gangue minerals: Garnet, quartz

Geologic description:

The country rocks in the area of this occurrence consist of a northwest-trending belt of Paleozoic marble bounded on the west by foliated granodiorite of Cretaceous age and on the east by leucocratic biotite granite and affiliated rocks of Tertiary age (Brew and others, 1978). Magnetite lenses as much as 15 feet thick and 35 feet long occur in northwest-striking, steeply dipping bodies in limy hostrocks intermixed with leucocratic granitic rock. The limy rocks are partly converted to skarn. MacKevett and others (1971, p. 72, table 9) reported more than 10 percent iron, 1000 ppm copper, and 7 to 15 ppm molybdenum in grab and selected samples collected at the site. They also reported magnetic anomalies of as much as 5000 gammas, but believed that the iron-rich lenses were too small to be commercially significant.

A selected sample collected by the U.S. Bureau of Mines (Kimball and others, 1978, p. C267) contained 1400 ppm copper, 1.5 ppm silver, and greater than 20 percent iron. Samples of lenses that ranged from 4.5 to 35 feet across contained more than 30 percent iron and as much as 750 ppm copper.

Alteration:
Skarn, contact metasomatic deposit.

Age of mineralization:
Tertiary.

Deposit model:
Fe skarn (Cox and Singer, 1986; model 18d).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
18d

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings. The Geological Survey and Bureau of Mines sampled only surface exposed occurrences. Samples collected by MacKevett and others (1971) contained 7-15 ppm molybdenum, 1000 ppm copper and greater than 10 percent iron. Kimball and others (1978) reported iron to greater than 30 percent and, in one selected sample, 1400 ppm copper.

The magnetite-rich skarn lenses are as much as 35 feet long and are traceable through a vertical range of at least 400 feet.

Production notes:

Reserves:

Additional comments:
Although some of the skarn bodies are rich enough to constitute iron ore, they are too small to be exploited. The proximity of this site to the Threesome Mountain (MF070) molybdenum-tungsten area, also affiliated with a Tertiary granite, suggests that the area could contain skarns having more molybdenum and copper.

The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (west arm of Dundas Bay)

Site type: Occurrence

ARDF no.: MF073

Latitude: 58.356 **Quadrangle:** MF B-2

Longitude: 136.500

Location description and accuracy:

This occurrence is on a small island in the south part of the west arm of Dundas Bay. The island is near the center of section 33, T.40 S., R. 54 E., of the Copper River Meridian. The location is accurate to 0.1 mile. It is the same site as number 67 of Kimball and others (1978) and number 58 of MacKevett and others (1971).

Commodities:

Main: Cu

Other: Ag, Co

Ore minerals: Chalcopyrite

Gangue minerals:

Geologic description:

The site is in a belt of quartz-feldspar-hornblende paragneiss and gneissic diorite. The protolith of the gneiss is Paleozoic in age; metamorphism occurred in the Cretaceous (Brew and others, 1978). At the site, hornblendite dikes as much as 10 feet thick contain disseminated chalcopyrite and lenses of nearly massive chalcopyrite as much as 2 inches thick and 6 inches long. The dikes cut garnetiferous gneissic diorite.

A grab sample of sulfide-bearing hornblendite collected during the U.S. Geological Survey's 1966 investigation of Glacier Bay contained 10,000 ppm copper by spectrographic analysis (MacKevett and others, 1971, table 9). Kimball and others (1978, p. C270) reported 1.8 percent copper, 3 ppm silver, and 700 ppm cobalt in selected samples of narrow chalcopyrite-rich lenses.

The dikes appear to be post-Cretaceous metamorphism. They are probably Late Cretaceous or younger in age.

Alteration:

Age of mineralization:

Probably Cretaceous or younger. The copper minerals occur in hornblendite dikes which cut metamorphic strata of Paleozoic age.

Deposit model:
Disseminated copper deposit in ultramafic (hornblendite) rock.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
MacKevett and others (1971) reported about 1 percent Cu in samples of hornblendite dikes. Kimball and others (1978) reported 1.8 percent copper in selected samples of copper-rich lenses; the selected samples contained as much as 3 ppm silver and 700 ppm cobalt. There are no mine workings.

Production notes:

Reserves:

Additional comments:
The copper and cobalt content of the occurrence is significant , but the size is limited because the dikes are narrow and the island small. The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Sunrise, Newsboy, and Red Top claims of 'Doc' Silver

Site type: Occurrence

ARDF no.: MF074

Latitude: 58.382 **Quadrangle:** MF B-2

Longitude: 136.475

Location description and accuracy:

This site is on the northwest side of the mountain between Dundas Bay and the west arm of the Bay. The deposits are probably in the SW 1/4, section 22, T. 40 S., R. 54 E., of the Copper River Meridian. Mine workings mentioned by Stewart (1949) on the Red Top claims were at about 440-foot elevation. The location is probably within the old claim block and within about 0.25 mile of the site on the ground.

The site is approximately the same as number 57 of MacKevett and others (1971) and number 66 of Kimball and others (1978).

Commodities:

Main: Au

Other: Ag, Pb

Ore minerals: Galena?, gold (native)

Gangue minerals: Quartz

Geologic description:

Auriferous quartz veins occur in or near the contact zone of a foliated granitic intrusion of Cretaceous age and quartz-feldspar-hornblende gneiss of Paleozoic ancestry (Brew and others, 1978). The age of mineralization is believed to be Late Cretaceous or younger, as undeformed quartz veins occur in and cut foliated granitic rocks of Cretaceous age.

The property consisted of about 47 lode claims when it was visited by Stewart of the Territorial Department of Mines in 1938 (Stewart, 1949). Stewart reported a steeply dipping quartz vein 1 to 2 feet thick near 440 feet elevation. In a later investigation, the U.S. Bureau of Mines (Kimball and others, 1978) found quartz veins near the approximate site of Stewart's examination. One quartz vein was 0.5 foot thick; another, in diorite country rock, was about 2 feet thick. A vein, sampled over 1.9 ft. width, contained 5 ppm silver, 250 ppm lead, and 0.275 ounce per ton gold.

Alteration:

Age of mineralization:

Late Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: No

Site Status: Inactive

Workings/exploration:
Stewart (1949) reported mine workings and an auriferous quartz vein near 440 feet elevation above Dundas Bay. The vein was observed during an examination that he made in 1938. Kimball and others (1978) found mining debris, probably near Stewart's location. A 1.9 foot vein sampled by the Bureau of Mines in 1975 contained 0.275 oz/ton gold, 5 ppm silver and 250 ppm lead.

The site appears to have been active in the late 1930s, with as least as many as 47 claims--24 Sunrise, 15 Newsboy, and 8 Red Top. Stewart (1949) reported that, in 1933, 'Doc' Silver held two Red Top claims. The area is steep and brushy, but because of the evidence of mining activity found by the U.S. Bureau of Mines in 1975, the site is almost certainly at least partly coincident with the area of the 'Doc' Silver claims. The auriferous vein found by the U.S. Bureau of Mines may not, however, be the same vein that was reported by Stewart.

Production notes:

Reserves:

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
Stewart, 1949; MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Stewart, 1949

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (east side of Dundas Bay)

Site type: Occurrence

ARDF no.: MF075

Latitude: 58.375 **Quadrangle:** MF B-1

Longitude: 136.288

Location description and accuracy:

This occurrence is east of the mouth of the Dundas River and is mostly in the west half of section 26, T. 40 S., R. 55 E., of the Copper River Meridian. It ranges from 100 feet wide to more than 1000 feet wide and extends from the shoreline northerly for about one mile. The coordinates are at the approximate center of the occurrence, which is the same as number 31 of MacKevett and others (1971), number 57 of Cobb (1972), and within figure C73 of Kimball and others (1978).

Commodities:

Main: Cu

Other: Ag, Au, Mo, Pb, Zn

Ore minerals: Chalcopyrite, galena?, malachite, pyrite, sphalerite

Gangue minerals: Muscovite (sericite?) , quartz

Geologic description:

Pyritic quartz-mica semischist, that possibly is a metarhyolite,and metabasalt appear to occur within a unit that elsewhere consists mainly of graywacke and argillite of Silurian and Devonian age (Brew and others, 1978). Foliated granitic rocks crop out west of the pyritic schists. The granitic rocks are inferred to be extensive, but are covered by water in Dundas Bay.

The pyritic semischist, which is the mineralized unit, forms a steep, north trending body from 100 feet to more than 1000 feet thick. It in sharp contact with adjacent metabasalt. Pyrite is more abundant than chalcopyrite in the semischist unit, but chalcopyrite is generally present. The semischist is cut locally by veinlike zones that contain relatively abundant chalcopyrite.

The occurrence is probably syngenetic and volcanigenic. Chalcopyrite may have been remobilized into the vein-like zones during Cretaceous metamorphism.

Selected samples of the semischist unit contained as much as 1 ppm silver and 2000 ppm copper (MacKevett and others, 1971, table 9). Kimball and others (1978) reported 2 ppm silver, 320 ppm copper, and 230 ppm zinc in a 50 foot long chip sample of the semischist. Molybdenum is commonly present and assayed as much as 100 ppm in a 12

foot chip sample. Moerlein (1968) collected 35- and 20-ft. chip samples from a northwest-striking shear zone within the semischist; his samples contained, respectively, 0.51 and 0.34 percent copper.

Alteration:
Local oxidation of copper minerals.

Age of mineralization:
Devonian-Silurian with possible remobilization during the Cretaceous.

Deposit model:
Volcanogenic, cupriferous metarhyolite -- similar to kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
Similar to 28a

Production Status: No

Site Status: Inactive

Workings/exploration:
Claims reportedly staked for gold, lead, zinc and copper were reported in the east Dundas Bay area by Wright and Wright (1937). In the 1966 examination by the U.S. Geological Survey, only surface exposures were examined and sampled. A chip sample collected across 40-feet of semischist contained 1000 ppm copper; a malachite stained zone contained 2000 ppm copper (MacKevett and others, 1971). Moerlein (1968) found as much as 0.51 percent copper in a northwest trending shear zone within the pyritic semischist unit. Samples of semischist collected by the U.S. Bureau of Mines (Kimball and others, 1978) showed anomalous silver, molybdenum, and zinc as well as copper. Maximum reported molybdenum content was 100 ppm.

Production notes:

Reserves:

Additional comments:
Although the reported grade of the deposit is subeconomic, its size and possible volcanogenic nature encourages further exploration and the mapping of the Devonian-Silurian volcanic stratigraphy.
The site is in Glacier Bay National Park and Preserve.

References:
Wright and Wright, 1937; MacKevett and others, 1971; Moerlein, 1968; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (east of Dundas Bay)

Site type: Occurrence

ARDF no.: MF076

Latitude: 58.355 **Quadrangle:** MF B-1

Longitude: 136.280

Location description and accuracy:

This occurrence is at an elevation of about 100 feet on the east side of Dundas Bay about 2.5 miles north of the mouth of the Bay. It is about 0.5 mile northeast of triangulation station Deed and is accurately located within about 0.25 mile. The location is approximately the same as number 58 of Cobb (1972), number 32 of MacKevett and others (1971), and number 68 of Kimball and others (1978).

Commodities:

Main: Cu, Mo

Other: Ag

Ore minerals: Chalcopyrite, malachite, molybdenite

Gangue minerals: Quartz

Geologic description:

A foliated quartz diorite of Cretaceous age forms a stock-like pluton on the east side of the mouth of Dundas Bay. It is in contact to the north with metamorphosed sedimentary rocks of Devonian and Silurian age (Brew and others, 1978). MacKevett and others (1971) found malachite-stained quartz stringers, containing chalcopyrite and molybdenite, within quartz veins in cataclastic quartz diorite. The veins are of Late Cretaceous or younger age.

A sample collected to represent quartz-vein-bearing sheared rock contained 1000 ppm copper and 300 ppm molybdenum. Samples collected by the U.S. Bureau of Mines from the same or nearby sites contained as much as 1900 ppm copper, 10 ppm molybdenum, and 1 ppm silver.

Alteration:

Local oxidation of copper minerals.

Age of mineralization:

Probably Cretaceous or younger.

Deposit model:
Low-sulfide quartz-copper-bearing vein.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings. A representative sample of copper-stained sheared and quartz-veined quartz diorite collected by MacKevett and others (1971, table 9 location 32) contained 1000 ppm copper and 300 ppm molybdenum. Chip samples collected by Bureau of Mines (Kimball and others, 1978, p. C270) contained as much as 1900 ppm copper, 10 ppm molybdenum and 1 ppm silver.

Production notes:

Reserves:

Additional comments:
The occurrence is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Alaska Chief

Site type: Prospect

ARDF no.: MF077

Latitude: 58.445 **Quadrangle:** MF B-1

Longitude: 136.101

Location description and accuracy:

The Alaska Chief prospect is on a steep northeast-facing sidehill at about 1150 ft elevation. The prospect is about 0.7 mile southwest of Ripple Cove and about 0.85 mile slightly north of east from Hill 2146. Its general location is 5 miles north of the mouth of Glacier Bay into Icy Straits on the west side of the bay. The prospect is accurately located by elevation, but its location could range within about 0.15 mile along the contour. It was formerly accessible by trail from Ripple Cove, but the trail is badly overgrown.

Commodities:

Main: Ag, Au, Cu

Other: Bi, Co, Ni, Zn

Ore minerals: Azurite, bornite, chalcopyrite, limonite, malachite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Calcite, quartz

Geologic description:

Rocks exposed in the vicinity of the deposit are limestone and marble of Paleozoic age, and foliated granodiorite of probable Cretaceous age. About 0.1 mile west of the deposit, a lighter colored granitic rock of probable Tertiary age intrudes the granodiorite (MacKevett and others, 1971). Massive sulfides and tactite replace marble and hornfels in the contact zone of the granodiorite pluton. The major components of the tactite are grossularite-rich garnet, epidote and zoisite. The contact and relict bedding at the deposit strike about N 30 W and dip steeply to the southwest. Although the deposit is physically associated with the contact of foliated granodiorite of Cretaceous age, it is possible that the mineral deposit is genetically related to the younger intrusion and only physically controlled by the favorable older contact zone.

The deposit consists of a massive-sulfide body grading out into a disseminated deposit in contact altered country rock (Reed, 1938). The massive sulfide replacement body occurs under a 150- by 55-foot stripped area. At the surface, the massive sulfide body was oxidized to a limonitic gossan, possibly manganiferous. Azurite and malachite are locally abundant in the oxidized part of the deposit. The underlying sulfide-rich deposit contains

bornite, chalcopyrite, pyrite, pyrrhotite and sphalerite.

Grab samples of ore stockpiled near old workings contained more than 10 percent copper. MacKevett and others (1971) reported as much as 0.232 ounce per ton gold, 4.4 ounces per ton silver, and 1.5 percent copper when they resampled the deposit in 1966.

Alteration:

Formation of contact-metasomatic calc-silicate minerals in limestone and contact zone of granitic intrusion; local oxidation of copper and iron minerals.

Age of mineralization:

Late Cretaceous or younger.

Deposit model:

Copper skarn (Cox and Singer, 1986; model 18b). Contact metasomatic copper-gold deposit, massive sulfide and skarn replacement.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

18b

Production Status: No

Site Status: Inactive

Workings/exploration:

The prospect was discovered before 1906 and was patented in 1924. It was explored by clearing vegetation off the outcrop and by an adit driven about 60 feet below the outcrop. Wright and Wright (1937, p. 221-222) reported the adit as 130 feet in length. Reed (1938, p. 37), and MacKevett and Cornwall (in MacKevett and others, 1971, p. 45-48, fig. 9) found an adit less than 40 feet long. It thus appears likely that the Wrights' footage measurement is in error or that the workings found by the Wrights are covered by surface debris.

MacKevett and others (1971) reported as much as 1.5 percent copper, 700 ppm zinc, 0.232 ounce per ton gold and 4.4 ounce per ton silver and geochemically anomalous sample values molybdenum, bismuth, nickel and cobalt. A grab sample from an old ore pile contained more than 10 percent copper. A soil sample collected below the stripped area contained 50 ppm each of silver and gold, 15,000 ppm copper, 300 ppm each of bismuth and cobalt, 500 ppm nickel and 1500 ppm zinc. The deposit has not been drilled.

Production notes:

Reserves:

Based on a surface dimension of 150 x 30 feet projected to a depth of 50 feet, and a tonnage factor of 8 cubic-feet / ton, MacKevett and others (1971, p. 48) propose an indicated reserve of about 28000 tons that would contain more than 1 percent copper, 2 ounces per ton silver, and 0.10 ounce per ton gold. This estimate, however, is probably too high because the adit driven below the deposit is in lower-grade ore. Kimball and others (1978,

p. C353) concurred with the USGS's reserve estimate but it seems more realistic to call it inferred because the subsurface data are so scant.

Additional comments:

The deposit justifies further study and exploration because of its grade and possible size. It is in Glacier Bay National Park and Preserve.

References:

Wright and Wright, 1937; Reed, 1938; MacKevett and others, 1971; Cobb, 1972 (MF-436); Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 01/22/99

Site name(s): Unnamed (west of Alaska Chief)

Site type: Occurrence

ARDF no.: MF078

Latitude: 58.436 **Quadrangle:** MF B-1

Longitude: 136.153

Location description and accuracy:
This site is at an elevation of about 400 feet on the left limit of a southeast-flowing creek that enters Icy Strait about 1 mile west of the mouth of Glacier Bay. The occurrence is about 2 miles west-southwest of the Alaska Chief prospect (MF077) and about 5.6 miles northwest of Pt. Carolus. It is located within about 0.2 mile. The occurrence is the same as number 30 of MacKevett and others (1971) and number 98 of Kimball and others (1978).

Commodities:

Main: Ag, Pb, Zn

Other:

Ore minerals: Galena?, sphalerite

Gangue minerals:

Geologic description:
The mineral occurrence is within a large felsic granitic intrusion of Tertiary age (Brew and others, 1978). A representative sample from a 3-foot wide shear zone in the granite contained 7 ppm silver, 1500 ppm zinc, and 300 ppm lead (MacKevett and others, 1971, table 9).

Alteration:

Age of mineralization:
Tertiary.

Deposit model:
Mineralized shear zone, distal.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
No workings. Exploration limited to chip sample reported by MacKevett and others (1971, location 30).

Production notes:

Reserves:

Additional comments:
The mineral site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Christmas and Enterprise (Whitney claims, Lemesurier Island)

Site type: Prospect

ARDF no.: MF079

Latitude: 58.258 **Quadrangle:** MF B-1

Longitude: 136.097

Location description and accuracy:
The prospect is about 50 feet above sea level near the southernmost point on Lemesurier Island, about 0. 2 mile west of triangulation station Gail. It is located accurately within about 0.1 mile. It is location 61 of Cobb (1972).

Commodities:

Main: Mo

Other: Cu

Ore minerals: Chalcopyrite, molybdenite

Gangue minerals: Calcite, quartz

Geologic description:
Molybdenum and copper occur in contact-type deposits in marble of Paleozoic age that has been intruded by a granitic pluton of probable Cretaceous age (Knopf, 1912, p. 17; Buddington, 1926, p. 55-56; Reed, 1938). At the Whitney claims, a thirty-foot-wide zone along a contact between marble and granitic rock is mainly garnet-pyroxene tactite. A 78-foot adit driven in about 1916, started in tactite, cut through banded hornfels and quartzite, and ended in 'diorite' (Smith, 1942, p. 176) Molybdenite occurs as fracture coatings and as disseminations in the tactite. Hornfels is developed locally and contains chalcopyrite. Local molybdenite-lined vugs or pockets in the tactite contain as much as several percent molybdenum.

Alteration:
Development of hornfels and tactite.

Age of mineralization:
Cretaceous or younger.

Deposit model:
Contact metasomatic deposit, molybdenum skarn.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Probably inactive

Workings/exploration:

Surface exposures of molybdenite and chalcopyrite were explored in a 78-foot-long tunnel and 25-foot-crosscut, that were driven in about 1916. The occurrence was first reported by Knopf (1912), and subsequently described in resource summaries by Brooks (1918, 1919, 1921), Kaufman (1958), Berg and Cobb (1967) and Cobb (1972). The site was also noted by Buddington (1926, p. 55-56) and Buddington and Chapin (1929, p. 329-330). It was visited by Reed (1938). Smith (1942, p. 176-177) summarized developments and also reported that Reed believed the prospect deserved more work.

Production notes:

Small test shipments made.

Reserves:

Additional comments:

Two patented claims, inactive for many years. Favorable area for skarn and porphyry-type molybdenum-copper deposits. The area is in Tongass National Forest, outside of Glacier Bay National Park and Preserve. It appears to be open for mineral location.

References:

Knopf, 1912; Brooks, 1918; Brooks, 1919; Brooks, 1921; Buddington, 1926; Buddington and Chapin, 1929; Reed, 1938; Smith, 1942; Kaufman, 1958; Berg and Cobb, 1967; Cobb, 1972 (MF-436).

Primary reference: Buddington, 1926; Reed, 1938

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 01/25/99

Site name(s): Unnamed (near Iceberg Point, Lemesurier Island)

Site type: Prospect

ARDF no.: MF080

Latitude: 58.263 **Quadrangle:** MF B-1

Longitude: 136.076

Location description and accuracy:
The occurrence is almost at sea level on Iceberg Point, south of Jacks Cove and west of Willoughby Cove on the south-central coastline of Lemesurier Island. The site is location number 62 of Cobb (1972). It is accurately located within 0.15 mile.

Commodities:

Main: Cu, Mo

Other:

Ore minerals: Bornite, chalcopyrite, molybdenite

Gangue minerals: Calcite, epidote, garnet, paligorskite, quartz

Geologic description:
The occurrence is in limestone of Paleozoic age which, elsewhere on Lemesurier Island, is cut by granitic intrusions. The mineral suite reported at the locality--quartz, garnet, epidote, pyroxene, calcite, molybdenite, chalcopyrite, and bornite--(Smith, 1942, p. 177) is a tactite suite, probably related to a nearby intrusion. An unusual asbestos-like mineral, paligorskite, called mountain leather, formed as replacement of limestone near copper-molybdenum bearing vein occurrences. Paligorskite masses reportedly were mined by Joe Ibach.

The site is about three-quarters of a mile east-northeast of the Whitney claims (MF079) another occurrence of copper-molybdenum minerals on the island.

Alteration:
Development of tactite in limestone.

Age of mineralization:
Cretaceous or younger.

Deposit model:
Distal tactite, suspected intrusion not exposed.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:

Surface exposures of copper and molybdenum minerals were explored by trenches and cuts dug by long-time southeast Alaska prospector Joe Ibach, who occasionally lived on the island. The occurrence was first reported by Buddington (1926). It was also listed by Buddington and Chapin (1929) and briefly described by Smith (1942, p. 177).

Production notes:

Production of paligorskite, probably as mineral specimens by Ibach.

Reserves:

Additional comments:

The prospect is in a carbonate terrane of Paleozoic age. The prospect is in Tongass National Forest and appears to be open for mineral location. Claim activity is unknown.

References:

Buddington, 1926; Buddington and Chapin, 1929; Smith, 1942; Cobb, 1972 (MF-436); Cobb, 1978.

Primary reference: Buddington, 1926; Smith, 1942

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Marvitz; Ibach

Site type: Mine

ARDF no.: MF081

Latitude: 58.123 **Quadrangle:** MF A-2

Longitude: 136.420

Location description and accuracy:

The mine, on the northwesternmost part of Chichagof Island, is on a northwest-facing mountain side below Vein Mountain and east of Column Point. Workings have been reported at 850, 980, and 1080-foot elevations (Reed, 1938). The location is near number 63 of Cobb (1972). Another mineral locality probably exists on the mountain at an elevation of about 1500 feet. The approximate location of the mine is shown on Plate 16 of Rossman (1959, B 1058-E). The coordinates of the site are approximate, but are probably within 0.25 mile of the reported mine workings.

Commodities:

Main: Au

Other: As, Pb

Ore minerals: Arsenopyrite, galena, gold (native), pyrite

Gangue minerals: Quartz

Geologic description:

Northwest Chichagof Island is underlain mainly by schist, slate, and greenstone of Triassic or Jurassic age (Rossman, 1959, B 1058-E; Loney and others, 1975). Near the Marvitz mine, schist and slate strike north-northwest and dip steeply northeast; northeast cross joints are steep. The cross (northeast) structures are filled with lenticular quartz veins as much as 5 feet thick and with quartz andesite dikes as much as 4 feet thick. The veins are closely spaced in quartz-sericite schist and slate, and locally contain gold (native), pyrite, arsenopyrite, and galena. A quartz andesite dike at 1500-foot elevation contains pyrite, arsenopyrite and is reported to contain gold (Reed, 1938, p. 75-76; Rossman, 1959, p. 211). Another gold vein was reported to exist about 1/4 mile east of Column Point, but it was not found by Rossman. The creek draining the mine area, and the beach where the creek enters Cross Sound are reported to contain gold-bearing placer deposits. Rossman also suggests that there may be gold-bearing veins on the hill slopes below hill 1658 (elevation of point) about 1/4 mile west of the Marvitz mine.

Alteration:

Age of mineralization:
Post Jurassic. Probably Cretaceous or younger emplaced in cross-cutting structures and dike-rocks of intermediate composition.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: Undetermined.

Site Status: Not determined

Workings/exploration:
A short adit was driven at 850 ft. elevation, a 50-ft.-long adit at 980 feet elevation, and a 210-ft.-long adit at about 1080 ft. elevation (Reed, 1938). Shallow pits or trenches are also reported. There may be small-scale workings on the placer deposits reported below the mine.

Production notes:
Less than 100 ounces of gold.

Reserves:
No known reserves.

Additional comments:
The Vein Mountain area was proposed by Rossman (1959, B 1058-E) to be part of a gold-favorable metamorphic belt that extends from the Chichagof mines north-northwest through the Apex-El Nido area to Vein Mountain. Rossman proposes a very favorable gold prospecting area exists that is centered near the southwest ridge of Vein Mountain (about 58.11 and 136.42). The beach adjacent to the creek draining the mineralized area (location about 58.122, 137.424) is reported to be auriferous. The area appears to be on U.S. Forest Land available under the Mining Law. It is outside of Glacier Bay National Park and Preserve.

References:
Reed, 1938; Rossman, 1959 (B 1058-E); Cobb, 1972 (MF-436); Loney and others, 1975.

Primary reference: Reed, 1938; Rossman, 1959 (B 1058-E)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Yakobi Island; Miner Island

Site type: Mine

ARDF no.: MF082

Latitude: 58.012 **Quadrangle:** MF A-2

Longitude: 136.343

Location description and accuracy:
The mine is accurately located (to within 0.1 mile) on the shore line of Yakobi island, northwest of Miner Island. It is on the point west of the junction of Lisianski Strait with Lisianski Inlet (west). The site is location number 64 of Cobb (1972).

Commodities:

Main: Au

Other: Cu

Ore minerals: Chalcopyrite, gold (native)

Gangue minerals: Clay (gouge), quartz

Geologic description:
The Yakobi Island gold-quartz vein is within an intrusion of quartz diorite, of Cretaceous age, which forms a major granitic batholith on Chichagof, Baranof, and Yakobi Islands (Loney and others, 1975). A coarse-grained hornblendite occurs within a few feet of the vein deposit.

The mineralized quartz vein is from 1to 3 feet wide, dips steeply, and strikes northwest. The quartz occurs along a shear zone, associated with clay gouge, in a dark colored phase of the quartz diorite. Locally, the vein contains small amounts of chalcopyrite and native gold. The vein was developed by a short adit; the quartz pinched out in the adit, but was picked up on strike on the surface above the workings, indicating that quartz masses along the shear zone are lenticular (Overbeck, 1919).

Alteration:
Clay gouge developed along shear zone.

Age of mineralization:
Cretaceous or younger.

Deposit model:
Low-sulfide gold-quartz vein (Cox and Singer, 1986; model 36a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
36a

Production Status: Yes; small

Site Status: Undetermined

Workings/exploration:
A 35-foot-long adit was driven about 1887 on the shear zone, just above tide level. Four claims were active in 1917.

Production notes:
About 55 ounces of gold were produced before 1917.

Reserves:

Additional comments:
The site is in Rossman's hypothetical gold belt (plate 16, 1959). The site is in Tongass National Forest on land of unknown mining status.

References:
Overbeck, 1919; Rossman, 1959 (B 1058-E); Cobb, 1972 (MF-436); Loney and others, 1975; Cobb, 1978 (OFR 78-316).

Primary reference: Overbeck, 1919

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/14/99

Site name(s): Unnamed (east of Dundas Bay)

Site type: Occurrence

ARDF no.: MF083

Latitude: 58.35 **Quadrangle:** MF B-1

Longitude: 136.17

Location description and accuracy:
The occurrence is at or near the north shoreline of Icy Strait and about 5 miles northeast of the mouth of Dundas Bay. It is approximately located within about 0.5 mile. The approximate location was taken from an unpublished map by Darwin Rossman (MacKevett and others, 1971, locality 33). The site is approximately the same as number 60 of Cobb (1972) and number 69 of Kimball and others (1978).

Commodities:

Main: Fe

Other:

Ore minerals: Magnetite?

Gangue minerals:

Geologic description:
The occurrence is an inferred iron deposit based on old claim activity (1903), permissive geology, and the existence of a strong magnetic anomaly reported near the locality by MacKevett and others (1971, p. 70).
Geologically, carbonate rocks of Devonian-Silurian age are sandwiched between granite or Cretaceous age to the west and granite of Tertiary age to the east (Brew and others, 1978). The carbonate section is a permissive host for metasomatic iron deposits. Another permissive locality for a contact metasomatic iron occurrence is the southwest contact of Tertiary granite with the carbonate septum about 1/2 mile to the northeast of the first possible locality (MacKevett and others, 1971, pl. I). Iron locality 33 of MacKevett and others is shown within the foliated granite, but the location was from a reported mineral occurrence that was not examined by the U.S. Geological Survey in 1966. Stream-sediment samples anomalous in total heavy metals (THM) were reported near the site.

Alteration:

Age of mineralization:
Cretaceous or younger.

Deposit model:
Contact metasomatic iron deposit.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Inactive

Workings/exploration:
Four claims were staked for iron in the area in 1903; five other claims were staked nearby for unspecified commodities before 1953 (Kimball and others (1978, p. C270).

Production notes:

Reserves:

Additional comments:
MacKevett and others (1971, p. 70) cited a magnetic anomaly on the north side of Icy Strait near their locality 33. The size of the magnetic anomaly suggests that a substantial iron deposit is possible. The magnetic anomaly is on USC & GS Chart No. 8202, 13th edition.
The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978.

Primary reference: MacKevett and others, 1971

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/15/99

Site name(s): Unnamed (west-northwest of Mt. Dagelet)

Site type: Occurrence

ARDF no.: MF084

Latitude: 58.605 **Quadrangle:** MF C-4

Longitude: 137.267

Location description and accuracy:

This occurrence is at an elevation of about 5600 feet on the southeast flank of Hill 7661 about 3.4 miles west-northwest of Mt. Dagelet (Rossman, B 1121-F, photograph fig. 17). Rossman's sample No. A37 (plate 1) is about 0.2 mile southeast. The site is also about 1.45 miles southeast of Peak 6902 , which Rossman called Mt. Lookout. The location is accurate within about 0.1 mile. The location is approximately the same as number 10 of Kimball and others (1978).

Commodities:

Main: Ti

Other:

Ore minerals: Ilmenite

Gangue minerals:

Geologic description:

This occurrence consists of ilmenite segregations in the Crillon-La Perouse layered mafic-ultramafic intrusion, along its southwestern contact zone (Brew and others, 1978). The adjacent metamorphic rocks are hornblende and biotite schist probably derived from a Mesozoic protolith. The intrusion is of Tertiary age.

An ilmenite magmatic segregation deposit exists at the site. It continues along strike of the layered intrusion for several hundred feet but could not be traced farther because of extremely steep topography. At the site, the intrusion is estimated to contain from 10 to 25 percent ilmenite (Rossman, 1963, 1121-F). A sample that contained 25 percent ilmenite contained 2 percent graphite by weight.

Alteration:

Age of mineralization:

Tertiary.

Deposit model:

Possibly Bushveld Fe-Ti-V (Cox and Singer, 1986; model 3). Magmatic segregation; ilmenite deposit in layered mafic-ultramafic intrusive.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
3

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings. Sample 53ARm a37 contained 25 percent ilmenite (Rossman, 1963, p. F43).

Production notes:

Reserves:
An inferred resource could be calculated based on data given by Rossman.

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-F); Brew and others, 1978; Kimball and others, 1978.

Primary reference: Rossman, 1963 (B 1121-F)

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/15/99

Site name(s): Unnamed (on Idaho Ridge)

Site type: Occurrence

ARDF no.: MF085

Latitude: 58.901 **Quadrangle:** MF D-1

Longitude: 136.258

Location description and accuracy:
Occurrence is at an elevation of about 2900 feet on Idaho Ridge about 0.1 mile east of hill 2994 (section 21, T. 34 S., R 55 E., of the Copper River Meridian). It is located within 0.05 mile accuracy. The location of the site is shown on figure C65 of Kimball and others (1978).

Commodities:

Main: Mo, W

Other: Ag, Cu

Ore minerals: Chalcopyrite?, molybdenite?, scheelite?, 'sulfides'

Gangue minerals: Quartz

Geologic description:
The Idaho Ridge area is underlain mostly by foliated granitic rock of Cretaceous age, covered locally by deep glacial moraine (MacKevett and others, 1971; Brew and others, 1978). At the site investigated by the U.S. Bureau of Mines widely distributed fractures in granitic rock had propylitic alteration (epidote); the intrusive was also cut by unmineralized breccia zones (Kimball and others, 1978; p. C310-312). A float rock sample (75CN108A) collected near this area by the U.S. Geological Survey in 1975 contained 700 ppm molybdenum, 300 ppm tungsten, 100 ppm bismuth, and 10 ppm silver (Brew and others, 1978, table B-8). In follow-up activity conducted by the U.S. Bureau of Mines in 1976, significant mineralization was found in narrow (to 0.15 foot) quartz-sulfide veins, but not in chip samples collected over a 5 to 13 foot width (Kimball and others, 1978, table C56): Selected samples of thin quartz-sulfide veinlets contained as much as 240 ppm copper, 500 ppm tungsten, 300 ppm molybdenum, and 15 ppm silver.

Alteration:
Epidote along quartz veins.

Age of mineralization:
Cretaceous or younger. Veins post-date foliated granitic intrusion of Cretaceous age.

Deposit model:
Low-grade porphyry molybdenum-tungsten deposit.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings A sample of mineralized float (USGS No. 75CN108A--Brew and others, 1978, table B-8) contained 700 ppm molybdenum, 300 ppm tungsten, 100 ppm Bi, and 10 ppm silver. In 1976, the U.S. Bureau of Mines found thin quartz-sulfide veinlets at two locations on Idaho Ridge that contained as much as 500 ppm tungsten, 300 ppm molybdenum, 15 ppm silver, and 240 ppm copper (Kimball and others, 1978, p. C310-312). The Bureau suggested that prospecting around the margins of the host intrusive could reveal better mineralized zones.

Production notes:

Reserves:

Additional comments:
Veins found to date are too thin to be of economic interest, but anomalous geochemical samples suggest more prospecting of the area would be justified (Kimball and others, 1978, p. C310-312, including fig. C65). The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/15/99

Site name(s): Unnamed (between Curtis Hills and Bruce Hills)

Site type: Occurrence

ARDF no.: MF086

Latitude: 58.96 **Quadrangle:** MF D-1

Longitude: 136.25

Location description and accuracy:

Poorly-defined northwest-trending area between the Curtis Hills and Bruce Hills. It is north of Plateau Glacier and south of Burroughs Glacier. The area is approximately 2 to 3 miles long and 1 mile wide. The coordinates are for the approximate midpoint of the area. The site is location number 73 of Kimball and others (1978) and number 23 of MacKevett and others (1971).

Commodities:

Main: Ag, Cu, Pb

Other: Cr, Fe, Ti

Ore minerals:

Gangue minerals: Ankerite, calcite, quartz

Geologic description:

The area is underlain by schist, hornfels, and marble derived mainly from sedimentary rocks of Paleozoic age. The sedimentary rocks were metamorphosed by the intrusion of a granitic batholith of Cretaceous age (Brew and others, 1978). The metasedimentary rocks are cut by mafic dikes and lie between the granitic Curtis and Bruce Hills. The area has recently been denuded by melting of the Plateau and Burroughs Glaciers.

The mineral occurrences of the area are mainly low-sulfide quartz-calcite-ankerite veins that formed on the contacts of mafic dikes that cut the metasedimentary rodk. Grab samples of various occurrences contained as much as 300 ppm lead, 700 ppm copper, and 15 ppm silver (MacKevett and others, 1971, location 23, table 9; Kimball and others, 1978, location 73, p. C316-317). Other elements, including chromium, iron, and titanium, are locally geochemically anomalous in the veins; these elements possibly were contained in or contributed to the veins by the mafic dikes. Titanium content exceeded 1 percent in one sample and was 1 percent in several others.

Veins of the area could be distal structures to a buried contact zone between granite and the metasedimentary rocks.

Alteration:

Propylitic (?).

Age of mineralization:
Cretaceous or younger.

Deposit model:
Distal low-sulfide quartz-carbonate veins: Possible trace element contribution from mafic dike hosts.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings. MacKevett and others (1971, location 23) found as much as 700 ppm copper and chromium and 1 percent titanium in iron-stained vein zones along mafic dikes. Kimball and others (1978, p. C316-317) reported 300 ppm lead and 15 ppm silver in a 0.3 foot thick quartz-calcite vein and more than 1 percent titanium in one wider (5 ft.) chip sample.

Production notes:

Reserves:

Additional comments:
The vein deposits are typical distal quartz-carbonate veins locally enriched in lead, copper, and silver. Prospecting closer to the granitic intrusives of the Bruce and Curtis Hills might find richer vein deposits, possibly transitional into copper and copper-molybdenum-bearing deposits.
The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Brew and others, 1978; Kimball and others, 1978.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/15/99

Site name(s): Valley of Tears; Dundas River

Site type: Mine

ARDF no.: MF087

Latitude: 58.516 **Quadrangle:** MF C-2

Longitude: 136.368

Location description and accuracy:

This deposit (placer) is in a wide valley on a south-flowing tributary of the Dundas River. It is about 1.25 miles south of Lake Seclusion, locally called Dundas Lake . (Claim location notices described it as located 2 miles south of Dundas Lake in the Dundas River.) At least part of the placer is within the NE 1/4 SW 1/4, section 5, T. 39 S., R. 55 E., of the Copper River Meridian. The location is accurate within a few tenths of a mile.

The deposit could be the Dundas River placer, which was reported by MacKevett and others (1971, p. 67) and Cobb (1972, location 69) to be in the Mt. Fairweather B-2 quadrangle.

Commodities:

Main: Au

Other:

Ore minerals: Native gold

Gangue minerals:

Geologic description:

The Valley of Tears placer is about 2 miles south of the contact between a large granitic body of Cretaceous age and carbonate-rich strata of Paleozoic age (Brew and others, 1978). The deposit appears to be a river bar placer that was formed by reworking of slightly auriferous outwash and alluvium derived from the granitic contact region exposed at Lake Seclusion.

The Bureau of Mines collected nine 3- to 7.5-pound samples at the site (Kimball and others, 1978, p. C363-4). The samples were panned at Juneau; all panned concentrates contained gold visible under a binocular microscope. Fire assays of the samples indicated a very small total gold content (about 1 cent per cubic yard, with gold valued at about $300 per ounce). Mining equipment was found at the site. Probably miners found and mined small, rich concentrations of lag-concentrated sand and gravel in river bar deposits.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
River bar-type placer formed by reworking of slightly auriferous Holocene outwash and alluvium.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: No

Site Status: Active

Workings/exploration:
Surface prospects were found near a cabin; there were visible claim lines. All samples collected by Kimball and others (1978) of alluvial material contained gold that could be concentrated by panning. The placer may be the same deposit reported by MacKevett and others (1971, p. 67) as the Dundas River placer. The placer deposit was covered with nine claims owned by the Jimmie Martin estate. Tentatively the Valley of Tears placer is regarded as the same deposit that was given an uncertain location on the 'Dundas River' in Mt. Fairweather B-2 quadrangle by MacKevett and others (1971) and by Cobb (1972).

Production notes:
Small, but some production probable.

Reserves:
Very low-grade resource; mineable in local concentrations.

Additional comments:
The site is in Glacier Bay National Park and Preserve.

References:
MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978; Cobb, 1981 (OFR 81-249A); Cobb, 1981 (OFR 81-249B).

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/15/99

Site name(s): Unnamed (Brady Glacier outwash)

Site type: Mine

ARDF no.: MF088

Latitude: 58.35 **Quadrangle:** MF B-2

Longitude: 136.61

Location description and accuracy:

This placer deposit is at the terminus of Brady Glacier at Taylor Bay; it extends southerly onto broadly-exposed tide flats. The coordinate location is the approximate center of the glacier front as drawn on the Mt. Fairweather B-2 quadrangle, which was mapped from aerial photographs taken in 1948. The placer deposits occur in an arcuate zone about 3 miles long south of the glacier. Small, transient placer deposits could occur throughout the broad tide flats south of the terminus of the glacier.

Commodities:

Main: Au, Ti, Zr

Other: PGE

Ore minerals: Gold (native), ilmenite, PGE, zircon

Gangue minerals:

Geologic description:

Brady Glacier occupies a major north-northwest-aligned boundary between Paleozoic strata intruded by granitic rocks of Cretaceous age on the east and rocks of Cretaceous and Tertiary age to the west (Brew and others, 1978). The Brady Glacier nickel-copper deposit (MF003) is in the western province and within the drainage basin of the glacier. Glacial erosion of the sulfide and oxide deposits of the Crillon-LaPerouse layered mafic intrusion, the host of the Brady Glacier deposit, would furnish titanium and PGEs to the glacial outflow. Gold deposits similar to the LeRoy mine (MF022) could exist in the Cretaceous rocks in the eastern terrane.

Gold, in extremely fine-grained form, ilmenite, PGEs, and zircon locally are concentrated in transient placers at the front of the glacier.

Placer samples collected from the outwash fan by the U.S. Bureau of Mines contained as much as 0.15 ppm gold (Kimball and others, 1978) and 6.15 percent titanium (Foley and others,1995).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer: Low-grade glacial outwash reworked on tidal flat.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:
Small, transient placers on the outwash plain were worked during the early years of the twentieth century (Rossman, 1963, B 1121-K, p. K51-52). The U.S. Bureau of Mines (Kimball and others, 1978, p. C126) detected gold content in stream-sediment-type samples of up to 0.15 ppm (0.004 oz/ton) along with traces of silver, copper, cobalt, and nickel. The gold is extremely fine-grained, but local concentrations could have been rich. The gold is so fine that recovery is difficult.

Foley and others (1995, sample no. 319) determined that ilmenite (titanium) and zircon (zirconium) were present in one sample in anomalous amounts. The sample contained 4.95 percent and 6.15 percent titanium, respectively, in a head split and a spiral concentrate. Zirconium was reported as 720 ppm in the head split and 1084 ppm in the spiral concentrate.

Production notes:

Reserves:

Additional comments:
The placer sites are in Glacier Bay National Park and Preserve.

References:
Rossman, 1963 (B 1121-K); MacKevett and others, 1971; Cobb, 1972 (MF-436); Brew and others, 1978; Kimball and others, 1978; Foley and others, 1995.

Primary reference: Kimball and others, 1978

Reporter(s): C.C. Hawley (Hawley Resource Group)

Last report date: 04/15/99

References

Barnes, D. F. and Watts, R. D., 1977, Geophysical surveys in Glacier Bay National Monument: U. S. Geological Survey Circular 751-B, p. B93-B95.

Barnes, D. F., Morin, R. L., and Watts, R. D., 1978, Interpretation of gravity and ice-thickness data, in Brew, D. A., and others, Mineral resources of the Glacier Bay National Monument wilderness study area, Alaska: U. S. Geological Survey Open-File Report 78-494, p. B51-B75.

Berg, H. C., and Cobb, E. H., 1967, Metalliferous lode deposits of Alaska: U. S. Geological Survey Bulletin 1246, 254 p.

Berg, H. C., Jones, D. L., and Richter, D. H., 1972, Gravina-Nutzotin Belt—tectonic significance of an Upper Mesozoic sedimentary and volcanic sequence in southern and southeastern Alaska: U. S. Geological Survey Professional Paper 800-D, p. D1-D24.

Bichan, R., 1969, Chromite seams in the Hartley complex of the Great Dyke of Rhodesia, in Magmatic Ore Deposits: Economic Geology Monograph 4, p. 95-113.

Bliss, J. D. (editor), 1992, Developments in mineral deposit modeling: U. S. Geological Survey Bulletin 2004, 168 p.

Brew, David A., 1978, Geology, in Brew, D. A., and others, Mineral resources of Glacier Bay National Monument, wilderness study area, Alaska: U. S. Geological Survey Open-File Report 78-494, p. B1-B21.

Brew, David A., Johnson, Bruce R., Grybeck, Donald, Griscom, Andrew, and Barnes, D. B., Kimball, A. L., Still, Jan C. and Rataj, Jeanne L., 1978, Mineral Resources of Glacier Bay National Monument, wilderness study area, Alaska: U. S. Geological Survey Open-File Report 78-494. 661p.

Brooks, A. H., 1904, Placer mining in Alaska in 1903: U. S. Geological Survey Bulletin 225, p. 43-59.

Brooks, A. H., 1918, The Alaska mining industry in 1916: U. S. Geological Survey Bulletin 662, p. 11-62.

Brooks, A. H., 1919, Alaska's mineral supplies: U. S. Geological Survey Bulletin 666, p. 89-102.

Brooks, A. H., 1921, The future of Alaska mining: U. S. Geological Survey Bulletin 714, p. 5-57.

Brooks, A. H., 1922, The Alaska mining industry in 1920: U. S. Geological Survey Bulletin 722, p. 7-74.

Brooks, A. H., 1923, The Alaska mining industry in 1921: U. S. Geological Survey Bulletin 739, p. 1-50.

Brooks, A. H., 1925, Alaska's mineral resources and production, 1923: U. S. Geological Survey Bulletin 773, p. 3-52.

Brooks, A. H., and Martin, G. C. 1921, The Alaska mining industry in 1919: U. S. Geological Survey Bulletin 714, p. 59-95.

Brooks, A. H., and Capps, S. R., 1924, The Alaska mining industry in 1922: U. S. Geological Survey Bulletin 755, p. 3-56.

Buddington, A. F., 1925, Mineral investigations in southeastern Alaska: U. S. Geological Survey Bulletin 773-B, p. 71-139.

Buddington, A. F., 1926, Mineral investigations in southeastern Alaska: U. S. Geological Survey Bull 783-B, p. 41-62.

Buddington, A. F. and Chapin, Theodore, 1929, Geology and mineral deposits of southeastern Alaska: U. S. Geological Survey Bulletin 800, 398 p.

Burchard, E. F., 1914, Marble resources of the Juneau, Skagway, and Sitka districts: U. S. Geological Survey Bulletin 592-C, p. 95-107.

Burchard, E. F., 1920, Marble resources of southeastern Alaska: U. S. Geological Survey Bulletin 682, 118 p.

Clifton, H. E., and Luepke, G., 1987, Heavy-mineral placer deposits of the continental margin of Alaska and the Pacific Coast States, in Geology and resource potential of the continental margin of western North America and adjacent ocean basins, Beaufort Sea to Baja California: Circum-Pacific Council for Energy and Mineral Resources, Earth Science Series, v. 6, p. 691-738.

Cobb, E. H., 1972, Metallic mineral resources of the Mount Fairweather quadrangle, AK: U. S. Geological Survey Miscellaneous Field Study Map MF-436, 1 sheet, scale 1:250,000.

Cobb, E. H., 1972, Placer deposits of Alaska: U. S. Geological Survey Open-file Report 508.

Cobb, E. H., 1973, Placer deposits of Alaska: U. S. Geological Survey Bulletin 1374, 213 p.

Cobb, E. H., 1978, Summary of references to mineral occurrences (other than mineral fuels and construction materials) in the Mt. Fairweather and Skagway quadrangles, Alaska: U. S. Geological Survey Open-File Report 78-316, 123 p.

Cobb, E. H., 1981, Summaries of data and lists of references to metallic and selected nonmetallic mineral occurrences in the Mt. Fairweather quadrangle, Alaska, Supplement to Open-file Report 78-316: U. S. Geological Survey Open-File Report 81-249A, 20 p.

Cobb, E. H., 1981, Summaries of data and lists of references to metallic and selected non-metallic mineral occurrences in the Mt. Fairweather quadrangle, Alaska, Supplement to Open-file Report 78-316: U. S. Geological Survey Open-File Report 81-249B, 15 p.

Cook, D. J., 1969, Lituya Bay, in Heavy minerals in Alaskan beach sand deposits: University of Alaska Mineral Industry Research Laboratory Report 20, p. 47-57.

Cornwall, H. R., 1971, Brady Glacier Prospect, in MacKevett and others, Mineral resources of Glacier Bay National Monument: U. S. Geological Survey Professional Paper 632, p. 79-82.

Cox, D. P., and Singer, G. A. (editors), 1986, Mineral deposits models: U. S. Geological Survey Bulletin 1693, 379 p.

Czamanske, G. K., and others, 1977, The Brady Glacier Ni-Cu deposit, southeastern Alaska (abs): Program with abstracts, v. 2, 1977, Annual Meeting of the Geological Association of Canada, Vancouver, p. 14.

Czamanske, G. K., Haffty, Joseph, and Nabbs, S. W., 1981, Pt, Pd, and Rh analyses and beneficiation of mineralized mafic rocks from the LaPerouse layered gabbro, Alaska: Economic Geology, v. 76, p. 2001-2011.

Ellett, R. D., 1975, Statement and discussion: Adverse effects of proposed legislation upon Alaska nickel mining, in The regulation of mining activities within areas of the National Park System: U. S. Congressional Senate Committee hearing before the Committee on Internal and Insular Affairs, Oct. 7, 1975, 94th Congress, 1st Session, p. 311-316

Engebretson, D. C., Cox, A, and Gordon, R. C., 1985, Relative motions between oceanic and continental plates in the Pacific: Geological Society of America Special Paper 206, 59 p.

Foley, J. Y., Burns, L. E., Schneider, C. L., and Forbes, R. B., 1989, Preliminary report of platinum-group element occurrences in Alaska: Alaska Division of Geological and Geophysical Surveys Public-Data File 89-20, 32p.

Foley, J. Y., LaBerge, R. D., Grosz, A. E., Oliver, F. S., and Hirt, W. C., 1995, Onshore titanium and related heavy-mineral investigations in the eastern Gulf of Alaska Region, southern Alaska: U. S. Bureau of Mines Open-file Report 10-95, 125 p.

Foley, J. Y., Light, T. D., Nelson, S. W., and Harris, R. A., 1997, Mineral occurrences associated with mafic-ultramafic and related alkaline complexes in Alaska: Economic Geology, Monograph 9, p. 396-449.

Fowler, Howard, 1950, Memorandum Report on the LeRoy Mines, Glacier Bay, Alaska: Territorial Department of Mines, Property Examination 114-4, 2 p.

Goldfarb, R. J., 1997, Metallogenic evolution of Alaska: Economic Geology Monograph 9, p. 4-34.

Griscom, Andrew, 1978, Interpretation of the aeromagnetic map of Glacier Bay National Monument, Alaska, in Brew, D. A. and others, Mineral Resources of the Glacier Bay National Monument wilderness study area, Alaska: U. S. Geological Survey Open-file Report 78-494, p. B22-B50.

Himmelberg, Glen R. and Loney, Robert A., 1981, Petrology of the ultramafic and gabbroic of the Brady Glacier nickel-copper deposit, Fairweather Range, Southeastern Alaska: U. S. Geological Survey Professional Paper 1195, 26 p.

Holdsworth, P. R., 1955, Mt. Parker area, Mt. Fairweather quadrangle: Territorial Department of Mines, Examination Report 115-5, 3 p.

Jones, D. L., Silberling, N. L., and Newhouse, John, 1978, Wrangellia—a displaced terrane in northwestern North America: Canadian Journal of Earth Science, v. 14, no. 11, p. 2365-2477.

Kaufman, Alvin, 1958, Southeastern Alaska's mineral industry: U. S. Bureau of Mines Information Circular 7844, 37 p.

Kennedy, G. C. and Walton, M. S., Jr., 1946, Geology and associated mineral deposits of some ultrabasic rocks in southeastern Alaska: U. S. Geological Survey Bulletin 947-D, p. 65-84.

Kimball, A. L., Still, Jan C., and Rataj, Jeanne L., 1978, Mineral resources, in Brew, D. A., and others, Mineral resources of the Glacier Bay National Monument wilderness study area, Alaska: U. S. Geological Survey Open-file Report 78-494, p. C1-C375.

Knopf, Adolph, 1912, The Sitka mining district, Alaska: U. S. Geological Survey Bulletin 504, 32 p.

Loney, Robert A., Brew, D. A., Muffler, L. J. B., and Pomeroy, J. S., 1975, Reconnaissance geology of Chichagof, Baranof, and Kruzof Islands, southeastern Alaska: U. S. Geological Survey Professional Paper 792, 105 p.

MacKevett, E. M. Jr., Brew, D. A., Hawley, C. C., Huff, L. C., and Smith, J. G., 1971, Mineral resources of Glacier Bay National Monument, Alaska: U. S. Geological Survey Professional Paper 632, 90 p.

Mark-Anthony, Leo, 1977, Maps and notes on investigations in Glacier Bay, 1958-1960. (Unpublished material available at U. S. Bureau of Land Management library, Juneau, Alaska).

Martin, G. C., 1920, The Alaska mining industry in 1918: U. S. Geological Survey Bulletin 712-A, p. 11-52.

Mertie, J. B., 1933, Notes on the geography and geology of Lituya Bay: U. S. Geological Survey Bulletin 836-B,

p. 117-135

Miller, D. J., 1953, Preliminary geologic map of Tertiary rocks in the southeastern part of the Lituya district, Alaska: U. S. Geological Survey Open-file Report 81, 2 maps, scale 1:63,360.

Miller, D. J., 1961, Geology of the Lituya district, Alaska, Gulf of Alaska Tertiary Province, Alaska: U. S. Geological Survey Open-file Report 210, 1 map, scale 1:96,000.

Moerlein, G. A., 1968, Geology and drilling results, Nunatak molybdenum prospect, Walper property, southeastern Alaska: (Unpublished report available at U. S. Bureau of Land Management Library at Juneau, Alaska).

Moerlein, G. A., 1971, Report of examination of Bruce Hills copper-molybdenum deposit, Mt. Fairweather D-2 quadrangle: (Unpublished report available at U. S. Bureau of Land Management Library at Juneau, Alaska).

Overbeck, R. M., 1919, Geology and mineral resources of the west coast of Chichagof Island: U. S. Geological Survey Bulletin 692, p. 91-136.

Plafker, George and MacKevett, E. M., Jr. 1970, Mafic and ultramafic rocks from a layered pluton at Mount Fairweather, Alaska: U. S. Geological Survey Professional Paper 700-B, p. B21-B26.

Reed, J. C., 1938, Some mineral deposits of Glacier Bay and vicinity, Alaska: Economic Geology, v. 33, p. 52-80.

Roehm, J. C., 1942, LeRoy Mining Company gold lode: Territorial Department of Mines, Examination Report 111-2A, 7 p.

Rossman, Darwin, 1957, Ilmenite-bearing beach sands near Lituya Bay, Alaska: U. S. Geological Survey Open-file Report 149, 10 p.

Rossman, Darwin, 1959, Geology and ore deposits in the Reid Inlet area, Glacier Bay, Alaska: U. S. Geological Survey Bulletin 1058-B, p. 33-58.

Rossman, Darwin, 1959, Geology and ore deposits of the northwestern part of Chichagof Island, Alaska: U. S. Geological Survey Bulletin 1058-E, p. 139-216.

Rossman, Darwin, 1963, Geology and petrology of two stocks of layered gabbro in the Fairweather Range, Alaska: U. S. Geological Survey Bulletin 1121-F, p. F1-F50.

Rossman, Darwin, 1963, Geology of the eastern part of the Mount Fairweather quadrangle, Glacier Bay, Alaska: U. S. Geological Survey Bulletin 1121-K, p. K1-K57.

Sanford, R. S., Apell, G. A., and Rutledge, F. A., 1949, Investigations of Muir Inlet or Nunatak molybdenum deposit, Glacier Bay, southeastern Alaska: U. S. Bureau of Mines Report of Investigations 4421, 6 p.

Seitz, James F., 1959, Geology of Geikie Inlet area, Glacier Bay, Alaska: U. S. Geological Survey Bulletin 1058-C, p. 61-120.

Shephard, J. G., 1926, Smith Prospect, Willoughby Island: Territorial Department of Mines, Property Examination Report 111-4, 1 p.

Smith, P. S., 1926, Mineral industry of Alaska in 1924: U. S. Geological Survey Bulletin 783, p. 1-30.

Smith, P. S., 1933, Mineral industry of Alaska in 1931: U. S. Geological Survey Bulletin 844-A, p. 1-82.

Smith, P. S., 1934, Mineral industry of Alaska in 1932: U. S. Geological Survey Bulletin 857-A, p. 1-91.

Smith, P. S., 1934, Mineral industry of Alaska in 1933: U. S. Geological Survey Bulletin 864-A, p. 1-94.

Smith, P. S., 1936, Mineral industry of Alaska in 1934: U. S. Geological Survey Bulletin 868-A, p. 1-91.

Smith, P. S., 1937, Mineral industry of Alaska in 1935: U. S. Geological Survey Bulletin 880-A, p. 1-95.

Smith, P. S., 1938, Mineral industry of Alaska in 1936: U. S. Geological Survey Bulletin 897-A, p. 1-107.

Smith, P. S., 1939, Mineral industry of Alaska in 1937: U. S. Geological Survey Bulletin 910-A, p. 1-113.

Smith, P. S., 1939, Mineral industry of Alaska in 1938: U. S. Geological Survey Bulletin 917-A, p. 1-113.

Smith, P. S., 1941, Mineral industry of Alaska in 1939: U. S. Geological Survey Bulletin 926-A, p. 1-106.

Smith, P. S., 1942, Mineral industry of Alaska in 1940: U. S. Geological Survey Bulletin 933-A, p. 1-102.

Smith, P. S., 1942, Occurrences of molybdenum minerals in Alaska: U. S. Geological Survey Bulletin 926-C, p. 161-210.

Stewart, B. D., 1949, Memorandum on Red Top property, Dundas Bay, AK: Territorial Department of Mines, Examination Report 111-3, 2 p.

Thomas, B. J., and Berryhill, R. V., 1962, Reconnaissance studies of Alaska beach sands, eastern Gulf of Alaska: U. S. Bureau of Mines Report of Investigations 5986, 40 p.

Twenhofel, W. S., 1946, Molybdenite deposits of the Nunatak area, Muir Inlet, Glacier Bay, in Twenhofel, W. S., Robinson, G. D., and Gault, H. R., Molybdenite investigations in southeastern Alaska: U. S. Geological Survey Bulletin 947-B, p. 7-38.

Twenhofel, W. S., Reed, J. C., and Gates, G. O., 1949, Prospects between Reid and Lamplugh Glaciers, Glacier Bay, in Some mineral investigations in southeastern Alaska: U. S. Geological Survey Bulletin 963-A, p. 30-34.

Watts, R. D., and England, A. W., 1976, Radio-echo soundings of temperate glaciers: Journal of Glaciology, v. 17, no. 75, p. 39-48.

Worst, B. G., 1960, The great dyke of Southern Rhodesia: Southern Rhodesia Geological Survey Bulletin 47.

Wright, F. E., and Wright, C. W., 1907, Lode mining in southeastern Alaska: U. S. Geological Survey Bulletin 314-C, p. 47-72.

Wright, F. E. and Wright, C. W., 1937, The Glacier Bay National Monument in southeastern Alaska, its glaciers and geology: U. S. Geological Survey manuscript report, 224 p.

Yehle, Lynn A., 1979, Reconnaissance engineering geology of the Yakutat area, Alaska, with emphasis on evaluation of earthquake and other geologic hazards: U. S. Geological Survey Professional Paper 1074, 44 p.