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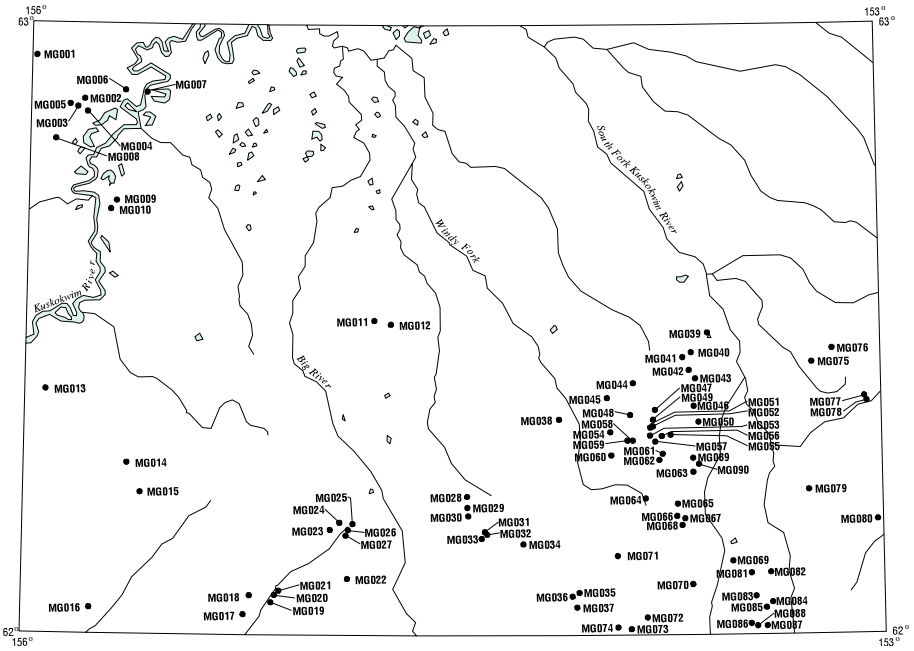
Alaska Resource Data File

McGrath 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 McGrath 1:250,000-scale quadrangle, Alaska

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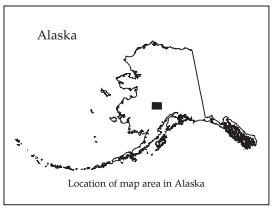

U.S. DEPARTMENT OF THE INTERIOR · MARCH 3, 1849 ·

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OPEN-FILE REPORT 99-357

Site name(s): Unnamed (east flank of Takotna Mountain)

Site type: Occurrence

ARDF no.: MG001

Latitude: 62.946 **Quadrangle:** MG D-6

Longitude: 155.984

Location description and accuracy:

This unnamed occurrence is located on a northeast flank of Takotna Mountain; at an elevation of 2,350 feet (716 m) in the SE1/4 sec. 18, T. 33 N., R. 36 W., of the Seward Meridian. The reporter visited the site in 1978; at station no. 78BT467.

Commodities:

Main: Ag, Cu

Other: Pb

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:

This unnamed occurrence consists of disseminated chalcopyrite and pyrite in silicified zones of a border phase of the Takotna Mountain composite pluton, which was radiometrically dated at 71.2 Ma (Bundtzen and Laird, 1983). The occurrence is near a faulted contact between the pluton and somewhat older andesitic stratovolcano of the Takotna Mountain volcanic-plutonic complex, one of thirteen known in the Kuskokwim Mineral Belt of southwest Alaska (Bundtzen and Miller, 1997). No estimates of the size of the mineralized zone are available. Two grab samples from the mineralized zone contained up to 222 ppm copper, 0.6 grams/tonne silver, and 100 ppm lead (Bundtzen and Laird, 1983).

Alteration:

Sericitic and secondary biotite.

Age of mineralization:

Unknown; host pluton is 71.2 Ma (Bundtzen and Laird, 1983).

Deposit model:

Polymetallic vein (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:
The unnamed occurrence was investigated by the reporter in 1978 during a 1:63,360 scale geologic mapping effort for the Alaska Division of Geological and Geophysical Surveys in the McGrath quadrangle (Bundtzen and Laird, 1983). Two grab samples from the mineralized zone contained up to 222 ppm copper, 0.6 grams/tonne silver, and 100 ppm lead.

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen and Laird, 1983; Bundtzen and Miller, 1997.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/13/98

Site name(s): Candle Creek

Site type: Mine

ARDF no.: MG002

Latitude: 62.876 **Quadrangle:** MG D-6

Longitude: 155.81

Location description and accuracy:

The Candle Creek placer deposit is located in the valley of Candle Creek, which flows 11 miles (18 km) to Tatalina River, a tributary of Takotna River, which in turn flows into the Kuskokwim River. The placer deposit occupies the upper headward reaches of Candle Creek valley at an elevation ranging from 550 feet (168 m) to 780 feet (238 m) in both NE1/4 and SE1/4 sec. 10, T. 32 N., R. 35 W., of the Seward Meridian. Most placer mining activities took place about 8 miles (13 km) southwest of the village of McGrath. Location is precisely known.

Commodities:

Main: Ag, Au, Hg

Other: PGE, W

Ore minerals: Cinnabar, gold, monazite, PGE minerals, scheelite

Gangue minerals:

Geologic description:

Deposit consists of placer gold with abundant cinnabar and ilmenite; minor scheelite, monazite, olivine, garnet, and zircon; and trace PGE. Deposits consist of river gravels composed of weathered monzonite, monzodiorite, granite, basalt, andesite, and hornfels, which reflects nearby bedrock sources (Bundtzen and Laird, 1983). The known paystreak was deposited on monzonite and monzo-diorite. The heavy minerals and placer gold found in the Candle Creek placer deposit were derived from quartz veins, and mineralized shears within a silica-saturated phase of the pluton near the faulted western pluton-volcanic contact of the Candle volcanic-plutonic complex (Bundtzen and Laird, 1983; Bundtzen and Miller, 1997).

The developed portion of the placer deposit on Candle Creek varies from 45 meters to 200 meters wide and about 2,300 meters long. The pay gravels range from 2 meters to 8 meters thick, with overburden markedly thickening below the northeasterly limits of the mined area. According to T. Almasy (personal communication, 1997) and Holdsworth (1952), the thick overburden and thawed pay gravels prevented further exploitation of the placer deposit by either open cut or underground methods. Churn drilling programs con-

ducted by both the Kuskokwim Dredging Company and Strandberg and Sons Inc. indicates that auriferous-bearing gravels continue for an additional 2 miles (3.2 km) downstream and northeast of the lower limits of the mined paystreak (L. Magnuson, personal communication, 1997; unpublished Strandberg and Sons Inc. data).

Placer gold, especially at the upper end of the paystreak, is very coarse and angular; nuggets up to 2 ounces (62 grams) in weight are common, which suggests minimal transport from hardrock sources. Gold fineness varies from 894 to 917 and averages 902 (Bundtzen and others, 1987). The average gold content of gravels mined in previous years was considered rich compared to those mined in creeks elsewhere in the region. For example 23,050 cubic yards (17,620 cubic meters) of gravel mined with open-cut methods between 1915 and 1917 yielded 6,130 ounces (190.6 kg) gold; these gravels contained 0.23 ounces gold per cubic yard. During 1920 to 1923, the Kuskokwim Dredging Company dredged 567,447 cubic yards gravel and produced 68,750 ounces (2,138 kg) gold for an average recoverable grade of 0.12 ounces gold per cubic yard. Bundtzen and others (1987) reported that mined concentrates from Candle Creek contained 5.2 ppm PGE and 11.5 percent chromium (probably from magnesiochromite); however, the PGE source in the concentrates is unknown. Abundant cinnabar was also commercially recovered in addition to the placer gold.

Alteration:

Pay gravels are partially decomposed by groundwater weathering.

Age of mineralization:

Deposit model:

Residual, elluvial, and alluvial gold-heavy mineral placer (Cox and Singer, 1986; model 39a).

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

39a

Production Status: Yes; medium

Site Status: Active

Workings/exploration:

Early mining from 1915 to 1917 consisted of ground sluicing and hydraulic open-cut methods by the McKinnon-Aitken partnership. From 1918 to 1926, the Kuskokwim Dredging company mined the placer deposits with bucketline stacker dredge technologies (Wimmler, 1922, 1924, 1925, 1926; Moffit, 1927). From 1937 to 1941 and from 1946 to 1947, Strandberg and Sons Inc. mined the Candle Creek placer deposit with a large-scale dragline operation (Roehm, 1937). Strandberg and Sons Inc. restarted the old Kuskokwim Dredging Company dredge and operated it from 1949 to 1952 (Holdsworth, 1952). Small-scale open-cut mine methods have taken place from 1927 to 1936 and from 1995 to 1998. The Kuskokwim Dredging Company and Strandberg and Sons Inc. have conducted extensive churn drilling programs in Candle Creek valley from the 1920s to the

1940s.

Production notes:

In 1913, Placer gold was discovered in Candle Creek by Louis Blackburn and Bert Eldridge (Bundtzen and Laird, 1983; Brooks, 1914). From 1915 to 1917, the Aitken-McKinnon partnership mined the upper limits of the paystreak with open-cut methods and produced 6,130 ounces (190.6 kg) refined gold from 23,050 cubic yards (17,260 cubic meters) of gravel. In 1916 and 1917, the Kuskokwim Dredging Company (KDC) hauled in and built a 3 cubic foot capacity bucketline stacker dredge on Candle Creek. From 1918 to 1926, the KDC produced 99,158 ounces (3,083 kg) refined gold. During 1920 to 1923, the KDC dredge processed 567,447 cubic yards of pay (433,870 cubic meters) and produced 68,750 ounces (2,138 kg) of refined gold. Volume figures for processed gravels are unknown for the years 1918, 1919, and 1924 to 1926. In addition to placer gold production, approximately 83 flasks (6,308 pounds) of byproduct mercury that were recovered from cinnabar concentrates were produced by KDC from 1921 to 1924, and marketed to local placer mine operators (Bundtzen and Laird, 1983; Mertie and Harrington, 1924; T.K. Bundtzen and Ted Almasy, written communication, 1997).

Small scale open-cut placer mining by Carl and Gus Shutler took place on Candle Creek from 1927 to 1936 (Smith, 1929, 1930, 1932, 1933). From 1936 to1941 and from 1946 to 1947, Strandberg and Sons Inc. operated a large-scale dragline-fed mining operation in Candle Creek basin and recovered 17,494 ounces (544 kg) refined gold (Smith, 1937, 1938, 1939, 1941). In 1948 Strandberg and Sons Inc. rebuilt the KDC dredge, which operated from 1949 to 1952 (Holdsworth, 1952). Magnuson Mining Company produced gold from open-cut mine operations from 1995 to 1998.

Total known production from placer deposits in Candle Creek basin is 138,377 ounces (4,304 kg) of refined gold, at least 11,963 ounces (372 kg) of byproduct silver, and 83 flasks (6,308 pounds) of byproduct mercury.

Reserves:

Additional comments:

Stream gradient in upper valley is about 60 meters/kilometer.

References:

Brooks, 1914; Smith, 1915; Smith, 1917; Martin, 1920; Brooks, 1921; Wimmler, 1922; Mertie, 1923; Wimmler, 1924; Mertie and Harrington, 1924; Brooks, 1925; Wimmler, 1925; Wimmler, 1926; Moffit, 1927; Smith, 1929; Smith, 1930; Smith, 1932; Smith, 1933; Mertie, 1936; Smith, 1937; Smith, 1938; Smith, 1939; Smith, 1941; White and Killeen, 1953; Holdsworth, 1952; Cobb, 1972 (MF 379); Cobb, 1973; Cobb, 1976; Cobb and Reed, 1981; Bundtzen and Laird, 1983; Bundtzen and others, 1987; Bundtzen and Laird, 1998.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Unnamed (on Candle Creek)

Site type: Prospect

ARDF no.: MG003

Latitude: 62.863 **Quadrangle:** MG D-6

Longitude: 155.834

Location description and accuracy:

This prospect is situated in the valley of the west fork of Candle Creek at an elevation of 950 feet (290 m) in the SW1/4 sec. 15, T. 32 N., R. 35 W., of the Seward Meridian. The reporter visited the site in 1978 and in 1990.

Commodities:

Main: Au

Other: Ag, Cu, Hg, Sb

Ore minerals: Arsenopyrite, chalcopyrite, cinnabar

Gangue minerals: Quartz, dolomite

Geologic description:

The prospect consists of copper-gold-silver-arsenic-, and mercury-bearing, mineralized zones that occur in plutonic rocks of the Candle Hills volcanic-plutonic complex (Bundtzen and Miller, 1997). The Candle Hills pluton yielded a K-Ar biotite age of 69.7 Ma (Bundtzen and Laird, 1983). The lode prospect occurs upslope and upstream from the rich Candle Creek placer gold deposit, which produced about 4,304 kilograms (138,377 ounces) gold to 1997 (MG002).

According to Bundtzen and Miller (1997), an ankerite-bearing alteration zone ranging from 5 to 16 meters thick can be traced for about 350 meters along a faulted (?) contact between an augite-rich, olivine monzonite and biotite quartz monzonite pluton and basaltic andesite. Thin quartz veinlets containing anomalous gold, antimony, arsenic, and mercury occur in a larger, 600 meter by 45 meter , elliptically shaped area with anomalous gold (200 ppb) and mercury (5,000 ppb) in soils. Selected samples collected by ACNC Inc. during a regional trenching and drilling program yielded values of up to 3.76 grams/ tonne gold in measured drill intercepts. Nearby copper-bearing volcanics have yielded values of up to 313 ppm copper in disseminated chalcopyrite-epidote clots and stockwork veins.

Alteration:

Ankerite, epidote, and sericite.

Age of mineralization:
Inferred to be 69.7 Ma, based on a sericite age from Candle pluton (Bundtzen and Miller, 1997).

Deposit model:
Porphyry copper-gold (Cox and Singer, 1986; model 20c).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
20c

Production Status: No

Site Status: Inactive

Workings/exploration:
Exploration work by ACNC Inc. in 1989 and 1990 discovered an elliptically shaped, 600 meter by 45 meter zone of anomalous gold (up to 200 ppb) and mercury(up to 5,000 ppb) values in soils. Selected samples collected by ACNC Inc. during a follow-up trenching and drill program (totaling about 700 meters of diamond core) yielded values of up to 3.76 g/tonne gold in measured drill intercepts. ASA Inc. completed additional drilling into the prospect in 1995, but specific exploration results of these efforts are unknown.

Production notes:

Reserves:
None known.

Additional comments:

References:
Bundtzen and Laird, 1983; Bundtzen and Miller, 1997.

Primary reference: Bundtzen and Miller, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Candle-East

Site type: Occurrence

ARDF no.: MG004

Latitude: 62.855 **Quadrangle:** MG D-6

Longitude: 155.799

Location description and accuracy:

The Candle-East occurrence is located on a low bluff immediately south of the Sterling Landing-Ophir Road at an elevation of 1,000 feet (304 m) in the SW1/4 sec. 14, T. 32 N., R. 35 W., of the Seward Meridian. The Candle-East occurrence corresponds to prospects #6 and #7 in Bundtzen and Laird (1983). The reporter visited the site in 1977, 1979, and 1997.

Commodities:

Main: Ag, Cu, Pb

Other: Zn

Ore minerals: Chalcopyrite, goethite

Gangue minerals: Biotite, tourmaline

Geologic description:

The Candle-East occurrence consists of a densely concentrated zone of ferricrete-tourmaline veins and stockwork in a brecciated hornfels aureole adjacent to the Late Cretaceous, Candle volcanic-plutonic complex (Bundtzen and Laird, 1983). The zone trends northeast and dips steeply to both the southeast and northwest. The mineralization covers a 100 meter by 15 meter area. A trace of chalcopyrite was observed in one hand specimen. Two chip-channel samples taken across the strike of the mineralization contained up to 2.23 grams/tonne silver, 169 ppm copper, 130 ppm lead, and 246 ppm zinc.

Alteration:

Extensive ferricrete alteration.

Age of mineralization:

Unknown; inferred to be Late Cretaceous based on 70 Ma K-Ar age reported for nearby Candle monzonite pluton by Bundtzen and Laird (1983).

Deposit model:

Polymetallic vein (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:
The occurrence area has been used as road metal for local road construction and is fairly well exposed. Two chip channel samples taken across the strike of the mineralization contained up to 2.23 grams/tonne silver, 169 ppm copper, 130 ppm lead, and 246 ppm zinc.

Production notes:

Reserves:

Additional comments:

References:
Bundtzen and Laird, 1983; Wilson and others, 1998.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Unnamed (in western Candle Hills)

Site type: Occurrence

ARDF no.: MG005

Latitude: 62.867 **Quadrangle:** MG D-6

Longitude: 155.861

Location description and accuracy:

This occurrence is located at the rim of a prominent spur in the western Candle Hills about 3 kilometers due west of Candle placer mine (MG002) at an elevation of 1,000 feet (304 m) in the NW1/4 sec. 16, T. 32 N., R. 35 W., of the Seward Meridian. The reporter investigated the site in 1978 (as ADGGS station no. 78BT364).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Chalcopyrite

Gangue minerals: Epidote, quartz

Geologic description:

This occurrence consists of chalcopyrite blebs and disseminations in quartz-epidote veinlets hosted in a porphyritic, subaerial basalt radiometrically dated at 73 Ma (Bundtzen and Miller, 1997). The occurrence is limited to a small 5 meter by 6 meter outcrop surrounded by vegetation and talus. One grab sample contained 233 ppm copper and 0.9 grams/tonne silver (Bundtzen and Laird, 1983).

Alteration:

Epidote.

Age of mineralization:

Unknown; probably associated with 69-73Ma Candle volcanic-plutonic complex.

Deposit model:

Polymetallic vein (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:

One grab sample contained 233 ppm copper and 0.9 grams/tonne silver (Bundtzen and Laird, 1983).

Production notes:

Reserves:

None.

Additional comments:

Mineralization may be related to the Au-polymetallic prospect in the valley of Candle Creek (MG003).

References:

Bundtzen and Laird, 1983; Bundtzen and Miller, 1997.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Round

Site type: Occurrence

ARDF no.: MG006

Latitude: 62.891 **Quadrangle:** MG D-6

Longitude: 155.665

Location description and accuracy:
The Round occurrence is situated about 40 meters north of VABM Round at an elevation of 1,550 feet (472 m) in the NW1/4 sec. 4, T. 32 N., R. 43 W., of the Seward Meridian. The reporter visited the site in 1978.

Commodities:

Main: Ag

Other: Cu

Ore minerals:

Gangue minerals: Epidote, quartz

Geologic description:
The Round occurrence consists of an iron-stained quartz-epidote stockwork in hornfels of the Late Cretaceous Kuskokwim Group flysch (Bundtzen and Laird, 1983). The occurrence is poorly exposed and mainly observed in talus and rubble crop. No surface dimensions were measured, and its extent is unknown. Selected surface samples contain up to 5.43 grams/tonne silver and 99 ppm copper (Bundtzen and Laird, 1983).

Alteration:
None.

Age of mineralization:

Deposit model:
Polymetallic vein (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:

Selected surface samples contain up to 5.43 g/tonne silver, and 99 ppm copper (Bundtzen and Laird, 1983).

Production notes:

Reserves:

None.

Additional comments:

References:

Bundtzen and Laird, 1983.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Unnamed (along Kuskokwim River)

Site type: Occurrence

ARDF no.: MG007

Latitude: 62.888 **Quadrangle:** MG D-6

Longitude: 155.588

Location description and accuracy:

The unnamed occurrence is located along the banks of the Kuskokwim River about 8 kilometers due south of McGrath, Alaska and 1.5 kilometers due south of VABM About, at an elevation of about 400 feet (120 m) in the SE1/4 sec. 2, T. 32 N., R. 34 W., of the Seward Meridian. The occurrence corresponds to prospect #1 of Cobb (1972) and prospect #13 of Bundtzen and Laird (1983; field no. 77BT230).

Commodities:

Main: Ag, Cu, Pb

Other: Ni

Ore minerals: Pyrite, pyrrhotite

Gangue minerals: Quartz

Geologic description:

This occurrence consists of pyrite-pyrrhotite nodules in highly deformed, sheared shale and siltstone of the Late Cretaceous Kuskokwim Group (Bundtzen and Laird, 1983). Individual sulfide nodules average about 8 centimeters in diameter, and are locally oxidized to ferricrete gossan. The sulfide bearing zone, which appears to be parallel to steeply dipping bedding in the host sedimentary rocks, is about 3 meters thick. The sulfide zone quickly extends upward into the vegetated slopes (Bundtzen and Laird, 1983). Cobb (1972) and Brooks and Martin (1921) refer to the occurrence as an unnamed, copper-nickel lode. A selected grab sample reported by Bundtzen and Laird (1983) contains 12.26 grams/tonne silver, 116 ppm copper, 167 ppm lead, and 139 ppm nickel.

Alteration:

Ferricrete oxidation of pyrite and pyrrhotite.

Age of mineralization:

Deposit model:

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:
Brooks and Martin (1921) first mentioned the existence of sulfide mineralization at the site. A selected grab sample reported by Bundtzen and Laird (1983) contains 12.26 grams/tonne silver, 116 ppm copper, 167 ppm lead, and 139 ppm nickel.

Production notes:

Reserves:
None.

Additional comments:

References:
Brooks and Martin, 1921; Cobb, 1972; Bundtzen and Laird, 1983.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Carl Creek

Site type: Mine

ARDF no.: MG008

Latitude: 62.81 **Quadrangle:** MG D-6

Longitude: 155.91

Location description and accuracy:

Placer gold was mined in a south-flowing tributary of Carl Creek, an east- flowing stream that empties into the Kuskokwim River. The Carl Creek placer deposit is located on the southwest flank of Candle Hills at approximately 550 foot (167 m) elevation, about 14 miles (22 km) southwest of McGrath village in NE1/4 sec. 6, T. 31 N., R. 35 W., of the Seward Meridian. Location is not precisely known and based on air-photo interpretation cited in Bundtzen and Laird (1983) and discussions with Lloyd Magnuson of McGrath.

Commodities:

Main: Ag, Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:

Carl Creek, a south-flowing tributary of the Kuskokwim River, is about 2 meters wide and its floodplain is covered in pioneer flora. The stream dissects the Candle Hills volcanic-plutonic complex (Bundtzen and Laird, 1983; Bundtzen and Miller, 1997).

Alteration:

Age of mineralization:

Deposit model:

Gold-heavy mineral placer deposit (Cox and Singer, 1986; model 39a).

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

39a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

Surface tailings recognized from air-photo interpretation.

Production notes:

In 1917 and 1918, Albert Lind mined 18 ounces (558 grams) placer gold from shallow surface workings (Cobb, 1974; unpublished U.S. Mint records, 1920). Additional placer gold was mined by Carl and Gus Schutler during the 1920's and 1930's. Total production quantities of gold from Carl Creek are unknown (Bundtzen and Laird, 1983; Wimmler, 1925; Smith, 1939).

Reserves:

Additional comments:

References:

Wimmler, 1925; Smith, 1939; Cobb, 1974; Bundtzen and Laird, 1983; Bundtzen and Miller, 1997.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Vinasale

Site type: Prospect

ARDF no.: MG009

Latitude: 62.71 **Quadrangle:** MG C-6

Longitude: 155.69

Location description and accuracy:

The Vinasale deposit is located about 2,000 feet (610 m) from the summit of Vinasale Mountain at an elevation of 1,520 feet (463 m) in the NW1/4 sec. 8, T. 30 N., R. 34 W., of the Seward Meridian. The Vinasale deposit is about 1.5 kilometers due east of the Kuskokwim River and 29 kilometers (18 air miles) south of McGrath, Alaska. The reporter visited the site in 1977 and 1992.

Commodities:

Main: Ag, Au

Other: As, Bi, Mo, Pb, Sb, Zn

Ore minerals: Arsenopyrite, galena, jamesonite, pyrargyrite, pyrite, silver (native), sphalerite, stibnite

Gangue minerals: Epidote, dolomite, quartz, sericite, tourmaline

Geologic description:

Vinasale Mountain is underlain by a composite intrusive complex of Late Cretaceous age (Bundtzen, 1986; DiMarchi, 1993). The intrusive suite includes peraluminous, porphyritic quartz monzonite, rhyolite porphyry, shonkinite, and monzonite breccia. The intrusive phases cut and thermally alter clastic rocks of the early Late Cretaceous, Kuskokwim Group flysch (Bundtzen and Miller, 1997). The stock has yielded a K-Ar age of 69 Ma (Solie and others, 1991). Much of the following is based on work summarized by DiMarchi (1993) and Bundtzen and Miller (1997).

During industry exploration work conducted from 1989 to 1991, (DiMarchi, 1993), large areas of coincident multi-element (Au, As, Sb, Pb, Mo) soil anomalies were found in three distinct zones named the Central, Northeast, and South zones surrounding the summit of Vinasale Mountain. The Central zone is approximately 457m by 610 m in area and contains maximum values in soil of 2,470 ppb Au. The Northeast and South Zones were similar in total area but contained weaker maximum soil anomalies of 185 ppb Au and 335 ppb Au respectively. The soil anomalies led to the subsurface exploration work that discovered significant Au-polymetallic mineralization.

Silicification occurs in veins, segregations and silica flooded zones, and is frequently

accompanied by sulfides. Sericite alteration in the Central Zone is characterized by progressive replacement of biotite and plagioclase by sericite and dolomite. and of K-feldspar by sericite, quartz, and dolomite. Propylitic alteration forms a broad halo around zones containing silica and sericite alteration, and is characterized by replacement of biotite by chlorite, and plagioclase by epidote, chlorite, and calcite.

Sulfide mineralization in the Central Zone consists of disseminated pyrite and arsenopyrite in areas of silica flooding in quartz monzonite, sericitic alteration in monzonite breccias, and quartz-dolomite veins and segregations in all intrusive lithologies. Subordinate veinlets and veins host coarse-grained pyrite, galena, arsenopyrite, sphalerite, stibnite, and jamesonite, and microscopic native silver and very minor gold. Practically all of the gold values appear to be concentrated in lattice structures of arsenopyrite, pyrite, and other sulfide minerals. The Northeast and South Zones contain similar but weaker manifestations of Au-polymetallic mineralization than that displayed in the Central Zone.

The two longest drill intercepts from the Central Zone contain 63.1 m of 2.42 grams/tonne gold and 71.9 m containing 2.27 grams/tonne gold. The Central Zone is enriched in antimony (average=338 ppm), zinc (average=108 ppm), lead (average=75 ppm), bismuth (3 ppm), and silver (average=0.7 ppm). The gold/silver ratio averages about 2:1 in mineralized samples. Arsenic is most concentrated in the southern Central Zone where it averages 0.80 percent. High barium (average=500 ppm) occurs in the Northeast Zone.

Based on 11,260 m of diamond drilling, the Vinasale Deposit is estimated to contain 10.3 million tonnes grading 2.40 g/tonne gold or about 24,540 kg (789,000 ounces) gold (Bundtzen and Miller, 1997).

Alteration:

Silicification and dolomitic, sericitic, and propylitic.

Age of mineralization:

68.0 Ma from sericite and 69.0 Ma from apatite, both from Central Zone mineralization.

Deposit model:

Porphyry gold-polymetallic stockwork (Cox and Singer, 1986; model 20c).

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

20c

Production Status: No

Site Status: Inactive

Workings/exploration:

Bundtzen (1986) first described the mineralized Vinasale pluton and associated gold-scheelite-bismuth vein mineralization on the south flank of Vinasale Mountain, and suggested that the lode mineralization was the source of placer gold mined in Alder Gulch. During 1990, Placer Dome U.S. Inc. and operator Central Alaska Gold Mining Company discovered significant gold anomalies in soils in the Central, Northeast, and South Zones, and initiated a diamond drill program, concentrating on the Central Zone (DiMarchi,

1993).

By the end of 1991, a 5,182 m diamond drill program indicated that 11,566,000 tonnes of ore contained about 31,100 kg (1 million ounces) gold (Bundtzen and others, 1992). With additional work completed in 1992 and 1993, a revised resource estimate for the Vinasale deposit, based on a total of 11,260 m of subsurface drilling, is 10.3 million tonnes grading 2.4 g/tonne gold for a total in-place reserve of 24,540 kg (789,000 ounces) gold (J. DiMarchi, written communication, 1994; Bundtzen and Miller, 1997). An additional 6,562 kg (211,000 ounces) gold is regarded as an in-place resource.

Production notes:

Reserves:

Drill-indicated gold resources are 24,540 kg (789,000 ounces); an additional 6,562 kg (211,000 ounces) gold in an inferred resource category. Byproduct metal content (Ag, Bi) has not been determined.

Additional comments:

Classified as a peraluminous granite porphyry-hosted gold-polymetallic deposit, an important deposit type in the Kuskokwim Mineral Belt (Bundtzen and Miller, 1997).

References:

Bundtzen, 1986; Solie and others, 1991; Bundtzen and others, 1992; DiMarchi, 1993; Bundtzen and Miller, 1997; McCoy and others, 1997.

Primary reference: DiMarchi, 1993

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/6/98

Site name(s): Alder Gulch; Vinasale

Site type: Mine

ARDF no.: MG010

Latitude: 62.696 **Quadrangle:** MG C-6

Longitude: 155.71

Location description and accuracy:

The Alder Gulch placer mine is located in Alder Gulch, a south flowing tributary that drains the south slope of Vinasale Mountain. The mine workings are at an elevation of 850 feet (259 m) in the NE1/4 sec. 18, T. 30 N., R. 34 W., of the Seward Meridian. The reporter investigated the mine in 1982.

Commodities:

Main: Ag, Au

Other: Bi, PGE, Sb, W

Ore minerals: Bismuth, gold, ilmenorutile, monazite, scheelite

Gangue minerals:

Geologic description:

The Alder Gulch heavy mineral placer deposit consists of auriferous, semi-residual and alluvial, unconsolidated deposits of Quaternary age in a steep gulch on the south flank of Vinasale Mountain. The placer deposit lies down slope and downstream from a mineralized 69.0 Ma granitic pluton that forms most of Vinasale Mountain (Bundtzen, 1986). Alder Gulch has only intermittent water flow and is dry through much of late summer and fall.

The gold and heavy mineral bearing material ranges from 0.5 to 2 meters thick, over stream widths of 12 to 20 meters. Placer gold has been detected for about 2 kilometers below the main workings. The placer deposit begins just below the contact between quartz monzonite and sheared hornfels, which may be a mineralized source for the placer minerals. The stream gradient is very steep and averages about 100 meters/kilometer at the head of Alder Gulch.

Principle heavy minerals identified during mining activities include placer gold that exhibits a fineness of 930, abundant native bismuth and scheelite; minor hastingsite, ilmenite, magnetite, and zircon; trace amounts of monazite, and ilmenorutile; and up to 2.6 ppm PGE (Bundtzen, 1986). The mineralogical source of the PGE is unknown. Sulfide-scheelite-quartz float found in the placer cut contains up to 14.3 grams/tonne gold (Bundtzen, 1986).

Alteration:
Extensive oxidation of regolith results in grussification of plutonic suite.

Age of mineralization:
Quaternary, based on geomorphic character (in active stream basin).

Deposit model:
Gold heavy mineral placer (Cox and Singer, 1986; model 39a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
39a

Production Status: Yes; small

Site Status: Active

Workings/exploration:
Surface exploration includes samples collected and processed by mine operator Peter Snow and samples reported by Bundtzen (1986). Sulfide-scheelite-quartz float found in the mine cut contain up to 14.3 grams/tonne gold.

Production notes:
Between 1930 and 1932, Carl Shutler mined in shallow hand mining cuts and produced 106.5 ounces (3.3 kg) gold and 20.2 ounces (0.6 kg) of byproduct silver Bundtzen, 1986). In 1981 and 1982, Peter Snow produced 16.5 ounces (503 grams) gold and 3.5 ounces (108 grams) of silver from a series of small test pits using a small tractor.

Reserves:

Additional comments:
Bundtzen (1986) collected a series of bulk concentrate samples from Peter Snow's 1982 operation, and concluded that up to 68 kilograms of scheelite could be recovered from one tonne of concentrate.

References:
Cobb, 1972; Cobb, 1973; Cobb, 1976; Bundtzen, 1986.

Primary reference: Bundtzen, 1986

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Red Shale

Site type: Occurrence

ARDF no.: MG011

Latitude: 62.516 **Quadrangle:** MG C-4

Longitude: 154.776

Location description and accuracy:

The Red Shale occurrence is located in a low saddle along a north-south ridgeline about 3 kilometers west of VABM Lone; it is at an elevation of 1,475 feet (450 m) in the NE1/4 sec. 14, T. 28 N., R. 30 W., of the Seward Meridian. The reporter visited the site in 1982, 1992, and 1997.

Commodities:

Main: Pb, Zn

Other: Cu

Ore minerals: Ferricrete oxide

Gangue minerals: Calcite, quartz

Geologic description:

The Red Shale occurrence is a stratiform, ferricrete gossan interbedded with quartzite, algal limestone, and dolomite of probable Cambrian or Late Proterozoic (?) age (Wilson and others, 1998). The section is exposed near the axis of an upright anticline that is structurally uplifted in a horst. The ferricrete zone occurs mainly as rubble crop and talus in a poorly exposed, shallow water, dolomite-carbonate dominant sequence that is interpreted to be the oldest exposed part of the Nixon Fork subterrane in the McGrath quadrangle (Babcock and others, 1994; Decker and others, 1994).

The mineralized gossan strikes N15E, dips approximately 8E, ranges from 10 centimeters to 40 centimeters thick, and can be traced for about 140 meters along strike. Vegetation conceals the extensions of the mineralized area in both directions. Although poorly exposed, the mineralization is parallel to bedding. Minor late calcite incrustations were found in the ferricrete gossan.

Three chip-channel samples (82BT219, 82BT221, 82BT222) taken at equally-spaced intervals along the exposed strike of the gossan zone contain up to 62.60 percent iron, 231 ppm copper, 485 ppm lead, 169 ppm nickel, and 2,250 ppm zinc (T.K. Bundtzen, written communication, 1983). No sulfides were recognized.

Alteration:

Strong ferricrete replacement of earlier sulfides.

Age of mineralization:
Late Proterozoic or Cambrian if mineralization is syngenetic.

Deposit model:
Uncertain; either Southeast Missouri Pb-Zn (?) or sedimentary exhalitive lead-zinc (Cox and Singer, 1986; model 32a or 31a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
32a or 31a

Production Status: No

Site Status: Inactive

Workings/exploration:
Three chip-channel samples (82BT219, 82BT221, 82BT222) taken at equally spaced intervals along the exposed strike of the gossan zone contain up to 62.60 percent iron, 231 ppm copper, 485 ppm lead, 169 ppm nickel, and 2,250 ppm zinc (T.K. Bundtzen, written communication, 1983).

Production notes:

Reserves:
None.

Additional comments:

References:
Babcock and others, 1994; Decker and others, 1994; Wilson and others, 1998.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/15/98

Site name(s): Lone

Site type: Occurrence

ARDF no.: MG012

Latitude: 62.51 **Quadrangle:** MG C-4

Longitude: 154.718

Location description and accuracy:

The Lone occurrence is located about 0.5 miles south of VABM Lone at an elevation of 2,500 feet (762 m) in the SE1/4 sec. 18, T. 28 N., R. 29 W., of the Seward Meridian. The reporter visited the site in 1982 and 1992.

Commodities:

Main: Cu, Fe

Other: Ag

Ore minerals: Chalcopyrite, magnetite

Gangue minerals: Epidote, garnet, quartz

Geologic description:

A leucocratic, biotite granite radiometrically dated at 71.0 Ma (Solie and others, 1991) intrudes Lower Ordovician deepwater carbonate of the Nixon Fork Subterrane (Decker and others, 1994). The intrusion created a 760 meter wide thermal aureole, which locally has formed hornfels and small, discontinuous pods of skarn. The skarns at the Lone occurrence consist of magnetite, epidote, undetermined amphibole, and weakly disseminated pyrite and chalcopyrite. The magnetite bearing skarns crop out over a 10 meter by 12 meter area (Bundtzen, Harris, and Gilbert, 1997).

Selected analyses (2) of the skarn zones at the Lone occurrence contain up to 0.50 percent copper, 35.00 percent iron, and 4.7 grams/tonne silver.

Alteration:

Epidote.

Age of mineralization:

Inferred to be related to the 71.0 Ma granite intrusion (Solie and others, 1991).

Deposit model:

Copper-iron skarns (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:
Selected analyses from surface samples at the Lone occurrence contain up to 0.50 percent copper, 35.00 percent iron, and 4.7 g/tonne silver.

Production notes:

Reserves:
None.

Additional comments:
See Nixon Fork and Whirlwind skarn deposits (MD040, MD064, MD062) in Medfra quadrangle.

References:
Solie and others, 1991; Decker and others, 1994; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/20/98

Site name(s): Unnamed (near VABM Upselat)

Site type: Occurrence

ARDF no.: MG013

Latitude: 62.4 **Quadrangle:** MG B-6

Longitude: 155.928

Location description and accuracy:

This unnamed occurrence is situated on a distinct, northeast-trending ridgeline about 9 kilometers south of the Kuskokwim River and 4 kilometers southwest of VABM Upselat, at an elevation of 1,475 feet (450 m) in the NE1/4 sec. 27, T. 27 N., R. 36 W., of the Seward Meridian. The reporter investigated the site in 1977 and again in 1989 (as station nos. 77BT301 and 89BT69).

Commodities:

Main: Ag

Other: Au

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:

This unnamed occurrence is associated with a small, 2 square kilometer alaskite pluton that intrudes the Late Cretaceous Kuskokwim Group. A prominent northwest trending lineament - possibly a fault - forms the eastern boundary of the alaskite. The alaskite is undated, but thought to be correlative with other Late Cretaceous-early Tertiary plutonic suites in the Kuskokwim Mineral Belt (Bundtzen and Miller, 1997). A stockwork-bearing hornfels that crops out 1.5 kilometers east of the alaskite pluton may indicate a larger intrusion at depth. Mineralization occurs as ferricrete stained, pyritic-quartz veins and breccia in hornfels. Two chip samples collected of mineralized zones average 2.33 grams/tonne silver and 0.68 grams/tonne gold.

Alteration:

Ferricrete oxidation common.

Age of mineralization:

Deposit model:

Polymetallic vein (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:
The reporter investigated the site in 1977 as part of an ADGGS minerals appraisal. Two chip samples collected from the mineralized zone in alaskite average 2.33 grams/ tonne silver and 0.68 grams/tonne gold.

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen and Miller, 1997; Wilson and others, 1998.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Unnamed (west side of Selatna Hills)

Site type: Occurrence

ARDF no.: MG014

Latitude: 62.281 **Quadrangle:** MG B-6

Longitude: 155.64

Location description and accuracy:

This unnamed occurrence is situated on a bluff and unnamed stream draining the west side of the Selatna Hills about 15 kilometers south of the big bend in the Selatna River at an elevation of 1,350 feet (412 m) in the SE1/4 sec. 6, T. 25 N., R. 34 W., of the Seward Meridian. The reporter visited the site in 1978 (at station nos. 78BT327-329).

Commodities:

Main: Ag, Cu, Pb

Other: Zn

Ore minerals:

Gangue minerals: Ferricrete gossan

Geologic description:

A ferrigenous gossan occurs in a prominent north-south trending, high-angle fault zone on the west side of the Selatna Hills in the southwest McGrath quadrangle. The zone can be traced for about 950 meters along strike and is locally up to 60 meters wide, based on the appearance of ferrigenous seeps and rubble. The high-angle fault juxtaposes siltstone of the Late Cretaceous Kuskokwim Group flysch against axinite-bearing hornfels related to the early Cretaceous (61.0 Ma) Selatna pluton (Solie and others, 1991; Wilson and others, 1998). Three soil samples (78BT327-329) taken along a 150 meter-long line immediately south of the creek average 1.9 ppm silver, 169 ppm copper, 130 ppm lead, and 246 ppm zinc.

Alteration:

Gossan.

Age of mineralization:

Deposit model:

Polymetallic vein(?) (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:
Four soil samples taken in 1978 along a 500 foot long line immediately south of the creek average 1.9 ppm silver, 169 ppm copper, 130 ppm lead, and 246 ppm zinc (T.K. Bundtzen, unpublished data).

Production notes:

Reserves:
None.

Additional comments:

References:
Solie and others, 1991; Wilson and others, 1998.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Unnamed (in Tatlawiksuk River basin)

Site type: Occurrence

ARDF no.: MG015

Latitude: 62.233 **Quadrangle:** MG A-6

Longitude: 155.592

Location description and accuracy:
This unnamed occurrence is located in a small saddle along a southwest-northeast-trending spur overlooking a south-flowing tributary of the Tatlawiksuk River; it is at an elevation of 2,150 feet (655 m) in the NW1/4 sec. 28, T. 25 N., R. 34 W., of the Seward Meridian. The reporter visited the site in 1978; at station no. 78BT196.

Commodities:

Main: Ag

Other: Cu

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
This unnamed occurrence is a pyrite-rich quartz-breccia zone within a N5E-trending, high-angle fault zone that juxtaposes quartz monzonite and thermally altered Kuskokwim Group rocks (Wilson and others, 1998). A pronounced fault zone is at least 15 meters thick and extends for 10 kilometers along strike. One grab sample of pyrite-rich gossan from the fault zone contained 10.1 grams/tonne silver and 142 ppm copper (T.K. Bundtzen, written communication, 1998).

Alteration:

Age of mineralization:

Deposit model:
Polymetallic vein (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:

The unnamed occurrence was found by the reporter during geologic mapping conducted for the Alaska Division of Geological and Geophysical Surveys; and eventually published in Wilson and others (1998). One grab sample contained 10.1 grams/tonne silver and 142 ppm copper (T.K. Bundtzen, written communication, 1998).

Production notes:

Reserves:

None.

Additional comments:

References:

Wilson and others, 1998.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/18/98

Site name(s): Tatlawiksuk Springs

Site type: Occurrence

ARDF no.: MG016

Latitude: 62.043 **Quadrangle:** MG A-6

Longitude: 155.763

Location description and accuracy:

The Tatlawiksuk Springs occurrence is located in a low marshy area in a valley tributary of Tatlawiksuk River at an elevation of 475 feet (145 m) in the NW1/4 sec. 31, T. 23 N., R. 35 W., of the Seward Meridian. The reporter investigated the site in 1989 and 1992.

Commodities:

Main: Au

Other: Ag

Ore minerals: Native Au

Gangue minerals:

Geologic description:

Bundtzen and others (1991) first described Tatlawiksuk Hot Springs, a newly discovered geothermal system in western Alaska. Tatlawiksuk Hot Springs is a fairly alkaline, low-chlorine, sodium bicarbonate spring that is comparable to other Alaskan hot springs related to faulted granitic pluton-sedimentary rock contact zones. The four recognized Tatlawiksuk springs emit hot waters that reach a maximum temperature of 68 degrees Celsius; the springs plumbing system exhibits a north-south alignment parallel to high-angle faults mapped in the area (Bundtzen and others, 1991; Wilson and others, 1998). During State Land Selection resource investigations conducted by the reporter in 1992 (Division of Geological and Geophysical Surveys Staff, 1993), several grains of placer gold were detected in sinterous material at the northern end of the spring system.

Alteration:

Siliceous sinter.

Age of mineralization:

Quaternary(?).

Deposit model:

Hot Springs gold-silver(?) (Cox and Singer, 1986; model 25a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
25a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
During State Land Selection resource investigations conducted by the reporter in 1992 (Division of Geological and Geophysical Surveys Staff, 1993), several grains of placer gold were detected in sinterous material at the northern end of the spring system.

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen and others, 1991; Wilson and others, 1998.

Primary reference: Bundtzen and others, 1991

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Unnamed (near Cheeneetnuk River)

Site type: Occurrence

ARDF no.: MG017

Latitude: 62.034 **Quadrangle:** MG A-5

Longitude: 155.228

Location description and accuracy:
This unnamed occurrence is located on a north-south ridgeline, 3.0 kilometers NW of Cheeneetnuk River, at an elevation of 2,500 feet (762 m) in the SE1/4 sec. 36, T. 23 N., R. 33 W., of the Seward Meridian. The location corresponds to map number 136 of Gilbert (1981); his station no. 77WG236. The reporter visited the site in 1989.

Commodities:

Main: Cu

Other: Mo, Zn

Ore minerals: Pyrite

Gangue minerals: Axinite, quartz

Geologic description:
This unnamed occurrence is a pyrite-rich gossan developed in Upper Paleozoic argillite of the Mystic subterrane near a thrusted contact with an overlying, Late Devonian shallow water limestone (Gilbert, 1981; Wilson and others, 1998). The pyritic gossan parallels the thrust contact and may mark a subsidiary thrust fault zone. The argillite host appears to be thermally upgraded to hornfels by a buried intrusive system; a Tertiary granite is exposed about 5 kilometers NE of the occurrence area. Platey axinite and quartz were found in two localities in the argillite. The extent of the site is unknown. One grab sample of the pyritic material contained 290 ppm copper, 150 ppm zinc, and 7 ppm molydenum (Gilbert, 1981).

Alteration:

Age of mineralization:

Deposit model:
Polymetallic replacement (?) (Cox and Singer, 1986; model 19a).

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

19a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:

W.G. Gilbert sampled the mineralized zone during geologic mapping for the Alaska Division of Geological and Geophysical Surveys in 1977 (Gilbert, 1981). One grab sample of the pyritic material yielded 290 ppm copper, 150 ppm zinc, and 7 ppm molybdenum.

Production notes:

Reserves:

None.

Additional comments:

References:

Gilbert, 1981; Wilson and others, 1998.

Primary reference: Gilbert, 1981

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (on tributary of Cheeneetnuk River)

Site type: Occurrence

ARDF no.: MG018

Latitude: 62.065 **Quadrangle:** MG A-5

Longitude: 155.207

Location description and accuracy:

This unnamed occurrence is located on a north-south ridgeline overlooking an unnamed tributary of Cheeneetnuk River; it is at an elevation of 2,475 feet (754 m) in the SE1/4 sec. 19, T. 23 N., R. 32 W., of the Seward Meridian. The location corresponds to map number 138 in Gilbert (1981); his station no. 77WG203. The reporter visited the site in 1989.

Commodities:

Main: Cu

Other: Ag

Ore minerals: Pyrite

Gangue minerals:

Geologic description:

This unnamed occurrence is a sulfide gossan hosted in Upper Paleozoic argillite of the Mystic subterrane, adjacent to a Tertiary andesite dike (Gilbert, 1981; Wilson and others, 1998). The gossan trends northeast for 90 meters and may be related to the dike.

Pyrite impregnates ferricrete gossan in one sample; otherwise sulfide minerals have been completely oxidized. The argillite is locally thermally upgraded to hornfels; axinite and secondary biotite are observed in talus and rubble crop. A mid-Tertiary (39.8 Ma) granite pluton (Solie and others, 1991) is exposed in low angle contact with the Upper Paleozoic argillite and probably underlies the ridge where the mineralization occurs. Surface dimensions of the gossan are not available. One grab sample of gossan contained 350 ppm copper and 0.3 grams/tonne silver (Gilbert, 1981).

Alteration:

Axinite, secondary biotite.

Age of mineralization:

Unknown; possibly related to 39.8 Ma granite body nearby (Gilbert, 1981; Solie and others, 1991).

Deposit model:
Polymetallic replacement (?) (Cox and Singer, 1986; model 19a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
19a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
W.G. Gilbert found the occurrence during a geologic mapping program for the Alaska Division of Geological and Geophysical Surveys in 1977 (Gilbert, 1981). One grab sample of gossan contained 350 ppm copper and 0.3 grams/tonne silver (Gilbert, 1981).

Production notes:

Reserves:
None.

Additional comments:

References:
Gilbert, 1981; Solie and others, 1991; Wilson and others, 1998.

Primary reference: Gilbert, 1981

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (on west bank of Cheeneetnuk River)

Site type: Occurrence

ARDF no.: MG019

Latitude: 62.054 **Quadrangle:** MG A-5

Longitude: 155.132

Location description and accuracy:

This unnamed occurrence is located near the west bank of Cheeneetnuk River at an elevation of 850 feet (259 m) in the SW1/4 sec. 27, T. 23 N., R. 32 W., of the Seward Meridian. The occurrence corresponds to map number 122 of Gilbert (1981); his station no. 77WG21.

Commodities:

Main: Ag, Cu

Other: Mo

Ore minerals:

Gangue minerals:

Geologic description:

This occurrence is a highly anomalous stream sediment sample taken at the intersection of an unnamed, second order stream with Cheeneetnuk River. The stream drains a mid-Tertiary granite pluton; its associated, mineralized contact zone may be related to several other occurrences in the area (MG017, MG018, MG020, MG021). The stream sediment sample contained 43.3 grams/tonne silver, 322 ppm copper, and 19 ppm molybdenum (Gilbert, 1981).

Alteration:

Age of mineralization:

Deposit model:

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

Production Status: No

Site Status: Inactive

Workings/exploration:

W.G. Gilbert collected the stream sediment sample in 1977 (Gilbert, 1981). The sample contained 43.3 grams/tonne silver, 322 copper, and 19 ppm molybdenum.

Production notes:

Reserves:

None.

Additional comments:

References:

Gilbert, 1981; Solie and others, 1991.

Primary reference: Gilbert, 1981

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (near Cheeneetnuk River)

Site type: Occurrence

ARDF no.: MG020

Latitude: 62.066 **Quadrangle:** MG A-5

Longitude: 155.12

Location description and accuracy:
The unnamed occurrence is located on a steep east-facing slope overlooking Cheeneetnuk River, at an elevation of 1,400 feet (427 m) in the southern half of sec. 22, T. 23 N., R. 32 W., of the Seward Meridian. The occurrence corresponds to map number 120 of Gilbert (1981); his station no. 77WG5.

Commodities:

Main: Cu

Other: Ag

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
This unnamed occurrence is a mineralized, pyritic argillite near the contact between Middle Devonian limestone and upper Paleozoic argillite, both subdivisions of the Mystic subterrane (Gilbert, 1981; Wilson and others, 1998). The argilite appears to be thermally upgraded to hornfels; a mid-Tertiary granite pluton is exposed about one mile west of the occurrence. One grab sample contained 178 ppm copper and 0.7 grams/tonne silver (Gilbert, 1981).

Alteration:

Age of mineralization:

Deposit model:
Polymetallic replacement (?) (Cox and Singer, 1986; model 19a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
19a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:

W.G. Gilbert found the mineral zone during a geologic mapping project for the Alaska Division of Geological and Geophysical Surveys in 1977 (Gilbert, 1981). One grab sample contained 178 ppm copper and 0.7 grams/tonne silver.

Production notes:

Reserves:

None.

Additional comments:

References:

Gilbert, 1981; Wilson and others, 1998.

Primary reference: Gilbert, 1981

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (overlooking Cheeneetnuk River)

Site type: Occurrence

ARDF no.: MG021

Latitude: 62.073 **Quadrangle:** MG A-5

Longitude: 155.105

Location description and accuracy:

This unnamed occurrence is located on a steep east-facing bluff overlooking Cheeneetnuk River; at an elevation of 1,000 feet (305 m) in the NW1/4 sec. 23, T. 23 N., R. 32 W., of the Seward Meridian. The occurrence corresponds to prospect number no. 117 in Gilbert (1981); his station no. 78WG79. The reporter visited the site in 1989.

Commodities:

Main: Cu

Other: Ag

Ore minerals: Pyrite

Gangue minerals:

Geologic description:

The unnamed occurrence is a large zone of pyritic gossan in argillite of the Upper Paleozoic Mystic subterrane near the Cheeneetnuk Thrust Fault system (Gilbert, 1981; Wilson and others, 1998). The pyrite-rich gossan can be traced for more than 300 meters of strike length; mineralized widths were not determined. A Tertiary (37.8 Ma) granite is exposed about one quarter mile from the gossan (Gilbert, 1981). Four grab samples taken along the strike of the zone consistently yielded anomalous copper and silver with values of up to 224 ppm copper and 1.9 grams/tonne silver (Gilbert, 1981).

Alteration:

Age of mineralization:

Deposit model:

Polymetallic replacement (?) (Cox and Singer, 1986; model 19a).

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

19a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:

W.G. Gilbert sampled the gossan during geologic mapping for the Alaska Division of Geological and Geophysical Surveys in 1978 (Gilbert, 1981). Four grab samples taken along the strike of the zone consistently yielded anomalous copper and silver with values of up to 224 ppm copper and 1.9 grams/tonne silver (Gilbert, 1981).

Production notes:

Reserves:

None.

Additional comments:

References:

Gilbert, 1981; Wilson and others, 1998.

Primary reference: Gilbert, 1981

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (near tributary of Cheeneetnuk River)

Site type: Occurrence

ARDF no.: MG022

Latitude: 62.093 **Quadrangle:** MG A-4

Longitude: 154.867

Location description and accuracy:
This unnamed occurrence is located on the east side of a low hill overlooking an unnamed west-flowing tributary of Cheeneetnuk River; it is at an elevation of 2,050 feet (625 m) in the SE1/4 sec. 12, T. 23 N., R. 31 W., of the Seward Meridian. The occurrence corresponds to map number 98 of Gilbert (1981); his station no. 79WG50.

Commodities:

Main: Zn

Other: Ni

Ore minerals: Iron oxides

Gangue minerals:

Geologic description:
This unnamed occurrence is a gossan zone in silty limestone correlative with the Mid-Silurian, Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). No surface dimensions of the mineralized zone are available. One grab sample taken from the gossan contained 2,900 ppm zinc and 180 ppm nickel (Gilbert, 1981).

Alteration:

Age of mineralization:

Deposit model:
Polymetallic replacement (?) (Cox and Singer, 1986; model 19a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
19a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:

W.G. Gilbert found the mineralized zone during geologic mapping for the Alaska Division of Geological and Geophysical Surveys in 1979 (Gilbert, 1981). One sample from the gossan contained 2,900 ppm zinc and 180 ppm nickel.

Production notes:

Reserves:

None.

Additional comments:

References:

Gilbert, 1981; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Gilbert, 1981

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (overlooking tributary of Cheeneetnuk River)

Site type: Occurrence

ARDF no.: MG023

Latitude: 62.173 **Quadrangle:** MG A-4

Longitude: 154.928

Location description and accuracy:
This unnamed occurrence is located on a south-facing spur overlooking an unnamed tributary of Cheeneetnuk River. It is about 2.5 kilometers southwest of VABM Big (White Mountain), at an elevation of 1,900 feet (579 m) in the NE1/4 sec. 15, T. 24 N., R. 31 W., of the Seward Meridian. The location corresponds to map number 25-26 of Gilbert (1981); his station no. 79WG192.

Commodities:

Main: Pb, Zn

Other: Ag, Cu

Ore minerals: Iron oxides

Gangue minerals:

Geologic description:
This unnamed occurrence is a ferricrete gossan hosted in an unnamed Ordovician mudstone unit of the Nixon Fork subterrane (Gilbert, 1981; Wilson and others, 1998). The gossan is parallel to bedding in the unit; no surface measurements are available. Two grab samples taken in the gossan zone contained up to 3.0 grams/tonne silver, 81 ppm copper, 320 ppm lead, and 6,800 ppm zinc (Gilbert, 1981).

Alteration:

Age of mineralization:

Deposit model:
Polymetallic replacement (?) (Cox and Singer, 1986; model 19a)

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
19a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:

W.G. Gilbert found the occurrence during geological mapping for the Alaska Division of Geological and Geophysical Surveys in 1979 (Gilbert, 1981). Two grab samples taken across the gossan zone contained up to 3.0 grams/tonne silver, 81 ppm copper, 320 ppm lead, and 6,800 ppm zinc (Gilbert, 1981).

Production notes:

Reserves:

None.

Additional comments:

References:

Gilbert, 1981; Wilson and others, 1998.

Primary reference: Gilbert, 1981

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/11/98

Site name(s): Unnamed (near summit of White Mountain)

Site type: Occurrence

ARDF no.: MG024

Latitude: 62.185 **Quadrangle:** MG A-4

Longitude: 154.895

Location description and accuracy:

This unnamed occurrence is located on a southeast ridge about 200 meters from the summit of VABM Big (White Mountain), at an elevation of 3,100 feet (945 m) in the SE1/4 sec. 11, T. 24 N., R. 30 W., of the Seward Meridian. The location corresponds to prospect number 11 in Gilbert (1981); at station no. 79WG199.

Commodities:

Main: Cu, Hg

Other: Ag

Ore minerals: Cinnabar

Gangue minerals: Calcite

Geologic description:

This unnamed occurrence is a cinnabar-bearing breccia in a diabase dike that intrudes an unnamed algal limestone, a subdivision of the Nixon Fork subterrane (Gilbert, 1981; Wilson and others, 1998). The host dike trends east-west and dips steeply into the hill-side. One sample of cinnabar-bearing breccia contained 214 ppm copper; mercury was not analyzed.

Alteration:

Age of mineralization:

Deposit model:

Polymetallic vein (?) (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:

W.G. Gilbert found the occurrence during geologic mapping for the Alaska Division of Geological and Geophysical Surveys in 1979 (Gilbert, 1981). One sample of cinnabar-bearing breccia contained 214 ppm copper; mercury was not analyzed.

Production notes:

Reserves:

None.

Additional comments:

References:

Gilbert, 1981; Wilson and others, 1998.

Primary reference: Gilbert, 1981

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): White Mountain

Site type: Mine

ARDF no.: MG025

Latitude: 62.183 **Quadrangle:** MG A-4

Longitude: 154.849

Location description and accuracy:

The White Mountain Mine is located on a southwest facing slope on the north side of the headward reaches of the Cheeneetnuk River at an elevation of approximately 2,000 feet (610 m) in sec. 7, T. 24 N., R. 30 W., of the Seward Meridian. The term White Mountain was originally used by local residents to refer to a prominent mountain two miles directly west of the mine that is capped by white dolomite of Late Silurian age (Gilbert, 1981).

The White Mountain Mine correlates with locality number 14 on Cobb (1972), and located just to the southeast of the airstrip marked on the McGrath A-4 quadrangle and McGrath 1:250,000 quadrangle maps. (Note that White Mountain Mine is misplotted on the Lime Hills 1:250,000 quadrangle map). Location is accurate; the reporter has visited the site numerous times since 1977. The 700 meter long airstrip is now largely overgrown with vegetation and suitable only for small 'Super Cub' type aircraft.

Commodities:

Main: Hg

Other: Sb

Ore minerals: Cinnabar, pyrite, stibnite

Gangue minerals: Calcite, chalcedony, dickite, dolomite, limonite

Geologic description:

The White Mountain Mercury Mine consists of a series of at least three discrete, structurally controlled, cinnabar-dolomite-chalcedony mineralized areas with subordinate to trace amounts of stibnite, pyrite, calcite, and dickite. During development and production activities, the three mineralized areas were designated the"South', 'Center', and 'North' ore zones (Sainsbury and MacKevett, 1965). The cinnabar deposits are distributed along a belt approximately one kilometer wide and three kilometers long near the northwest side of the active strand of the Farewell-Denali Fault system (Gilbert, 1981). In the White Mountain Mine area, this fault system juxtaposes Cambro-Ordovician ollitic limestone on the southeast against Ordovician mudstone on the northwest (Gilbert, 1981). Both units are part of the Nixon Fork subterrane (Decker and others, 1994). The cinnabar ore bodies

are found near individual strands of the Farewell-Denali fault, generally where shale is faulted against limestone (Sainsbury and MacKevett, 1960, 1965). All of the known ore zones strike from N25W to N40E and dip steeply to vertically, parallel to the Farewell-Denali fault system.

In all three mineralized areas, cinnabar occurs as dark-red crystals coating open-space fillings in brecciated dolomite, as 'paint' on breccia surfaces, and as irregular veinlets of nearly pure cinnabar. Dolomite replacement is a conspicuous feature of the ore zones and in addition, significant amounts of chalcedonic alteration also occurs in the north ore zone. These features, coupled with observations of ancestral spring activity in other nearby deposits such as the Peggy Barbara (MG026) and Mary Margaret Prospects (MG027) and isotopic data from White Mountain Mine (Gray and others, 1997) suggest a mineralogical origin in a hot springs environment. Crystalline cinnabar was especially well developed in the North ore zone.

In the South ore zone a 60 meter long orebody 12 meters wide contained as much as 1 percent mercury. In the Central deposit, an elliptically shaped, 10 meter by 13 meter zone of cinnabar mineralization was intersected to a depth of 23 meters. The North zone is at least 76 meters long and 3 to 6 meters wide, and contains some of the richest ore with grades over 2.5 meter widths exceeding 5 percent mercury (Sainsbury and MacKevett, 1965; Conwell, 1975).

Alteration:

Extensive dolomitic and chalcedonic alteration; minor dickite, limonite, and calcite alteration.

Age of mineralization:

Deposit model:

Hot Springs Mercury (Cox and Singer, 1986; model 27a).

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

27a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

Cinnabar mineralization in the White Mountain area was discovered by Jack Egnaty in 1958, while following up panned cinnabar concentrates in the upper Cheeneetnuk River area. The prospects were taken over by Cordero Mining Company (R.F. Lyman family) in 1959 (Jasper, 1961). Trenches were quickly made by Cordero Mining Company and mapped by the U. S. Geological Survey (Sainsbury and MacKevett, 1960, 1965). In 1960, the U.S. Bureau of Mines completed additional trenching and hand tested specific areas with an auger drill (Malone, 1962, 1965). The U.S. Geological Survey visited the property again in 1961 and completed additional mapping of exposed trenches (Sainsbury and MacKevett, 1965).

After production was initiated in 1964, Cordero Mining Company continued exploration and development of the property through limited diamond drilling, trenching,shaft sinking, and drifting. Their activities continued until the mine ceased operations in 1974 (Conwell, 1975).

In the South ore zone, a 60 meter long ore body 12 meters wide contained as much as 1 percent mercury. In the Central deposit, an elliptically shaped zone an 10 meter by 13 meter area contains cinnabar mineralization. Drilling confirmed the presence of cinnabar to a depth of 23 meters. The North zone is at least 76 meter long and 3 to 6 meter wide and contains some of the richest ore on the property with grades over 2.5 meter widths exceeding 5 percent mercury.(Sainsbury and MacKevett, 1965; Conwell, 1975).

Production notes:

Production began in 1964 from a series of small open pits and trenches. Later in 1967 and 1968, shallow underground workings were mined (Conwell, 1971). Originally rich ores were selectively mined and shipped for processing and retortion to a facility in Oregon. In 1971, a small crusher and concentrator were designed to process lower grade disseminated ores on the mine site and to produce a cinnabar crystal concentrate for selected buyers. The ores were mainly retorted at a facility in Oregon.

The White Mountain Mine is estimated to have produced about 3,500 flasks (58,300 kilograms) of mercury from 1964 to 1974 (Bundtzen and Conwell, 1982). Operations ceased when mine operator Robert F. Lyman was killed in a heavy equipment accident at the mine site (Conwell, 1975; Bundtzen and Conwell, 1982). The property has remained inactive since.

Reserves:

Additional comments:

See also Mary Margaret (MG027) and Peggy Barbara (MG026) prospects.

References:

Sainsbury and MacKevett, 1960; Jasper, 1961; Malone, 1962; Sainsbury and MacKevett, 1965; Malone, 1965; Conwell, 1971; Cobb, 1972; Conwell, 1975; Cobb, 1976; Gilbert, 1981; Bundtzen and Conwell, 1982; Nokleberg and others, 1987; Decker and others, 1994; Gray and others, 1997.

Primary reference: Sainsbury and MacKevett, 1965

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Peggy Barbara; Ship Rock

Site type: Prospect

ARDF no.: MG026

Latitude: 62.173 **Quadrangle:** MG A-4

Longitude: 154.865

Location description and accuracy:

The Peggy Barbara prospect is located on a limestone bluff adjacent to an east fork of the Cheeneetnuk River, about 1 mile (1.5 km) south of the White Mountain Mercury Mine airstrip in the NW1/4 sec. 18, T. 24 N., R. 30 W., of the Seward Meridian. The reporter visited the prospect in 1989 (Alaska Division of Geological and Geophysical Surveys station no. 89BT117).

Commodities:

Main: Hg

Other: Sb

Ore minerals: Cinnabar, stibnite

Gangue minerals: Calcite

Geologic description:

Mineralization at the Peggy Barbara prospect consists of small stringers and lenses of cinnabar and minor stibnite in black-gray limestone of the Early Devonian Cheeneetnuk Limestone (Gilbert, 1981; Blodgett and Gilbert, 1983). Cinnabar is found in limestone blocks at the base of and within a 15 meter high by 60 meter long cliff; limestone was first cut by calcite veins and later cinnabar-stibnite mineralization accompanied by more calcite veining.

The largest lens or pipe measures 10 cm by 30 cm in dimension with an unknown, steep rake into the limestone outcrop. One high grade sample contained 66.8% Hg (Sainsbury and MacKevett, 1965). Deposit geology is similar to that at the nearby Mary Margaret prospect (MG027) and the White Mountain Mercury mine (MG025).

Alteration:

Dickite alteration.

Age of mineralization:

Deposit model:

Probably Hot Springs Mercury (Cox and Singer, 1986; model 27a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
27a

Production Status: No

Site Status: Inactive

Workings/exploration:
Only surface sampling has been conducted on the property. One sample contained 66.8 percent mercury (Sainsbury and MacKevett, 1965).

Production notes:

Reserves:

Additional comments:
Mineralization may be related to the nearby Farewell-Denali strike slip fault system (Gilbert, 1981; Wilson and others, 1998).

References:
Sainsbury and MacKevett, 1965; Maloney, 1967; Cobb, 1972; Gilbert, 1981; Blodgett and Gilbert, 1983; Wilson and others, 1998.

Primary reference: Sainsbury and MacKevett, 1965

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Mary Margaret; Coxcomb

Site type: Prospect

ARDF no.: MG027

Latitude: 62.164 **Quadrangle:** MG A-4

Longitude: 154.873

Location description and accuracy:

The Mary Margaret prospect is located along a steep, southeast bank of Cheeneetnuk River, about 1.5 miles (2.4 km) southwest of the airstrip at White Mountain Mercury mine at an elevation of 1,450 feet (442 m) in the SE1/4 sec. 13, T. 24 N., R. 30 W., of the Seward Meridian. Some of the mineralized zone crops out on a ridge about 150 meters south of a conspicuous cold water spring entering the Cheeneetnuk River. The prospect is location 16, of Cobb (1972); the reporter visited the site in 1989 (Alaska Division of Geological and Geophysical Surveys station # 89BT118).

Commodities:

Main: Hg

Other: Sb

Ore minerals: Cinnabar, stibiconite, stibnite

Gangue minerals: Calcite, quartz

Geologic description:

The Mary Margaret prospect consists of cinnabar, quartz, carbonate and minor stibnite in brecciated limestone of the Early Devonian Cheeneetnuk limestone (Blodgett and Gilbert, 1983). The unit overlies the Dillinger subterrane, a lower Paleozoic continental margin assemblage (Bundtzen and others, 1997).

On the bluff south of the Cheeneetnuk River, two mineralized fracture orientations were measured: (1) a strike of N50E, with a dip of 70SE; and (2) a strike of N65E with a dip of 30SE. The fracture system can be traced for a strike length of about 20 meters before disappearing under vegetation. The cinnabar veinlets average about 5 cm thick and exhibit an exceptional bright red color similar to cinnabar at the Mountain Top Mine described by Miller and others (1989) in the Sleetmute quadrangle.

At the creek level, a cold water sulfur spring that flows from fractured limestone in the area is depositing black, foul-smelling mud that contains Hg. Selected samples of ore contain from 2 to 13 percent mercury and up to 0.5 percent antimony, but with no precious metal values. The cinnabar to stibnite ratio averages about 10 to 1 (T.K. Bundtzen, written communication, 1989).

Alteration:
Oxidation of stibnite mineralization to stibiconite.

Age of mineralization:

Deposit model:
Hot Springs mercury (?) (Cox and Singer, 1986; model 27a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
27a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
Only surface sampling has been conducted at the prospect. Selected samples contain from 2 to 13 percent mercury and up to 0.5 percent antimony, but no precious metals.

Production notes:

Reserves:
None.

Additional comments:
The Mary Margaret prospect formed near or in an unnamed strand of the Farewell-Denali fault system (Gilbert, 1981).

References:
Sainsbury and MacKevett, 1965; Maloney, 1967; Cobb, 1972; Gilbert, 1981; Blodgett and Gilbert, 1983; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Sainsbury and MacKevett, 1965

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Unnamed (overlooking Middle Fork of Kuskokwim River)

Site type: Occurrence

ARDF no.: MG028

Latitude: 62.228 **Quadrangle:** MG A-3

Longitude: 154.45

Location description and accuracy:

The unnamed occurrence is located in a low saddle overlooking the Middle Fork of the Kuskokwim River at an elevation of 3,000 feet (915 m) in the SW1/4 sec. 27, T. 25 N., R. 28 W., of the Seward Meridian. The reporter visited the site in 1998 at station no. 98BT440.

Commodities:

Main: Ag

Other: Fe, Mo

Ore minerals: Molybdenite, pyrite

Gangue minerals: Epidote, quartz

Geologic description:

This unnamed occurrence is a skarn zone developed in a highly sheared limestone of Late Triassic age, a part of the Mystic subterrane (Gilbert and others, 1988; Bundtzen, Harris, and Gilbert, 1997). Massive pyrite bands averaging 8 centimeters in thickness occur in association with epidote-quartz gangue within a 10 meter wide skarn zone near a gabbro-diorite sill. One grab sample contained 10.75 percent iron, 100 ppm molybdenum, and 1.25 grams/tonne silver (T.K. Bundtzen and G.M. Laird, written communication, 1998).

Alteration:

Age of mineralization:

Deposit model:

Iron-rich skarn (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:

This unnamed occurrence was investigated in 1998. One grab sample contained 10.75 percent iron, 100 ppm molybdenum, and 1.25 grams/tonne silver (T.K. Bundtzen and G. M. Laird, written communication, 1998).

Production notes:

Reserves:

None.

Additional comments:

References:

Gilbert and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/22/98

Site name(s): Unnamed (on tributary to Middle Fork of Kuskokwim River)

Site type: Occurrence

ARDF no.: MG029

Latitude: 62.21 **Quadrangle:** MG A-3

Longitude: 154.449

Location description and accuracy:

This unnamed occurrence is located near the juncture of two second order tributaries to an unnamed stream draining into Middle Fork of Kuskokwim River. It is at an elevation of 2,700 feet (823 m) in the SW1/4 sec. 34, T. 25 N., R. 28 W., of the Seward Meridian. The reporter visited the site in 1998; at station no. 98BT441.

Commodities:

Main: Ag, Cu, Pb

Other: Fe, Mo, Ni, V, Zn

Ore minerals: Galena, marcasite, pyrite

Gangue minerals: Sericite

Geologic description:

The unnamed occurrence consists of stratiform pyrite-marcasite-galena bands parallel to sedimentary bedding in black, carbonaceous shale of the Lower Ordovician to Lower Silurian, Post River Formation, a unit of the Dillinger subterrane (Gilbert and others, 1988; Bundtzen, Harris, and Gilbert, 1997). The mineralization occurs in several outcrops at creek level that can be traced for about 75 meters; the sulfide-bearing bands are about 3 meters thick. However, individual sulfide-bearing layers are rarely more than 5 centimeters thick, and are isoclinally deformed as are the sedimentary interlayers. Microprobe analysis showed galena grains impregnated in the pyrite-rich layers.

One grab sample of massive pyrite-marcasite-galena mineralization contained 2.4 grams/tonne silver, 135 ppm copper, 11.60 percent iron, 39 ppm molybdenum, 255 ppm nickel, 176 ppm lead, 168 ppm vanadium, and 208 ppm zinc.

Alteration:

Age of mineralization:

Lower Paleozoic if mineralization is syngenetic.

Deposit model:
Sedimentary exhalitive lead-zinc (?) (Cox and Singer, 1986; model 31b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
31b(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
The reporter investigated the site in 1998 (T.K. Bundtzen and G.M. Laird, written communication, 1998). One grab sample of massive pyrite-marcasite-galena mineralization contained 2.4 grams/tonne silver, 135 ppm copper, 11.60 percent iron, 39 ppm molybdenum, 255 ppm nickel, 176 ppm lead, 168 ppm vanadium, and 208 ppm zinc.

Production notes:

Reserves:
None.

Additional comments:
See other possible sedimentary exhalitive prospects in McGrath quadrangle (MG049, MG051, MG064, MG071, MG072, MG074).

References:
Gilbert and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/22/98

Site name(s): Robert's PGM (near Middle Fork of Kuskokwim River)

Site type: Prospect

ARDF no.: MG030

Latitude: 62.196 **Quadrangle:** MG A-3

Longitude: 154.446

Location description and accuracy:

The Robert's PGM prospect is located on the crest of a steep, north-sloping ridgeline near the head of an unnamed tributary of the Middle Fork of the Kuskokwim River. The prospect is approximately 5 kilometers south-southwest of Middle Fork airstrip (Bob Fithian's guide camp) at an elevation of 4,350 (1,326 m) feet in the SE1/4 sec. 5, T. 24 N., R. 28 W., of the Seward Meridian. The reporter investigated the site in 1982 and 1998.

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Ag, Au, Bi, Co, Cr

Ore minerals: Bravoite, chalcopyrite, galena, pentlandite, pyrite, pyrrhotite, Te-Bi sulfosalts

Gangue minerals: Hematite, magnetite

Geologic description:

The Robert's PGM prospect is hosted in a differentiated, mafic-ultramafic sill-form intrusion that cuts silty limestone and shale of the Late Cambrian to Early Ordovician Lyman Hills Formation, the oldest facies of the Dillinger subterrane (Bundtzen Harris, and Gilbert, 1997). The sill is undated, but believed to be correlative with Late Triassic feeders in the Tatina River Volcanics, a subdivision of the Middle Devonian to Lower Jurassic Mystic subterrane (Bundtzen, Harris, and Gilbert, 1997; T.K. Bundtzen and G.M. Laird, written communication,1998).

The mafic-ultramafic sill trends N55E, dips about 35SE parallel to bedding, and ranges in composition from picrite to diorite but is generally a gabbro. Surface sampling and sampling indicates that the sill is differentiated with picrite-gabbro near the base and diorite occurring near the top (T.K. Bundtzen and G.M. Laird, written communication, 1998). Another mafic sill was mapped by Gilbert and others (1988) about 3 kilometers southwest and on strike with the Robert's PGM occurrence.

Principle mineralization at the Robert's PGM occurrence consists of disseminated and network-style sulfides in the lower and middle part of the sill. These include megascopic chalcopyrite, pyrite, magnetite, and pyrrhotite, and microscopic bravoite, galena, Bi-Te sulfosalts, and pentlandite. According to W.S. Roberts (written communication, 1984) ,

the PGE mineral may be a palladium bismuth telluride. T.K. Bundtzen and G.M. Laird (written communication, 1998) could not firmly establish a mineralogical source of the PGE values at the prospect. The thickness of the mineralized zone, based on limited chip-channel sampling efforts, ranges from 2 to 4 meters thick; a minimum strikelength of about 25 meters was measured.

Five samples taken perpendicular to the strike of the sill contained up to 0.49 ppm palladium, 0.35 ppm platinum, 0.8 ppm silver, 0.09 ppm gold, 1,315 ppm copper, 1,510 ppm nickel, and 1,530 ppm chromium (T.K. Bundtzen and G.M. Laird, written communication, 1998). Bench tests conducted by the U.S. Bureau of Mines (now U.S. Bureau of Land Management) show up to 4.71 percent nickel, 0.16 percent cobalt, 4.68 percent copper, 6.2 ppm platinum, 7.7 ppm palladium, and 4.7 ppm gold (W.S. Roberts, written communication, 1984; Foley and others, 1997; Bundtzen, Harris, and Gilbert, 1997).

Alteration:

Serpentinization of ultramafic phases of sill.

Age of mineralization:

Unknown; thought to be correlative with Late Triassic feeders in Tatina River Volcanics (Bundtzen, Harris, and Gilbert, 1997).

Deposit model:

Disseminated Ni-Cu-PGE in gabbro (Cox and Singer, 1986; model 5b).

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

5b

Production Status: No

Site Status: Inactive

Workings/exploration:

The Robert's PGM prospect was discovered in 1981 by W.S. Roberts, formerly of the U.S. Bureau of Mines, while conducting cooperative strategic mineral studies with the Alaska Division of Geological and Geophysical Surveys in the McGrath quadrangle (Roberts and O'Connor, 1985). Five samples taken perpendicular to the strike of the sill by T.K. Bundtzen and G.M. Laird (written communication, 1998) contained up to 0.49 ppm palladium, 0.35 ppm platinum, 0.8 ppm silver, 0.09 ppm gold, 1,315 ppm copper, 1,510 ppm nickel, and 1,530 ppm chromium. Bench tests conducted by the U.S. Bureau of Mines (now U.S. Bureau of Land Management) showed up to 4.71 percent nickel, 0.16 percent cobalt, 4.68 percent copper, 6.2 ppm platinum, 7.7 ppm palladium, and 4.7 ppm gold (W.S. Roberts, written communication, 1984; Foley and others, 1997).

Production notes:

Reserves:

None.

Additional comments:

Similar to Chip-Loy deposit (MG032).

References:

Roberts and O'Connor, 1985; Gilbert and others, 1988; Foley and others, 1997; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Roberts and O'Connor, 1985

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Straight Creek Springs

Site type: Occurrence

ARDF no.: MG031

Latitude: 62.17 **Quadrangle:** MG A-3

Longitude: 154.388

Location description and accuracy:

Straight Creek Springs (more than a dozen distinct springs are known) are located on the west limit of Straight Creek valley just down stream from the Chip Loy deposit (MG032). The springs occur at an elevation of 2,800 feet (853 m) in the W1/2 sec. 15, T. 24 N., R. 28 W., of the Seward Meridian. The coordinates are in the center of the spring system. The reporter visited the site in 1998.

Commodities:

Main: Cu, Ni, Zn

Other: Mo

Ore minerals: Iron oxides

Gangue minerals: Silicrete minerals

Geologic description:

Straight Creek Springs consist of a very distinctive, north-south trending, 400-meter-long line of more than a dozen active springs, each containing conspicuous coatings and replacements of brilliant orange limonite and light gray, bleached, silicrete crusts up to 3 centimeters thick. The conspicuous orange-light gray colored springs occur immediately below the contact between the black shale-rich section of the Ordovician-Lower Silurian, Post River Formation and the mid to Late Silurian Terra Cotta Mountains Sandstone, both of lower Paleozoic age (Churkin and Carter, 1996; Bundtzen, Harris, and Gilbert, 1997). The springs may indicate a concealed mineralized source in the black shale section.

Herreid (1968) and T.K. Bundtzen and G.M. Laird (written communications, 1998) report that samples of silicrete-limonite material from two of the springs contain up to 125 ppm copper, 270 ppm zinc, 400 ppm nickel, and 10 ppm molybdenum.

Alteration:

Silicrete-limonite.

Age of mineralization:

Quaternary.

Deposit model:
Unknown; anomalous values are apparently derived from Ordovician-Silurian black shale section.

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

Production Status: No

Site Status: Inactive

Workings/exploration:
The Straight Creek Springs were first described by Herreid (1968). Herreid (1968) and T.K. Bundtzen and G.M. Laird (written communication, 1998) report that samples of silicrete-limonite material from three of the springs contain up to 125 ppm copper, 270 ppm zinc, 400 ppm nickel, and 10 ppm molydenum.

Production notes:

Reserves:
None.

Additional comments:
The gossan occurs in the same stratigarphic position as exists in the Crash (MG049) and Dahl (MG053) prospects in the 'Farewell mineral belt'.

References:
Herreid, 1968; Churkin and Carter, 1996; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Chip-Loy

Site type: Prospect

ARDF no.: MG032

Latitude: 62.166 **Quadrangle:** MG A-3

Longitude: 154.38

Location description and accuracy:

The Chip-Loy deposit is located on a steep valley wall of Straight Creek at an elevation ranging from 2,900 feet (884 m) to 4,000 feet (1,220 m) in the SW1/4 sec. 15, T. 24 N., R. 28 W., of the Seward Meridian. Location is precisely known and visited by the reporter in 1983 and 1998. Caution: the precipitous, steep slopes that contain the Chip-Loy deposit are considered dangerous and are unsafe for traversing.

Commodities:

Main: Co, Cu, Ni

Other: Ag, Au, Fe

Ore minerals: Bravoite, chalcopyrite, cubanite, galena, nickelian pyrrhotite, pentlandite, sphalerite, tetradymite, violarite, undetermined Co-Ni-Fe arsenide

Gangue minerals: Ilmenite

Geologic description:

According to Herreid (1968), Foley (1987), Nokleberg and others (1987), and Foley and others (1997), the Chip-Loy deposit consists of an irregular, steeply dipping layer of massive to disseminated, nickelian pyrrhotite accompanied by other sulfides in an elongate, composite, diabase intrusion. Herreid (1968) describes the diabase, which ranges from gabbro to diorite, as a pipe in plane view, but Smith and Albanese (1985) describe the same intrusion as a dike. The diabase trends in a northeast direction and varies from 40 meters to 260 meters wide; cliff walls prevent accurate investigations of the intrusion's true dimensions. The composite diabase intrusion cuts mid-Silurian Terra Cotta Mountains Sandstone, a formation of the Dillinger subterrane, a continental margin assemblage of Lower Paleozoic age. (Bundtzen, Harris, and Gilbert, 1997). Although undated, Gilbert and others (1988) assign the mineralized diabase intrusion an early Tertiary age.

The Chip-Loy deposit contains disseminated-to-massive sulfides, mainly pyrrhotite and chalcopyrite, and minor cubanite, and sphalerite, and trace galena, bravoite, violarite, tetradymite (Bi_2Te_2S), and undetermined Co-Ni-Fe arsenides (Bart Cannon, written communication, 1998). The sulfides are interwoven with ilmenite and other rock-forming minerals such as plagioclase and olivine. The northeast trending, sulfide-bearing zone oc-

curs within the diabase about 10 to 30 meters away from the contact with sandstone and shale. The zone is about 335 meters long and 10 to 15 meters wide, but is quite irregular along strike. Herreid (1968) estimated that the Chip-Loy deposit contained an inferred reserve of about 150,000 tonnes of disseminated and massive sulfide mineralization. Smith and Albanese (1985) suggested a larger reserve than Herreid; they estimate from 0.15 to 1.25 million tonnes of sulfide mineralization exist at the Chip-Loy deposit.

Chip-channel samples from the Chip-Loy deposit contain up to 3.30 percent nickel, 0.25 percent cobalt, 2.10 percent copper, 12.1 grams/tonne silver, and 43.2 percent iron (Smith and Albanese, 1985; Bundtzen, Roberts, and others, 1982). A single sample of massive sulfide mineralization contained 3.0 grams/tonne gold (Foley, 1987; Gilbert and others, 1988). Tetradymite was found in solid solution with rock-forming silicates--a typical PGE association--although no PGE has ever been detected in analyses of mineralized rock from the Chip-Loy deposit. A 12-meter-long chip-channel sample taken midway across the strike of the deposit contained 0.28 percent copper, 2.6 grams/tonne silver, 444 ppm cobalt, 0.70 percent nickel, and 17.82 percent iron (Smith and Albanese, 1985; Gilbert and others, 1988). Pyrrhotite from selected samples averages 0.4 percent cobalt and 1.5 percent nickel (Bart Cannon, written communication, 1998).

Alteration:

Slight oxidation of massive sulfides.

Age of mineralization:

Unknown; thought to be early Tertiary by Gilbert and others (1988).

Deposit model:

Gabbroic Ni-Cu (Cox and Singer, 1986; model 7a).

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

7a

Production Status: No

Site Status: Inactive

Workings/exploration:

The Chip-Loy deposit was discovered and staked by prospectors Ed Chipp and Robert Loy in the early 1960s. Surface samples have been collected and analyzed by Herreid (1968), Bundtzen, Roberts, and others (1982), Smith and Albanese (1985), Roberts (1985), Gilbert and others (1988), Foley (1987), and T.K. Bundtzen and G.M. Laird (written communication, 1998). Chip-channel sample intervals from the Chip-Loy deposit run up to 3.30 percent nickel, 0.25 percent cobalt, 2.10 percent copper, 12.1 grams/tonne silver, and 43.2 percent iron. A 12 meter-long, chip-channel sample taken across the strike of the mineralized zone contained 0.70 percent nickel, 444 ppm cobalt, 0.25 percent copper, 2.6 grams/tonne silver, and 17.82 percent iron (Smith and Albanese, 1985; Gilbert and others, 1988).

Production notes:

Reserves:

Herreid (1968), who provides the only detailed geologic map of the Chip-Loy deposit, estimated that approximately 150,000 tonnes of disseminated-to- massive sulfide mineralization exists on site. Smith and Albanese (1985) estimate that between 0.15 and 1.25 million tonnes of disseminated to massive mineralization exist at the Chip-Loy deposit.

Additional comments:

About 50 percent of the nickel and cobalt is believed to exist in pyrrhotite; the remainder is in pentlandite and other nickleiferous and cobaltiferous minerals.

References:

Herreid, 1968; Cobb, 1972; Cobb, 1976; Bundtzen and others, 1982; Smith and Albanese, 1985; Gilbert and others, 1988; Nokleberg and others, 1987; Foley, 1987; Foley and others, 1997; Bundtzen and others, 1997.

Primary reference: Herreid, 1968

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Reger Pyrrhotite

Site type: Occurrence

ARDF no.: MG033

Latitude: 62.159 **Quadrangle:** MG A-3

Longitude: 154.399

Location description and accuracy:

The Reger Pyrrhotite occurrence is located on the west side of Straight Creek Valley about one kilometer southwest of the Chip Loy deposit (MG032)) at an elevation of 3,460 feet (1,055 m) in the NW1/4 sec. 22, T. 24 N., R. 28 W., of the Seward Meridian. Location is based on a description and map provided by Herreid (1968).

Commodities:

Main: Cu, Ni

Other: Fe

Ore minerals: Pyrrhotite

Gangue minerals: Limonite

Geologic description:

The Reger Pyrrhotite occurrence is in a limestone-slate thermal aureole 760 meters north of the contact of the Middle Fork Plutonic complex (Solie, 1983). A steeply dipping mafic dike of Tertiary (?) age is covered by limonite and contains abundant disseminated pyrrhotite. The sulfide-bearing dike continues upward to an elevation of at least 3,750 feet (1,143 m). Azurite and malachite staining was noted. A sample collected in the mineralized area contains 230 ppm copper and 600 ppm nickel (Herreid, 1968).

Alteration:

Copper bearing sulfides oxidized to azurite and malachite.

Age of mineralization:

Unknown; dike rock is undated.

Deposit model:

Unknown--possibly disseminated Ni-Cu-PGE type (Cox and Singer, 1986; model 5b).

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

5b(?)

Production Status: No

Site Status: Inactive

Workings/exploration:

The Reger Pyrrhotite occurrence was found by R.D. Reger during field investigations by the Alaska Department of Natural Resources in 1967 (Herreid, 1968). A sample collected in the mineralized aureole contains 230 ppm copper and 600 ppm nickel.

Production notes:

Reserves:

None.

Additional comments:

See Chip Loy deposit (MG032).

References:

Herreid, 1968; Solie, 1983; Gilbert and others, 1988.

Primary reference: Herreid, 1968

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Fluorite Creek Gossan

Site type: Occurrence

ARDF no.: MG034

Latitude: 62.15 **Quadrangle:** MG A-3

Longitude: 154.254

Location description and accuracy:

The Fluorite Creek Gossan occurrence is located along the eastern limit of Fluorite Creek glacier at an elevation of 4,100 feet (1,250 m) in the SE1/4 sec. 20, T. 24 N., R. 27 W., of the Seward Meridian. The gossan zone is mainly exposed in talus derived from a cliff source.

Commodities:

Main: Ag, Au, Cu, Pb, Zn

Other: F

Ore minerals: Pyrite

Gangue minerals: Fluorite

Geologic description:

The Fluorite Creek Gossan occurrence is a small but prominent gossan zone in a cliff above the southwest side of the 1967 terminus of Fluorite Creek glacier (Herreid, 1968). The gossan is near the northern contact between the Middle Fork composite plutonic complex (Solie, 1983; Gilbert and others, 1988) and the Lower to mid-Paleozoic Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). Only pyrite has been identified at the site; the original sulfides have been oxidized to an extensive ferricrete gossan. Green fluorite float was found in the creek about 3 kilometers below the gossan area.

Apparently representative gossan (not in place) contains maximum values of 2.04 grams/tonne gold, 5.40 grams/tonne silver, 1.00 percent copper, 0.10 percent lead, and 0.20 percent zinc. According to Herreid (1968), it is unlikely that a large amount of material of this grade is present in the Fluorite Creek drainage.

Alteration:

Oxidation to ferricrete gossan.

Age of mineralization:

Deposit model:

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:
The Fluorite Creek Gossan was discovered and described by Herreid (1968). Surface samples of apparently representative gossan (not in place) contains maximum values of 2.04 grams/tonne gold, 5.40 grams/tonne silver, 1.00 percent copper, 0.10 percent lead, and 0.20 percent zinc (Herreid, 1968).

Production notes:

Reserves:
According to Herreid (1968), it is unlikely that a large amount of metalliferous material is present in Fluorite Creek drainage.

Additional comments:

References:
Herreid, 1968; Cobb, 1972 (MF 379); Solie, 1983; Gilbert and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Herreid, 1968

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Windy Fork Placer

Site type: Occurrence

ARDF no.: MG035

Latitude: 62.07 **Quadrangle:** MG A-3

Longitude: 154.06

Location description and accuracy:

The Windy Fork Placer occurrence is located at the confluence of the Windy Fork of the Kuskokwim River and two unnamed, north flowing tributaries draining the Windy Fork pluton (Gilbert and others, 1988). The occurrence is at an elevation of 2,900 feet (884 m) in the NW1/4 sec. 21, T. 23 N., R. 26 W., of the Seward Meridian. The coordinates given above are in the geographic center of the deposit, which occupies an irregular one square kilometer area. The reporter visited the site in 1988.

Commodities:

Main: Ce, La, Nb, Ti, Zr

Other: Fe, Sn, Th, U

Ore minerals: Cassiterite, chevkinite, monazite, thorite, tscheffkinite

Gangue minerals: Allanite, eudialyte, ilmenite, zircon

Geologic description:

The Windy Fork Placer prospect is a significant accumulation of REE minerals, ilmenite, zircon, and other heavy minerals liberated from the peralkaline Windy Fork composite pluton and concentrated in a high energy glaciofluvial placer deposit (Solie, 1983; Gilbert and others, 1988; Barker, 1991; Bundtzen, Harris, and Gilbert, 1997). Although the Windy Fork pluton contains riebekite granite, biotite granite, and pyroxene syenite phases; it's average chemical composition is that of a peralkaline granite (Solie, 1983). The Windy Fork pluton is radioactive and scintillometer readings taken along traverses across the intrusion range from 650-to-800 cps, about 3 times the average background for granitic rocks.

High energy glaciofluvial gravels with significant heavy mineral concentrations have accumulated in an elliptical, one square kilometer area near the confluence of Windy Fork and two second order tributary streams that dissect the Windy Fork pluton (Gilbert and others, 1988). Stream bed and fan deposits contain abundant chevkinite, eudialyte, ilmenite, monazite, tscheffkinite, and zircon and minor to trace allanite, cassiterite, and thorite (Barker, 1991). Natural streaks of black sand rich in magnetite and ilmenite are very common in bedload environments. Monazite and zircon are easily identified in the field.

Placer concentrations averaging 7.5 percent titanium, 2.9 percent zirconium, 0.21 percent lanthanum, 0.28 percent cerium, and 460 ppm niobium occur throughout large areas of the placer deposit. Based on systematic bulk sampling, Barker (1991) estimates that the Windy Fork placer deposit contains 13 million cubic meters with an average grade of 9 to 11 kilograms per cubic meter of cerium-enriched, REE heavy minerals.

Alteration:
None.

Age of mineralization:
Quaternary.

Deposit model:
Similar to heavy mineral placer model (Cox and Singer, 1986; model 39d and 39e).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
39d,e

Production Status: No

Site Status: Inactive

Workings/exploration:
Systematic surface sampling of the placer deposit was completed by Barker (1991) during 1988, during a cooperative strategic mineral assessment of the McGrath quadrangle with the Alaska Division of Geological and Geophysical Surveys. Placer concentrations averaging 7.5 percent titanium, 2.9 percent zirconium, 0.21 percent lanthanum, 0.28 percent cerium, and 460 ppm niobium occur throughout large areas of the placer deposit. Based on systematic bulk sampling, Barker (1991) estimates that the Windy fork placer deposit contains 13 million cubic meters that average 9-11 kilograms per cubic meter of cerium-enriched, REE minerals.

Production notes:

Reserves:
Barker (1991) estimates that 13 million cubic meters average 9-11 kilograms per cubic meter of cerium-enriched, REE minerals. This inferred resource estimate is considered conservative.

Additional comments:
A specific Cox and Singer (1986) deposit model does not exist for this prospect.

References:
Solie, 1983; Gilbert and others, 1988; Barker, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Barker, 1991

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Eudialyte

Site type: Prospect

ARDF no.: MG036

Latitude: 62.064 **Quadrangle:** MG A-3

Longitude: 154.084

Location description and accuracy:

The Eudialyte Prospect is located on a steep, northwest-facing promontory within a north flowing unnamed tributary of the Middle Fork of the Kuskokwim River, at an elevation of 3,950 feet (1,204 m) in the SW1/4 sec. 20, T. 23 N., R. 26 W., of the Seward Meridian. The reporter visited the site in 1982.

Commodities:

Main: REE, Zr

Other: Th, U

Ore minerals: Eudialyte, thorite

Gangue minerals: Hornblende, ilmenite, potassic feldspar

Geologic description:

The Eudialyte Prospect consists of thin (3-10 centimeter thick), uranium and thorium-enriched veins in mainly coarse talus of a eudialyte-bearing hornblende diorite dike that intrudes into the contact zone between the Windy Fork peralkaline granite complex and Dillinger subterrane clastic rocks (Gilbert and others, 1988; Bundtzen, Harris, and Gilbert, 1997). The eudialyte-bearing dike averages about one meter thick and can be traced for about 90 meters along strike. The Dillinger subterrane lithologies in the prospect area are Silurian whereas the Windy Fork pluton has been dated at 25 Ma (Solie and others, 1991).

Pink eudialyte, a zirconium-enriched REE mineral, and thorite occur as disseminations and blebs in a coarse grained hornblende-rich diorite dike that displays a distinct foliated-flow texture. Reed and Miller (1980) reported values of 33.3 ppm uranium and 46.3 ppm thorium at the Eudialyte prospect.

Alteration:

None.

Age of mineralization:

Late Tertiary (25 Ma), based on K-Ar age of Windy Fork pluton.

Deposit model:
Thorium-Rare Earth Veins (Cox and Singer, 1986; model 11b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
11b

Production Status: No

Site Status: Inactive

Workings/exploration:
Reed and Miller (1980) first reported the existence of eudialyte, radioactive minerals and anomalous uranium and thorium values near the contact zone of the Windy Fork peralkaline granite complex. The site was later described by Gilbert and others (1988), Gunter and others (1993), and Bundtzen, Harris, and Gilbert (1997), who reported locally abundant pink eudialyte, a zirconium-enriched REE mineral, in foliated hornblende-rich diorite. Reed and Miller (1980) reported values of 33.3 ppm uranium and 46.3 ppm thorium from grab samples at the prospect.

Production notes:
Some eudialyte crystals have been collected as mineral specimens by various individuals since 1982.

Reserves:
Eudialyte-bearing dike is of a small size.

Additional comments:
The Eudialyte Prospect is a likely area for discovery of specimen-quality, eudialyte and other REE-bearing minerals.

References:
Reed and Miller, 1980; Solie, 1983; Gilbert and others, 1988; Solie and others, 1991; Gunter and others, 1993; Bundtzen and others, 1997.

Primary reference: Gunter and others, 1993

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Unnamed

Site type: Occurrence

ARDF no.: MG037

Latitude: 62.046 **Quadrangle:** MG A-3

Longitude: 154.068

Location description and accuracy:

This unnamed occurrence is located at the base of a cliff face on the east side of an unnamed, glacially carved, second order tributary of the Middle Fork of the Kuskokwim River. The occurrence is about three kilometers upstream from the mouth of the unnamed tributary and immediately downslope from an active valley glacier terminous at an elevation of 3,950 feet (1,204 m) in the NE1/4 sec. 32, T. 23 N., R. 26 W., of the Seward Meridian. The reporter briefly visited the site in 1982.

Commodities:

Main: Th, U

Other: Sn, Zr

Ore minerals: Thorite, uranothorite(?)

Gangue minerals: Feldspar, hematite, quartz

Geologic description:

The occurrence consists mainly of several feldspar-hematite-quartz veins infilling joints and fractures in the Windy Fork composite pluton about one mile from the contact zone with sandstone and limestone of the Lower to mid-Paleozoic Dillinger subterrane (Reed and Miller, 1980; Gilbert and others, 1988; Bundtzen, Harris, and Gilbert, 1997). The individual joint fillings are 3 to 6 centimeters thick and continue for 2 to 3 meters along strike. Much of the mineralization trends N65W. Feldspars are typically altered to a clay matrix; quartz is the 'smokey' variety due to radioactive(?) decay (Gunter and others, 1993). Green-to-purple fluorite is common in talus but was not recognized in place.

Composite grab samples of quartz-feldspar-hematite joint-filled material reported by Reed and Miller (1980) contain up to 490 ppm uranium and 376 ppm thorium.

Alteration:

Feldspars are altered to clay minerals; quartz is a 'smokey' variety, possibly due to radioactive decay.

Age of mineralization:

Late Tertiary, based on age (25Ma) of Windy Fork composite pluton (Solie and others, 1991).

Deposit model:
Thorium-Rare Earth veins (Cox and Singer, 1986; model 11b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
11b

Production Status: No

Site Status: Inactive

Workings/exploration:
The occurrence was found by the late Bruce Reed while conducting mineral resource investigations and regional geologic mapping for the U.S. Geological Survey in the western Alaska Range (Reed and Miller, 1980).

Composite grab samples of quartz-feldspar-hematite joint-filled material as reported by Reed and Miller (1980) contain up to 490 ppm uranium and 376 ppm thorium.

Production notes:

Reserves:
None estimated.

Additional comments:
See Eudialyte Prospect (MG036).

References:
Reed and Miller, 1980; Gilbert and others, 1988; Solie and others, 1991; Gunter and others, 1993; Bundtzen and others, 1997.

Primary reference: Reed and Miller, 1980

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/25/98

Site name(s): Rock Glacier

Site type: Occurrence

ARDF no.: MG038

Latitude: 62.354 **Quadrangle:** MG B-3

Longitude: 154.128

Location description and accuracy:

The Rock Glacier occurrence is located in the headwall of an unnamed stream valley above an active rock glacier at an elevation of approximately 4,600 feet (1,402 m) in the SE1/4 sec. 8, T. 26 N., R. 26 W., of the Seward Meridian. The location is based on descriptions provided in Gilbert and others (1990). The reporter visited the site in 1984.

Commodities:

Main: Cu

Other: Fe

Ore minerals: Malachite, pyrite, pyrrhotite

Gangue minerals: Carbonate, chlorite, epidote, quartz

Geologic description:

Pyrite-rich gossan zones were noted by Gilbert and others (1990) in a composite dike swarm, andesitic flows, and lappilli tuffs within the Windy Fork volcanic complex (Bundtzen, Harris, and Gilbert, 1997). Pyrite and pyrrhotite, which locally comprise up to 50 percent of the gossan-rich zones, are accompanied by carbonates, chlorite, epidote, and quartz. Individual gossan bodies are irregular in dimension, and reach maximum lengths of 40 meters Gangue mineralogy suggests formation by introduction of metasomatic fluids; i.e., skarns. Malachite staining was observed in some of the fractured hornfels in the gossan zones. No assay data is available for the Rock Glacier occurrence.

Alteration:

Propylitization.

Age of mineralization:

K-Ar age of 37.9 Ma published by Gilbert and others (1990).

Deposit model:

Copper skarn(?) (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:
No assay data is available for the Rock Glacier occurrence.

Production notes:

Reserves:
None.

Additional comments:
Similar to Rat Fork-Headwall and Rat Fork-Base prospects (MG058; MG059) in McGrath B-2 quadrangle.

References:
Gilbert and others, 1990; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Gilbert and others, 1990

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/4/98

Site name(s): Farewell Mineral Licks

Site type: Occurrence

ARDF no.: MG039

Latitude: 62.495 **Quadrangle:** MG C-2

Longitude: 153.606

Location description and accuracy:

The Farewell Mineral Licks are located just east of a low saddle about 6 kilometers due south of Farewell Lake Lodge at an elevation of 960 feet (293 m) in the NE1/4 sec. 30, T. 28 N., R. 23 W., of the Seward Meridian. The reporter investigated the site in 1980 and 1981.

Commodities:

Main: Cu, Fe, Mn

Other: K, Na

Ore minerals: Iron oxides

Gangue minerals: Dolomite

Geologic description:

The Farewell Mineral Licks are a series of three subcircular areas of dark yellow-brown soils frequently utilized as mineral licks and roll areas by buffalo (Bison bison), moose (Alces alces), and other ungulates. Each 'lick' is approximately 40 meters in diameter, and composed of distinctive yellow-brown residual soils in Quaternary drift directly overlying the active strand of the Denali-Farewell fault, a major transcurrent fault that forms an arc across central Alaska and Yukon (Bundtzen, Harris, and Gilbert, 1997). A distinct silicrete rind covers soil at the site. Dolomite fragments were recognized in one soil sample.

One soil sample taken at the Farewell Mineral licks was anomalous in copper (250 ppm), manganese (8,500 ppm), potassium (6.50 percent), and sodium (12.00 percent). The manganese may be the result of decomposed dolomite. The remaining elements may be the result of a hydrothermal plumbing system within the Denali fault system.

Alteration:

Silicrete and ferricrete.

Age of mineralization:

Quaternary, based on C14 age data summarized by Kline and Bundtzen (1986).

Deposit model:
Unknown; possibly hot springs related.

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

Production Status: No

Site Status: Inactive

Workings/exploration:
One soil sample taken at the Farewell Mineral Licks was anomalous in copper (250 ppm), manganese (8,500 ppm), potassium (6.50 percent) and sodium (12.00 percent).

Production notes:

Reserves:
None.

Additional comments:
See White Mountain Mercury Mine (MG025) and the Peggy Barbara (MG026) and Mary Margaret (MG027) prospects.

References:
Bundtzen, Kline, and Clough, 1982; Kline and Bundtzen, 1986; Bundtzen, Harris, and Gilbert, 1997; Kline and Pinney, 1997.

Primary reference: Bundtzen and others, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/4/98

Site name(s): Tin Creek-Tributary

Site type: Occurrence

ARDF no.: MG040

Latitude: 62.463 **Quadrangle:** MG B-2

Longitude: 153.664

Location description and accuracy:
The Tin Creek-Tributary occurrence is located in a small, unnamed tributary gulch of Tin Creek at an elevation of approximately 2,800 feet (854 m) in the NE1/4 sec. 2, T. 27 N., R. 24 W., of the Seward Meridian. The location corresponds to mineral occurrence no. 2 of Cobb (1972), and is located to within 1,000 feet (305 m).

Commodities:

Main: Cu

Other: Zn

Ore minerals: Chalcopyrite, malachite, pyrrhotite, sphalerite

Gangue minerals: Quartz

Geologic description:
At the Tin Creek-Tributary occurrence, chalcopyrite and other sulfides are localized within one foot of a malachite-stained shear zone that extends for about 6 meters along dip. The shear zone cuts calcareous clastics of the mid-Silurian Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997).

Sulfide grab samples contain 0.70 percent copper and 0.15 percent zinc. Nearby stream cobbles contain pyrrhotite, with minor sphalerite and chalcopyrite. Placer concentrates contain anomalous copper and zinc in the nearby stream gulch that cuts the mineralized shear zone (Cobb, 1972).

Alteration:

Age of mineralization:

Deposit model:
Polymetallic vein (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:

Sulfide grab samples contain up to 0.70 percent copper and 0.15 percent zinc. Nearby stream cobbles contain pyrrhotite and minor sphalerite. Placer concentrates contain anomalous copper and zinc in a stream gulch that cuts the mineralized area.

Production notes:

Reserves:

None.

Additional comments:

References:

Reed and Elliott, 1968 (C 596); Cobb, 1972; Cobb, 1976; MacKevett and Holloway, 1977; Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Reed and Elliott, 1968 (C 596)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/6/98

Site name(s): Tin Creek-North

Site type: Occurrence

ARDF no.: MG041

Latitude: 62.455 **Quadrangle:** MG B-2

Longitude: 153.694

Location description and accuracy:
The Tin Creek-North occurrence is located near a 4,955 foot (1,510 m) summit about 6 kilometers east of Sheep Creek. The reporter visited the site in 1980.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Cd

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite (marmatite)

Gangue minerals: Epidote, garnet, johansenite

Geologic description:
The Tin Creek-North occurrence consists of thin, 5 to 20 centimeter thick mineral veins containing johansenite, garnet, sphalerite (marmatite), and chalcopyrite in argillaceous limestone of the mid-Silurian Terra Cotta Mountains Sandstone a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997).

The mineralization is hosted within a thermally altered zone where prograde garnet-johansenite veins are cut by epidote replacement bodies that are accompanied by sulfide minerals. The sulfide skarns are near a 29 Ma granidiorite dike which is part of a larger, 5 kilometer wide, N70W-trending dike swarm which intrudes the Dillinger subterrane. One grab sample contained 2.25 percent copper, 1.21 percent lead, 0.11 percent zinc, 0.13 percent cadmium, and 319.8 grams/tonne silver (Bundtzen, Kline, and Clough, 1982; Szumigala, 1987).

Alteration:
Epidotization.

Age of mineralization:
Inferred to be 29 Ma, based on age date from nearby granodiorite dike (Solie and others, 1991).

Deposit model:

Copper-iron skarn (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:
The Tin Creek-North occurrence was first described in Bundtzen, Kline, and Clough (1982). One grab sample contained 2.25 percent copper, 1.21 percent lead, 0.11 percent zinc, 0.13 percent cadmium, and 319.8 grams/tonne silver (Bundtzen, Kline, and Clough, 1982; Szumigala, 1987).

Production notes:

Reserves:
None.

Additional comments:
See MG042, Tin Creek-Midway (MG043) and Tin Creek-South (MG046) prospects.

References:
Bundtzen, Kline, and Clough, 1982; Szumigala, 1987; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Kline, and Clough, 1982

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/5/98

Site name(s): Unnamed (on tributary to Tin Creek)

Site type: Occurrence

ARDF no.: MG042

Latitude: 62.434 **Quadrangle:** MG B-2

Longitude: 153.672

Location description and accuracy:

This unnamed occurrence is located at an outcrop on the south side of an unnamed, east-flowing tributary of Tin Creek at an elevation of 2,850 feet (868 m) in the NW1/4 sec. 14, T. 27 N., R. 24 W., of the Seward Meridian. The reporter investigated the occurrence in 1981 at station nos. 81BT428-429.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Bi, Cd, Co

Ore minerals: Arsenopyrite, chalcopyrite, galena, malachite, pyrite, sphalerite (marmatite)

Gangue minerals: Epidote, diopside, garnet, magnetite

Geologic description:

The unnamed occurrence is a well exposed sulfide skarn typical of many silver-base metal-bearing skarns in the Farewell Mineral Belt (Bundtzen, Harris, and Gilbert, 1997; Newberry and others, 1997). Host lithologies are mainly a highly folded and sheared, mid-Silurian, argillaceous limestone of the Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The metasedimentary rocks are intruded by a N10W-trending, vertically dipping, 20 meter thick, granodiorite dike. Thinner, anastomosing dikes, which occur throughout the limestone, do not appear to alter the limestone (Smith and Albanese, 1985).

Mineralization consists of a 2 meter by 6 meter zone containing disseminated to semi-massive arsenopyrite, chalcopyrite, pyrite, iron-rich sphalerite (marmatite), galena, and pyrite encased in diopside(?)-garnet gangue minerals. The sulfide mineralization is encrusted with a thin but conspicuous malachite rind. The mineralization is parallel to bedding in host limestone, and begins at the contact of a hornblende granodiorite dike. Although mineralization is spatially related to the dike, no thermal alteration of the limestone was identified. Gangue minerals that accompany the sulfides include magnetite, diopside, and garnet.

Bundtzen, Kline, and Clough (1982) reported that chip-channel samples contained up to 2.30 percent copper, 0.30 percent lead, 6.20 percent zinc, 110 grams/tonne silver, 500

ppm cadmium, 100 ppm bismuth, and 100 ppm cobalt. Smith and Albanese (1985) reported that one sample from the mineral zone contained 5,890 ppm copper, 229 ppm lead, 6,690 ppm zinc, 74 ppm cadmium, and 37.5 grams/tonne silver.

Alteration:
Extensive diopside(?) replacement.

Age of mineralization:
Unknown; thought to be related to the 25 to 30 Ma granodiorite dike swarm in area (Solie and others, 1991; Szumigala, 1987).

Deposit model:
Low-temperature lead-zinc skarn (Cox and Singer, 1986; model 18c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
The Tin Creek Occurrence was first described by Bundtzen, Kline, and Clough (1982) and later by Smith and Albanese (1985). The former reference reported that chip-channel samples contained up to 2.30 percent copper, 0.30 percent lead, 6.20 percent zinc, 110 grams/tonne silver, 500 ppm cadmium, 100 ppm bismuth, and 100 ppm cobalt. Smith and Albanese (1985) reported that a single grab sample contained 5,890 ppm copper, 229 ppm lead, 6,690 ppm zinc, 74 ppm cadmium, and 37.5 grams/tonne silver.

Production notes:

Reserves:
None.

Additional comments:
See Tin Creek-Midway deposit (MG043).

References:
Bundtzen, Kline, and Clough, 1982; Smith and Albanese, 1985; Szumigala, 1987; Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997; Newberry and others, 1997.

Primary reference: Bundtzen and others, 1982

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/5/98

Site name(s): Tin-Midway; Tin Creek #1

Site type: Prospect

ARDF no.: MG043

Latitude: 62.42 **Quadrangle:** MG B-2

Longitude: 153.65

Location description and accuracy:

The Tin Creek-Midway deposit is exposed in a canyon of a major tributary of Tin Creek, about 2.4 kilometers northwest of the north end of Veleska Lake at an elevation of 2,250 feet (685 m) in the NE1/4 sec. 24, T. 27 N., R. 24 W., of the Seward Meridian. The reporter visited the site in 1981 and 1983.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Cd, Co

Ore minerals: Arsenopyrite, chalcopyrite, galena, pyrite, sphalerite (marmatite)

Gangue minerals: Amphibole, calcite, epidote, garnet, pyroxene (johannsenite), quartz

Geologic description:

The Tin Creek-Midway deposit (southern extension is known as Tin Creek #1) is perhaps the best-studied silver-base metal skarn deposit in the Farewell Mineral belt. It consists of a series of sulfide-skarn deposits that occur along contacts between dikes and carbonate sedimentary rocks, along faults, and as bedding replacements of calcareous units in siliciclastic rocks (Lu and others, 1992). The mineralization occurs where a composite, northwest trending dike and sill swarm (averaging granodiorite in composition) cuts highly deformed siliciclastic and carbonate sedimentary rocks of the mid-Silurian Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997).

The sedimentary rocks have been transformed into marble, garnet-banded marble, banded hornfels, and sulfide-rich, calc-silicate skarn. Volcanic units of the Latest Cretaceous (65 Ma) Veleska Lake Volcanic Field (Bundtzen, Harris, and Gilbert, 1997) cap the section immediately south of the Tin Creek-Midway Skarn deposit. Three sets of faults are present: (1) N30E high angle faults; (2) N50E-trending low angle reverse or thrust faults; and (3) younger west to northwest trending high angle faults that cut the earlier, northeast trending faults (Szumigala, 1986, 1987; Lu and others, 1992). These latter faults apparently controlled the northwest-trending granodiorite dike and sill swarm. Practically all of these dikes contain endoskarns; i.e., the dikes were apparently intruded

prior to skarn mineralization. Several granodiorite dikes in the prospect area have been radiometrically dated at 25-30 Ma (Szumigala, 1987; Solie and others, 1991).

Mineralized areas explored by Anaconda Minerals Company (Reed, 1982) were designated the MW (Tin Creek- Midway) and TCI (Tin Creek #1) zones. Although both endoskarn and exoskarn occur at the Tin Creek-Midway deposit, only exoskarn contains significant silver-base metal mineralization (Lu, 1988). The Tin Creek-Midway skarn system is zoned from a predominantly garnet skarn with abundant chalcopyrite and stockwork quartz veining in the northern MW zone to a pyroxene (johannsenite) skarn dominated by iron-rich sphalerite (marmatite) and minor galena in the southern TCI zone (Lu and others, 1992).

Microthermometric, isotopic, and microprobe data collected by Szumigala (1985,1987), Lu (1988, 1989), and Lu and others (1992) all indicate the Tin Creek-Midway skarn can be described as a low temperature (<250 degrees C), lead-zinc skarn in the southern TCI zone that zones into a higher temperature (>280 degrees C), copper-base metal skarn in the northern MW zone. A plutonic heat source is indicated near the northern MW mineral zone. Using the FeS mole fraction in sphalerite, Lu (1988) calculated that skarn formation took place at about 300 bars, or in a very shallow, subvolcanic environment

Six drill holes penetrated the Tin Creek-Midway deposit. Channel sampling from the various sulfide horizons average 0.7 percent copper, 4.7 percent zinc, and 40.4 grams/tonne silver over sample widths ranging from 1.5 meters to 23.0 meters (Brewer and others, 1992). Surface grab samples summarized by Bundtzen and others (1997) contain 0.35 percent copper, 0.17 percent lead, 5.55 percent zinc, 0.05 percent cadmium, and 13.0 grams/tonne silver. Based on subsurface exploration work completed by Anaconda Minerals Company (Reed, 1982; Rob Kell, written communication, 1984), at least 353,000 tonnes of semi- to massive-sulfide mineralization is inferred in the Tin Creek-Midway skarn deposit.

Alteration:

Late epidotization of prograde skarns.

Age of mineralization:

Not dated; inferred to be 25-to-30 Ma, based on ages of granodiorite dike swarm (Solie and others, 1991).

Deposit model:

Low temperature lead-zinc skarn deposit (Cox and Singer, 1986; model 18c).

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

18c

Production Status: No

Site Status: Inactive

Workings/exploration:

The Tin Creek-Midway skarn was investigated by the Alaska Division of Geological

and Geophysical Surveys in 1980 (Bundtzen, Kline, and Clough, 1982). During 1981 and 1982, the Anaconda Minerals Company explored the deposit with surface sampling and 6 diamond drill holes (Reed, 1982; Brewer and others, 1992). Channel sampling of the various sulfide horizons average 0.7 percent copper, 4.7 percent zinc, and 40.4 grams/ tonne silver over sample widths ranging from 1.5 meters to 23.0 meters (Brewer and others, 1992). Grab samples collected by Bundtzen, Harris, and Gilbert (1997) contained 0.35 percent copper, 0.17 percent lead, 5.55 percent zinc, 500 ppm cadmium, and 13.0 grams/tonne silver. Based on the Anaconda Minerals Company exploration work, about 353,000 tonnes of semi- to massive-sulfide mineralization (of unstated grade) is inferred at the Tin Creek-Midway deposit (Nokleberg and others, 1987). However, no official grade and tonnage data has been formally released (Reed, 1982; Brewer and others, 1992; Rob Kell, written communication, 1984).

Production notes:

Reserves:

Based on Anaconda Minerals Company exploration work, which included some limited diamond drilling, about 353,000 tonnes of semi- to massive-sulfide mineralization (of unstated grade) can be inferred at the Tin Creek-Midway deposit (Noklebeg and others, 1987).

Additional comments:

See Tin Creek-North (MG041), Tin Creek-South (MG046), Bowser Creek Northeast (MG067), and Bowser Creek-Main deposits (MG068).

References:

Bundtzen, Kline, and Clough, 1982; Reed, 1982; Szumigala, 1986; Szumigala, 1987; Lu, 1988; Lu, 1989; Solie and others, 1991; Lu and others, 1992; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997; Newberry and others, 1997.

Primary reference: Szumigala, 1987

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/6/98

Site name(s): Unnamed (in the canyon of Sheep Creek)

Site type: Occurrence

ARDF no.: MG044

Latitude: 62.413 **Quadrangle:** MG B-2

Longitude: 153.868

Location description and accuracy:

This unnamed occurrence is located in a steep canyon of the west fork of Sheep Creek, on its east bank, at an elevation of 2,450 feet (746 m) in the SW1/4 sec. 23, T. 27 N., R. 25 W., of the Seward Meridian. The reporter visited the site in 1998 at station no. 98BT448.

Commodities:

Main: Cu

Other: Ag, Fe

Ore minerals: Marcasite, pyrite

Gangue minerals: Quartz

Geologic description:

This occurrence is a highly sulfidized, alteration zone in a rhyodacite unit of the Paleocene to Eocene, Sheep Creek Volcanic Field (Bundtzen, Harris, and Gilbert, 1997). A very distinct, ferricrete gossan occurs in a cliff wall on the east side of Sheep Creek; the incompetent, mineralized walls have partially caved into the creek channel. The mineralization consists of disseminated to massive pyrite-quartz veins and stockworks up to 2 meters in width. Strike lengths were not determined. The mineralized area averages about 25 percent pyrite. Grab samples of massive pyrite-quartz veins contained an average 15.5 percent iron, 255 ppm copper, and 0.45 ppm silver (T.K. Bundtzen and G.M. Laird, written communication, 1998).

Alteration:

Strong silicification and sericite zones.

Age of mineralization:

Mineralization is undated.

Deposit model:

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:
The reporter investigated the site in 1981. Grab samples that contained massive pyrite-quartz stockwork veins yielded an average 255 ppm copper, 15.5 percent iron, and 0.45 ppm silver (T.K. Bundtzen and G.M. Laird, written communication, 1998).

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen, Kline, and Clough, 1982; Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/4/98

Site name(s): Unnamed

Site type: Occurrence

ARDF no.: MG045

Latitude: 62.389 **Quadrangle:** MG B-2

Longitude: 153.96

Location description and accuracy:

The unnamed occurrence is located on a sharp northwest-trending ridge immediately north of a 5,550 foot (1,692 m) knob on the USGS McGrath B-2 1:63,360 quadrangle at an elevation of 5,540 feet (1,689 m) in the NW1/4 sec. 32, T. 27 N., R. 25 W., of the Seward Meridian. The reporter found the site in 1981 and 1989; at station no. 81BT549.

Commodities:

Main: Cu, Fe, Ni

Other: Bi, Cr

Ore minerals: Chalcopyrite, pyrite, pyrrhotite

Gangue minerals: Magnetite

Geologic description:

This unnamed occurrence consists of disseminated sulfides in a differentiated picrite-diorite sill that intrudes highly altered chert, sandstone, and siltstone of the Middle Devonian to Permian Sheep Creek Formation, a unit of the Mystic subterrane (Bundtzen, Harris, and Gilbert, 1997). The 15- meter-thick, mafic sill trends roughly EW and dips about 35N. Exposures continue along strike for about 3 kilometers before dipping below talus cover on both ends. Locally, the sill has produced a large 150-meter-wide alteration area in the sedimentary rocks, which is composed of chalcedonic-carbonate replacement of both country rock and the sill itself. The differentiated sill is interpreted by Bundtzen, Harris, and Gilbert (1997) to be a feeder for mafic volcanism in the overlying Late Triassic to Lower Jurassic Tatina River Volcanics.

Mineralization appears at the base of the sill, and consists of abundant magnetite, pyrite, pyrrhotite, and traces of chalcopyrite. The size of the mineralized area was not determined. Samples of the sill are composed of up to 50 percent coarse grained magnetite interlocked with silicate melt minerals of magmatic origin. Some network style pyrite-pyrrhotite-magnetite zones contain up to 200 ppm copper, 600 ppm nickel, 100 ppm bismuth, and 1,000 ppm chromium (Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997). Anomalous copper and chromium values were found in stream sediment samples taken in the area (Reed and Elliott, 1968, OFR).

Alteration:
Chalcedonic, carbonate.

Age of mineralization:
Sill assigned a Late Triassic age by Bundtzen, Harris, and Gilbert (1997).

Deposit model:
Disseminated copper-nickel-cobalt (Cox and Singer, 1986; model 5b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
5b

Production Status: No

Site Status: Inactive

Workings/exploration:
Surface samples contain up to 200 ppm copper, 600 ppm nickel, 100 ppm bismuth, and 1,000 ppm chromium (Bundtzen, Kline, and Clough, 1982). Anomalous copper and chromium values were found in stream sediment samples taken in the occurrence area (Reed and Elliott, 1968, OFR).

Production notes:

Reserves:
None.

Additional comments:
Similar to Roberts PGM (MG030) and Chip Loy (MG032) prospects in McGrath A-3 quadrangle.

References:
Reed and Elliott, 1968 (OFR); Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/5/98

Site name(s): Tin Creek-South

Site type: Occurrence

ARDF no.: MG046

Latitude: 62.375 **Quadrangle:** MG B-2

Longitude: 153.656

Location description and accuracy:

The Tin Creek-South occurrence is situated on a high, rugged, north-to-northeast trending ridgeline about 5 kilometers southwest of Veleska Lake at an elevation of 5,300 feet (1,615 m) in the NW1/4 sec. 1, T. 26 N., R. 24 W., of the Seward Meridian. The reporter visited the occurrence in 1981 (at station no. 81BT484).

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Bi, Co, Cd

Ore minerals: Galena, pyrite, pyrrhotite, sphalerite

Gangue minerals: Diopside, garnet

Geologic description:

The Tin Creek-South occurrence is a high-grade, sulfide-bearing, diopside-garnet skarn zone associated with a complex, east-west trending dike swarm. The dikes cut the Late Cretaceous Veleska Lake Volcanic Field and the older Cambrian to Devonian Dillinger subterrane (Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997). The dikes have not been dated, but are younger than the 65 Ma Veleska Lake Volcanic Field.

Massive sphalerite veins are encased in a diopside-rich garnet skarn zone within a carbonate xenolith less than 2 meters thick. Because the exposure is in rubble-crop, the zone's orientation is unknown. Analytical data summarized by Bundtzen, Harris, and Gilbert (1997) indicate up to 0.04 percent copper, 1.30 percent lead, 14.70 percent zinc, 58.0 grams/tonne silver, 300 ppm cobalt, 200 ppm cadmium, and 1,000 ppm bismuth.

Alteration:

Age of mineralization:

Unknown; younger than 65 Ma Veleska Lake Volcanic Field.

Deposit model:

Low temperature lead-zinc skarn (Cox and Singer, 1986; model 18c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
The Tin Creek-South occurrence was investigated by the reporter for the Alaska Division of Geological and Geophysical Surveys in 1980 (Bundtzen, Kline, and Clough, 1982). Analytical data summarized by Bundtzen, Harris, and Gilbert (1997) indicate up to 0.04 percent copper, 1.30 percent lead, 14.70 percent zinc, 58.0 grams/tonne silver, 300 ppm cobalt, 200 ppm cadmium, and 1,000 ppm bismuth.

Production notes:

Reserves:

Additional comments:

References:
Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/5/98

Site name(s): Little Bird

Site type: Prospect

ARDF no.: MG047

Latitude: 62.369 **Quadrangle:** MG B-2

Longitude: 153.792

Location description and accuracy:

The Little Bird prospect is on an east-facing slope on the west side of Sheep Creek Valley at an elevation of about 3,600 feet (1,097 m) in the SE1/4 sec. 6, T. 26 N., R. 24 W., of the Seward Meridian. The Little Bird prospect is 3.5 kilometers (2.2 miles) north of the Dahl prospect. The Little Bird prospect was briefly examined by the reporter in 1982.

Commodities:

Main: Ag, Cu, Zn

Other: Pb, W

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

Gangue minerals: Epidote, diopside

Geologic description:

The Little Bird occurrence consists of sulfide-bearing, pyroxene skarn in limestone of the Lower Devonian Barren Ridge Limestone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The skarns occur near a weakly mineralized granite porphyry stock (Brewer and others, 1992). Discontinuous semi-massive sulfide to disseminated pyrrhotite, chalcopyrite, sphalerite, and galena occur in a 200 meter by 700 meter skarn zone. Grades and widths are quite variable, but up to 4.5 percent copper, 1.7 percent lead, 11.4 percent zinc, 426.1 grams/tonne silver, and 0.33 percent tungsten are found in the sulfide-bearing skarn zone (Brewer and others, 1992). The deposit was explored by Anaconda Minerals Company from 1981-1983. No analytical data is available.

Alteration:

Age of mineralization:

Deposit model:

Polymetallic lead-zinc skarn (Cox and Singer, 1986; model 18c).

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

18c

Production Status: No

Site Status: Inactive

Workings/exploration:

The Little Bird occurrence was explored by Anaconda Minerals Company from 1981-1983 (Rob Kell, written communication, 1984). Grades and widths are quite variable, but up to 4.5 percent copper, 1.7 percent lead, 11.4 percent zinc, 426.1 grams/tonne silver, and 0.33 percent tungsten occur in the sulfide bearing skarns (Brewer and others, 1992).

Production notes:

Reserves:

None.

Additional comments:

References:

Bundtzen, Kline, and Clough, 1982; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Brewer and others 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/5/98

Site name(s): Unnamed (northwest of Smith Lake)

Site type: Occurrence

ARDF no.: MG048

Latitude: 62.361 **Quadrangle:** MG B-2

Longitude: 153.879

Location description and accuracy:

The unnamed occurrence is located at the divide between the West Fork and Main Fork of Sheep creek, 8 kilometers northwest of Smith Lake, at an elevation of 5,100 feet (1,555 m) in the NE1/4 sec. 10, T. 26 N., R. 25 W., of the Seward Meridian. The reporter investigated the site in 1981.

Commodities:

Main: Cu

Other: Co, Pb, Zn

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals: Amphibole, clinopyroxene, olivine

Geologic description:

This unnamed occurrence consists of disseminated chalcopyrite and pyrrhotite in a medium grained, phaneritic, gabbro sill thought to be a feeding system for Triassic volcanism in the Tatina River Volcanics, a unit of the Mystic subterrane (Bundtzen, Kline, and Clough, 1982). An alternative hypothesis offered by Foley (1987) is that the mafic igneous rocks that host the occurrence are flows or feeders of the Paleocene to Eocene Sheep Creek Volcanic Field as defined by Bundtzen, Harris, and Gilbert (1997). Bundtzen, Harris, and Gilbert (1997) believe that unnamed and related occurrences constitute magmatic-disseminated sulfide Cu-Ni-Co-Fe mineralization similar to deposit model 5b of Cox and Singer (1986). Selected samples of the gabbro sills in the prospect area contain up to 540 ppm copper, 190 ppm nickel, 63 ppm cobalt, and 450 ppm zinc (Foley, 1987).

Alteration:

None.

Age of mineralization:

Undated; inferred to be either Late Triassic or early Tertiary, based on isotopic age dates of Tatina River Volcanics and Sheep Creek Volcanic Field respectively (Bundtzen, Harris, and Gilbert, 1997).

Deposit model:
Magmatic sulfide Cu-Ni-Co or polymetallic replacement (Cox and Singer, 1986; models 5b or 22c).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
5b or 22c

Production Status: No

Site Status: Inactive

Workings/exploration:
The gabbro feeders were mapped by the reporter in 1981 (Bundtzen, Kline, and Clough, 1982). Selected samples of the gabbro sills in the prospect area contain up to 540 ppm copper, 190 ppm nickel, and 450 ppm zinc (Foley, 1987).

Production notes:

Reserves:
None.

Additional comments:
See also Roberts PGM (MG030), Unnamed (MG045), and Chip-Loy (MG032) prospects and deposits.

References:
Bundtzen, Kline, and Clough, 1982; Foley, 1987; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Foley, 1987

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Crash; Sheep Creek 2

Site type: Prospect

ARDF no.: MG049

Latitude: 62.353 **Quadrangle:** MG B-2

Longitude: 153.799

Location description and accuracy:

The Crash prospect is located in an unnamed east-flowing tributary of Sheep Creek, 4.0 kilometers northwest of Smith Lake; it is at an elevation of 2,800 feet (853 m) in the SW1/4 sec. 7, T. 26 N., R. 24 W., of the Seward Meridian. The Crash occurrence is 3.0 kilometers north of the Dahl Prospect (MG053). The reporter visited the site in 1981.

Commodities:

Main: Ag, Cu, Zn

Other: Au, Pb

Ore minerals: Chalcopyrite, galena, malachite

Gangue minerals: Quartz

Geologic description:

The Crash prospect consists of two siliceous cataclastic breccias similar to those that host mineralization at the Dahl prospect (MG053). Exposed mineralization in one shale hosted breccia zone contains massive chalcopyrite, sphalerite, and traces of galena near the contact between the Lower Ordovician to Lower Silurian, Post River Formation and the mid- to Upper Silurian Terra Cotta Mountains Sandstone; both are units of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). Another siliceous cataclastic breccia contains abundant arsenopyrite. Both sulfide bearing zones range from 3 to 30 centimeters thick, appear stratiform or parallel to sedimentary bedding, and are isoclinally folded, which suggests sulfides were formed prior to Lower Cretaceous compressive deformation (Bundtzen, Harris, and Gilbert, 1997). The mineralization at the Crash prospect might also be related to younger plutons. The larger massive sulfide-bearing breccia contained up to 16.5 percent copper and 926.8 grams/tonne silver (Brewer and others, 1992). The second cataclastic zone contains a 0.2 to 2.0 meter pod of massive arsenopyrite that contains 6.8 grams/tonne gold. Three samples collected by Smith and Albanese (1985) contain up to 316 ppm copper, 86 ppm lead, 940 ppm zinc, and 10.5 grams/tonne silver.

Alteration:

Age of mineralization:
Undated; inferred to be Lower Ordovician to Lower Silurian, based on graptolites found in mineralized area (Bundtzen, Harris, and Gilbert, 1997).

Deposit model:
Uncertain; either sedimentary exhalitive lead-zinc (?) or polymetallic vein (Cox and Singer, 1986; model 31a or 22c).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
31a (?) or 22c

Production Status: No

Site Status: Inactive

Workings/exploration:
Tom Smith and Mary Albanese first sampled the Sheep Creek-2 occurrence in 1982 during mineral investigations by the Alaska Division of Geological and Geophysical Surveys in the area (Smith and Albanese, 1985). One breccia zone with massive sulfide mineralization contained up to 16.5 percent copper and 926.8 grams/tonne silver. Another smaller siliceous breccia zone with massive arsenopyrite contained 6.5 grams/tonne gold (Brewer and others, 1992). Three random grab samples contained up to 316 ppm copper, 86 ppm lead, 940 ppm zinc, and 10.5 grams/tonne silver.

Production notes:

Reserves:
None.

Additional comments:
The Crash prospect contains anomalous gold, which is atypical of most sulfide occurrences and prospects in the Farewell Mineral Belt. The Crash zone is in a splay structure associated with a regional fault that hosts the Dahl prospect (MG053).

References:
Bundtzen, Kline, and Clough, 1982; Smith and Albanese, 1985; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/7/98

Site name(s): Veleska-South

Site type: Occurrence

ARDF no.: MG050

Latitude: 62.349 **Quadrangle:** MG B-2

Longitude: 153.64

Location description and accuracy:

The Veleska-South occurrence is located in a steep canyon near the head of Tin Creek, about 300 feet (91 m) below the snout of an active rock glacier at an elevation of 3,300 feet (1,006 m) in the NE1/4 sec. 13, T. 26 N., R. 24 W., of the Seward Meridian. The occurrence is about 5 miles (8 km) south of Veleska Lake. The reporter investigated the Veleska-South occurrence in 1981.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Bi, Cd

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

Gangue minerals: Epidote, quartz

Geologic description:

At the Veleska-South occurrence, thin, 0.5 to 1 inch thick seams and stockworks of pyrrhotite, pyrite, chalcopyrite and galena cut nearly flat lying, subaerial andesite and basalt flows of the Late Cretaceous (65 Ma) Veleska Lake volcanic field (Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997). Northwest-trending, porphyro-aphanitic, granodiorite dikes that cut the Late Cretaceous volcanics carry disseminated sulfides and may be genetically related to the stockwork mineralization. Nearby stream cobbles contain pyrrhotite with a trace of chalcopyrite and sphalerite. A major northeast trending, high angle fault that cuts the Dillinger subterrane and younger Veleska Lake volcanic field is juxtaposed against the western edge of the Veleska Lake occurrence; this structure may have developed a tensional environment suitable for sulfide stockwork formation.

Principle sulfide mineralization consists of massive pyrrhotite and pyrite, and disseminated galena and sphalerite, and a trace of chalcopyrite. Reed and Elliott (1968, C 586) reported that selected samples contained up to 2.00 percent lead, 1.00 percent zinc, and 0.15 percent copper. Bundtzen, Kline, and Clough (1982) reported that a grab sample of nearly massive pyrrhotite contained 0.05 percent copper, 0.47 percent lead, 0.55 percent zinc, and 0.21 ounces/ton silver. Smith and Albanese (1985) reported that a grab sample

of sulfide-bearing mineralization near the Veleska-South occurrence contained 0.06 percent copper, 0.84 percent lead, 1.65 percent zinc, 0.40 ounces/ton silver, and 110 ppm cadmium.

Alteration:
Metasomatic replacement (Ca).

Age of mineralization:

Deposit model:
Polymetallic vein (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:
Only surface sampling has been conducted at the Veleska-South occurrence. Reed and Elliott (1968, C 596) reported that selected samples contained up to 2.00 percent lead, 1.00 percent zinc, and 0.15 percent copper. Bundtzen, Kline, and Clough (1982) reported that a grab sample of nearly massive pyrrhotite contained 0.05 percent copper, 0.47 percent lead, 0.55 percent zinc, and 0.21 ounces/ton silver. Smith and Albanese (1985) reported that a grab sample sulfide-bearing mineralization near the Veleska South occurrence contained 0.06 percent copper, 0.84 percent lead, 1.65 percent zinc, 0.40 ounces/ton silver, and 110 ppm cadmium.

Production notes:

Reserves:
None.

Additional comments:

References:
Reed and Elliott, 1968 (C 596); Cobb, 1972; Cobb, 1976; MacKevett and Holloway, 1977; Bundtzen, Kline, and Clough, 1982; Smith and Albanese, 1985; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Reed and Elliott, 1968 (C 596)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/6/98

Site name(s): Sheep Creek-1

Site type: Occurrence

ARDF no.: MG051

Latitude: 62.342 **Quadrangle:** MG B-2

Longitude: 153.799

Location description and accuracy:

The Sheep Creek-1 occurrence is located in the main tributary valley of Sheep Creek about 2.0 kilometers upstream from the confluence of the main tributary and the Smith Lake fork at an elevation of 2,800 feet (853 m) in the SW1/4 sec. 18, T. 26 N., R. 24 W., of the Seward Meridian. Sheep Creek-1 is mineral locality #12 of Bundtzen, Harris, and Gilbert (1997). The reporter found the site in 1981.

Commodities:

Main: Ag, Pb, Zn

Other: V

Ore minerals: Pyrite, sphalerite

Gangue minerals: Quartz

Geologic description:

The Sheep Creek-1 occurrence is a discontinuous zone of metal-bearing, sulfur-rich shale and siltstone of the Lower Ordovician to Lower Silurian Post River Formation, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The observed shale-hosted mineralization contains graptolites that correspond to the Monograptus spiralus zone or of Lower Silurian age. The mineralized zones occur in distinctive areas where a bright yellow sulfur staining is seeping out of pyrite-rich lamina in the black shale lenses and horizons. Within the sulfur-rich zones, disseminated pyrite, and sphalerite are found in 2 to 4 centimeter thick bands.

Bundtzen, Harris, and Gilbert (1997) regard the Sheep Creek-1 occurrence as a sedimentary exhalitive lead-zinc deposit type; however, it may also be an epigenetic occurrence related to nearby plutonic sources.

Random chip samples reported by Bundtzen, Kline, and Clough (1982) and Bundtzen, Harris, and Gilbert (1997) from four stratiform horizons contained an average 600 ppm lead, 1,700 ppm zinc, 1,000 ppm vanadium, and 2.7 grams/tonne silver. Smith and Albanese (1985) reported a single sample (#2526) from the Sheep Creek-1 occurrence contained 720 ppm lead, 37.1 grams/tonne silver, and 472 ppm antimony.

Alteration:
Strong sulfurous alteration.

Age of mineralization:
Inferred to be Lower Silurian, based on graptolite identification.

Deposit model:
Sedimentary exhalitive Pb-Zn(?) (Cox and Singer, 1986; model 31a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
31a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
The reporter first recognized the shale-hosted mineralization in 1981 (Bundtzen, Kline, and Clough, 1982). Random chip samples reported by Bundtzen, Kline, and Clough (1982) and Bundtzen, Harris, and Gilbert (1997) from four horizons of shale-hosted mineralization contained an average 600 ppm lead, 1,700 ppm zinc, 1,000 ppm vanadium, and 2.7 grams/tonne silver. Smith and Albanese (1985) reported that a single sample (#2526) from the Sheep Creek-1 occurrence contained 720 ppm lead, 37.1 grams/tonne silver, and 472 ppm antimony.

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen, Kline, and Clough, 1982; Smith and Albanese, 1985; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/7/98

Site name(s): Sheep Creek-West

Site type: Prospect

ARDF no.: MG052

Latitude: 62.34 **Quadrangle:** MG B-2

Longitude: 153.809

Location description and accuracy:

The Sheep Creek-West prospect is located on the west side of Sheep Creek Valley just below the intersection of the Rat Fork and the South Fork of Sheep Creek at an elevation of 3,400 feet (1,036 m) in the SW1/4 sec. 13, T. 26 N., R. 24 W., of the Seward Meridian. The location is accurate; the reporter visited the site in 1981.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Au, Cd

Ore minerals: Cerussite, chalcopyrite, galena, malachite, pyrrhotite, sphalerite

Gangue minerals: Epidote, garnet, iron oxides, johannsenite

Geologic description:

The Sheep Creek-West prospect contains oxidized, sulfide mineralization in a steeply dipping, northeast-striking fault (?) zone, 2 to 3 meters wide that juxtaposes silty limestone against tan arkosic sandstone; both lithologies belong to the Lower to Upper Silurian Terra Cotta Mountains Sandstone, a formation within the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The zone strikes northeast for a minimum distance of 135 meters and is marked by a distinctive notch along the steep sidehill. Sphalerite, galena, chalcopyrite and pyrrhotite that are accompanied by a gangue of epidote, johannsenite, and garnet replace limestone in vug fillings and shear zones (Bundtzen, Kline, and Clough, 1982). Abundant malachite stain and replacements is locally abundant and a locally conspicuous feature along the fault zone.

Two chip samples collected across about 3 meters of the zone contain up to 0.85 percent copper, 1.01 percent lead, 0.58 percent zinc, 30 ppm cadmium, 86 grams/tonne silver, and 0.60 grams/tonne gold (Bundtzen, Kline, and Clough, 1982).

The vein appears to be spatially related to nearby polymetallic veins at the Dahl (MG053), and the Sheep Creek-South (MG057) prospects, within the Farewell Mineral Belt. The structurally controlled vein mineralization at the Sheep Creek-West prospect may be distally related to skarn mineralization observed throughout the Farewell Mineral Belt.

Alteration:
Sulfides are highly oxidized with conspicuous cerrusite, iron oxides, and malachite replacements.

Age of mineralization:

Deposit model:
Polymetallic vein (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 sampling was conducted by the reporter in 1981. Two chip-channel samples collected across a 3 meter width of the vein contained 0.85 percent copper, 1.01 percent lead, 0.58 percent zinc, 30 ppm cadmium, 86 grams/tonne silver, and 0.60 grams/tonne gold (Bundtzen, Kline, and Clough, 1982).

Production notes:

Reserves:
None.

Additional comments:

References:
Reed and Elliott, 1968 (C 596); Cobb, 1972; Cobb, 1976; Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Kline, and Clough, 1982

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Dahl

Site type: Prospect

ARDF no.: MG053

Latitude: 62.327 **Quadrangle:** MG B-2

Longitude: 153.81

Location description and accuracy:

The Dahl prospect is located in a steep north-trending gulch 4.0 kilometers due west of the outlet of Smith Lake and one kilometer south of the confluence of the headward tributaries of Sheep Creek at an elevation of 3,600 feet (1,097 m) near the boundary between sections 19 and 24, T. 26 N., R. 24 W., of the Seward Meridian. The reporter visited the site in 1981 and in 1997. Note that the Dahl prospect is not accurately located in Bundtzen and others (1997; prospect # 14).

Commodities:

Main: Ag, Cu, Zn

Other: Pb

Ore minerals: Chalcopyrite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Quartz

Geologic description:

The Dahl prospect consists of several impressive zones of massive chalcopyrite-pyrite-sphalerite mineralization that replaces Lower Paleozoic carbonaceous shale, and in contact zones between a north-trending quartz-feldspar porphyry sill (?) and shale. The massive sulfide mineralization at the Dahl prospect is exposed for over 90 meters along a narrow north-south ravine between two unnamed tributaries of upper Sheep Creek. The quartz-feldspar porphyry sill is parallel to the contact between the Lower Ordovician to Lower Silurian Post River Formation and mid-Silurian Terra Cotta Mountains Sandstone; both are units of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997).

The massive sulfide horizon consists primarily of mobilized massive pyrrhotite with variable amounts of chalcopyrite, sphalerite, and traces of tetrahedrite over widths of 2.0 to 4.5 meters within a 4.0 meter to 7.0 meter wide zone of siliceous foliated breccia. This breccia is localized in the faulted contact between the Ordovician-Lower Silurian Post River Formation and the mid to Upper Silurian Terra Cotta Sandstone. Chalcopyrite occurs as fine grained masses up to 15 centimeters thick. Subordinate sphalerite, pyrrhotite, and pyrite occurs with the chalcopyrite and in separate masses up to 5 centimeters thick. Minor quartz gangue occurs in the sulfide zones, which range from 1 to 5 meters thick.

Ore genesis for the Dahl prospect is controversial. The Anaconda Minerals Company, which explored the deposit in 1982 with a diamond drill, regarded the Dahl prospect as a shale hosted, sedimentary exhalitive, massive sulfide deposit hosted in lower Silurian tuffaceous(?) shale (Reed, 1982; Brewer and others, 1992). They based this interpretation on : (1) the stratigraphic section of the Dillinger subterrane is very similar to that in the Selwyn basin in Yukon Territory, Canada, which hosts significant 'sedex' mineralization of the same age; (2) the wallrocks at the Dahl prospect contain framboidal pyrite with high lead, zinc and copper backgrounds; (3) pyrite has been altered to pyrrhotite and 'buckshot' textures similar to that observed at Faro orebody, in Yukon; and (4) the whitish (?) layer interlayered with the sulfides was believed to be a syngenetic, submarine tuff. Sulfide-rich shale sections in drill core that were examined by the reporter in 1983 contained the graptolite Mongraptus spiralus which confirms that the host rock for mineralization is Lower Silurian in age.

However, Smith and Albanese (1985) observed crosscutting relationships of sulfides and host sediments and sulfide replacements in the younger (?) quartz-feldspar porphyry sill (?). The quartz-feldspar porphyry was also observed to cut bedding in host sediments. Del S34 values from pyrrhotite average -0.2, which suggests derivation from plutonic sources (T.K. Bundtzen, written communication, 1989). Hence, Smith and Albanese (1985) and Bundtzen, Harris, and Gilbert (1997) classified the Dahl prospect as an epigenetic, sulfide replacement deposit.

Two drill holes tested the Dahl prospect. Drill hole DP-W01 intersected 5.5 meters of massive sulfide mineralization that averaged 0.9 percent copper, 1.0 percent lead, 6.0 percent zinc, and 177.3 grams/tonne silver. Diamond drill hole DP-D01 intersected a true width of 3.5 meters in semi-massive sulfides that averaged 4.0 percent copper, 0.3 percent lead, 1.0 percent zinc, and 370.1 grams/tonne silver (Brewer and others, 1992). Bundtzen, Kline, and Clough (1982), Smith and Albanese (1985) and Bundtzen, Harris, and Gilbert (1997) reported that mineralized chip-channel surface samples contained up to 5.40 percent copper, 3.48 percent zinc, and 165.0 grams/tonne silver. No estimates of size and grade have been made or are available (Reed, 1982; Brewer and others, 1992).

Alteration:

Age of mineralization:

Unknown; believed to be either Tertiary, based on presumed age of the associated quartz-feldsar porphyry sill or Silurian based on fossil control (Bundtzen, Harris, and Gilbert, 1997).

Deposit model:

Either polymetallic replacement (?) or sedimentary exhalitive lead-zinc (Cox and Singer, 1986; model 19a or 31a).

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

19a(?) or 31a

Production Status: No

Site Status: Inactive

Workings/exploration:

The Dahl prospect was discovered by Anaconda Minerals Company in 1980 or 1981 and drilled from a precipitous platform in the steep 'discovery' gulch during the 1982 season. Drill hole DP-W01 intersected a true width of 5.5 meters of massive sulfide averaging 1.0 percent lead, 0.9 percent copper, 6.0 percent zinc, and 177.3 grams/tonne silver. Diamond drill hole DP-D01 intersected semi-massive sulfides with a true width of 3.5 meters that averaged 4.0 percent copper, 0.3 percent lead, 1.0 percent zinc, and 370.1 grams/tonne silver (Brewer and others, 1992). Bundtzen, Kline, and Clough (1982), Smith and Albanese (1985) and Bundtzen, Harris, and Gilbert (1997) reported that mineralized chip-channel surface samples contained up to 5.40 percent copper, 3.48 percent zinc, and 165.0 grams/tonne silver. A downhole mise-a-la-masse survey showed that the DP-D01 intercept is electrically continuous with the surface outcrops, confirming a downdip dimension of at least 150 meters. Additional surface conductivity surveys also suggest that the massive sulfide horizon extends to the north for an additional 150 meters.

Production notes:

Reserves:

Although the deposit was drilled, no reserves were calculated or are available.

Additional comments:

The Dahl prospect is not typical of other deposits in the Farewell Mineral Belt. The mineralized zone appears to be controlled by a regional structure that extends toward the Crash (MG049) and Little Bird (MG047) prospects.

References:

Bundtzen, Kline, and Clough, 1982; Reed, 1982; Smith and Albanese, 1985; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Brewer and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Unnamed

Site type: Occurrence

ARDF no.: MG054

Latitude: 62.333 **Quadrangle:** MG B-2

Longitude: 153.949

Location description and accuracy:
The occurrence is in a saddle separating two northeast-trending ridgelines at an elevation of 5,500 feet (1,677 m) in the NW1/4 sec. 20, T. 26 N., R. 25 W., of the Seward Meridian. The reporter visited the site in 1981.

Commodities:

Main: Cu, Zn

Other: Ag, Co

Ore minerals: Unidentified brassy sulfides

Gangue minerals: Olivine, peridotite

Geologic description:
This unnamed occurrence is hosted in a northwest-trending northward-dipping mafic sill of Late Triassic (?) age, a feeder for mafic volcanics of the Tatina River Volcanics, a unit of the Mystic subterrane. Unidentified, brassy, disseminated sulfides - probably iron sulfide - occur at the base of the mafic sill. Foley (1987) reports values of 210 ppm copper, 56 ppm cobalt, 330 ppm zinc, and 0.5 grams/tonne silver from the sulfide-bearing sills.

Alteration:
None.

Age of mineralization:

Deposit model:
Disseminated Cu-Ni-Co (Cox and Singer, 1986; model 5b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
5b

Production Status: No

Site Status: Inactive

Workings/exploration:

The sill swarm was mapped by the reporter in 1981 (Bundtzen, Kline, and Clough, 1982). Foley (1987) reports values of 210 ppm copper, 56 ppm cobalt, 330 ppm zinc, and 0.5 grams/tonne silver from the sulfide-bearing sill.

Production notes:

Reserves:

None.

Additional comments:

Similar to Robert's PGM (MG030), Unnamed (MG048), and Chip-Loy (MG032) deposits and prospects.

References:

Bundtzen, Kline, and Clough, 1982; Foley, 1987; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Foley, 1987

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Smith Lake

Site type: Prospect

ARDF no.: MG055

Latitude: 62.328 **Quadrangle:** MG B-2

Longitude: 153.738

Location description and accuracy:

The Smith Lake prospect is located about 150 meters west of the outlet of Smith Lake and 120 meters upstream of the confluence of a small unnamed tributary and the Smith Lake fork of Sheep Creek. It is at an elevation of 3,000 feet (915 m) in the SW1/4 sec. 21, T. 26 N., R. 24 W., of the Seward Meridian. The reporter investigated the prospect in 1981.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Bi, Co

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

Gangue minerals: Clinopyroxene, siderite

Geologic description:

The Smith Lake prospect consists of a high angle, sulfide-rich shear zone in mid-Silurian clastics of the Terra Cotta Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The shear (fault) zone trends N45E, dips steeply to vertically, and ranges from 0.5 to one meter wide. An adit has been driven into the mineralized zone and explored about 8 meters of the sulfide-vein along strike.

Principle sulfides include abundant pyrrhotite, which comprises up to 75 percent of the total sulfides, and minor amounts of pyrite, chalcopyrite, galena and sphalerite. The gangue material contains significant secondary siderite and highly deformed clinopyroxene. Selected chip-channel samples reported by Bundtzen, Kline, and Clough (1982) and Smith and Albanese (1985) contained up to 1.05 percent copper, 1.74 percent lead, 5.22 percent zinc, 42.0 grams/tonne silver, 100 ppm cobalt, and 100 ppm bismuth. A 0.3 meter channel sample collected by Brewer and others (1992) contained 14.8 percent lead, 10.6 percent zinc, 0.6 percent copper, and 90.2 grams/tonne silver.

Alteration:

Siderite alteration.

Age of mineralization:

Deposit model:
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:
Some time prior to 1980, an 8 meter long adit was driven into the sulfide-rich shear zone. Selected chip-channel samples reported by Bundtzen, Kline, and Clough (1982) and Smith and Albanese (1985) contained up to 1.05 percent copper, 1.74 percent lead, 5.22 percent zinc, 42.0 grams/tonne silver, 100 ppm cobalt, and 100 ppm bismuth. A 0.3 meter channel sample collected by Brewer and others (1992) contained 14.8 percent lead, 10.6 percent zinc, 0.6 percent copper, and 90.2 grams/tonne silver.

Production notes:

Reserves:

Additional comments:
The Smith Lake mineralization is not typical of other silver-polymetallic prospects in Farewell Mineral Belt.

References:
Bundtzen, Kline, and Clough, 1982; Smith and Albanese, 1985; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Kline, and Clough, 1982

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Clough

Site type: Occurrence

ARDF no.: MG056

Latitude: 62.326 **Quadrangle:** MG B-2

Longitude: 153.769

Location description and accuracy:

The Clough occurrence is in a saddle that separates two northwest-trending ridgelines about 2.0 kilometers west of the north end of Smith Lake at an elevation of 4,500 feet (1,372 m) in the SW1/4 sec. 20, T. 26 N., R. 24 W., of the Seward Meridian. The reporter visited the site with Jim Clough in 1981. Note that the occurrence as shown in Bundtzen, Harris, and Gilbert (1997; map no. 10) is mislocated.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Co

Ore minerals: Chalcopyrite, pyrite, sphalerite

Gangue minerals: Epidote(?), quartz

Geologic description:

The Clough occurrence is a small but rich massive sulfide skarn zone adjacent to an altered, east-west-trending felsic (?) dike. The host rock for the skarn is argillaceous limestone of the mid-Silurian Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997).

Principle sulfide minerals include massive pyrite and sphalerite veins up to 8 centimeters thick, and a trace of chalcopyrite in an epidote-quartz skarn. One grab sample of high grade mineralization contained 13.0 percent zinc, 0.11 percent lead, 0.50 percent copper, 26 grams/tonne silver, and 300 ppm cobalt. (Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997).

Alteration:

None.

Age of mineralization:

Deposit model:

Low temperature lead-zinc skarn (Cox and Singer, 1986; model 18c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
The Clough occurrence was found by Jim Clough of Alaska Division of Geological and Geophysical Surveys during a geologic mapping program in 1981 (Bundtzen, Kline, and Clough, 1982). One grab sample of high grade mineralization contained 13.0 percent zinc, 0.11 percent lead, 0.50 percent copper, 26 grams/tonne silver, and 300 ppm cobalt.

Production notes:

Reserves:
None.

Additional comments:
Similar to Rat Fork-Headwall (MG059) and Rat Fork-Base (MG058) prospects.

References:
Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/7/98

Site name(s): Sheep Creek-South

Site type: Occurrence

ARDF no.: MG057

Latitude: 62.317 **Quadrangle:** MG B-2

Longitude: 153.792

Location description and accuracy:
The Sheep Creek-South occurrence is located on the east side of the upper Sheep Creek valley at an elevation of 3,300 feet (1,006 meters) in the NE1/4 sec. 30, T. 26 N., R. 24 W., of the Seward Meridian. The reporter visited the site in 1981.

Commodities:

Main: Zn

Other: Fe, Pb

Ore minerals: Sphalerite, pyrite, pyrrhotite

Gangue minerals: Quartz

Geologic description:
At the Sheep Creek occurrence, sphalerite occurs in small lenses along shear zones in dikes near the north side of a small stock that cuts limestone and siltstone of the mid-Silurian Terra Cotta Mountains Sandstone, a formation within the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). According to Reed and Elliott (1968, C 596), selected grab samples contain up to 5.00 percent zinc.

Alteration:
None recognized.

Age of mineralization:

Deposit model:
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:

Only surface sampling data is available from the occurrence. According to Reed and Elliott (1968, C 596), selected grab samples contain up to 5.00 percent zinc.

Production notes:

Reserves:

None.

Additional comments:

References:

Reed and Elliott, 1968 (C 596); Cobb, 1972; Cobb, 1976; Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Reed and Elliott, 1968 (C 596)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/6/98

Site name(s): Rat Fork-Base

Site type: Prospect

ARDF no.: MG058

Latitude: 62.319 **Quadrangle:** MG B-2

Longitude: 153.87

Location description and accuracy:

The Rat Fork-Base prospect is located near the base of the cirque that defines the head of the Rat Fork of Sheep Creek; it is at an elevation of 4,175 feet (1,273 m) in the NW1/4 sec. 26, T. 26 N., R. 25 W., of the Seward Meridian. An active rock glacier forms the southern boundary of the prospect area. The location is accurate; the reporter visited the site in 1982.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Cd, Co, Fe

Ore minerals: Chalcopyrite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Clinopyroxene (johannsenite), epidote, garnet

Geologic description:

The Rat Fork-Base prospect consists of disseminated sulfides in a calc-silicate hornfels and marble adjacent to an extensive, east-west-trending, granodiorite sill and dike swarm, the same plutonic complex that is exposed at the Rat Fork-Headwall (MG059) prospect. At the Rat Fork-Base prospect, the calc-silicate zone, which consists of garnet, epidote, and clinopyroxene in arkosic, metaclastic rocks, has been intruded by several mafic sills that are parallel to bedding. The plutonic rocks intrude the Lower Paleozoic Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997).

The zone of disseminated mineralization trends roughly east-west, varies from 1 to 10 meters thick , and can be traced along the strike for about 40 meters. Principle sulfide minerals include abundant pyrite and pyrrhotite, and minor amounts of chalcopyrite and sphalerite.

Surface sampling of massive sulfide talus below a diamond drill station contained 0.31 percent copper, 1.85 percent zinc, 6.5 grams/tonne silver, 158 ppm cobalt, 161 ppm cadmium, and 41.4 percent iron (Smith and Albanese, 1985).

Alteration:

Surface oxidation of massive pyrite and pyrrhotite formed a pronounced ferricrete gos-

san.

Age of mineralization:
Unknown; inferred to be 25 to 35 Ma, based on age of similar dike swarm in Tin Creek area (Solie and others, 1991).

Deposit model:
Lead-zinc (copper) skarn (Cox and Singer, 1986; model 18c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
A single drill station was sited by Falconbridge Minerals through their operator St. Eugene Mining Company sometime in the late 1960s and early 1970s (records for time of activities are poorly known). The results of these exploration efforts are unknown. Surface sampling of massive sulfide talus below the diamond drill station contained 0.31 percent copper, 1.85 percent zinc, 6.5 grams/tonne silver, 158 ppm cobalt, 161 ppm cadmium, and 41.4 percent iron (Smith and Albanese, 1985).

Production notes:

Reserves:

Additional comments:
Similar to Rat Fork-Headwall (MG059), Tin Creek North (MG041), Tin Creek Midway (MG043), Smith Lake (MG055), and Bowser Creek Main (MG068) skarn deposits in the Farewell Mineral belt, McGrath Quadrangle.

References:
Reed and Elliott, 1968 (C 559); Reed and Elliott, 1968 (C 596); Bundtzen, Kline, and Clough, 1982; Smith and Albanese, 1985; Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Smith and Albanese, 1985

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 11/6/98

Site name(s): Rat Fork-Headwall

Site type: Prospect

ARDF no.: MG059

Latitude: 62.319 **Quadrangle:** MG B-2

Longitude: 153.889

Location description and accuracy:

The Rat Fork-Headwall prospect is located just below the crest of a steep ridgeline near the head of a glacial cirque, the headward reaches of the Rat Fork of Sheep Creek; it is at about 5,500 feet (1,676 m) elevation, in the NW1/4 sec. 27, T. 26 N., R. 25 W., of the Seward Meridian. The prospect is accurately located; the reporter visited the site in 1982.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: As, Cd

Ore minerals: Chalcopyrite, galena, pyrite, pyrrhotite, sphalerite (marmatite)

Gangue minerals: Clinopyroxene, epidote, garnet

Geologic description:

The Rat Fork-Headwall prospect consists of disseminated to massive sulfide veins in a calc-silicate skarn zone within an extensive, east-west-trending, granodiorite dike swarm more than 1.5 kilometers wide (Bundtzen Kline, and Clough, 1982). The dike swarm cuts Lower Paleozoic clastics and carbonates of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The dikes are not dated at the prospect site, but are similar to dikes that are spatially related to the Tin Creek-Midway prospect (MG043) to the northeast, which has yielded K-Ar ages ranging in age from 25 to 35 Ma (Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997).

The calc-silicate skarns, which are composed of garnet, epidote, and low temperature clinopyroxene (johannsenite) occur mainly in arenaceous, recrystallized limestone. The sulfide bearing vein parallels a pervasive joint set which cuts various calc-silicate rocks and limestone (Smith and Albanese, 1985). The sulfide vein trends N85W, dips 85S, varies from 0.5 to 3 meters thick, and can be traced for about 22 meters along strike. Principle sulfide minerals in the vein consist of pyrite, sphalerite (iron-rich marmatite), galena, and chalcopyrite. Sulfides locally compose up to 45 percent of the vein, even in thickened areas. Chip-channel samples taken across the vein at three intervals contained up to 0.56 percent copper, 11.10 percent lead, 14.10 percent zinc, 301 grams/tonne silver, 3.80 percent arsenic, 0.12 percent cadmium, and 42.40 percent iron (Smith and Albanese,

1985).

Alteration:
Extensive oxidation of pyrite-rich areas to ferricrete gossan.

Age of mineralization:
Unknown; inferred to be 25 to 35 Ma, based on K-Ar dating of similar granodiorite dike swarms elsewhere in McGrath quadrangle.

Deposit model:
Lead-zinc (copper) skarns (Cox and Singer, 1986; model 18c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
In the late 1960s and early 1970s (records are unclear), Falconbridge Minerals through exploration operator St. Eugene Mining Company, conducted a limited amount of diamond core drilling from two stations near the sulfide vein. Based on drill hole orientations, the exploration drilling attempted to intersect the vein at depth. The results of this exploration work are unknown.

Surface sampling has been conducted by Reed and Elliott (1968, C 596), Bundtzen, Kline, and Clough (1982) and Smith and Albanese (1985).

Production notes:

Reserves:
None.

Additional comments:
The Rat Fork-Headwall prospect is part of a widespread polymetallic mineral belt similar to other deposits in the Farewell Mineral belt, including Tin Creek North (MG041), Tin Creek South (MG044), Bowser Creek-Main (MG068), Bowser Creek Northeast (MG067), and Smith Lake (MG055) prospects.

References:
Reed and Elliott, 1968 (C 596); Cobb, 1972; Cobb, 1976; Bundtzen, Kline, and Clough, 1982; Smith and Albanese, 1985; Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Smith and Albanese, 1985

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Ozzna Creek

Site type: Prospect

ARDF no.: MG060

Latitude: 62.295 **Quadrangle:** MG B-2

Longitude: 153.946

Location description and accuracy:

The Ozzna Creek prospect is located on the north facing slopes of Ozzna Creek, a westerly flowing tributary of the Windy Fork, Kuskokwim River; it is at an elevation of 4,750 feet (1,448 m) in the SE1/4 sec. 32, T. 26 N., R. 25 W., of the Seward Meridian. Location corresponds to locality number 3 of Cobb (1972). Location is accurate; the reporter investigated the prospect in 1981.

Commodities:

Main: Ag, Au, Cu, Pb, Zn

Other: Mo

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

Gangue minerals: Carbonate, epidote, quartz, sericite

Geologic description:

The Ozzna creek prospect consists of base metal sulfide veins and replacement deposits within an extensive quartz-sericite-pyrite halo rimming a 450 meter wide, rugged, quartz monzonite breccia pipe, which forms the core of a distinctive, precipitous, 7,205-foot - high (2,197 m) peak. A biotite separate from the quartz monzonite breccia pipe yielded a K-Ar age of 58 Ma. (Solie and others, 1991). A pronounced magnetic high rims the edge of the breccia pipe (Rob Kell, written communication, 1983).

The vein and replacement deposits consist of small pods and lenses of pyrrhotite, sphalerite, argentiferous galena, and pyrite in a gangue of carbonate, epidote, and quartz along shear zones in felsic dikes and igneous breccia. Most massive sulfide pods range from 0.2 to 1.5 meters in width and 0.5 to 6.0 meters in length. Selected samples yielded 1,623.0 to 2,189.0 grams/tonne silver (Reed and Elliott, 1968, C 596).

An extensive quartz-sericite-pyrite halo that surrounds the quartz monzonite breccia pipe ranges from 15 to 60 meters wide, and can be traced along strike for about 450 meters. Disseminated chalcopyrite and traces of molybdenite occur in pyrite-rich igneous breccia. Selected samples from the quartz-sericite-pyrite halo contain up to 0.08 percent copper, 150 ppm molybdenum, 1.50 percent lead, 1.00 percent zinc, 14.6 grams/tonne silver, and 2.48 grams/tonne gold (Bundtzen, Kline, and Clough, 1982; Bundtzen, Harris,

and Gilbert, 1997).

Alteration:
Pyritic and sericitic alteration in breccia pipe.

Age of mineralization:
Early Tertiary (58 Ma) , based on K-Ar biotite age of intrusion.

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:
Only surface sampling has been completed at the prospect. Selected samples from the quartz-pyrite-sericite halo contain up to 0.08 percent copper, 150 ppm molybdenum, 1.50 percent lead, 1.00 percent zinc, 14.6 grams/tonne silver, and 2.48 grams/tonne gold (Bundtzen, Kline, and Clough, 1982).

Production notes:

Reserves:
None.

Additional comments:
The magnetic anomaly that rims the quartz monzonite breccia pipe is similar to a geophysical feature found in porphyry copper systems throughout the North American Cordillera.

References:
Reed and Elliott, 1968 (C 596); Cobb, 1972; Cobb, 1976; MacKevett and Holloway, 1977; Bundtzen, Kline, and Clough, 1982; Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Reed and Elliott, 1968 (C 596)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Badnews

Site type: Prospect

ARDF no.: MG061

Latitude: 62.297 **Quadrangle:** MG B-2

Longitude: 153.766

Location description and accuracy:

The Badnews Prospect is located on a steep and precipitous, north-facing slope of Peak 6,920, at an elevation of 5,700 feet (1,738 m) in the SW1/4 sec. 32, T. 26 N., R. 24 W., of the Seward Meridian. The location is from Foley (1987).

Commodities:

Main: Ag, Au, Cu, Zn

Other: Cd, Co, Pb

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

Gangue minerals: Calcite, epidote, garnet, quartz

Geologic description:

The Badnews polymetallic prospect is a Cu-Pb-Zn-Ag-Au (Co-Pb) skarn deposit in tightly folded limestone, siltstone, and argillite of the mid-Silurian Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The limestone layers have been preferentially replaced by skarn minerals and locally sulfides; clastic rocks have been transformed into purple-green hornfels. Central to the prospect area is a granodiorite porphyry stock with apophyses and numerous dikes intruding a large aureole of hornfelsed sedimentary rocks (Bundtzen, Harris, and Gilbert, 1997). Several east-west trending, high-angle, granodiorite dikes cut the limestone; the dikes are apparently pathways for hydrothermal-skarn mineralization. A post skarn breccia occurs at the contact of one granodiorite dike.

Principle sulfide minerals include; chalcopyrite, pyrrhotite, sphalerite, and a trace of galena. Pyrrhotite is the dominant sulfide in practically all mineralized skarn zones. Skarn gangue includes abundant recrystallized calcite and red garnet, with minor epidote and quartz. Massive sulfide pods and mantos ranging up to 10 meters thick can be traced laterally for several hundred meters (Brewer and others, 1992). Individual sulfide zones reach a maximum thickness of 0.7 meters within skarn zones up to 2 meters wide. Sphalerite is most abundant in epidote-garnet-rich rock whereas chalcopyrite and pyrrhotite are most abundant in lighter calcite-garnet rock (Foley, 1987).

In sulfide skarns where chalcopyrite and sphalerite dominate, 23 grab samples averaged

3.7 percent zinc and 0.4 percent copper (Brewer and others, 1992). Selected samples from zinc-rich areas also contain up to 1,740 ppm cadmium. Overall gold values are more anomalous in the Badnews skarn prospect than in any other area of the Farewell Mineral Belt, with assays of up to 11.2 grams/tonne gold and 143.1 grams/tonne silver noted (Brewer and others, 1992). An average gold value of 490 ppb gold was obtained from numerous other sulfide-bearing grab samples at the prospect. Two grab samples of sulfide-bearing skarn collected by Foley (1987) contained maximum values of 9.20 percent zinc, 93 ppm lead, 0.44 percent copper, 290 ppm cobalt, and 16.6 grams/tonne silver.

Alteration:

Strong secondary biotite (potassic) alteration in skarn.

Age of mineralization:

Deposit model:

Low temperature lead-zinc skarn (Cox and Singer, 1986; model 18c).

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

18c

Production Status: No

Site Status: Inactive

Workings/exploration:

The Badnews polymetallic prospect was named by Roger Burleigh during mineral investigations conducted in 1979 by Placid Oil Company. Only surface sampling has taken place at the site, mainly by Anaconda Minerals and the U.S. Bureau of Mines. Where sphalerite and chalcopyrite dominate, 23 grab samples average 3.7 percent zinc and 0.4 percent copper (Brewer and others, 1992). Overall gold values are more anomalous in the Badnews skarn prospect than in any other area of the Farewell mineral belt; with assays of up to 11.2 grams/tonne gold and 143.1 grams/tonne silver noted (Brewer and others, 1992). Two samples of sulfide-bearing skarn collected by Foley (1987) contained up to 9.20 percent zinc, 93 ppm lead, 0.44 percent copper, 290 ppm cobalt, and 16.6 grams/tonne silver.

Production notes:

Reserves:

None.

Additional comments:

Similar to Tin Creek-Midway (MG043), and Rat Fork-Headwall (MG059) prospects. The Badnews skarn prospect contains more gold than any other prospect or occurrence in the Farewell Mineral Belt.

References:

Bundtzen, Kline, and Clough, 1982; Foley, 1987; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Foley, 1987

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/7/98

Site name(s): Pyrrhotite

Site type: Prospect

ARDF no.: MG062

Latitude: 62.287 **Quadrangle:** MG B-2

Longitude: 153.778

Location description and accuracy:

The Pyrrhotite prospect is located on a steep, precipitous southerly flank of Peak 6,920 at the head of Sheep Creek. It is about 1.5 kilometers southwest of the Badnews Prospect (MG061)) at an elevation of 5,750 feet (1,753 m) in the NW1/4 sec. 5, T. 25 N., R. 24 W., of the Seward Meridian. The reporter investigated the site in 1982.

Commodities:

Main: Co, Cu, Fe, Ni

Other: Zn

Ore minerals: Pyrite, pyrrhotite

Gangue minerals: Calcite

Geologic description:

The Pyrrhotite occurrence consists of several semi-massive to massive pods of pyrrhotite and minor pyrite enclosed in banded hornfels and marble adjacent to a small stock of highly altered granodiorite porphyry. The host rocks are thermally altered marble and clastic sediments of the mid-Silurian Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen and others, 1997).

Pyrrhotite occurs as disseminated grains in veinlets up to 8 centimeters thick, as semi-massive to massive sulfide pods up to 30 centimeters thick, and as clots and crystals up to three centimeters across. Grab samples of pyrrhotite-rich sulfide mineralization collected during investigations by Anaconda Minerals Company contained up to 0.44 percent nickel and 460 ppm cobalt (Brewer and others, 1992). Selected samples reported by Foley (1987) contain up to 180 ppm nickel, 180 ppm copper, and 180 ppm zinc. Massive pyrrhotite-bearing samples contained 58.00 percent iron.

Alteration:

None.

Age of mineralization:

Deposit model:
Polymetallic replacement (?) (Cox and Singer, 1986; model 19a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
19a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
The Pyrrhotite occurrence was noted by the reporter during mapping conducted in 1981 (Bundtzen, Kline, and Clough, 1982). Grab samples of pyrrhotite-rich sulfide mineralization collected by Anaconda Minerals Company contained up to 0.44 percent nickel and 460 ppm cobalt (Brewer and others, 1992). Selected samples reported by Foley (1987) contain to 180 ppm nickel, 180 ppm copper, and 180 ppm zinc. Massive pyrrhotite-bearing samples contained up to 58.00 percent iron.

Production notes:

Reserves:
None.

Additional comments:
See Post Lake Prospect (MG069).

References:
Bundtzen, Kline, and Clough, 1982; Foley, 1987; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Foley, 1987

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Hippie Creek; Post River #2

Site type: Occurrence

ARDF no.: MG063

Latitude: 62.267 **Quadrangle:** MG B-2

Longitude: 153.66

Location description and accuracy:

The Hippie Creek occurrence crops out in an unnamed, east-flowing tributary of Post River at an elevation of 2,150 feet (655 m) in the SE1/4 sec. 11, T. 25 N., R. 24 W., of the Seward Meridian. Location is accurate as identified in Reed and Elliott (1968, C 596).

Commodities:

Main: Ag, Pb, Zn

Other: As, Cd, Cu, Sb

Ore minerals: Arsenopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, epidote

Geologic description:

The Hippie Creek occurrence contains pyrite, sphalerite, and argentiferous galena in scattered grains and discontinuous bands 2 to 25 cm wide, and found in a steep bedrock canyon where calcite-epidote veins cut limestone near the faulted contact between the Terra Cotta Mountains Sandstone and Barren Ridge Limestone of the Dillinger subterrane (Bundtzen, Harris,and Gilbert, 1997). The sulfide-rich vein also contains minor arsenopyrite.

The vein ranges from 6 inches to 6 feet wide and is obscured by talus on both sides of a steep canyon. Dike swarms and small stock-like bodies of porphyritic felsic rocks occur north of the limestone (Reed and Elliott, 1968, C 596). Sampling completed by Anaconda Minerals Company, who referred to the site as the Post River #2 prospect, contained a true width of 5.0 meters averaging 0.7 percent copper, 12.7 percent lead, 10.5 percent zinc, and 587.8 grams/tonne silver (Brewer and others, 1992). Grab samples of surface mineralization reported by Reed and Elliott (1968, C 596) contain up to 686.0 grams/tonne silver, 500 ppm cadmium, 0.30 percent copper, 7.00 percent lead, 300 ppm antimony, and 10.00 percent zinc.

Alteration:

Age of mineralization:

Unknown; thought to be Tertiary by Bundtzen, Kline, and Clough (1982) and Bundtzen, Harris, and Gilbert (1997).

Deposit model:
Polymetallic vein (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:
The Hippie Creek occurrence was found and investigated by the late Bruce Reed during regional geological investigations conducted by the U.S. Geological Survey in the southern Alaska Range (Reed and Elliott, 1968, C 596). Sampling by the Anaconda Minerals Company, who referred to the site as the Post River #2 prospect, reported a 5.0 meter true width that averaged 0.7 percent copper, 12.7 percent lead, 10.5 percent zinc, and 587.8 grams/tonne silver (Brewer and others, 1992). Selected samples collected by Reed and Eliott (1968, C 596) contain up to 686.0 grams/tonne silver, 500 ppm cadmium, 0.30 percent copper, 7.00 percent lead, 300 ppm antimony, and 10.00 percent zinc.

Production notes:

Reserves:
None known.

Additional comments:
The Hippie Creek prospect may be controlled along a high angle structure that also hosts the Veleska-South (MG050) prospect about 11 kilometers to the north.

References:
Reed and Elliott, 1968 (C 596); Cobb, 1972; Cobb, 1976; MacKevett and Holloway, 1977; Cobb and Reed, 1981; Bundtzen, Kline, and Clough, 1982; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Reed and Elliott, 1968 (C 596)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Unnamed

Site type: Occurrence

ARDF no.: MG064

Latitude: 62.224 **Quadrangle:** MG A-2

Longitude: 153.827

Location description and accuracy:
This occurrence is exposed in outcrops on the south bank of a prominent, unnamed eastern fork of Windy Fork at an elevation of 3,100 feet (945 m) in the SW1/4 sec. 25, T. 25 N., R. 25 W., of the Seward Meridian. The reporter visited the site in 1982.

Commodities:

Main: Zn

Other:

Ore minerals: Pyrite, sphalerite

Gangue minerals:

Geologic description:
This occurrence is a stratiform sulfide zone in the Lower Ordovician to Lower Silurian Post River Formation, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The sulfide bearing zone is estimated to be about 1.5 meters thick and consists of several thin pyritiferous layers with traces of sphalerite observed (Bundtzen and others, 1988). Two chip samples taken across 3 meters of the sulfide-bearing shale averaged 395 ppm zinc.

Alteration:

Age of mineralization:
Inferred to be Late Ordovician to Early Silurian.

Deposit model:
Sedimentary exhalitive lead zinc (?) (Cox and Singer, 1986; model 31a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
31a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:

Kristi McDonald of the Alaska Division of Geological and Geophysical Surveys found and sampled the occurrence in 1982 while measuring section in the Lower Paleozoic black shales of the Post River Formation (Churkin and Carter, 1996). Two chip samples taken across 3 meters of the sulfide-bearing shale exposure averaged 395 ppm zinc (Bundtzen and others, 1988).

Production notes:

Reserves:

None.

Additional comments:

See unnamed stratiform occurrence at site MG071.

References:

Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Hippie Creek-South

Site type: Occurrence

ARDF no.: MG065

Latitude: 62.215 **Quadrangle:** MG A-2

Longitude: 153.715

Location description and accuracy:

The Hippie Creek-South occurrence is located on the east side of a cirque basin at an elevation of 4,100 feet (1,250 m) in the SW1/4 sec. 34, T. 25 N., R. 24 W., of the Seward Meridian (prospect #10 of Cobb, 1972). The occurrence is located to within 500 feet (152 m).

Commodities:

Main: Ag, Pb

Other: Sb, Zn

Ore minerals: Galena, pyrite, sphalerite, stibnite

Gangue minerals: Calcite, epidote

Geologic description:

According to Reed and Elliott (1968, C 596), the Hippie Creek-South occurrence consists of locally abundant calcite, pyrite, and galena and minor to trace sphalerite and stibnite (?) in several 2 to 8 cm thick shear zones in limestone of the Terra Cotta Mountains Sandstone, a formation of the lower Paleozoic Dillinger subterrane (Bundtzen and others, 1988, 1997). The mineralized shear zone is parallel to a 6 m thick, pyrite-bearing felsite porphyry dike swarm (Bundtzen and others, 1988). The dikes are undated but a similar plutonic suite to the south yielded a 60.5 Ma age (Solie and others, 1991). The shear zone is discontinuously mineralized.

Analyses cited in Reed and Elliott (1968, C 596) contained greater than 1,000 ppm silver, 1,000 ppm arsenic, greater than 0.50 percent lead, 0.30 percent antimony, and greater than 1.00 percent zinc.

Alteration:

Age of mineralization:

Unknown; inferred to be mid-Tertiary, based on isotopic age dating of nearby genetically related plutonic rocks (Solie and others, 1991).

Deposit model:
Lead-zinc skarn deposit (Cox and Singer, 1986; model 18c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
The Hippie Creek-South occurrence was found and investigated by the late Bruce Reed during regional geological investigations in the southern Alaska Range by the U.S. Geological Survey (Reed and Elliott, 1968, C 596). Selected analyses contain greater than 1,000 ppm arsenic, greater than 0.50 percent lead, 0.30 percent antimony, and greater than 1.0 percent zinc.

Production notes:

Reserves:
None known.

Additional comments:
Peripheral to Bowser Creek-Main (MG068), Bowser Creek-Northeast (MG067), and Bowser Creek-Headwaters (MG066) prospects.

References:
Reed and Elliott, 1968 (C 596); Cobb, 1972; Cobb, 1976; Bundtzen and others, 1988; Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Reed and Elliott, 1968 (C 596)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Bowser Creek-Headwaters

Site type: Prospect

ARDF no.: MG066

Latitude: 62.195 **Quadrangle:** MG A-2

Longitude: 153.718

Location description and accuracy:

The Bowser Creek-Headwaters prospect is located in the valley bottom of the headwaters of Bowser Creek; it extends for a distance of about 750 feet (230 meters) at an elevation of 4,400-to-4,500 feet (1,340 to 1,370 meters) in the NE1/4 sec. 5, T. 24 N., R. 24 W., of the Seward Meridian. Location is precisely known; reporter visited the site in 1982.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: As, Au, Co

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

Gangue minerals: Calcite, quartz, siderite

Geologic description:

The Bowser Creek-Headwaters prospect consists of disseminated to massive, sulfide mineralization in discrete, northwest-trending, steeply dipping, quartz-carbonate veins and vein breccias cutting quartz porphyry of the Bowser Creek composite pluton. The quartz porphyry phase, which has been radiometrically dated a 60.4 Ma; it intrudes the Early to mid-Paleozoic Dillinger subterrane (Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997). A prospect map has been published by Bundtzen and others (1988).

Sulfide minerals include massive sphalerite and pyrrhotite, with lesser amounts of galena, chalcopyrite, and arsenopyrite. Pyrrhotite and arsenopyrite clearly crosscut previously deposited galena, sphalerite, and pyrite. Reed and Elliott (1968, C 559) reported scattered values of up to 4,820 grams/tonne silver, 0.08 grams/tonne gold, 3.00 percent arsenic, 3.00 percent copper, 200 ppm cobalt, 10.00 percent zinc, and 10.00 percent lead. The average of four chip samples taken by Bundtzen and others (1988) across the sulfide-bearing vein system was 35.7 grams/tonne silver, 0.29 percent copper, 0.14 percent lead, and 4.00 percent zinc, but no detectable gold. Other elevated metal concentrations include 469 ppm arsenic, 0.12 percent cadmium, and 169 ppm cobalt (Bundtzen and others, 1988).

Alteration:
Massive pyrrhotite is heavily oxidized to ferricrete gossan.

Age of mineralization:
Inferred to be Tertiary, based on a K-Ar age of 60.4 Ma from host quartz porphyry intrusion.

Deposit model:
Polymetallic vein (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:
No surface exploration excavations have been undertaken at the prospect. Reed and Elliott (1968, C 559) reported scattered values of up to 4,280 grams/tonne silver, 0.08 grams/tonne gold, 3.00 percent arsenic, 3.00 percent copper, 200 ppm cobalt, 10.00 percent zinc, and 10.00 percent lead. The average metallic content of four chip samples taken by Bundtzen and others (1988) across the sulfide-bearing veins was 37.5 grams/tonne silver, 0.29 percent copper, 0.14 percent lead, and 4.00 percent zinc. Other elevated metal concentrations include 469 ppm arsenic, 0.12 percent cadmium, and 169 ppm cobalt noted by Bundtzen and others (1988).

Production notes:

Reserves:
None.

Additional comments:
Part of a larger mineral center related to the Bowser Creek composite pluton; see Bowser Creek-Main (MG068) and Bowser Creek-Northeast (MG067) prospects.

References:
Reed and Elliott, 1968 (C 559); Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/13/98

Site name(s): Bowser Creek-Northeast

Site type: Prospect

ARDF no.: MG067

Latitude: 62.191 **Quadrangle:** MG A-2

Longitude: 153.69

Location description and accuracy:

The Bowser Creek-Northeast prospect is located on a steep, north-trending spur on the north side of Bowser Creek valley; it is at an elevation of 4,700 feet to 5,100 feet (1,432 to 1,554 meters) in sec. 4, T. 24 N., R. 24 W., of the Seward Meridian. The prospect is precisely known; the reporter visited the site in 1982.

Commodities:

Main: Ag, Au, Pb, Zn

Other: Cu, Fe

Ore minerals: Chalcopyrite, galena, pyrrhotite, sphalerite (marmatite)

Gangue minerals: Chlorite, clinopyroxene (hedenbergite), epidote

Geologic description:

The Bowser Creek-Northeast prospect is a north-trending, elongate mineral zone that averages 7 meters wide and about 300 meters long near a small body of quartz porphyry and related felsite dikes, which are satellite intrusions of the main Bowser Creek composite pluton (Bundtzen and others, 1988). The plutonic rocks intrude a limestone-rich section of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997); host rocks at the Bowser Creek Northeast prospect are Late Silurian to Lower Devonian in age. A prospect map was published by Reed and Elliott (1968, C 559).

According to Reed and Elliott (1968, C 559), the skarn typically consists of pyrrhotite and marmatite (iron-rich sphalerite) with abundant epidote, chlorite, clinopyroxene (hedenbergite), and quartz. Disseminated galena occurs in shear zones related to dike swarm activity.

Reed and Elliott (1968, C 559) reported values from chip sample traverses as high as 357.7 grams/tonne silver, 3.4 grams/ton gold, 2.44 percent copper, 24.00 percent lead, and 22.10 percent zinc. According to Bundtzen and others (1988), the average metallic content of several 5 meter chip samples taken across the the mineralized zone was 0.35 grams/tonne gold, 244.0 grams/tonne silver, 821 ppm copper, 12.13 percent lead, and 11.13 percent zinc.

Alteration:
Extensive ferricrete oxidation of pyrrhotite and marmatite-rich sulfide zones.

Age of mineralization:
Inferred to be Tertiary, based on a 60.4 Ma K-Ar age from quartz porphyry in the Bowser Creek pluton.

Deposit model:
Lead-zinc skarn (Cox and Singer, 1986; model 18c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
The Bowser Creek-Northeast prospect was found by the late Bruce Reed during minerals investigations for the U.S. Geological Survey in the 1960s (Reed and Elliott, 1968, C 596). Reed and Elliott (1968, C 559) reported values from chip sample traverses as high as 357.7 grams/tonne silver, 3.4 grams/tonne gold, 2.44 percent copper, 24.00 percent lead, and 22.10 percent zinc. According to Bundtzen and others (1988), the average metallic content of several 5 meter chip samples taken across the mineralized zone was 0.35 grams/tonne gold, 244.0 grams/tonne silver, 821 ppm copper, 12.13 percent lead, and 11.13 percent zinc.

No surface trenching or drilling have been conducted on the property.

Production notes:

Reserves:
None.

Additional comments:
Part of a series of low temperature zinc-lead-silver skarns associated with Bowser Creek composite pluton (see MG066, MG068 prospects).

References:
Reed and Elliott, 1968 (C 559); Reed and Elliott, 1968 (C 596); Cobb, 1972 (MF 379); Cobb, 1976; Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Reed and Elliott, 1968 (C 559)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/13/98

Site name(s): Bowser Creek-Main

Site type: Mine

ARDF no.: MG068

Latitude: 62.18 **Quadrangle:** MG A-2

Longitude: 153.7

Location description and accuracy:
The Bowser Creek-Main deposit is located along the steep, eastern margin of an active rock glacier in Bowser Creek valley; it is at an approximate elevation of 4,200 feet (1,280 m) in sec. 9, T. 24 N., R. 24 W., of the Seward Meridian. Location accurately determined; reporter visited the site in 1982 and 1988.

Commodities:

Main: Ag, Pb, Zn

Other: As, Au, Cd, Co, Cu

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

Gangue minerals: Amphibole, calcite, epidote, garnet, hedenbergite, johansenite, quartz

Geologic description:
The Bowser Creek-Main deposit consists of replacement pods, lenses and veins of sphalerite, galena, pyrrhotite, and minor chalcopyrite, marcasite, and pyrite in skarn adjacent to felsic dikes. However, important fissure-controlled, silver-rich galena, tetrahedrite, pyrrhotite, and calcite mineralization occurs in marble away from the skarn itself. Sphalerite is iron-rich (marmatite). Galena is paragenetically late and crosscuts the earlier sphalerite-chalcopyrite veins and replacement bodies. No sulfosalts were recognized. The skarns and replacement deposits at the Bowser Creek-Main deposit are related to a dumbell-shaped, 7 square kilometer, composite pluton that intrudes a limestone rich section of the Barren Ridge Limestone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). A quartz porphyry phase of the Bowser Creek pluton has been radiometrically dated at 60.4 Ma (Bundtzen and others, 1988). Prospect sketches were provided by Reed and Elliott (1968, C 596).

The richest silver concentrations occur in shear-zone controlled massive galena-sulfide veins. Reed and Elliott (1968, C 596) reported values of up to 9,635.0 grams/tonne silver, 60.00 percent lead, 14.70 percent zinc, 0.49 percent copper, and 0.4 grams/tonne gold. Bundtzen and others (1988) reported that the average of six high-grade samples of massive galena ore from shear zones in the marble front contained 2,510.0 grams/tonne silver, 23.70 percent lead, 3.44 percent zinc, 0.15 percent copper, and 110 ppb gold.

Other samples collected by Bundtzen and others (1988) contained 157 ppm cobalt and 0.11 percent cadmium. Based on polished-section and assay data, silver has a highest correlation coefficient with lead (galena); cobalt is concentrated in the pyrrhotite. High cadmium values occur in sphalerite. The mineralogical source of the sporadic gold values is unknown.

Alteration:

Pyrrhotite and iron-rich sphalerite (marmatite) ubiquitously weather to a deep reddish brown gossan.

Age of mineralization:

Tertiary, based on 60.4 Ma age of nearby quartz porphyry intrusion; ore mineralization not dated.

Deposit model:

Zinc-lead skarn deposits (Cox and Singer, 1986; model 18c); low temperature lead-zinc-silver skarns after Eimaudi and Burt, (1982)

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

18c

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

The Bowser Creek-Main deposit was discovered during regional geological mapping and mineral investigations conducted in the southern Alaska Range by the U.S. Geological Survey and published in Reed and Elliott (1968, C 559 and 596) and Reed and Lanphere (1972). Portland-based, Alaskamin Mining Company and St. Eugene Mining Company, the operator for Falconbridge Mining Company, acquired the property in late 1968 (Williams, 1969) and by 1973, cut about 250 feet of surface trenches, built a 2,600-foot-long airport on the Post River, and sacked about 15 tons of high grade galena ores for air shipment to Sunshine Mining Company's Kellogg smelter in Idaho (B.L. Reed and C.N. Conwell, written communication 1982). Records from an alleged early drilling program have not been documented.

Reed and Elliott (1968, C 559) reported values from surface chip samples of up to 9,635 grams/tonne silver, 60.00 percent lead, 14.70 percent zinc, 0.49 percent copper, and 0.4 grams/tonne gold. Bundtzen and others (1988) reported that the average of six high grade samples of massive galena-sulfide ores from shear zones in the marble front contained 2,510 grams/tonne silver, 23.70 percent lead, 3.44 percent zinc, 0.15 percent copper, and 110 ppb gold. Other samples collected by Bundtzen and others (1988) contained 0.11 percent cadmium and 157 ppm cobalt.

Production notes:

Approximately 15 tons of galena-rich massive sulfide ores were sacked and eventually

processed at the Sunshine Mining Company smelter in Kellogg, Idaho in 1972-73 (B.L. Reed and C.N. Conwell, written communications, 1982). These ores contained about 2,332 grams/tonne silver, about 50 percent lead, and elevated zinc, cadmium, copper, and gold. Only the lead and silver were credited at the smelter (C.N. Conwell, written communication, 1982).

Reserves:

Additional comments:

Part of a larger intrusive-related mineral center; see Bowser Creek-Northeast (MG067) and Bowser Creek-Headwaters (MG066) prospects.

References:

Reed and Elliott, 1968 (C 559); Reed and Elliott, 1968 (C 596); Williams, 1969; Cobb, 1972; Reed and Lanphere, 1972; Cobb, 1976; Cobb and Reed, 1981; Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/13/98

Site name(s): Post Lake

Site type: Prospect

ARDF no.: MG069

Latitude: 62.121 **Quadrangle:** MG A-2

Longitude: 153.525

Location description and accuracy:

The Post Lake prospect is located about 1 mile (1.5 km) east of Post River and 1.8 miles (2.9 km) south of Post Lake on a low, glaciated bench level in sec. 32, T. 24 N., R. 23 W., of the Seward Meridian. Location is precisely known; the reporter investigated the mineralization in 1983.

Commodities:

Main: As, Co, Cu, Ni

Other: Fe, Pb

Ore minerals: Arsenopyrite, chalcopyrite, pyrrhotite

Gangue minerals: Quartz

Geologic description:

The Post Lake prospect consists of massive, sulfide veins and replacement zones that cut Ordovician to Lower Silurian shale of the Post River Formation, a unit of the Dillinger subterrane (Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997). The mineralized area is about 122 meters south of the contact between the Post River Formation and a small quartz monzonite stock. A prospect map has been published by Bundtzen and others (1988).

Most of the sulfide mineralization consists of massive pyrrhotite, and minor to sparse chalcopyrite and arsenopyrite. Sulfide masses vary from 0.5 to 2 meters in thickness and strike lengths of 20 to 80 meters. Most of the mineralization trends about N25W, parallel to the nearby Bowser Creek fault.

Bundtzen and others (1988) reported values as high as 570 ppm copper, 302 ppm zinc, 378 ppm arsenic, 139 ppm cobalt, and 637 ppm nickel. Five chip samples taken across the massive sulfides averaged about 33.5 percent iron. Elevated cobalt and nickel values occur in the massive pyrrhotite zones.

Alteration:

Ferricrete oxidation of massive pyrrhotite zones is extensive and ubiquitous.

Age of mineralization:
Inferred to be Tertiary based on ages of plutonic suite in area (Solie and others, 1991).

Deposit model:
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:
Only surface sampling has been conducted. Bundtzen and others (1988) reported values as high as 570 ppm copper, 302 ppm zinc, 378 ppm arsenic, 139 ppm cobalt, and 637 ppm nickel. Five chip samples taken across the massive sulfide zones averaged about 33.5 percent iron. Elevated cobalt and nickel values occur in the massive pyrrhotite zones.

Production notes:

Reserves:
None.

Additional comments:
Geological features are similar to Chip-Loy prospect (MG032) in McGrath A-3 quadrangle.

References:
Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/13/98

Site name(s): Post River Pluton

Site type: Prospect

ARDF no.: MG070

Latitude: 62.083 **Quadrangle:** MG A-2

Longitude: 153.665

Location description and accuracy:

The Post River Pluton prospect is located in a saddle 10 kilometers southwest of Post Lake at an elevation of 5,400 feet (1,646 m) in the NW1/4 sec. 15, T. 23 N., R. 24 W., of the Seward Meridian. The prospect corresponds to map number 6a, b in Bundtzen and others (1988) and map number 28 in Bundtzen, Harris, and Gilbert (1997). The reporter investigated the site in 1982.

Commodities:

Main: Ag, Cu, Sn, W

Other: Au, Pb

Ore minerals: Chalcopyrite, pyrite, scheelite

Gangue minerals: Calcite, quartz

Geologic description:

The Post River Pluton prospect is a chalcopyrite-scheelite-quartz vein system that cuts sheared, thermally altered shale of the Lower Ordovician to Lower Silurian Post River Formation; the unit is intruded by an early Tertiary quartz monzonite pluton (Bundtzen and others, 1988). The largest vein, which reaches a maximum one meter wide, trends across the saddle in a N40E direction for about 84 meters. Smaller en echelon veins and veinlets also trend in a northeasterly direction. Lack of good bedrock control prevented any systematic dip or size measurements. A strong secondary biotite overprint occurs in the thermally altered shales.

Principle mineralization consists of disseminated scheelite-chalcopyrite aggregates in quartz-calcite veins, and pyrite in hornfels. Bundtzen and others (1988) report values of 98.0 grams/tonne silver, 1.15 percent copper, 0.18 percent lead, 275 ppm tungsten, and 890 ppm tin from five chip-channel samples. Tin and lead minerals were not identified. One sample contained 900 ppb gold. A one meter wide zone of pyrite-rich hornfels contained 759 ppm copper and 0.8 grams/tonne silver. A pan concentrate from a steep ravine draining the mineralized area contained 59.0 grams/tonne silver and abundant visible scheelite.

Alteration:
Secondary biotite (potassic).

Age of mineralization:
Undated; nearby quartz monzonite pluton yielded K-Ar age of 60.4 Ma (Solie and others, 1991).

Deposit model:
Polymetallic vein (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:
T.K. Bundtzen and M.S. Lockwood found the mineralized area during geologic mapping for the Alaska Division of Geological and Geophysical Surveys in 1982. Bundtzen and others (1988) report values of 98.0 grams/tonne silver, 1.15 percent copper, 0.18 percent lead, 275 ppm tungsten, and 890 ppm tin from five chip-channel samples. Tin and lead minerals were not identified. One sample contained 900 ppb gold. A one meter wide zone of pyrite-rich hornfels contained 759 ppm copper and 0.8 grams/tonne silver. A pan concentrate from a steep ravine draining the mineralized area contained abundant visible scheelite and 59.0 grams/tonne silver.

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen and others, 1988; Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Unnamed (on a tributary to Windy Fork)

Site type: Occurrence

ARDF no.: MG071

Latitude: 62.13 **Quadrangle:** MG A-2

Longitude: 153.926

Location description and accuracy:

Occurrence is located in a bedrock outcrop on the north side of an unnamed west-flowing tributary stream to Windy Fork; it is at an elevation of 3,900 feet (1,189 m) in the NE1/4 sec. 31, T. 24 N., R. 25 W., of the Seward Meridian. The reporter investigated the site in 1983 and in 1997. Note that the occurrence is properly located in Bundtzen and others (1988; #8), but mislocated in Bundtzen, Harris, and Gilbert, (1997; #23).

Commodities:

Main: Ag, Zn

Other: Mo

Ore minerals: Pyrite, galena, sphalerite

Gangue minerals:

Geologic description:

This unnamed occurrence consists of three thin, stratiform sulfide layers in black shale of the Lower Ordovician to Lower Silurian Post, River Formation a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The sulfide beds are isoclinally folded along with host strata and are believed to be syngenetic in origin. The occurrence is just below the contact between the Post River Formation and the mid-Silurian Terra Cotta Mountains Sandstone, and hence has an inferred age of Early Silurian.

Three 6 centimeter thick sulfide layers mainly contain pyrite, with minor to trace disseminated sphalerite and galena (Bundtzen and others, 1988; Bundtzen Harris, and Gilbert, 1997). Grab samples of one sulfide bearing horizon contained 700 ppm zinc, 1.2 grams/tonne silver, and 31 ppm molybdenum.

Alteration:

Age of mineralization:

Undated, inferred to be Early Silurian, based on stratigraphic evidence.

Deposit model:

Sedimentary exhalitive lead-zinc (?) (Cox and Singer, 1986; model 31a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
31a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
The reporter first found the occurrence in 1983 (Bundtzen and others, 1988). Grab samples of one sulfide bearing horizon contained 700 ppm zinc, 1.2 grams/tonne silver, and 31 ppm molybdenum.

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Unnamed (near West Fork of Post River)

Site type: Occurrence

ARDF no.: MG072

Latitude: 62.029 **Quadrangle:** MG A-2

Longitude: 153.824

Location description and accuracy:

This unnamed occurrence is located on a steep, southeasterly slope adjacent to the west fork of Post River at an elevation of 4,900 feet (1,494 m) in the NE1/4 sec. 3, T. 22 N., R. 25 W., of the Seward Meridian. The reporter sampled the site in 1982.

Commodities:

Main: Ag, Cu, Zn

Other: Ni

Ore minerals: Pyrite

Gangue minerals:

Geologic description:

This unnamed occurrence is shale-hosted Ag-Cu-Zn mineralization in the Lower Ordovician-to-Lower Silurian Post River Formation, a unit of the Dillinger subterrane (Bundtzen and others, 1988). Graptolites of the Monograptus spiralus zone were found in the shale at the occurrence.

A distinctive yellowish, sulfur bloom occurs in the mineralized zone, which is estimated to be about 2 meters thick. Disseminated pyrite was observed in one outcrop. Although isotopic data is lacking, Bundtzen, Harris, and Gilbert (1997) classified the occurrence as a sedimentary exhalitive lead-zinc deposit. Two random chip-channel samples collected across the zone contained up to 1.37 percent zinc, 0.12 percent copper, 13.6 grams/tonne silver, and 196 ppm nickel.

Alteration:

Sulfides oxidized to free sulfur.

Age of mineralization:

Inferred to be Lower Silurian, based on graptolite identifications (Bundtzen and others, 1988).

Deposit model:

Sedimentary exhalitive lead-zinc(?) (Cox and Singer, 1986; model 31b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
31b(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
The reporter sampled the occurrence in 1982. Two random chip-channel samples taken across the mineralized zone contained up to 1.37 percent zinc, 0.12 percent copper, 13.6 grams/tonne silver, and 196 ppm nickel.

Production notes:

Reserves:
None.

Additional comments:
See other shale-hosted deposits in McGrath quadrangle such as MG049, MG029, MG051, MG071, MG064, and MG074.

References:
Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): West Fork-Post River

Site type: Occurrence

ARDF no.: MG073

Latitude: 62.01 **Quadrangle:** MG A-2

Longitude: 153.88

Location description and accuracy:
The West Fork-Post River occurrence is located on an east facing bluff of the west fork of Post River; it is at an elevation of approximately 4,000 feet (1,220 m) in the NE1/4 sec. 8, T. 22 N., R. 25 W., of the Seward Meridian. The occurrence, which corresponds to locality number 19 in Cobb (1972), is located to within 460 m.

Commodities:

Main: Ag, Cu

Other: Zn

Ore minerals: Chalcopyrite, pyrrhotite, sphalerite

Gangue minerals:

Geologic description:
The West Fork-Post River occurrence consists of small lenses and disseminations of pyrrhotite associated with a swarm of northwest-trending mafic dikes that cut argillite of the Early to Late Silurian Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997). Samples collected by Reed and Elliott (1968, C 596) contained semi-massive pyrrhotite and minor chalcopyrite and sphalerite. Values from selected grab samples on the surface run up to 45.7 grams/tonne silver, 1.50 percent copper, and 0.07 percent zinc.

Alteration:

Age of mineralization:

Deposit model:
Polymetallic vein (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:

The West Fork-Post River was discovered by the late Bruce Reed during mineral investigations for the U.S. Geological Survey in the 1960s (Reed and Elliott, 1968, C 596). Values from selected grab samples collected by Reed and Elliott (1968, C 596) contain up to 45.7 grams/tonne silver, 1.50 percent copper, and 0.07 percent zinc.

Production notes:

Reserves:

None.

Additional comments:

Similar to Veleska-South prospect (MG050) in McGrath B-2 quadrangle.

References:

Reed and Elliott, 1968 (C 596); Reed and Elliott, 1968 (OFR); Cobb, 1972; Cobb, 1976; MacKevett and Holloway, 1977; Bundtzen and others, 1988; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Reed and Elliott, 1968 (C 596)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 10/30/98

Site name(s): Unnamed (east of headwaters of Windy Fork)

Site type: Occurrence

ARDF no.: MG074

Latitude: 62.013 **Quadrangle:** MG A-2

Longitude: 153.926

Location description and accuracy:

This unnamed occurrence is located on a moderately steep, southeast facing spur overlooking the headwaters of the west fork of Post River. It is about 3 kilometers east of the headwaters of the Windy Fork of the Kuskokwim River, at an elevation of 5,050 feet (1,540 m), in the NE1/4 sec. 7, T. 22 N., R. 25 W., of the Seward Meridian. The reporter sampled the site in 1982.

Commodities:

Main: Ag, Zn

Other: Cu, Pb

Ore minerals: Pyrite

Gangue minerals:

Geologic description:

The unnamed occurrence consists of shale-hosted Zn-Ag (Pb-Cu) mineralization in the Lower Ordovician to Lower Silurian Post River Formation, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997). The mineralized zone is parallel to bedding and is a distinctly sulfur-stained, carbonaceous shale bed about one meter thick. Only disseminated pyrite was identified in the zone. Although isotopic data is lacking, Bundtzen, Harris, and Gilbert (1997) regarded the occurrence as possible sedimentary exhalitive (?) lead-zinc mineralization. Two random grab samples from the mineralized shale contained up to 0.86 percent zinc, 4.5 grams/tonne silver, 104 ppm copper, and 186 ppm lead (Bundtzen and others, 1988).

Alteration:

None.

Age of mineralization:

Inferred to be Lower Ordovician to Lower Silurian (Bundtzen, Harris, and Gilbert, 1997), assuming it is a syngenetic deposit.

Deposit model:
Sedimentary exhalitive lead-zinc (Cox and Singer, 1986; model 31b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
31b

Production Status: No

Site Status: Inactive

Workings/exploration:
The reporter and Kristi McDonald sampled the mineralized zone in 1982. Two random grab samples from the mineralized shale yielded up to 0.86 percent zinc, 4.5 grams/tonne silver, 104 ppm copper, and 186 ppm lead (Bundtzen and others, 1988).

Production notes:

Reserves:
None.

Additional comments:
See other examples of shale-hosted mineralization in McGrath quadrangle (MG029, MG049, MG051, MG064, MG071).

References:
Bundtzen and others, 1988; Bundtzen and others, 1997.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed (near Jones River)

Site type: Occurrence

ARDF no.: MG075

Latitude: 62.446 **Quadrangle:** MG B-1

Longitude: 153.241

Location description and accuracy:

This unnamed occurrence is located on a northwest facing spur overlooking an unnamed tributary of Jones River; it is at an elevation of 4,900 feet (1,494 m) in the NW1/4 sec. 7, T. 27 N., R. 21 W., of the Seward Meridian. The reporter visited the site in 1984; at station no. 84BT113.

Commodities:

Main: Cu

Other: Fe

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:

This unnamed occurrence is a thick, sulfide-bearing, quartz-vein breccia hosted in the mid Silurian Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997).

The sulfide vein breccia zone averages about 45 meters wide, with individual veins and breccia zones subparallel to bedding in host sandstone and silty limestone. The zone strikes across a saddle in a northeasterly direction; it disappears into talus on both ends. Veins include an older anhedral variety of quartz that has been cut by younger euhedral quartz veins that introduced both chalcopyrite and pyrite. Breccia fragments of sedimentary country rock comprise about 15 percent of the vein material. Total sulfide content is estimated at about 1 percent of the total mineralized zone. No assay data is available. Metallic content is based on recognition of chalcopyrite and pyrite in the field.

Alteration:

Age of mineralization:

Deposit model:

Polymetallic vein (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:
The reporter investigated the site during geologic mapping for the Alaska Division of Geological and Geophysical Surveys in 1984. No assay data is available from the mineralized zone. Metallic content is based on recognition of chalcopyrite and pyrite in the field.

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed (overlooking headwaters of Jones River)

Site type: Occurrence

ARDF no.: MG076

Latitude: 62.468 **Quadrangle:** MG B-1

Longitude: 153.169

Location description and accuracy:

This unnamed occurrence is located on a flattened, south-facing spur overlooking the headwaters of the Jones River; it is at an elevation of 5,200 feet (1,585 m) in the SE1/4 sec. 33, T. 28 N., R. 21 W., of the Seward Meridian. The reporter visited the site in 1984; at station nos. 84BT104 and 84BT147.

Commodities:

Main: Cu

Other: Pb

Ore minerals: Chalcopyrite, galena, pyrite

Gangue minerals: Carbonate, quartz

Geologic description:

This unnamed occurrence consists of a mineralized quartz-carbonate breccia zone in a small composite pluton of Late Cretaceous (79 Ma) age (Solie and others, 1991). The pluton averages diorite in composition; it covers an equant, one square kilometer area, and intrudes the sandstone, siltstone, and silty limestone of the mid-Silurian Terra Cotta Mountains Sandstone, a unit of the Dillinger subterrane (Bundtzen, Harris, and Gilbert, 1997).

The deposit consists of disseminated chalcopyrite, pyrite, and a trace of galena in an intrusive hosted, quartz-carbonate breccia. Total sulfides amount to no more than 1 percent of the total mineralized zone. No surface measurements of the mineralized area are available. No assay data is available. Metallic content is based on field identification of sulfide minerals.

Alteration:

Extensive carbonate alteration.

Age of mineralization:

Deposit model:

Polymetallic replacement(?) (Cox and Singer, 1986; model 19a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
19a(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
The reporter examined the site in 1984. No assay data is available. Metallic content is based on field identification of sulfide minerals.

Production notes:

Reserves:
None.

Additional comments:

References:
Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (a tributary to Tatina River)

Site type: Occurrence

ARDF no.: MG077

Latitude: 62.389 **Quadrangle:** MG B-1

Longitude: 153.058

Location description and accuracy:
This unnamed occurrence is located in a steep, south-flowing tributary of the Tatina River at an elevation of 3,350 feet (1,021 m) in the NW1/4, T. 27 N., R. 20 W., of the Seward Meridian. The reporter visited the site in 1984; at station no. 84BT117.

Commodities:

Main: Cu, Zn

Other: Pb

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:
This unnamed occurrence is a low sulfide, quart-carbonate vein system that strikes east-west near the contact between the Upper Triassic to Lower Jurassic, Tatina River Volcanics and the Lower Cretaceous Kahiltna Flysch (Bundtzen, Harris, and Gilbert, 1997). The mineralized zone occurs in a well-defined shear zone subparallel to bedding; it continues for at least 140 meters, and varies from 15 centimeters to one meter thick. Principle sulfides include pyrite and minor to trace chalcopyrite disseminated throughout the quartz-carbonate vein. Two samples taken across the vein averaged 230 ppm zinc, 314 ppm copper, and 90 ppm lead.

Alteration:

Age of mineralization:

Deposit model:
Polymetallic vein (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:

The reporter sampled the site in 1984. Two samples taken across the vein in separate locations averaged 230 ppm zinc, 314 ppm copper, and 90 ppm lead.

Production notes:

Reserves:

None.

Additional comments:

References:

Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (in tributary to the Tatina River)

Site type: Occurrence

ARDF no.: MG078

Latitude: 62.381 **Quadrangle:** MG B-1

Longitude: 153.05

Location description and accuracy:
This unnamed occurrence is located in a steep, south-flowing, unnamed tributary of the Tatina River; it is at an elevation of 2,550 feet (777 m) in the SE1/4 sec. 31, T. 27 N., R. 20 W., of the Seward Meridian. The reporter visited the site in 1984; at station no. 84BT120.

Commodities:

Main: Zn

Other: Cd, Cu, Mo

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Iron oxides

Geologic description:
This unnamed occurrence is a mineralized gossan in shale of the Lower Cretaceous Kahiltna Flysch about 500 meters below the contact between the Upper Triassic to Lower Jurassic Tatina River Volcanics and Lower Cretaceous, Kahiltna Flysch (Bundtzen, Harris, and Gilbert, 1997). The gossan strikes east-west across a steep bedrock canyon subparallel to bedding and is about 3 meters thick; the strikelength was not measured. Disseminated chalcopyrite and pyrite were identified in one hand sample, but most mineralization is oxidized. One grab sample of mineralized shale contained 1,200 ppm zinc, 109 ppm copper, 9.3 ppm cadmium, and 7 ppm molybdenum.

Alteration:
None.

Age of mineralization:

Deposit model:
Polymetallic replacement (Cox and Singer, 1986; model 19a).

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

19a

Production Status: No

Site Status: Inactive

Workings/exploration:

The reporter investigated the site during geologic mapping of the area in 1984 (Bundtzen, Harris, and Gilbert, 1997). One grab sample of mineralized shale contained 1,200 ppm zinc, 109 ppm copper, 9.3 ppm cadmium, and 7 ppm molybdenum.

Production notes:

Reserves:

None.

Additional comments:

References:

Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/10/98

Site name(s): Unnamed (on tributary to Dalzell Creek)

Site type: Occurrence

ARDF no.: MG079

Latitude: 62.237 **Quadrangle:** MG A-1

Longitude: 153.257

Location description and accuracy:
This unnamed occurrence is located on a rugged north-facing spur of a tributary valley of Dalzell Creek at an elevation of 4,600 feet (1,402 m) in the SE1/4 sec. 24, T. 25 N., R. 22 W., of the Seward Meridian. The reporter sampled the site in 1988; at station no. 88BT177.

Commodities:

Main: As, Au

Other: Sb

Ore minerals: Arsenopyrite, pyrite

Gangue minerals: Quartz

Geologic description:
This unnamed occurrence is a low sulfide-quartz vein that intrudes sandstone of the Lower Cretaceous Kahiltna Flysch (Bundtzen, Harris, and Gilbert, 1997). The vein strikes approximately N70E for a distance of about 110 meters, and averages about 0.5 meters wide. Disseminated arsenopyrite and pyrite comprise about 1 percent of the vein volume. One grab sample of the vein contained 1,600 ppm arsenic, 150 ppb gold, and 55 ppm antimony.

Alteration:
None.

Age of mineralization:

Deposit model:
Polymetallic vein (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:

The reporter investigated the site during a geological mapping program for the Alaska Division of Geological and Geophysical Surveys in 1988 (Bundtzen, Harris, and Gilbert, 1997). One grab sample of sulfide-bearing vein material contained 1,600 ppm arsenic, 150 ppb gold, and 55 ppm antimony.

Production notes:

Reserves:

None.

Additional comments:

References:

Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed (on tributary valley to Happy River)

Site type: Occurrence

ARDF no.: MG080

Latitude: 62.187 **Quadrangle:** MG A-1

Longitude: 153.019

Location description and accuracy:

This unnamed occurrence is located on a steep, west-facing slope of a tributary valley to the Happy River. It is at about 4 kilometers southeast of Rainy Pass, at an elevation of 4,400 feet (1,341 m), in the NE1/4 sec. 7, T. 24 N., R. 20 W., of the Seward Meridian. The reporter visited the site in 1988; at station no. 88BT205.

Commodities:

Main: As, W

Other: Au

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:

This unnamed occurrence consists of a chalcopyrite-bearing quartz vein in the contact aureole of a small composite hornblende-rich, granodiorite pluton that intrudes Lower Cretaceous Kahiltna Flysch (Bundtzen, Harris, and Gilbert, 1997). The undated pluton contains monzonite, granodiorite, and syenite phases with granodiorite predominates. The small intrusion covers an area of 100 meters by 200 meters; however, a 125 meter wide thermal aureole surrounds the intrusion, which suggests an enlarged body at depth.

Chalcopyrite-bearing quartz veins occur in the thermal aureole near the contact with the pluton. Chalcopyrite comprises no more than one percent of the total sulfides, which are dominated by pyrite. Three samples taken of the sulfide-vein mineralization contained an average 180 ppm tungsten, 200 ppm arsenic, and 250 ppm gold. The samples were not run for either lead or copper.

Alteration:

Sericite in intrusion.

Age of mineralization:

Deposit model:

Polymetallic vein (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:
The reporter mapped the pluton as part of a Division of Geological and Geophysical Surveys mapping effort in 1988 (Bundtzen, Harris, and Gilbert, 1997). Three samples taken of sulfide-vein mineralization contained an average 180 ppm tungsten, 200 ppm arsenic, and 250 ppm gold. The samples were not analyzed for lead or copper.

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/8

Site name(s): Ellie's Gold

Site type: Occurrence

ARDF no.: MG081

Latitude: 62.101 **Quadrangle:** MG A-1

Longitude: 153.461

Location description and accuracy:

Ellie's Gold occurrence is in a second order stream that flows westerly about 8 kilometers to Post River. It is at an elevation of 3,900 feet (1,189 m) in the NE1/4 sec. 10, T. 23 N., R. 23 W., of the Seward Meridian. The location was determined from the field map plots of E.E. Harris and corresponds to map number 30 in Bundtzen, Harris, and Gilbert (1997).

Commodities:

Main: Au

Other: Ag

Ore minerals: Native gold

Gangue minerals:

Geologic description:

The Ellie's Gold occurrence is a concentration of placer gold in a second order stream in the Eocene, Terra Cotta Volcanic field. Abundant black sands - including magnetite - were identified in the panned concentrate collected in the field. Bedrock is shallow and the stream more or less flows on bedrock. Stream gradient is about 200 meters/ kilometer; i.e., it is steep. The gold appears as several flat, subangular, pin-sized grains in a black-sand-rich concentrate. The pan concentrate also contained 360 ppm chromium, 220 ppm zinc, and 19.4 percent iron (Bundtzen, Harris, and Gilbert, 1997).

Alteration:

None.

Age of mineralization:

Deposit model:

Gold placer (Cox and Singer, 1986; model 39a).

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

39a

Production Status: No

Site Status: Inactive

Workings/exploration:

The placer gold occurrence was found by Ellen E. Harris in 1988, during regional geochemical and geological investigations in the McGrath A-1 quadrangle by the Alaska Division of Geological and Geophysical Surveys (Bundtzen, Harris, and Gilbert, 1997).

Production notes:

Reserves:

None.

Additional comments:

References:

Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen and others, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/8/98

Site name(s): Unnamed (in Terra Cotta Mountains)

Site type: Occurrence

ARDF no.: MG082

Latitude: 62.102 **Quadrangle:** MG A-1

Longitude: 153.394

Location description and accuracy:

This unnamed occurrence is located in the Terra Cotta Mountains near the base of a northwesterly spur overlooking a north flowing, unnamed tributary of the South Fork of Kuskokwim River. It is at an elevation of 4,200 feet (1,280 m) in the NE1/4 sec. 12, T. 23 N., R. 23 W., of the Seward Meridian. The reporter visited the site in 1988; at station no. 88BT169.

Commodities:

Main: As, Au, Sb, W

Other: Co

Ore minerals: Arsenopyrite, pyrite

Gangue minerals: Quartz

Geologic description:

This unnamed occurrence is a quartz-sulfide vein swarm in altered dacitic tuffs of the Eocene, Terra Cotta Volcanic Field (Bundtzen, Harris, and Gilbert, 1997). Most of the material is in the form of talus and no exposures of the veins were observed. Some sulfide zones have been transformed into extensive gossan. The extent of the mineralized area was not measured. One sample contained 240 ppb gold, 2,200 ppm arsenic, 880 ppm tungsten, 110 ppm cobalt, and 200 ppm antimony (Bundtzen, Harris, and Gilbert, 1997).

Alteration:

Extensive ferricrete gossan.

Age of mineralization:

Deposit model:

Polymetallic vein (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:

The reporter sampled the site in 1988 during geologic mapping for the Alaska Division of Geological and Geophysical Surveys (Bundtzen, Harris, and Gilbert, 1997). One sample contained 240 ppb gold, 2,200 ppm arsenic, 880 ppm tungsten, 110 ppm cobalt, and 200 ppm antimony.

Production notes:

Reserves:

None.

Additional comments:

References:

Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed (near Post River)

Site type: Occurrence

ARDF no.: MG083

Latitude: 62.063 **Quadrangle:** MG A-1

Longitude: 153.446

Location description and accuracy:

This unnamed occurrence is located in a northeast-facing slope near a saddle between two northeast-flowing tributaries of Post River. It is at an elevation of 5,180 feet (1,579 m) in the SW1/4 sec. 23, T. 23 N., R. 23 W., of the Seward Meridian. The occurrence corresponds to map number 33 in Bundtzen, Harris, and Gilbert (1997) The reporter investigated the site in 1988; at station nos. 88BT150-151.

Commodities:

Main: As, Au, Zn

Other: Sb

Ore minerals: Pyrite, Sb mineral

Gangue minerals: Quartz

Geologic description:

This unnamed occurrence consists of significant amounts of cross-cutting quartz-sulfide stringers and stockwork in dacite-andesite flows and tuffs of the Eocene Terra Cotta Volcanic Field (Bundtzen, Harris, and Gilbert, 1997).

Individual veins range from 2 to 10 centimeters thick and contain 3 to 8 percent pyrite and a bladed Sb mineral - probably stibnite. An elongate, SE to NW-trending, 45 meter wide by 110 meter long area of hydrothermal alteration contains intense silicification of andesite and strong ferricrete gossan. About 10 percent of the area is a sulfide gossan. A northeast- trending fault breccia cuts off the sulfidized zone on the southeast; the northeast limit of the mineralized area is obscured by talus and a snow field (present in 1988). Two grab samples of sulfide-quartz stockwork contain up to 4,200 ppm arsenic, 360 ppb gold, 150 ppm antimony, and 2,100 ppm zinc (Bundtzen, Harris, and Gilbert, 1997).

Alteration:

Strong silicification and ferricrete gossan.

Age of mineralization:

Unknown; hosted in Eocene Terra Cotta Volcanic Field (Solie and others, 1991).

Deposit model:
Creede epithermal vein (?) (Cox and Singer, 1986; model 25b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
25b(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
The reporter found the mineralization during geologic mapping for the Alaska Division of Geological and Geophysical Surveys in 1988 (Bundtzen, Harris, and Gilbert, 1997). Two grab samples of sulfide-quartz stockwork contain up to 4,200 ppm arsenic, 360 ppb gold, 150 ppm antimony, and 2,100 ppm zinc.

Production notes:

Reserves:
None.

Additional comments:

References:
Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed

Site type: Occurrences

ARDF no.: MG084

Latitude: 62.053 **Quadrangle:** MG A-1

Longitude: 153.389

Location description and accuracy:

These unnamed occurrences are in two, second order tributary streams that enter an east-flowing third order stream that enters the South Fork of Kuskokwim River. The occurrences are in the SW1/4 sec. 30, T. 23 N., R. 22 W., of the Seward Meridian. The location(s) are based on field plots completed by Ellen E. Harris in 1988; at station nos. 88HA11-12 (Bundtzen, Harris, and Gilbert, 1997).

Commodities:

Main: Sn

Other: W

Ore minerals: Cassiterite

Gangue minerals:

Geologic description:

These unnamed occurrences contain significant concentrations of tin and tungsten from panned heavy mineral fractions in second order stream basins. Stream gradients average 220 meters/kilometer (steep), and both gulches flow on bedrock. The area drains the contact zone of a 58 Ma granite that intrudes Lower Cretaceous flysch (Bundtzen, Harris, and Gilbert, 1997). The granite is the same age of the tin-bearing McKinley suite of plutons exposed throughout south central Alaska (Hudson and Reed, 1997).

Several grains of cassiterite were identified in one pan concentrate. The mineralogical source of anomalous tungsten is unknown. Analyses of panned concentrates indicate values of 2,100 ppm and 220 ppm tin and 230 ppm and 180 ppm tungsten from both gulches.

Alteration:

None.

Age of mineralization:

Quaternary.

Deposit model:

Alluvial placer tin (Cox and Singer, 1986; model 39e).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
39e

Production Status: No

Site Status: Inactive

Workings/exploration:
Ellen E. Harris collected the staniferous samples during geochemical studies for the Alaska Division of Geological and Geophysical Surveys in 1988 (Bundtzen, Harris, and Gilbert, 1997). Analyses of panned concentrates indicate values of 2,100 ppm and 220 ppm tin and 230 ppm and 180 ppm tungsten from both gulches.

Production notes:

Reserves:
None.

Additional comments:

References:
Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997; Hudson and Reed, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed (near tributary to South Fork of Kuskokwim River)

Site type: Occurrence

ARDF no.: MG085

Latitude: 62.044 **Quadrangle:** MG A-1

Longitude: 153.411

Location description and accuracy:

This occurrence is located on a north-facing spur overlooking an unnamed tributary of the South Fork of the Kuskokwim River. It is at an elevation of 5,100 feet (1,555 m) in the NW1/4 sec. 36, T. 23 N., R. 23 W., of the Seward Meridian. The location is based on field mapping by D.N. Solie, formerly of the Alaska Division of Geological and Geophysical Surveys; at station no. 88DNS107. The occurrence corresponds to map number 35 in Bundtzen, Harris, and Gilbert (1997).

Commodities:

Main: As, Au, W

Other: Co, Sb

Ore minerals: Arsenopyrite, galena, pyrite

Gangue minerals: Quartz

Geologic description:

This unnamed occurrence is a stockwork of pyrite-galena-quartz that cuts a small granodiorite porphyry intrusion and altered dacitic tuffs. The mineralized zone occurs near the contact between igneous rocks of the Terra Cotta Volcanic Field and Lower Cretaceous Kahiltna flysch (Bundtzen, Harris, and Gilbert, 1997). No precise structural or size measurements of the mineralized zone are available. Grab samples from talus contain up to 4,000 ppm arsenic, 2,100 ppb gold, 66 ppm cobalt, 110 ppm antimony, and 550 ppm tungsten (Bundtzen, Harris, and Gilbert, 1997).

Alteration:

Sericite.

Age of mineralization:

Deposit model:

Creede epithermal vein (?) (Cox and Singer, 1986; model 25b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
25b(?)

Production Status: No

Site Status: Inactive

Workings/exploration:
D.N. Solie discovered the mineralized area during geologic mapping for the Alaska Division of Geological and Geophysical Surveys in 1988. Grab samples from the talus contain up to 4,000 ppm arsenic, 2,100 ppb gold, 66 ppm cobalt, 110 ppm antimony, and 550 ppm tungsten (Bundtzen, Harris, and Gilbert, 1997).

Production notes:

Reserves:
None.

Additional comments:

References:
Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed (at head of tributary to Post River)

Site type: Occurrence

ARDF no.: MG086

Latitude: 62.018 **Quadrangle:** MG A-1

Longitude: 153.464

Location description and accuracy:

This unnamed occurrence is located at the base of a steep north-facing cliff near the cirque headwall of an unnamed northwest flowing tributary of Post River. It is at an elevation of 4,500 feet (1,372 m) in the NE1/4 sec. 10, T. 22 N., R. 23 W., of the Seward Meridian. The occurrence corresponds to map number 34 in Bundtzen, Harris, and Gilbert (1997). The reporter sampled the site in 1988; at station no. 88BT163.

Commodities:

Main: As, Pb

Other: Zn

Ore minerals: Galena, pyrite

Gangue minerals: Quartz

Geologic description:

This unnamed occurrence consists of a series of N70W, steeply dipping joints and fractures filled with quartz, pyrite, and euhedral galena grains. Width and strike length of the mineralized area was not determined. Host rock is a medium-grained, phaneritic variant of the Hartman pluton (Bundtzen, Harris, and Gilbert, 1997), which has been dated by K-Ar methods as 37.9 Ma (Solie and others, 1991). A strong ferricrete gossan is associated with the sulfide-bearing stockwork veins. One chip sample of of mineralized stockwork veins contained 500 ppm arsenic, 20 ppb gold, and 340 ppm zinc (Bundtzen, Harris, and Gilbert, 1997). Lead was not analyzed.

Alteration:

Strong ferricrete alteration.

Age of mineralization:

Mineralization undated; host pluton is 37.5 Ma (Solie and others, 1991).

Deposit model:

Polymetallic vein (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:
The reporter visited the site in 1988. One chip sample of mineralized stockwork veins contained 500 ppm arsenic, 20 ppb gold, and 340 ppm zinc. Lead was not analyzed (Bundtzen, Harris, and Gilbert, 1997).

Production notes:

Reserves:
None.

Additional comments:

References:
Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Bundtzen, Harris, and Gilbert, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed (on tributary to South Fork of Kuskokwim River)

Site type: Occurrence

ARDF no.: MG087

Latitude: 62.014 **Quadrangle:** MG A-1

Longitude: 153.409

Location description and accuracy:
This unnamed occurrence is located in the steep canyon of a northeast-flowing tributary to the South Fork of the Kuskokwim River; it is at an elevation of 3,950 feet (1,204 m) in the NW1/4 sec. 12, T. 22 N., R. 23 W., of the Seward Meridian. The reporter investigated the site in 1988; at station no. 88BT165.

Commodities:

Main: As, Au

Other: W

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
This unnamed occurrence is a series of sheeted quartz-pyrite veins in Lower Cretaceous Kahiltna flysch adjacent to several, east-west-trending rhyolite dikes cutting the flysch (Bundtzen, Harris, and Gilbert, 1997). The quartz veins dip south and are parallel to the east-west-trending dikes. The Kahiltna flysch is locally thermally upgraded to slate. One sample contained 830 ppm arsenic, 180 ppb gold, and 710 ppm tungsten. A panned concentrate taken just below the mineralized dike swarm contained 1.00 percent tin and 1,400 ppm tungsten.

Alteration:

Age of mineralization:

Deposit model:
Polymetallic vein (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:

The reporter visited and sampled the site in 1988; anomalous pan concentrate samples were collected by Ellen E. Harris. One sample of sheeted veining contained 830 ppm arsenic, 180 ppb gold, and 710 ppm tungsten. A panned concentrate taken just below the mineralized dike swarm contained 1.00 percent tin and 1,400 ppm tungsten (Bundtzen, Harris, and Gilbert, 1997).

Production notes:

Reserves:

None.

Additional comments:

References:

Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Unnamed (in saddle between Post River and South Fork)

Site type: Occurrence

ARDF no.: MG088

Latitude: 62.014 **Quadrangle:** MG A-1

Longitude: 153.442

Location description and accuracy:

This unnamed occurrence is located in a saddle between tributaries of the Post River and South Fork of the Kuskokwim River; it is at an elevation of 5,150 feet (1,570 m) in the center of sec. 11, T. 22 N., R. 23 W., of the Seward Meridian. The reporter visited the site in 1988; at station no. 88BT164.

Commodities:

Main: As

Other: Au, Sb

Ore minerals: Arsenopyrite

Gangue minerals: Carbonate, quartz

Geologic description:

This unnamed occurrence is a low-sulfide, quartz-carbonate vein or veins intruding a border phase of the 37.9 Ma, Hartman Pluton (Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997). The border phase consists of very fine-grained biotite-rich granodiorite and monzonite. The border phase is in contact with a massive hornfels aureole that is approximately 125 meters wide.

A one meter wide, low sulfide, quartz carbonate vein swarm strikes N70W for about 115 meters through the saddle. The veins cuts the intrusive border phase, but apparently die out in the hornfels aureole. Disseminated arsenopyrite and pyrite grains occur near vein margins. One grab sample of the mineralized vein contained 6,500 ppm arsenic, 71 ppb gold, and 250 ppm antimony.

Alteration:

Secondary biotite (potassic) in the border phase.

Age of mineralization:

Deposit model:

Polymetallic vein (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:
The reporter sampled the occurrence during a geologic mapping program for the Alaska Division of Geological and Geophysical Surveys in 1988 (Bundtzen, Harris, and Gilbert, 1997). One grab sample of the mineralized vein contained 6,500 ppm arsenic, 71 ppm gold, and 250 ppm antimony.

Production notes:

Reserves:
None.

Additional comments:

References:
Solie and others, 1991; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: This description

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 12/9/98

Site name(s): Saturn

Site type: Prospect

ARDF no.: MG089

Latitude: 62.29 **Quadrangle:** MG B-2

Longitude: 153.66

Location description and accuracy:

The Saturn prospect is situated on an east-west ridgeline that divides an unnamed, northwest-flowing tributary leading into Smith Lake from an unnamed, east-flowing tributray of Post River; it is at an elevation of 5,350 feet (1,631 m) in the SE1/4 sec. 35, T. 26 N., R. 24 W., of the Seward Meridian. The location is based on maps supplied by Brewer and others (1992), and is only approximately known.

Commodities:

Main: Zn

Other: Ag, Cu

Ore minerals: Chalcopyrite, pyrrhotite, sphalerite

Gangue minerals:

Geologic description:

The Saturn Prospect consists of discontinuous layers of massive to semi-massive sphalerite and pyrrhotite within a 300 meter by 10 meter wide skarn zone in limestone of the Barren Ridge Limestone, a unit of the Dillinger subterrane (Bundtzen Harris, and Gilbert, 1997). The limestone is adjacent to highly altered, Late Cretaceous, Veleska Lake Volcanic field, which has in turn been intruded by a weakly mineralized granite porphyry pluton about 300 meters from the prospect (Bundtzen, Kline, and Clough, 1982).

Results of limited grab samples conducted by North Pacific Mining Company show values ranging up to 0.3 percent copper, 20.9 percent zinc, and 9.3 grams/tonne silver (Brewer and others, 1992).

Alteration:

Sericite in granite intrusion.

Age of mineralization:

Unknown; may be related to dated Tertiary intrusions of area (Solie and others, 1991).

Deposit model:
Low temperature lead-zinc skarn (Cox and Singer, 1986; model 18c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The Saturn prospect was discovered by the Anaconda Minerals Company in 1980 or 1981 (Brewer and others, 1992). Results of limited grab samples collected by North Pacific Mining Company show values of up to 0.3 percent copper, 20.9 percent zinc, and 9.3 grams/tonne silver (Brewer and others, 1992).

Production notes:

Reserves:
None.

Additional comments:

References:
Bundtzen, Kline, and Clough, 1982; Solie and others, 1991; Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Brewer and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 4/20/99

Site name(s): Neptune

Site type: Occurrences

ARDF no.: MG090

Latitude: 62.28 **Quadrangle:** MG B-2

Longitude: 153.64

Location description and accuracy:

The Neptune occurrences are located in an unnamed east-flowing tributary of Post River, at an elevation of 3,100 feet near the center of sec. 1, T. 25 N., R. 24 W., of the Seward Meridian. The location of the occurrences is derived from a rough sketch map made by Anaconda Minerals Company in 1981, and is considered to be accurate to within about one half kilometer.

Commodities:

Main: Pb, Zn

Other: Ag

Ore minerals: Galena, sphalerite

Gangue minerals:

Geologic description:

The Neptune occurrences are a small cluster of unexplained but highly anomalous lead, zinc, and silver values (values unstated) in an area capped by the Late Cretaceous, Veleska Lake Volcanic field (Bundtzen, Harris, and Gilbert, 1997).

Scattered occurrences of galena and sphalerite in fault-controlled quartz veins may be the source of these anomalies (Brewer and others, 1992).

Alteration:

Age of mineralization:

Unknown; may be related to Late Cretaceous, Veleska Lake Volcanic Field (Bundtzen, Harris, and Gilbert, 1997).

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:

The Neptune occurrences were found by the Anaconda Minerals Company in 1980 or 1981 (Brewer and others, 1992). High lead, zinc, and silver anomalies (unstated values) may be derived from galena-sphalerite quartz veins in the area, but more work is recommended.

Production notes:

Reserves:

None.

Additional comments:

References:

Brewer and others, 1992; Bundtzen, Harris, and Gilbert, 1997.

Primary reference: Brewer and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting)

Last report date: 4/20/99

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