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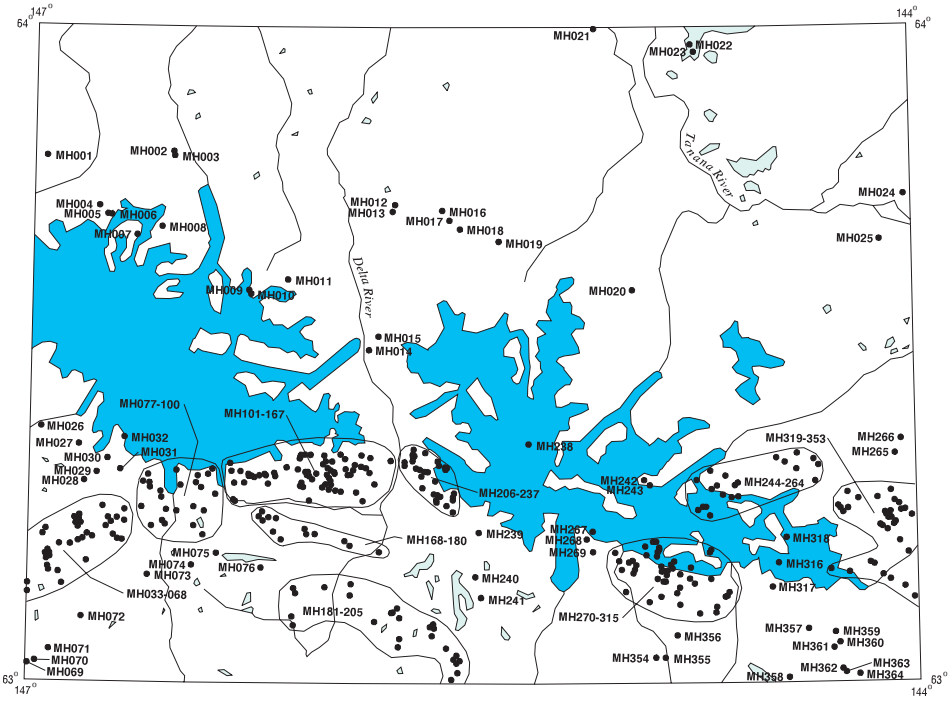
Alaska Resource Data File

Mount Hayes quadrangle

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



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

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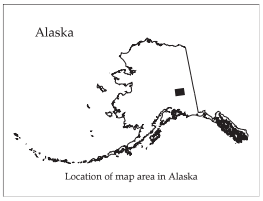

U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

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OPEN-FILE REPORT 2004-1266

Site name(s): Unnamed (in upper Buchanan Creek)

Site type: Occurrence

ARDF no.: MH001

Latitude: 63.8009 **Quadrangle:** MH D-6

Longitude: 146.9604

Location description and accuracy:
This occurrence is in the headwaters of an unnamed southeast tributary of Buchanan Creek at an elevation of 4,000 feet, in the SW1/4SW1/4 section 10, T. 13 S., R.4 E., Fairbanks Meridian. The site corresponds to locality N1 in table 2 of Nokleberg and others (1991). The location of this occurrence is approximate.

Commodities:

Main: Au

Other: Cu (?), Mo (?)

Ore minerals: Pyrite (?)

Gangue minerals:

Geologic description:
The rocks near this occurrence are Devonian granitic and metasedimentary rocks, including quartzite and pelitic schist (Nokleberg and Aleinikoff, 1985). The mineralized unit is chloritized schistose granodiorite. A grab sample of the altered granodiorite contained 0.10 part per million gold (Nokleberg and others, 1991). The principal ore mineral is probably pyrite; the deposit may contain copper and molybdenum in addition to gold.

Alteration:
Chloritization of granodiorite.

Age of mineralization:
Possibly Devonian, the age of some of the intrusive host rocks (Nokleberg and Aleinikoff, 1985; Nokleberg and others, 1991).

Deposit model:
Porphyry Cu-Mo (?) (Cox and Singer, 1986; model 21a).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
A grab sample of altered granodiorite contained 0.1 part per million gold (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and Aleinikoff, 1985; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/01

Site name(s): Unnamed (in Ptarmigan Creek)

Site type: Prospect

ARDF no.: MH002

Latitude: 63.8094 **Quadrangle:** MH D-6

Longitude: 146.5256

Location description and accuracy:
This prospect is on the north side of the canyon of Ptarmigan Creek just above where the creek enters the flood plain of Delta Creek. The prospect is about 2,000 feet north of the center of section 11, T. 13 S., R 6 E., Fairbanks Meridian. It is probably accurately located within one-third of a mile. The site corresponds to locality N2 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Mo

Other: Ag

Ore minerals: Molybdenite (?), pyrite

Gangue minerals: Quartz

Geologic description:
This unnamed prospect is in Cretaceous granodiorite at or near the contact of the granodiorite with quartz schist (Nokleberg and Aleinikoff, 1985; Nokleberg and others, 1991). At the prospect site iron-stained rock contains pyrite and molybdenite(?). Grab sample 80IL003B-E contained 70 parts per million (ppm) molybdenum and 5 ppm silver (Nokleberg and others, 1991). The prospect is almost certainly related geologically to the nearby Ptarmigan Creek prospects (MH003).

Alteration:
The granodiorite exhibits local oxidation.

Age of mineralization:
The deposit is probably related to the emplacement of the Cretaceous granodiorite host rock.

Deposit model:
Porphyry Mo (Cox and Singer, 1986; model 21b).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Minor prospecting of uncertain date; reconnaissance sampling by the U.S. Geological Survey indicated as much as 70 parts per million (ppm) molybdenum and 5 ppm silver (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and Aleinikoff, 1985; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/01

Site name(s): Ptarmigan Creek

Site type: Prospects

ARDF no.: MH003

Latitude: 63.8029 **Quadrangle:** MH D-6

Longitude: 146.5229

Location description and accuracy:

The prospects are in a canyon on lower Ptarmigan Creek just above where the creek enters the wide flood plain of Delta Creek. The prospect area is at the east end of the mountain mass called Molybdenum Ridge. The location for this record is on the south side of Ptarmigan Creek about 1,000 feet north-northeast of the center of section 11, T. 13 S.. R. 6 E., Fairbanks Meridian. It is near the center of an area of mineralization reported to extend about one mile along the canyon. The site corresponds to locality 1 of Cobb (1979 [OFR 79-238] and to locality N3 in table 2 of Nokleberg and others (1991). It is accurate as a general location of a mineralized area, but may not exactly correspond to the location of the Ptarmigan Creek prospects reported by Smith (1942 [B 926-C]) and Joesting (1942). (MH312 in the A-2 quadrangle is also named Ptarmigan Creek.)

Commodities:

Main: Mo

Other: Au

Ore minerals: Molybdenite

Gangue minerals: Quartz

Geologic description:

The Ptarmigan Creek prospects are mainly in Cretaceous granodiorite near the contact of the intrusion with schist and slate (Nokleberg and Aleinikoff, 1985; Nokleberg and others, 1991). Smith (1942 [B 926-C]) reported that the mineralization is in a zone about one mile long along Ptarmigan Creek; Martin (1920) noted that it is concentrated in an 800- to 900-foot-wide zone. Molybdenite occurs sparsely in quartz veins scattered through the granodiorite; in places, the veins are numerous enough to form a stockwork in the granodiorite. Individual veins are a few inches to more than 2 feet thick (Smith, 1942 [B 926-C, p. 195]). Gold-quartz veins also occur in the granodiorite (Joesting, 1942).

Most of the veins are of low grade, but selected samples contained as much as 2.71 percent molybdenite (Smith, 1942 [B 926-C]; it is not certain whether the values are of molybdenum or of the sulfide). The veins were discovered in about 1914 and were prospected during World War I, from 1937 to 1940, and probably during World War II.

Alteration:

Silicification; formation of quartz veins and stockworks in granodiorite.

Age of mineralization:

Probably Cretaceous, related to emplacement of granodiorite.

Deposit model:

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

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

21b

Production Status: Undetermined.

Site Status: Inactive

Workings/exploration:

The molybdenite deposit was discovered in 1914 by Frank Gillespie, who explored it between 1914 and 1918. He drove drifts as much as 30 feet long (Smith, 1942 [B 926-C]). The prospect was active again from 1937 to 1940; Joesting (1942) reported one adit 106 feet long and three shorter ones. The prospect was briefly visited in the 1980's by the U.S. Geological Survey; a grab sample collected at that time contained 50 parts per million (ppm) molybdenum and 0.1 ppm gold (Nokleberg and others, 1991).

Production notes:

Some ore was stockpiled in World War I but was not shipped.

Reserves:

Additional comments:

No commercial mining has occurred, and the occurrences are fairly well prospected.

References:

Martin, 1920; Joesting, 1942; Smith, 1942 (B 926-C); Cobb, 1979 (OFR 79-238); Nokleberg and Aleinikoff, 1985; Nokleberg and others, 1991.

Primary reference: Joesting, 1942; Smith, 1942 (B 926-C)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/01

Site name(s): Unnamed (on unnamed east fork of Whistler Creek)

Site type: Occurrence

ARDF no.: MH004

Latitude: 63.7259 **Quadrangle:** MH C-6

Longitude: 146.7777

Location description and accuracy:
This occurrence is on the east side of an unnamed east fork of Whistler Creek at an elevation of 4,000 feet. The occurrence is about 750 feet north of the center of section 4, T. 14 S., R. 5 E., Fairbanks Meridian; the location is probably accurate to about one-quarter mile. The site corresponds to locality N4 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Pb

Other:

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
This occurrence consists of pyritic quartz-white mica-chlorite schist of early to mid-Paleozoic age (Nokleberg and Aleinikoff, 1985; Nokleberg and others, 1991; Lange and others, 1993). The schist is quartz veined. Grab sample 80NK010B of the pyritic schist contained 250 parts per million lead (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
The pyrite may be a primary constituent of the early to middle Paleozoic schist host rock.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no workings at the site. Reconnaissance samples of pyritic schist contained 250 parts per million lead (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1982; Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985 (C 967); Nokleberg and others, 1991; Lange and others, 1993.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/01

Site name(s): Miyaoka West

Site type: Prospect

ARDF no.: MH005

Latitude: 63.7130 **Quadrangle:** MH C-6

Longitude: 146.7485

Location description and accuracy:
The Miyaoka West prospect is located in the headwaters of an unnamed east fork of Whistler Creek at an elevation of about 4,500 feet. The prospect, located here at the approximate midpoint of a southeast-trending mineralized zone about a mile long, is about 750 feet west of the center of section 10, T. 14 S., R. 5 E., Fairbanks Meridian.

Commodities:

Main: Cu, Zn

Other: Ag, Au, Co, Pb, Sn

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

Gangue minerals:

Geologic description:
Rocks at the Miyaoka West prospect consist of complexly deformed greenstone, chlorite schist, and calc-schist of Devonian age (Nokleberg and Aleinikoff, 1985; Lange and others, 1993). The deposit is generally stratabound and consists mainly of pyrrhotite and pyrite. Chalcopyrite, sphalerite, and galena locally occur in fairly sparsely distributed pods, disseminations, and vein-like zones. The pods are as much as about 3 feet across. Samples collected during a 1980's U.S. Geological Survey reconnaissance contained as much as 0.5 percent zinc, 0.43 percent copper; and 0.017 percent lead. Trace elements in the mineralized rocks include as much as 50 parts per million (ppm) tin, 0.2 ppm gold, and 500 ppm cobalt (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Devonian, the age of the host strata.

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
Re-examination of the prospect by American Copper and Nickel Company in 1993 indicated that pyrrhotite is the main sulfide and that base metal concentrations are generally low (W.T. Ellis, unpublished data, 1993).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985 (C 967); Nokleberg and others, 1991; Lange and others, 1993.

Primary reference: Lange and others, 1993; Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/01

Site name(s): Miyaoka

Site type: Prospect

ARDF no.: MH006

Latitude: 63.7122 **Quadrangle:** MH C-6

Longitude: 146.7348

Location description and accuracy:

The Miyaoka prospect is at an elevation of about 5,000 feet on a ridge between a headwater tributary of Hayes Creek and an unnamed east fork headwater tributary to Whistler Creek. The prospect is in the NE1/4SE1/4 of section 10, T. 14 S., R. 5 E., Fairbanks Meridian. The prospect probably is a southeast extension of the Miyaoka West prospect (MH005). As such, it corresponds in part to locality N5 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu, Zn

Other: Au

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

Gangue minerals:

Geologic description:

The Miyaoka prospects consists of lenses, disseminations, and stringers of massive sulfides in metamorphosed intermediate volcanic rock, marble, and siliceous schist (Nokleberg and Aleinikoff 1985; Aleinikoff and Nokleberg, 1985 [C 967]; Lange and others, 1993). The host rocks are derived from Devonian felsic to intermediate volcanic rocks, mainly andesite, dacite, and quartz keratophyre flows and tuffs, and from Devonian or older shale, marl, and marble. Detailed mapping of the prospect by American Copper and Nickel Company in 1993 indicated that a felsic intrusion is infolded with mineralized schist and that part of the mineralization may be a pyrrhotite-rich skarn (W.T. Ellis, unpublished data, 1993).

The mineralized rocks crop out sporadically along a north to northwest strike for at least a mile, where they include the Miyaoka West prospect (MH005). In addition to dominant pyrrhotite, the deposit contains pyrite, chalcopyrite, sphalerite, and galena, which occur in pods and disseminations.

Alteration:

Age of mineralization:

Devonian, the age of the host strata.

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a); related base-metal skarn.

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

28a

Production Status: None

Site Status: Inactive

Workings/exploration:

The prospect was sampled in reconnaissance by the U.S. Geological Survey in the mid-1980's (see MH005). American Copper and Nickel Company mapped and sampled the prospect in 1993; their samples suggested it is a low-grade pyrrhotite-rich system.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985 (C 967); Nokleberg and others, 1991; Lange and others, 1993.

Primary reference: Lange and others, 1993

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/01

Site name(s): Hayes Glacier West

Site type: Prospect

ARDF no.: MH007

Latitude: 63.6819 **Quadrangle:** MH C-6

Longitude: 146.6471

Location description and accuracy:
The prospect is about 2.5 miles northeast of peak 8376, a northern spur of Mount Hayes, at an elevation of 5,100 feet. The prospect is in the SE1/4SE1/4 section 19, T. 14 S., R. 6 E., Fairbanks Meridian, and corresponds to locality N6 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Pb, Zn

Other: Ag, As, Au, Cu, Sn

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals:

Geologic description:
This prospect is part of a belt of massive sulfide deposits that is about 8 miles long and as much as one-third mile wide. Deposits in the belt consist of massive sulfide lenses, pods, and disseminations of pyrrhotite and pyrite, along with less abundant galena, sphalerite, and chalcopyrite. Individual lenses and pods are as much as 3 feet thick.

The host rocks of the Hayes Glacier West deposit are derived from Devonian felsic to intermediate volcanic rocks, mainly andesite, dacite, and quartz keratophyre flows and tuffs, and from Devonian or older shale, marl, and marble (Nokleberg and Aleinikoff, 1985; Lange and others, 1993). The rocks are intensely deformed and feature abundant mylonite schist; they were first metamorphosed to lower amphibolite facies and then retrograded to lower greenschist facies.

Samples collected during reconnaissance sampling by the U.S. Geological Survey in the 1980's contained as much as 0.72 percent lead, 0.69 percent zinc, 0.5 percent arsenic, and 0.11 percent copper (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Devonian, the age of the host strata.

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:

Grab samples contained as much as 0.11 percent copper 0.72 percent lead, 0.69 percent zinc, 0.2 part per million (ppm) gold, and 5 ppm silver (Nokleberg and others, 1991). Trace elements characteristic of the deposit include gold (to 0.2 ppm), silver (to 5 ppm), and tin (to 100 ppm). American Copper and Nickel Company sampled the prospect in 1993 (W.T. Ellis, unpublished data, 1993) and concluded that the mineralization consists mainly of pyrrhotite and has generally low base metals values.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985 (C 967); Nokleberg and others, 1991; Lange and others, 1993.

Primary reference: Lange and others, 1993

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/01

Site name(s): Hayes Glacier East

Site type: Prospect

ARDF no.: MH008

Latitude: 63.6948 **Quadrangle:** MH C-6

Longitude: 146.5622

Location description and accuracy:
This prospect is at an elevation of about 4,350 feet, south of the terminus of Hayes Glacier about a half-mile northeast of peak 4990. The prospect is in the NW1/4NE1/4 section 22, T. 14 S., R. 6 E., Fairbanks Meridian. The location corresponds to locality N7 in table 2 of Nokleberg and others (1991) and is accurate within one-quarter mile.

Commodities:

Main: Cu, Zn

Other: Ag, Pb

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

Gangue minerals:

Geologic description:
The rocks at the Hayes Glacier East prospect consist of complexly deformed chlorite and talc-schist of Devonian age (Nokleberg and others, 1991; Lange and others, 1993). Mineralized rock sampled during a U.S. Geological Survey reconnaissance in the 1980's consisted of disseminated to semimassive pyrite, chalcopyrite, galena, sphalerite, and pyrrhotite in chlorite-epidote-carbonate schist (Nokleberg and others, 1991). Grab sample 82IL064B of copper-rich schist contained 0.92 percent copper, 0.22 percent zinc, 0.06 percent lead, and 10 parts per million silver (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Devonian, the age of the host schist.

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
No substantial work has been done at the prospect. A grab sample collected by Nokleberg and others (1991) contained 0.92 percent copper, but American Copper and Nickel Company geologists subsequently concluded that, in general, the deposit is poor in valuable metals and consists mostly of pyrrhotite (W.T. Ellis, unpublished data, 1993).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991; Lange and others, 1993.

Primary reference: Lange and others, 1993

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/12/01

Site name(s): Roberts No. 1

Site type: Prospect

ARDF no.: MH009

Latitude: 63.5989 **Quadrangle:** MH C-5

Longitude: 146.2626

Location description and accuracy:
The Roberts No. 1 prospect is at an elevation of about 7,700 feet on a steep ridge about 3.8 miles north-northeast of McGinnis Peak. The prospect is about 1,100 feet south-southeast of the center of section 19, T. 15 S., R. 8 E., Fairbanks Meridian. Nokleberg and others (1991) designated the Roberts No. 1 as locality N8 in their table 2.

Commodities:

Main: Cu, Zn

Other: Pb, Sn

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

Gangue minerals:

Geologic description:
The Roberts No. 1 prospect consists of a massive sulfide lens in quartz-chlorite-calc schist. Sedimentary and volcanic protoliths of the schist are of Devonian age (Nokleberg and Aleinikoff, 1985 ; Aleinikoff and Nokleberg, 1985 [C 967]). The lens consists of pyrrhotite, pyrite, sphalerite, chalcopyrite, and some galena.

Alteration:

Age of mineralization:
Devonian, the protolith age of the host rock.

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: inactive

Workings/exploration:
Grab samples contain as much as 2.3 percent zinc, 0.26 percent copper, 0.03 percent lead, and 70 parts per million tin (Nokleberg and others, 1991). There are no extensive workings.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985 (C 967); Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/01

Site name(s): Roberts No. 2; McGinnis Glacier

Site type: Prospect

ARDF no.: MH010

Latitude: 63.5932 **Quadrangle:** MH C-5

Longitude: 146.2553

Location description and accuracy:

The Roberts No. 2 prospect is on a knife-like southeast -trending ridge at an elevation of about 7,200 feet. The prospect is about at the east end of the boundary between sections 19 and 30, T. 15 S., R. 8 E., Fairbanks Meridian. The location corresponds to locality N9 in table 2 of Nokleberg and others (1991); the Roberts No. 2 prospect corresponds to the McGinnis Glacier locality of Lange and others (1993). The location is accurate to within 1,100 feet.

Commodities:

Main: Cu, Pb, Zn

Other: Ag, Sn

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

Gangue minerals: Actinolite, biotite, calcite, chlorite, quartz

Geologic description:

The rocks for the Roberts No. 2 or McGinnis Glacier prospect are intensely deformed schists of Devonian or older age (Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985 [C 967]). They contain abundant mylonite zones and exhibit two periods of metamorphism and deformation: an older, lower amphibolite grade event, and a younger, lower greenschist grade event.

At the prospect, massive sulfides occur in a 6-foot-thick zone that can be traced for about 30 feet. Boulder-size masses of pyrrhotite occur in a matrix of chlorite-calcite-quartz schist. The hanging wall of the zone is capped by a graphitic calcite-quartz schist. Other lithologies include metaconglomerate and metagraywacke; a 45-foot-thick layer of gray marble lies about 75 feet structurally below the sulfide zone (Lange and others, 1993). Pyrrhotite, along with lesser amounts of pyrite, chalcopyrite, sphalerite, and galena occur with quartz, chlorite, biotite, actinolite, and calcite (Lange and others, 1993, p. 350).

Alteration:

Age of mineralization:

Devonian, the protolith age of metamorphic host rocks.

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

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

28a

Production Status: None

Site Status: Inactive

Workings/exploration:

There are no extensive workings. The U.S. Geological Survey mapped and sampled the area in reconnaissance during the 1980's. One sample assayed 0.69 percent copper, 0.3 percent lead, 2.3 percent zinc, and 45.4 parts per million (ppm) silver (Lange and others, 1993). Sample 81NK226 of Nokleberg and others (1991) assayed 0.25 percent copper, 0.25 percent lead, 0.2 percent zinc, 50 ppm silver, and 30 ppm tin.

The area was examined in the 1990's by American Copper and Nickel Company; their geologists concluded that the deposits were rich in pyrrhotite but poor in valuable metals (W.T. Ellis, unpublished data, 1993).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985 (C 967); Nokleberg and others, 1991; Lange and others, 1993.

Primary reference: Lange and others, 1993

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/11/01

Site name(s): Unnamed (on peak 5782)

Site type: Occurrence

ARDF no.: MH011

Latitude: 63.6154 **Quadrangle:** MH C-5

Longitude: 146.1302

Location description and accuracy:
This occurrence is at an elevation of about 5,400 feet, just east of peak 5782 about one mile north of McGinnis Glacier. The occurrence is about 800 feet southwest of the center of section 15, T. 15 S., R. 8 E., Fairbanks Meridian. The location corresponds to locality N10 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag, Au

Ore minerals: Chalcopyrite, malachite

Gangue minerals: Quartz

Geologic description:
The rocks at the occurrence are metagabbro of probable Cretaceous age that intrudes metamorphosed Devonian strata. The gabbro body appears to bounded on the north by the McGinnis Glacier fault (Nokleberg and others, 1991). The metagabbro contains sparse quartz veins and local concentrations of chalcopyrite partly oxidized to malachite (Nokleberg and others, 1991).

Alteration:
Copper minerals are oxidized.

Age of mineralization:
Probably Cretaceous or younger, on the basis of the probable age of the gabbro host rock.

Deposit model:
Copper deposit in gabbro.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings are reported at the site. Grab sample 80ZN013 of copper-bearing metagabbro contained 5.5 percent copper, 7 parts per million (ppm) silver, and 0.1 ppm gold (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/11/01

Site name(s): Savage Creek

Site type: Occurrence

ARDF no.: MH012

Latitude: 63.7299 **Quadrangle:** MH C-4

Longitude: 145.7658

Location description and accuracy:
This occurrence is on the west side of Ober Creek about 0.7 mile north of MH013. It is at an elevation of 2,500 feet in the SE1/4SE1/4 section 3, T. 14 S, R. 10 E, Fairbanks Meridian. Savage Creek is not named on the Mount Hayes C-4 topographic map. Most published reports indicate that it is a tributary of Ober Creek, but descriptions are vague and this location is approximate. For this record the site corresponds to the locality on figure 7 in Mulligan (1974).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
Prospecting for placer gold was reported at this site in 1924 (Brooks and Capps); in 1929 (Smith); in 1930 (Smith [B 810-A]); in 1930 (Smith [B 813-A]); in 1932 (Smith); in 1933 (Smith [B 836-A and B 844-A]). Mining claims recorded in 1954 reportedly were active in 1974 (Mulligan, 1974). A small amount of gold was probably recovered.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (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:
Mining claims recorded in 1954 reportedly were active in 1974 (Mulligan, 1974).

Production notes:

Reserves:

Additional comments:

References:

Brooks and Capps, 1924; Smith, 1929; Smith, 1930 (B 810-A); Smith, 1930 (B 813-A); Smith, 1932; Smith, 1933 (B 836-A); Smith, 1933 (B 844-A); Mulligan, 1974; Cobb, 1973 (B 1374); Cobb, 1979 (OFR 79-238).

Primary reference: Mulligan, 1974

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/12/02

Site name(s): Ober Creek

Site type: Prospect

ARDF no.: MH013

Latitude: 63.7194 **Quadrangle:** MH C-4

Longitude: 145.7739

Location description and accuracy:
This placer prospect is located at the forks of upper Ober Creek about 4 miles northeast of Donnelly Station. The workings are at an elevation of 2,500 feet in the NE1/4NE1/4 section 10, T. 14 S., R. 10 E, Fairbanks Meridian. This prospect is described by Moffitt (1942) and corresponds to locality 2 in Cobb (1979 [OFR 79-238]) and locality N1 in table 3 of Nokelberg and others (1991). The location is accurate within a one-half mile.

Commodities:

Main: Au

Other: U

Ore minerals: Gold, monazite

Gangue minerals: Epidote, fluorite, zircon

Geologic description:
Small amounts of gold occur in thin, frozen alluvial stream gravels at this locality (Moffit, 1942). The gravels are derived from extensive glacial deposits and metasedimentary schists (Nokleberg and others, 1991). Placer concentrate collected by Wedow and others (1954) contained as much as 0.011 percent equivalent uranium (eU), as well as monazite, zircon, fluorite, and epidote.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status:

Site Status: Inactive

Workings/exploration:
In 1942, the site was marked by cabins, pits, and abandoned equipment, suggesting considerable exploration and development (Moffit, 1942). Placer concentrate collected by Wedow and others (1954) averaged about 0.006 percent equivalent uranium (maximum of 0.011 percent).

Production notes:

Reserves:

Additional comments:

Wedow and others (1954) judged the deposit to be mainly of mineralogic interest because the gold content and radioactivity level were too low to be of economic significance.

The prospect is mislocated on plate 7 in U.S. Geological Survey Bulletin 989-D (Moffit, 1954); it is shown as approximately 4 miles farther north than is described in other publications.

References:

Moffit, 1942; Moffit, 1954; Wedow and others, 1954; Overstreet, 1967; Cobb, 1973 (B 1374); Cobb, 1979 (OFR 79-238); Mulligan, 1974; Nokleberg and others, 1991.

Primary reference: Moffit, 1942

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (south of Black Rapids Roadhouse)

Site type: Prospect

ARDF no.: MH014

Latitude: 63.5085 **Quadrangle:** MH C-4

Longitude: 145.8525

Location description and accuracy:
This prospect is at an elevation of 2,400 feet 1.5 mile south of the Black Rapids Roadhouse (Rapids Club). It is east of the Richardson Highway at the north edge of a small lake about the same elevation as the highway (Ebbley and Wright, 1948) in the SE1/4SW1/4 section 20, T. 16 S., R. 9 E., Fairbanks Meridian. The prospect corresponds to locality 7 of Cobb (1979 [OFR 79-238]) and locality N12 in table 1 of Nokelberg and others (1991). The location is accurate within a quarter mile.

Commodities:

Main: Sb

Other:

Ore minerals: Pyrite, stibnite

Gangue minerals: Quartz

Geologic description:
This prospect consists of stibnite and pyrite in nearly vertical quartz veins that strike N70E. The veins cut quartz-white mica-calcite schist derived from sedimentary rocks (Nokleberg and others, 1991). The veins are as much as 24 centimeters thick and contain as much as 71.4 percent antimony (average of 36.5 percent). About half of the stibnite is bladed. A shallow open cut reveals a quartz-stibnite lens a few inches to 12 feet thick. The lens strikes N70W, parallel to the foliation of the schist, but it dips more steeply than the schist (Ebbley and Wright, 1948). The schist is extensively silicified and pyritized near the stibnite-bearing veins. Faulting during or since the formation of the vein is indicated by slickensides and brecciated quartz.

Alteration:
The schist is extensively silicified and pyritized near the stibnite-bearing veins. Faulting during or since the formation of the vein is indicated by slickensides and brecciated quartz.

Age of mineralization:

Deposit model:
Simple Sb deposit (Cox and Singer, 1986; model 27d).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The prospect was explored by open cut, stripping, and an adit that is caved at 30 feet (Ebbley and Wright, 1948). The stripped area is about 30 feet north of the open cut, which is 250 feet east of the adit. Assays of

the veins showed as much as 71.4 percent antimony; the average is 36.4 percent antimony, but no gold or silver is present.

Production notes:

Reserves:

Additional comments:

References:

Ebbley and Wright, 1948; Moffit, 1954; Berg and Cobb, 1967; Mulligan, 1974; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Ebbley and Wright, 1948

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Gunnysack Creek (east of Black Rapids Roadhouse)

Site type: Prospect

ARDF no.: MH015

Latitude: 63.5291 **Quadrangle:** MH C-4

Longitude: 145.8203

Location description and accuracy:
The approximate location of this prospect is at an elevation of 2,450 feet on the north side of Gunnysack Creek 0.65 mile east-northeast of the Black Rapids Roadhouse (Rapids Club) or about 1 mile southeast of the Rapids landing strip. It is in the NE1/4SE1/4 section 17, T. 16 S., R. 10 E., Fairbanks Meridian. The location is approximated from a description by Capps (1912) and is accurate within a half-mile. It corresponds to locality 6 in Cobb (1979 [OFR 79-238]) and locality N11 of table 1 in Nokelberg and others (1991).

Commodities:

Main: Au, Sb

Other:

Ore minerals: Gold, stibnite

Gangue minerals:

Geologic description:
At this prospect pyrite and stibnite occur in an iron-stained milky quartz vein as much as 20 feet thick (Capps, 1912). This principal vein strikes S33W and dips about 70NW. In a 30-foot tunnel a stockwork of quartz stringers is parallel to the footwall of the main vein. The veins cut quartz mica schist derived from early to middle Paleozoic metasedimentary rocks. This summary description is from Nokleberg and others (1991). Joesting (1942) reported that the stibnite ore carried $1.5 to $15 (0.075 to 0.75 ounce) in gold per ton.

Alteration:

Age of mineralization:

Deposit model:
Simple Sb deposit (Cox and Singer, 1986; model 27d).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
A 30-foot tunnel was driven sometime prior to 1912 following reports of rich gold assays from the veins (Capps, 1912). Further tests proved the gold content too low for profitable extraction, and the claims were abandoned . Joesting (1942) reported that the stibnite ore carried $1.5 to $15 (0.075 to 0.75 ounce) in gold per ton (gold at $20 per ounce ton in 1912) and that the tunnel was driven in 1916, which does not

agree with Capps' date.

Production notes:

Reserves:

Additional comments:

References:

Capps, 1912; Moffit, 1942; Joesting, 1942; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Capps, 1912

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Lower McCumber Creek

Site type: Occurrence

ARDF no.: MH016

Latitude: 63.7211 **Quadrangle:** MH C-4

Longitude: 145.6042

Location description and accuracy:
This placer prospect is located below the falls on McCumber Creek (T. Hinderman, written communication, 1986). For this record it is at an elevation of 2,600 feet in the SW1/4NW1/4 section 10, T. 14 S., R. 11 E., Fairbanks Meridian. This site corresponds to locality 3 of Cobb (1979 [OFR 79-238]) and is accurate within a mile.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
In lower McCumber Creek small amounts of gold occur in alluvial gravel in streams draining an area of extensive glacial deposits (Smith, 1932). The gravel consists mainly of metasedimentary schists (Nokleberg and others, 1991). The most common bedrock types in the area are quartz-mica schist and quartz-rich phyllite; sulfide-bearing cobbles and quartz float are common (T. Hinderman, written communication, 1986). The schist is cut by diabase dikes and is overlain by conglomerate of the Nenana Gravel of Tertiary age, which is considered to be the source of placer gold in other districts in central Alaska (T. Hinderman, written communication, 1986). Gold recovered by T. Hinderman from Morningstar Creek in 1986 was flat and contained minor inclusions of silver. Most of the minerals accompanying the gold were garnet and magnetite.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (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:
Mining claims on lower McCumber Creek recorded in 1954 reportedly were idle in 1974 (Mulligan, 1974). In 1986 the McCumber Morningstar Property consisted of 40 State claims controlled by Richard

Knudsen of Anchorage (T. Hinderman, written communication, 1986). A placer test completed in 1986 resulted in the owner allowing the claims to lapse. The test showed a resource in lower McCumber Creek of 580,000 cubic yards of gravel grading $2.06 (0.0079 ounce of gold) per cubic yard.

Production notes:

Reserves:

Additional comments:

References:

Brooks, 1913; Smith, 1932; Smith, 1933 (B 836-A); Smith, 1933 (B 844-A); Moffit, 1942; Moffit, 1954; Wedow and others, 1954; Cobb, 1973 (B 1374); Cobb, 1979 (OFR 79-238); Mulligan, 1974; MacKevett and Holloway, 1977; Nokleberg and others, 1991; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Upper McCumber Creek

Site type: Prospect

ARDF no.: MH017

Latitude: 63.7061 **Quadrangle:** MH C-4

Longitude: 145.5792

Location description and accuracy:
This placer prospect is at an elevation of 2,700 on upper McCumber Creek in the NW1/4NE1/4 section 15, T. 14 S, R. 11 E., Fairbanks Meridian. It corresponds to locality 3 of Cobb (1979 [OFR 79-238]) and locality N2 in table 3 of Nokelberg and others (1991). The location is accurate within a mile.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals: Garnet, magnetite

Geologic description:
In the McCumber Creek area small amounts of gold occur in alluvial gravel in streams draining an area of extensive glacial deposits (Smith, 1932). The gravel consists mainly of metasedimentary schists (Nokleberg and others, 1991). The most common bedrock types in the area are quartz-mica schist and quartz-rich phyllite; sulfide-bearing cobbles and quartz float are common (T. Hinderman, written communication, 1986). The schist is cut by diabase dikes and is overlain by conglomerate of the Nenana Gravel of Tertiary age, which is considered to be the source of placer gold in other districts in central Alaska (T. Hinderman, written communication, 1986). Gold recovered by T. Hinderman from Morningstar Creek in 1986 was flat and contained minor inclusions of silver. Most of the minerals accompanying the gold were garnet and magnetite.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (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:
Mining claims on McCumber Creek recorded in 1954 reportedly were idle in 1974 (Mulligan, 1974). In 1986 the McCumber Morningstar Property consisted of 40 State claims controlled by Richard Knudsen of Anchorage (T. Hinderman, written communication, 1986). A placer test completed in 1986 resulted in the

owner allowing the claims to lapse. The test showed a resource in lower Morningstar Creek of 128,000 cubic yards of gravel grading $4.83 (0.019 ounce of gold) per cubic yard. McCumber Creek contains a much larger, lower-grade resource of 1,200,000 cubic yards of gravel grading $1.18 (0.0045 ounce of gold) per cubic yard.

Production notes:

Reserves:

Additional comments:

References:

Brooks, 1913; Smith, 1932; Smith, 1933 (B 836-A); Smith, 1933 (B 844-A); Moffit, 1942; Moffit, 1954; Wedow and others, 1954; Cobb, 1973 (B 1374); Cobb, 1979 (OFR 79-238); Mulligan, 1974; MacKevett and Holloway, 1977; Nokleberg and others, 1991; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Morningstar Creek

Site type: Prospect

ARDF no.: MH018

Latitude: 63.6928 **Quadrangle:** MH C-4

Longitude: 145.5435

Location description and accuracy:
This placer prospect is located on Morningstar Creek, a north-flowing tributary of McCumber Creek. It is approximately located at an elevation of 2,800 feet in the SE1/4SE1/4, section 14, T. 14 S, R. 11 E., Fairbanks Meridian. The site corresponds to locality 4 of Cobb (1979 [OFR 79-238]) and to locality N3 of table 3 in Nokelberg and others (1991). The location is accurate within a mile.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals: Garnet, magnetite

Geologic description:
In the area of Morningstar Creek small amounts of gold occur in alluvial gravel in streams draining an area of extensive glacial deposits (Smith, 1932). The gravel consists mainly of metasedimentary schists (Nokleberg and others, 1991). The most common bedrock types in the area are quartz-mica schist and quartz-rich phyllite; sulfide-bearing cobbles and quartz float are common (T. Hinderman, written communication, 1986). The schist is cut by diabase dikes and is overlain by conglomerate of the Nenana Gravel of Tertiary age, which is considered to be the source of placer gold in other districts in central Alaska (T. Hinderman, written communication, 1986). Gold recovered by T. Hinderman from Morningstar Creek in 1986 was flat and contained minor inclusions of silver. Most of the accompanying minerals were garnet and magnetite.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (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:
Mining claims on Morningstar Creek recorded in 1954 reportedly were idle in 1974 (Mulligan, 1974). In 1986 the McCumber Morningstar Property consisted of 40 State claims controlled by Richard Knudsen of

Anchorage (T. Hinderman, written communication, 1986). A placer test completed in 1986 resulted in the owner allowing the claims to lapse. The test showed a resource in lower Morningstar Creek of 128,000 cubic yards of gravel grading $4.83 (0.019 ounce of gold) per cubic yard. McCumber Creek contains a much larger, lower-grade resource of 1,780,000 cubic yards of gravel grading $1.95 (0.0075 ounce of gold) per cubic yard.

Production notes:

Reserves:

Additional comments:

References:

Smith, 1932; Smith, 1933 (B 836-A); Smith, 1933 (B 844-A); Cobb, 1973 (B 1374); Cobb, 1979 (OFR 79-238); Mulligan, 1974; MacKevett and Holloway, 1977; Nokleberg and others, 1991; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Unnamed (north of head of McCumber Creek)

Site type: Occurrence

ARDF no.: MH019

Latitude: 63.6739 **Quadrangle:** MH C-3

Longitude: 145.4105

Location description and accuracy:
The approximate location of this occurrence is at an elevation of 4,750 feet, north of the headwaters of McCumber Creek (Moffit, 1942). It is in the SW1/4NW1/4 section 27, T. 14 S., R. 12 E., Fairbanks Meridian, west of peak 5025. The site corresponds to locality 5 of Cobb (1979 [OFR 79-238]), but that location differs by a mile from his earlier location (Cobb, 1972 [MF- 414]).

Commodities:

Main: Pb

Other:

Ore minerals: Galena

Gangue minerals: Quartz

Geologic description:
Moffit (1942) reported galena in quartz stringers cutting quartz-white mica schist. The schist is derived from early to middle Paleozoic metasedimentary rocks (Nokleberg and others, 1991).

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: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Moffit, 1942; Cobb, 1972 (MF-414); Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Moffit, 1942

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Pegmatite Creek

Site type: Occurrence

ARDF no.: MH020

Latitude: 63.5993 **Quadrangle:** MH C-2

Longitude: 144.9560

Location description and accuracy:
Pegmatite Creek flows east and then northwest into the headwaters of the Little Gerstle River. The exact location of this occurrence is not known; for this record, the site is arbitrarily plotted at an elevation of 3,000 feet on the creek in the SW1/4 section 24, T. 15 S., R. 14 E., Fairbanks Meridian.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
Pegmatite Creek follows the contact between a granitic pluton and older metamorphic rocks (Cobb, 1979 [OFR 79-238]). A little gold was reported to be in the gravels, but no deposits of commercial value were found (Moffit, 1942). Pegmatite Creek is in Devonian and older, chiefly fine-grained, mylonitic metasedimentary rocks (Nokleberg and others, 1992).

Alteration:

Age of mineralization:
Quaternary.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Moffit, 1942; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1992.

Primary reference: Cobb, 1979(OFR 79-238)

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Redemption Creek

Site type: Prospect

ARDF no.: MH021

Latitude: 63.9977 **Quadrangle:** MH D-2

Longitude: 145.0828

Location description and accuracy:
The location of Redemption Creek was described by Cobb (1979 [OFR 79-238]) as being in the northern half of the Mount Hayes quadrangle or possibly the southern part of the Big Delta quadrangle. It probably is within the Delta River mining district. The location of Redemption Creek is not known. The location is an arbitrary point at the northeast corner of the Mount Hayes D-2 topographic map.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
In 1926, placer gold prospecting was reported on Redemption Creek (Smith, 1929). There are no other records of mining activity on Redemption Creek, and the location is not known.

Alteration:

Age of mineralization:
Quaternary.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
In 1926, placer gold prospecting was reported on Redemption Creek (Smith, 1929). There are no other records of mining activity on Redemption Creek, and the location is not known.

Production notes:

Reserves:

Additional comments:

References:

Smith, 1929; Cobb, 1979 (OFR 79-238).

Primary reference: Smith, 1929

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Kenyon Creek

Site type: Prospect

ARDF no.: MH022

Latitude: 63.9731 **Quadrangle:** MH D-2

Longitude: 144.7497

Location description and accuracy:
Kenyon Creek is said to be a tributary to Healy Lake (Brooks, 1915). The location of Kenyon Creek and this occurrence can not be identified on current maps. The location is at an arbitrary point near the center of Healy Lake in T. 11 S., R. 15 E., Fairbanks Meridian.

Commodities:

Main: Au

Other:

Ore minerals:

Gangue minerals:

Geologic description:
Auriferous gravels were found about 4 miles from the mouth of Kenyon Creek that was said to be a tributary of Healy Lake. The gravels are 125 feet deep, and the pay streak about 60 feet wide. Many garnets are found in the concentrates. The bedrock is schist, and the gold is medium grained with a few nuggets, angular, and bright colored (Brooks, 1915).

Alteration:

Age of mineralization:
Quaternary.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
In the summer of 1914, auriferous gravels were found in the Healy River region, and probably more than a hundred men went to the scene to investigate. Auriferous gravels were found on Kenyon Creek about 4 miles from its mouth. The gravels were reported to be 125 feet deep and the pay streak about 60 feet wide (Brooks, 1915). A little mining was reported on Kenyon Creek in 1915 (Brooks, 1916). There is no more recent report of activity, and the location of Kenyon Creek is now uncertain.

Production notes:

Reserves:

Additional comments:

References:

Brooks, 1915; Brooks, 1916.

Primary reference: Brooks, 1915

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Ruby Creek

Site type: Prospect

ARDF no.: MH023

Latitude: 63.9618 **Quadrangle:** MH D-2

Longitude: 144.7381

Location description and accuracy:
Ruby Creek is said to be a tributary to Healy Lake. The location of Ruby Creek and this occurrence have not been identified. The coordinates are for an arbitrary point south of the approximate center of Healy Lake in T. 11 S., R. 15 E., Fairbanks Meridian.

Commodities:

Main: Au

Other:

Ore minerals:

Gangue minerals:

Geologic description:
In the summer of 1914, auriferous gravels were found on Ruby Creek, said to be a tributary of Healy Lake (Brooks, 1915). There is no more recent report of activities, and the location of Ruby Creek is not known.

Alteration:

Age of mineralization:
Quaternary.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
Brooks (1915) reported that several years before, auriferous gravels had been discovered on Ruby Creek. There is no more recent report of activities, and the location of Ruby Creek is not known.

Production notes:

Reserves:

Additional comments:

References:

Brooks, 1915.

Primary reference: Brooks, 1915

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (northeast of Dot Lake)

Site type: Occurrence

ARDF no.: MH024

Latitude: 63.7424 **Quadrangle:** MH C-1

Longitude: 144.0238

Location description and accuracy:
This occurrence is north of the Tanana River a few miles northeast of Dot Lake. The location is approximate and based on Saunders' (1958) imprecise description. The accuracy of the location is indeterminate; it may be several or many miles away.

Commodities:

Main: Asbestos

Other:

Ore minerals: Chrysotile (?)

Gangue minerals: Serpentine

Geologic description:
Specimens from this occurrence have asbestos seams as much as three-quarters of an inch wide (Saunders, 1958). Saunders examined a hand specimen at Dot Lake village; he did not visit the location. The rocks at the occurrence are not described.

Alteration:
Serpentinization of olivine-bearing ultramafic rock.

Age of mineralization:

Deposit model:
Serpentine-hosted asbestos (Cox and Singer, 1986; model 8d).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
8d

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Saunders, 1958.

Primary reference: Saunders, 1958

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Walters North

Site type: Occurrence

ARDF no.: MH025

Latitude: 63.6739 **Quadrangle:** MH C-1

Longitude: 144.1096

Location description and accuracy:
This occurrence is on the south side of the Alaska Highway near BM 1367 in road cuts and on the slope above the highway. It is approximately 1.25 miles northwest of Dot Lake and about 0.4 mile west-northwest of the center of section 20, T. 22 N., R. 7 E., of the Copper River Meridian (see Saunders, 1958).

Commodities:

Main: Ag, Au

Other:

Ore minerals: Gold

Gangue minerals: Quartz

Geologic description:
There is no mention of the work Jimmie Walters performed on his prospect, although R. Saunders examined the property in July of 1958 and took four samples to be assayed at the Department of Mines assay office at College, Alaska. Saunders (1958) reported that all those samples were essentially barren. The best sample came from a 2-foot-wide quartz vein that contained 0.02 ounce of gold per ton and 0.12 ounce of silver per ton; no visible galena or other minerals mentioned. The wall rock of the veins is the Birch Creek Schist or its equivalent; the veins are a few hundred feet from a Mesozoic or Tertiary pluton of granitic to dioritic composition (Nokleberg and others, 1992). Three veins were examined in the road cut; they varied from 8 inches to 4 feet in width (Saunders, 1958), they trend southeast.

Alteration:

Age of mineralization:
Inferred to be related to a nearby Tertiary or Mesozoic granitic pluton.

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The veins are exposed in road cuts and in small pits dug along their trend to the southwest (Saunders, 1958).

Production notes:

Reserves:

Additional comments:

References:
Saunders, 1958; Nokleberg and others, 1992.

Primary reference: Saunders, 1958

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/26/03

Site name(s): Unnamed (upper East Fork Susitna River)

Site type: Occurrence

ARDF no.: MH026

Latitude: 63.3883 **Quadrangle:** MH B-6

Longitude: 146.9622

Location description and accuracy:
This placer occurrence is at an elevation of about 2,800 feet on an unnamed south-flowing tributary of the East Fork Susitna River. The location is accurate; it is in the NW 1/4 of section 3, T. 18 S., R. 4 E., Fairbanks Meridian. The occurrence corresponds to locality A2 of Kurtak and others (1992).

Commodities:

Main: Au

Other: Co

Ore minerals: Gold, linnaeite, pyrite

Gangue minerals: Garnet

Geologic description:
This gold placer occurrence is in alluvium and lateral moraine cut by a south-flowing tributary of the upper East Fork Susitna River. Two types of unconsolidated material host the gold deposits: one is the alluvium in the south-flowing tributary; the other is lateral moraine derived from a glacier in the East Fork Susitna River about 3 miles above the occurrence and derived from a regionally metamorphosed batholith of Late Cretaceous to Early Tertiary age (Nokleberg and others, 1982). Two gold-bearing samples were collected at the site. Sample 2923 was collected from the alluvial fan at the foot of the south-flowing tributary. At this site, poorly sorted material contained about 0.01 ounce of gold per cubic yard; gold particles ranged from very coarse to very fine. Concentrates from this sample contained pyrite, garnet, and microscopic particles of linnaeite, a cobalt sulfide (Kurtak and others, 1992, p. 83). Sample 2677 collected from lateral moraine contained 10 to 20 very fine particles of gold. Kurtak and others (1992) noted that several localities along the lateral moraine on the north side of the East Fork Susitna River contained gold of unknown source and significance.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986, model 39a).

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

Production Status: None

Site Status: inactive

Workings/exploration:

No workings.

Production notes:

Reserves:

Additional comments:

The presence of gold particles at several sites (see Geologic description) in the north-side lateral moraine below a glacier in the upper East Fork Susitna River suggests the existence of an upstream bedrock gold source.

References:

Nokleberg and others, 1982; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Lamb claims (Nos. 1-6)

Site type: Occurrence

ARDF no.: MH027

Latitude: 63.3621 **Quadrangle:** MH B-6

Longitude: 146.8334

Location description and accuracy:

The Lamb claims occurrence is on a steep slope between 5,500 and 6,000 feet elevation. It is about one-quarter mile north-northwest of peak 6440 in the NW1/4NW1/4 section 17, T. 18 S., R. 5 E., Fairbanks Meridian. The occurrence corresponds to locality 14 of Cobb (1979 [OFR 79-238]) and to a malachite location reported by Smith and others (1975). It also corresponds to locality A3 of Kurtak and others (1992). The location is probably accurate within one-quarter mile.

Commodities:

Main: Cu

Other: Mo, W

Ore minerals: Chalcopyrite, malachite, molybdenite

Gangue minerals:

Geologic description:

Rock at the occurrence consists mainly of pegmatite and amphibolite gneiss (Nokleberg and others, 1981). Chalcopyrite, molybdenite, and possibly an unidentified tungsten mineral are sparsely disseminated in the pegmatite and gneiss. Malachite is locally abundant as fracture coatings on weathered amphibolite (Smith and others, 1975; Cobb, 1979 [OFR 79-238]). The rocks are locally iron stained from oxidation of sulfides or possibly biotite.

The locality was sampled by the U.S. Bureau of Mines (Kurtak and others, 1992). Sample 1682 of biotite gneiss containing disseminated chalcopyrite assayed 0.5 percent copper and contained slightly anomalous amounts of gold (145 parts per billion) and silver (2.5 parts per million [ppm]); it also contained 170 ppm tungsten. A molybdenite-bearing granite gneiss (sample 618) contained 0.17 percent molybdenum.

Intrusion of the pegmatite, regional metamorphism of amphibolite, and introduction of metallic minerals probably occurred in the Late Cretaceous or early Tertiary (Nokleberg and others, 1981).

Alteration:

Age of mineralization:

Probably Late Cretaceous or Early Tertiary, the age of intrusion and metamorphism of the Maclaren complex (Nokleberg and others, 1981).

Deposit model:

Porphyry Cu-Mo (Cox and Singer, 1986; model 21a).

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

21a

Production Status: None

Site Status: Inactive

Workings/exploration:
The area has been mapped and sampled, but there are no substantial physical workings.

Production notes:

Reserves:

Additional comments:

References:
Smith and others, 1975; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1981; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (upper west fork tributary to the West Fork Maclaren River; Pettyjohn Creek)

Site type: Prospect

ARDF no.: MH028

Latitude: 63.3065 **Quadrangle:** MH B-6

Longitude: 146.8133

Location description and accuracy:
This prospect extends for about 4 miles along an unnamed west tributary of the West Fork Maclaren River. The location shown for this record is the approximate midpoint of a group of 45 claims staked for placer gold (U.S. Bureau of Mines, 1973), at the southeast corner of section 32, T. 18 S., R. 5 E., Fairbanks Meridian. The tributary locally has been called Pettyjohn Creek. The prospect corresponds to locality A73 of Kurtak and others (1992); this is Kardex site number KX68-310 of Heiner and Porter (1972).

Commodities:

Main: Au

Other: W

Ore minerals: Gold

Gangue minerals:

Geologic description:
This unnamed west tributary of the West Fork Maclaren River drains pre-Cretaceous schist, amphibolite, and phyllite (Nokleberg and others, 1982). About 45 claims were staked along the tributary, which locally has been called Pettyjohn Creek (U.S. Bureau of Mines, 1973). In the early 1990's, the U.S. Bureau of Mines found small amounts of gold (to 870 parts per billion) and tungsten (to 100 parts per million) in panned concentrates of alluvium (Kurtak and others, 1992).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: inactive

Workings/exploration:
The creek does not appear to have been explored. Forty-five claims staked by Tammany Gold Company were held between 1979 and 1983.

Production notes:

Reserves:

Additional comments:

References:

U.S. Bureau of Mines, 1973; Nokleberg and others, 1982; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (west of the upper West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH029

Latitude: 63.3194 **Quadrangle:** MH B-6

Longitude: 146.7712

Location description and accuracy:
This occurrence is at an elevation of about 5,500 feet on the ridge between a major west tributary to the West Fork and the West Fork Maclaren River and about one-quarter mile west-northwest of peak 6222, near the common corner of sections 27, 28, 33, and 34, T. 19 S., R. 5 E., Fairbanks Meridian. The site corresponds to locality 20 in table 2 of Nokleberg and others (1991). The location is probably accurate within one-half mile.

Commodities:

Main: Ag

Other: Cu, Mo

Ore minerals: Malachite, pyrite

Gangue minerals: Quartz, white mica

Geologic description:
The rock near the occurrence consists of white mica phyllite of the Maclaren Glacier metamorphic belt (Nokleberg and others, 1982). The phyllite is pyritic and in places stained with malachite. Copper was not detected in one sample that, however, contained 7 parts per million (ppm) silver and 50 ppm molybdenum (Nokleberg and others, 1991, locality 20, table 2).

Alteration:
Oxidation of iron- and copper-bearing minerals.

Age of mineralization:
Possibly syngenetic to protolith of white mica (sericite?) in phyllite.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no workings. The occurrence was found during regional mapping and sampling (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1982; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Unnamed (tributary to West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH030

Latitude: 63.3408 **Quadrangle:** MH B-6

Longitude: 146.7357

Location description and accuracy:
This occurrence is at an elevation of about 4,000 feet in a northeast-flowing part of a west tributary of the West Fork Maclaren River, near the center of section 23, T. 18 S., R. 5 E., Fairbanks Meridian. It corresponds to locality A30 of Kurtak and others (1992).

Commodities:

Main: Zn

Other:

Ore minerals: Sphalerite or oxidized zinc mineral

Gangue minerals:

Geologic description:
The area of the occurrence is underlain by schist and amphibolite probably formed during metamorphism of Cretaceous age (Nokleberg and others, 1982). Zinc contained in a mineral (probably sphalerite or an oxidation product) occurs in a breccia zone 5 to 15 feet wide (Nokleberg and others, 1990). Four samples of breccia contained between 0.12 and 0.18 percent zinc (Kurtak and others, 1992).

Alteration:
Possible oxidation of zinc mineral.

Age of mineralization:
Probably Late Cretaceous or younger; mineralized host breccia postdates Cretaceous (?) metamorphism.

Deposit model:
Zinc-bearing fault zone.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Surface samples of mineralized breccia contain from 0.12 to 0.18 percent zinc (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1982; Nokleberg and others, 1990; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Falling Rock

Site type: Prospect

ARDF no.: MH031

Latitude: 63.3242 **Quadrangle:** MH B-6

Longitude: 146.6919

Location description and accuracy:
The Falling Rock prospect is at an elevation of about 3,750 feet on the east side of the West Fork Maclaren River. The prospect is near the center of the SE1/4 section 25, T. 18 S., R. 5 E., Fairbanks, Meridian; it corresponds approximately to locality A5 of Kurtak and others (1992), Kardex site number KX68-96 (Heiner and Porter, 1972), the location of the Falling Rock No. 1 lode claim (U.S. Bureau of Mines, 1973), and locality 14 of Kaufman (1964).

Commodities:

Main: Au, W

Other:

Ore minerals: Gold (?), pyrite

Gangue minerals: Carbonate mineral (ankerite?), epidote, quartz

Geologic description:
The area of the Falling Rock prospect is underlain by metamorphic rocks of unknown protolith age that were assigned to the Maclaren terrane by Nokleberg and others (1982); rock near the prospect was mapped as argillite by Kaufman (1964).

At about this locality, Kaufman (1964, locality 14) mapped quartz-carbonate veins mainly parallel to, but locally crosscutting metamorphic layering. He noted no metallic minerals, but he proposed that the quartz-carbonate veins were potential source rocks of gold in the Valdez Creek placer deposit. The prospect is near the Falling Rock No. 1 lode claim located in 1965 (Heiner and Porter, 1972; U.S. Bureau of Mines, 1973).

Stream-sediment sample 3004 collected near the prospect by the U.S. Bureau of Mines in the early 1990's contained anomalous amounts of gold (1,200 parts per billion), arsenic (200 parts per million [ppm]), and tungsten (120 ppm) (Kurtak and others, 1992); float sample 3006 of vein quartz collected about 2 miles north of the site contained pyrite, epidote, and 640 ppm tungsten.

Alteration:

Age of mineralization:
Probably Cretaceous or younger; veins post-date regional metamorphism.

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

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

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings found.

Production notes:

Reserves:

Additional comments:

References:
Kaufman, 1964; Heiner and Porter, 1972; U.S. Bureau of Mines, 1973; Nokleberg and others, 1982; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (headwaters of West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH032

Latitude: 63.3734 **Quadrangle:** MH B-6

Longitude: 146.6791

Location description and accuracy:

This placer occurrence is in the headwaters of the West Fork Maclaren River at elevations between about 3,700 and 4,600 feet. The occurrence is shown as the approximate midpoint of the placer at the common south corner of section 1, T. 18 S., R. 5 E., and section 6, T. 18 S., R. 6 E., Fairbanks Meridian. The occurrence corresponds to locality A4 of Kurtak and others (1992).

The topographic map of the area (Mount Hayes B-6, edition of 1951) shows the location as glacier and medial moraine. Since 1951, the glacier has receded at least one mile, and the site now is alluvial in character.

Commodities:

Main: Au

Other: Mo, W

Ore minerals: Gold, molybdenite, pyrite, scheelite (?)

Gangue minerals: Quartz

Geologic description:

This placer occurrence is underlain by schist, amphibolite, slate, and schistose quartz probably of Cretaceous metamorphic age (Nokleberg and others, 1982). The metamorphic rocks are cut by quartz veinlets, some of which contain pyrite and trace amounts of molybdenite (to 22 parts per million molybdenum). Anomalous concentrations of tungsten in placer concentrate samples suggest the probable existence of scheelite at or near the site.

Placer gold occurs both in glacial moraine and in active stream gravel. The maximum concentration in a panned concentrate was 10,000 parts per billion (ppb) gold in active stream alluvium; the moraine material contained as much as 1,800 ppb gold (Kurtak and others, 1992, locality A4). The concentrates also contained tungsten; four of five pan-concentrate samples contained from 120 to 310 parts per million (ppm) tungsten. In addition, sample 3005 contained 0.15 percent arsenic, and sample 2662 (concentrates from glacial moraine) contained 740 ppm arsenic. The bedrock sources of the gold, arsenic, and tungsten are unknown.

Alteration:

Age of mineralization:

Holocene.

Deposit model:

Placer Au (Cox and Singer, 1986; model 39a).

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

39a

Production Status: None

Site Status: Inactive

Workings/exploration:
The area was sampled at a reconnaissance level by the U.S. Bureau of Mines (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:
The U.S. Bureau of Mines recommended additional prospecting along the margins of the glaciers for the bedrock sources of gold and tungsten (Kurtak and others, 1992).

References:
Nokleberg and others, 1982; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (northwest of Clearwater Creek)

Site type: Occurrence

ARDF no.: MH033

Latitude: 63.2323 **Quadrangle:** MH A-6

Longitude: 146.9400

Location description and accuracy:
This occurrence is at an elevation of about 5,400 feet, about a mile north of Clearwater Creek. It is in the SE1/4SE1/4 section 27, T. 19 S., R. 4 E., Fairbanks Meridian. The occurrence corresponds to locality 10 in table 2 of Nokleberg and others (1991). The location is probably accurate within a quarter of a mile.

Commodities:

Main: Zn

Other:

Ore minerals: Pyrite, sphalerite (?)

Gangue minerals: Garnet, white mica

Geologic description:
The rock at this occurrence is mica-garnet schist and amphibolite of the Maclaren Glacier metamorphic belt (Nokleberg and others, 1982, 1991). The area is traversed by a series of thrust faults, including the Meteor Fault. Metamorphism and thrusting are probably of Cretaceous age.

The mineral occurrence is pyritic white-mica and garnet schist. A grab sample of the schist contained 1,000 parts per million zinc (Nokleberg and others, 1991, locality 10, table 2), probably contained in a discrete mineral such as sphalerite.

Alteration:

Age of mineralization:
Either the age of the protolith or synchronous with Cretaceous (?) metamorphism and thrusting.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no workings at the site.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1982; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/01/01

Site name(s): Unnamed (northwest of Clearwater Creek near peak 6630)

Site type: Occurrence

ARDF no.: MH034

Latitude: 63.2242 **Quadrangle:** MH A-6

Longitude: 146.9498

Location description and accuracy:
This mineral occurrence is at an elevation of about 6,300 feet on a steep northwest-trending ridge about 1.5 miles northwest of Clearwater Creek. It is about a quarter of a mile west of peak 6630 in the NW1/4 section 24, T. 19 S., R. 4 E., Fairbanks Meridian. The location is probably accurate within a quarter of a mile. The occurrence corresponds to locality 9 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag

Other:

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
The rock at this occurrence is a biotite-chlorite-garnet schist, possibly a skarn, in a roof pendant in the East Susitna batholith of Cretaceous age (Nokleberg and others, 1982, 1991). The occurrence is near a regional thrust fault.
The garnetiferous schist is pyritic; a grab sample contained almost 0.5 ounce (15 parts per million) of silver per ton (Nokleberg and others, 1991, locality 9, table 2). The silver-bearing mineral is unknown.

Alteration:
Contact (?) metamorphism; skarn formation.

Age of mineralization:
Probably Cretaceous, the age of the granitic intrusion near the site.

Deposit model:
Pyritic garnetiferous skarn (?).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no workings at the occurrence.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1982; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Gossan lode

Site type: Prospect

ARDF no.: MH035

Latitude: 63.1940 **Quadrangle:** MH A-6

Longitude: 146.9400

Location description and accuracy:

The map site for the Gossan lode represents a mineralized area about 1 mile north of Coal Creek, east of Clearwater Creek. The area extends from 4,000 to 5,200 feet in elevation and is mainly in the SE1/4 section 10, T. 20 S., R. 4 E., Fairbanks Meridian. The location includes mineral localities 29 to 32 of Clautice and others (1989) and corresponds to locality A39 of Kurtak and others (1992). The location given here is at about the elevations cited in text by Kurtak and others (1992). Their map site (for locality A39), however, seems to be too low in elevation.

Commodities:

Main: Cu

Other: Ag, Au, Hg, Mn, Sb, W, Zn

Ore minerals: Chalcopyrite, hematite, pyrite

Gangue minerals: Dolomite, manganiferous carbonate, quartz, siderite

Geologic description:

The rocks near the Gossan lode consist of argillite, limestone, dolomite, and schist of probable Paleozoic age (Nokleberg and others, 1982). Minor amounts of andesite are intercalated with the weakly metamorphosed rocks. The strata are intruded by granodiorite of Cretaceous (?) age.

These rocks, particularly the carbonate rocks, have been partly replaced by dolomite, a manganiferous carbonate mineral, siderite, and pyrite. These rocks are variably gossanized on the surface and are stained with hematite, limonite, and manganiferous oxide. The staining is readily visible from the air.

The Gossan lode deposit possibly formed as the result of emplacement of granodiorite (Kurtak and others, 1992, p. 173). Besides the disseminated replacement deposit, quartz-sulfide veins occupy faults and shear zones in pyritized-carbonatized rock. Reported metal values are low. An industry-funded investigation in 1980 determined as much as 1,725 parts per million (ppm) copper (Ellis, 1980), and the U.S. Bureau of Mines found 0.62 percent copper in a quartz-pyrite-chalcopyrite vein (Kurtak and others, 1992, p. 175, sample 1167). This vein also contained 50 parts per billion gold and 1.5 ppm silver. Locally altered argillite, schist, and fault breccia contain anomalous concentrations of copper and zinc (hundreds of parts per million), from 10 to 50 ppm tungsten and from 15 to 85 ppm arsenic, and a fault breccia contains 15 ppm mercury.

Further data are supplied by Clautice and others (1989) in their descriptions of mineral localities 29 to 32 in the Gossan lode area. Locality 29 is altered tuff; it contains 255 ppb gold. Localities 30 and 31 are at the sites of recent spring deposits of calcrete or sinter; the spring deposit at locality 30 contains 3,330 ppm arsenic and 55 ppm antimony. Sample 31, collected adjacent to a modern cold-water spring, contains 6,520 ppm arsenic. Locality 32 is a trench-drill pad location on black gossan that contains 1,370 ppm copper, 345 ppm arsenic, and 726 ppm zinc.

Alteration:

Introduction of pyrite and iron- and manganese-bearing carbonates.

Age of mineralization:

The main Gossan lode deposit is possibly Cretaceous in age, related to emplacement of granodiorite. Some spring deposits in the area are recent or modern.

Deposit model:
Affinity to copper skarn or porphyry.

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:
The area was explored by a few trenches. Twenty-two Gossan lode claims were staked in 1973; 12 CM claims were staked in 1981 (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

References:
Ellis, 1980; Nokleberg and others, 1982; Clautice and others, 1989; Kurtak and others, 1992.

Primary reference: Clautice and others, 1989; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/01/01

Site name(s): Unnamed (east of Clearwater Creek)

Site type: Occurrence

ARDF no.: MH036

Latitude: 63.1992 **Quadrangle:** MH A-6

Longitude: 146.9319

Location description and accuracy:
This occurrence is at an elevation of about 4,600 feet, east of Clearwater Creek. It is in the NW1/4 section 11, T. 20 S., R. 4 E., Fairbanks Meridian. The location corresponds to locality 7 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite (?), pyrite

Gangue minerals:

Geologic description:
The rock at this occurrence is quartz-mica schist; the occurrence is near a thrust fault (Nokleberg and others, 1991, locality 7, table 2). A 15-foot-thick zone of schist is iron-stained. Grab sample 82SB023B of pyritic iron-stained schist contained 2,300 parts per million copper, possibly contained in chalcopyrite.

Alteration:
Sulfidized schist.

Age of mineralization:
Uncertain; the mineralized zone is stratabound.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings reported.

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/01/01

Site name(s): Unnamed (on peak 5480 southeast of Clearwater Creek)

Site type: Occurrence

ARDF no.: MH037

Latitude: 63.2093 **Quadrangle:** MH A-6

Longitude: 146.8935

Location description and accuracy:
This occurrence is near the top of peak 5480 near the center of section 1, T. 20 S., R. 4 E., Fairbanks Meridian. It corresponds to locality 8 in table 2 of Nokleberg and others (1991) and is about the same as a site sampled by Anaconda Minerals Company (Ellis, 1980). A probably related site is locality 20 of Clautice and others (1989), which is about one-quarter mile southeast of peak 5480 on the ridge crest.

Commodities:

Main: Ag, Pb, Zn

Other: Cu, Mo

Ore minerals: Galena, malachite, sphalerite (?), pyrite

Gangue minerals: Quartz

Geologic description:
The rock near the occurrence is muscovite schist, probably metarhyolite. The rocks are cut by low-angle (thrust) faults (Nokleberg and others, 1991). The deposit is a polymetallic vein rich in lead. Sample 82NK017C collected by the U.S. Geological Survey assayed 9.4 percent lead, 0.97 percent zinc, 0.27 percent copper, 47 parts per million (ppm) silver, and 15 ppm molybdenum (Nokleberg and others, 1991). A sample collected by Anaconda Minerals Company assayed 1.17 percent lead, 0.1 percent zinc, 0.305 percent copper, and 86 ppm molybdenum (Ellis, 1980). Similar mineralization was reported at a nearby site by Clautice and others (1989, their locality 20), where more than 1 percent lead, 0.52 percent zinc, and 0.26 percent copper occurred in a zone 2 to 3 inches wide in tuffaceous rock.

Alteration:

Age of mineralization:
The lead-rich vein deposit cuts muscovite schist of probable Paleozoic protolith age. The mineralization age is uncertain but possibly Cretaceous, related to widespread deformation that occurred at that time.

Deposit model:
Polymetallic vein (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
No extensive workings.

Production notes:

Reserves:

Additional comments:

References:

Ellis, 1980; Clautice and others, 1989; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/01/01

Site name(s): Unnamed (tributary to Pass Creek)

Site type: Occurrence

ARDF no.: MH038

Latitude: 63.1488 **Quadrangle:** MH A-6

Longitude: 146.9980

Location description and accuracy:
This occurrence is at about 4,100 feet elevation in a north-flowing tributary of Pass Creek, about a mile southwest of its junction with Clearwater Creek and in the SW1/4SW1/4 section 28, T. 20 S., R. 4 E., Fairbanks Meridian. The occurrence corresponds to locality A40 of Kurtak and others (1992), location 1 in figure 4 of Cobb (1979 [OFR 79-238]) and locality 1 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcocite, copper (native) (?), malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rocks at this occurrence are propylitized metabasalt of the Nikolai Greenstone of Late Triassic age. The metabasalt is sheared and locally silicified (Nokleberg and others, 1991; Kurtak and others, 1992). The deposit consists of copper minerals in bedrock and in float. Malachite, chalcocite, and possibly native copper occur in quartz or quartz-epidote veins and vesicles (Kurtak and others, 1992; Smith and others, 1973). U.S. Bureau of Mines sample 1416 assayed 0.16 percent copper and near background concentrations of gold (10 parts per billion) and silver (0.5 part per million) (Kurtak and others, 1992, table A41).

Alteration:
Metabasalt is propylitized and locally silicified.

Age of mineralization:
The deposit is probably either Cretaceous or early Tertiary (see MH060 and MH100).

Deposit model:
Basaltic Cu (Cox and Singer, 1986, model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The site has low development potential for copper deposits (Kurtak and others, 1992); there are no workings of significance.

Production notes:

Reserves:

Additional comments:

References:

Smith and others, 1973; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Unnamed (west of Clearwater Creek)

Site type: Occurrence

ARDF no.: MH039

Latitude: 63.1355 **Quadrangle:** MH A-6

Longitude: 146.9980

Location description and accuracy:

This occurrence is at an elevation of about 4,500 feet about 1.6 miles south-southwest of the junction of Clearwater and Pass Creeks, in the NW1/4SW1/4 section 33, T. 20 S., R. 4 E., Fairbanks Meridian. The occurrence corresponds to locality A41 of Kurtak and others (1992), to locality 2 in figure 4 of Cobb (1979 [OFR 79-238]), and to locality 41 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Azurite, chalcocite, chrysocolla, copper (native), malachite

Gangue minerals: Quartz

Geologic description:

Bedrock in the area consists of Nikolai Greenstone of Late Triassic age that is locally sheared and silicified and cut by quartz veinlets (Nokleberg and others, 1991; Kurtak and others, 1992, table A41).

The deposits consist of copper minerals, including chalcocite, chrysocolla, native copper, azurite, and malachite, in quartz veins, in vesicles, and on joint and fracture surfaces of propylitized and locally silicified basalt (Smith and others, 1973; Kurtak and others, 1992). Copper content of three samples of basalt with visible copper minerals assayed from 2.52 to 4.9 percent copper and 1.2 to 5.2 parts per million silver; gold was not reported (Kurtak and others, 1992).

Alteration:

Basalt is propylitized and locally silicified.

Age of mineralization:

The copper deposits are probably either Cretaceous or early Tertiary in age (see see MH060 and MH100).

Deposit model:

Basaltic Cu (Cox and Singer, 1986; model 23).

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

23

Production Status: None

Site Status: Inactive

Workings/exploration:

Several zones stained by copper oxides were sampled by the U.S. Bureau of Mines (Kurtak and others, 1992, table A41). Samples contained as much as 4.9 percent copper; a placer sample collected one mile south of the occurrence contained no gold.

Production notes:

Reserves:

Additional comments:

Copper values are locally very high, but the occurrences are small and there is a low potential for copper (Kurtak and others, 1992).

References:

Smith and others, 1973; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Unnamed (north of Coal Creek)

Site type: Occurrence

ARDF no.: MH040

Latitude: 63.1863 **Quadrangle:** MH A-6

Longitude: 146.9364

Location description and accuracy:
This occurrence is at an elevation of about 4,500 feet on the south side of the ridge north of Coal Creek. The occurrence is in the NE1/4 section 15, T. 20 S., R. 4 E., Fairbanks Meridian. It is an approximate location that may correspond to locality 4 in figure 4 of Cobb (1979 [OFR 79-238]).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rock at this site is the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The occurrence is one of several copper-in-basalt occurrences reported by Smith and others (1973, 1975). Copper, accompanied by epidote and quartz, occurs in primary chalcocite and secondary malachite in vesicles, veinlets, and on fracture surfaces. The host rock is propylitized.

Alteration:
Propylitic alteration.

Age of mineralization:
Probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Copper occurrence in greenstone (basalt). Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
This occurrence was found during mapping and reconnaissance sampling (Smith and others, 1973, 1975).

Production notes:

Reserves:

Additional comments:

References:

Smith and others, 1973; Smith and others, 1975; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Smith and others, 1973; Smith and others, 1975

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/01/01

Site name(s): Unnamed (south of Coal Creek)

Site type: Occurrence

ARDF no.: MH041

Latitude: 63.1746 **Quadrangle:** MH A-6

Longitude: 146.9319

Location description and accuracy:
This occurrence is at an elevation of about 4,900 feet on the northwest flank of peak 5410 approximately one-half mile south of Coal Creek. The occurrence is in the S1/2SW1/4 section 14, T. 20 S., R. 4 E., Fairbanks Meridian, and corresponds to locality 4 in figure 4 of Cobb (1979 [OFR 79-238]) and locality 3 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
This deposit is in propylitized metabasalt of the Nikolai Greenstone of Late Triassic age, a component of the Tangle subterrane, Wrangellia terrane (Nokleberg and others, 1991). The deposit consists of chalcocite and secondary malachite in quartz-epidote veinlets, in vesicles. and on fracture and joint surfaces (Smith and others, 1973). No samples were collected at the site, but small amounts of silver typically occur in the copper deposits of the Nikolai Greenstone.

Alteration:
Propylitic alteration.

Age of mineralization:
The deposits are probably either Cretaceous or early Tertiary in age (see MH060, MH087, and MH100).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Smith and others, 1973; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Smith and others, 1973

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Unnamed (north of Coal Creek)

Site type: Occurrence

ARDF no.: MH042

Latitude: 63.1944 **Quadrangle:** MH A-6

Longitude: 146.9257

Location description and accuracy:
This occurrence is at an elevation of about 4,800 feet on the north side of a ridge between Coal Creek and an unnamed east tributary to Clearwater Creek to the north. The occurrence is in the NW1/4SW1/4 section 11, T. 20 S., R. 4 E., Fairbanks Meridian, and corresponds to locality 9 of Kaufman (1964) and to locality 28 of Clautice and others (1989). The location is accurate.

Commodities:

Main: Au (?)

Other: Pb, W

Ore minerals: Pyrite

Gangue minerals: Iron carbonate

Geologic description:
The rocks at this occurrence are folded, east- to northeast-striking, interbedded andesite, basalt, limestone, and pyritic felsite probably of Triassic age (Kaufman, 1964; Nokleberg and others, 1982). The layered rocks are cut by a small granodiorite body of possible Cretaceous age.

The rocks at the site are iron-stained due to the weathering of pyritic felsite, of iron carbonate bands in the andesite, and of ferruginous cement in a breccia (Kaufman, 1964). Iron staining is visible from the air, and the area is not well prospected on the ground. Clautice and others (1989, plate 2) collected a rock sample containing anomalous amounts of arsenic, lead, and tungsten about 500 feet to the southwest of the map site on the crest of the ridge above Coal Creek.

Alteration:

Age of mineralization:
Late Triassic syngenetic mineralization, or Cretaceous (?), related to intrusion of granodiorite.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings at the site.

Production notes:

Reserves:

Additional comments:

Kaufman (1964, p. 7) proposed, 'Further prospecting is warranted to investigate the composition of the more inaccessible zones.'

References:

Kaufman, 1964; Nokleberg and others, 1982; Clautice and others, 1989.

Primary reference: Kaufman, 1964; Clautice and others, 1989

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Unnamed (south-flowing tributary to Coal Creek)

Site type: Occurrence

ARDF no.: MH043

Latitude: 63.1895 **Quadrangle:** MH A-6

Longitude: 146.9248

Location description and accuracy:
This occurrence is at an elevation of about 4,800 feet at the head of an unnamed south-flowing tributary to Coal Creek, in the S1/2SW1/4 section 11, T. 20 S., R. 4 E., Fairbanks Meridian. The location corresponds to mineral occurrence 27 of Clautice and others (1988, 1989). The location is accurate within one-tenth of a mile.

Commodities:

Main: Au

Other: Hg

Ore minerals: Arsenopyrite (?)

Gangue minerals: Quartz

Geologic description:
A small, probably Cretaceous granodiorite plug and felsite dikes intrude greenstone and argillite in the area of this occurrence (Kaufman, 1964). The deposit consists of an iron-stained quartz stockwork in argillite (Clautice and others, 1989, plate 2). The stockwork is strongly anomalous in arsenic (1,925 parts per million [ppm]) and mercury (64 ppm) and contains 170 parts per billion (ppb) gold (Clautice and others, 1988, sample 33882). Stream-sediment sample 33610S collected about one-half mile downstream was anomalous in arsenic (495 ppm) and somewhat anomalous in tungsten (25 ppm).

Alteration:

Age of mineralization:
Probably Cretaceous, related to intrusion of granodiorite and felsite dikes.

Deposit model:
Low-sulfide Au-quartz veins (Cox and Singer, 1986, model 36a).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings at the site.

Production notes:

Reserves:

Additional comments:

An arsenic anomaly at the mouth of the tributary stream suggests further prospecting is warranted in the area.

References:

Kaufman, 1964; Clautice and others, 1988; Clautice and others, 1989.

Primary reference: Kaufman, 1964; Clautice and others, 1989

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/14/01

Site name(s): Yukon; Mendeltna

Site type: Prospect

ARDF no.: MH044

Latitude: 63.1690 **Quadrangle:** MH A-6

Longitude: 146.9284

Location description and accuracy:

This prospect is about 1.3 miles east of Clearwater Creek and about 1.5 miles above its junction with Pass Creek. It is at an elevation of 4,500 to 5,100 feet on the south flank of peak 5410 in the NW1/4 section 23, T. 20 S., R. 4 E., Fairbanks Meridian. The prospect probably includes locality 5 in figure 4 of Cobb (1979 [OFR 79-238]) and localities 4 and 5 in table 2 of Nokleberg and others (1991). It also includes locality 33 of Clautice and others (1989) about 2,000 feet north of the center of section 23; see also table A37 of Kurtak and others (1992).

Commodities:

Main: Cu

Other: Ag, W

Ore minerals: Bornite, chalcocite, chalcopyrite, covellite, malachite, tetrahedrite (?)

Gangue minerals: Calcite, epidote, quartz

Geologic description:

Bedrock in the area consists of propylitized basalt of the Nikolai Greenstone of Late Triassic age that is cut by mafic dikes (Nokleberg and others, 1991; Kurtak and others, 1992). The basalt is locally sheared and silicified and is cut by quartz-epidote-calcite-filled veinlets. Veinlets and vesicles are stained with malachite and contain chalcocite, tetrahedrite (?), and, less commonly, bornite and covellite (Kurtak and others, 1992, table A37). At the ridgetop, a 2-inch vein in amygdaloidal basalt consists mainly of chalcopyrite and malachite (Clautice and others, 1989, locality 33).

Mineralized zones are of moderately high grade but are small and discontinuous (Kurtak and others, 1992). Sample 3010 containing bornite and covellite in greenstone assayed 3.28 percent copper; sample 1411 assayed 0.41 ounce of silver per ton, 3.72 percent copper, and 50 parts per million (ppm) tungsten. A narrow vein sampled by Clautice and others (1989, locality 33) contained more than 1 percent copper and 24.6 ppm silver.

Alteration:

Silicification and propylitization of basalt.

Age of mineralization:

The deposits are probably of either Cretaceous or early Tertiary age (see MH060 and MH100).

Deposit model:

Basaltic Cu (Cox and Singer, 1986; model 23).

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

23

Production Status: None

Site Status: Inactive

Workings/exploration:

The Mendeltna (Kardex site number KX68-79) claims were located by Atwater in 1957; the Yukon claims (Kardex site number KX68-28) were located by F.S. Pettyjohn, Jr., in 1961 (Kurtak and others, 1992; Heiner and Porter, 1972). State geologists found other copper veins in later reconnaissance work (Clautice and others, 1988, 1989). There are no significant workings at the site.

Production notes:

Reserves:

Additional comments:

Select samples contain high copper values, but the exposures are very small and discontinuous, and the prospect has low potential for commercial copper and silver deposits (Kurtak and others, 1992).

References:

Heiner and Porter, 1972; Cobb, 1979 (OFR 79-238); Clautice and others, 1988; Clautice and others, 1989; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Clautice and others, 1989; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Unnamed (south end of Clearwater Mountains, east of Clearwater Creek)

Site type: Occurrence

ARDF no.: MH045

Latitude: 63.1669 **Quadrangle:** MH A-6

Longitude: 146.8962

Location description and accuracy:
This occurrence is at an elevation of about 4,300 feet about 2.5 miles east-northeast of the junction of Clearwater and Pass Creeks, and about two-tenths of a mile west of the center of section 24, T. 20 S., R. 4 E., Fairbanks Meridian. It corresponds to locality 6 in figure 4 of Cobb (1979 [OFR 79-238]) and locality 5 in table 2 of Nokleberg and others (1991). It is also an unnumbered copper occurrence on plate 2 of Clautice and others (1989) that was originally reported by Smith and others(1973).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Chalcocite, malachite

Gangue minerals: Quartz

Geologic description:
The rock near the occurrence is propylitized basalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The deposit consists of chalcocite or secondary malachite in quartz veins, in vesicles, and on fracture or joint surfaces of the metabasalt (Smith and others, 1973). No samples were collected at the site, but small amounts of silver commonly accompany copper in deposits in the Nikolai Greenstone.

Alteration:
Propylitic alteration.

Age of mineralization:
The copper deposits are probably either Cretaceous or early Tertiary (see MH060 and MH100).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no significant workings at this site. The occurrence was discovered during geologic reconnaissance (Smith and others, 1973).

Production notes:

Reserves:

Additional comments:
The copper deposits are small and discontinuous.

References:
Smith and others, 1973; Cobb, 1979 (OFR 79-238); Clautice and others, 1989; Nokleberg and others, 1991.

Primary reference: Smith and others, 1973

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Little Clearwater lode

Site type: Occurrence

ARDF no.: MH046

Latitude: 63.1492 **Quadrangle:** MH A-6

Longitude: 146.8837

Location description and accuracy:
The Little Clearwater lode is at an elevation of about 4,850 feet about 0.7 mile southwest of peak 5315 at the south end of the Clearwater Mountains; it is in the SE1/4SE1/4 section 24, T. 20.S., R. 4 E., Fairbanks Meridian. The occurrence corresponds to locality A36 of Kurtak and others (1992), locality 3 in figure 4 of Cobb (1979 [OFR 79-238]), and locality 6 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Chalcocite, chalcopyrite, malachite

Gangue minerals: Calcite, quartz

Geologic description:
The rock at the occurrence is propylitized basalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The deposit consists of copper-bearing quartz-calcite veins in the weakly altered basalt. Reported copper minerals are chalcopyrite, chalcocite, and malachite. Sample 1414 from metabasalt assayed 0.34 ounce of silver per ton and 1.08 percent copper; gold is present in a near-background amount (10 parts per billion) (Kurtak and others, 1992, table A32, p. 165).

Alteration:
Propylitic alteration.

Age of mineralization:
The deposit is probably either Cretaceous or early Tertiary in age (see MH060, MH087, or MH100).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
U.S. Bureau of Mines sample 1414 contained 1.08 percent copper and 0.34 ounce of silver per ton (Kurtak and others, 1992, table A32).

Production notes:

Reserves:

Additional comments:
The mineralized zones are small and mostly in rubble.

References:
Smith and others, 1973; Cobb, 1979 (OFR 79-238); Clautice and others, 1989; Nokleberg and others, 1991.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Unnamed (tributary to West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH047

Latitude: 63.1843 **Quadrangle:** MH A-6

Longitude: 146.8018

Location description and accuracy:
This occurrence is at an elevation of about 5,000 feet along an east-flowing tributary of the West Fork Maclaren River. The occurrence is in the SE1/4NW1/4 section 16, T. 20 S., R. 5 E., Fairbanks Meridian, and corresponds to locality 7 in figure 4 of Cobb (1979 [OFR 79-238]).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rock of this occurrence is metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The deposit consists of malachite and chalcocite in quartz-epidote veins, in vesicles, and on fracture and joint surfaces in propylitized basalt (Smith and others, 1973). No samples were collected at this site, but small amounts of silver commonly occur in the copper deposits of the Nikolai Greenstone.

Alteration:
Propylitic alteration.

Age of mineralization:
The deposit is probably Cretaceous or early Tertiary in age (see MH060 and MH100).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The deposit was discovered during regional reconnaissance; there are no workings.

Production notes:

Reserves:

Additional comments:

References:

Smith and others, 1973; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Smith and others, 1973

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Mex

Site type: Prospect

ARDF no.: MH048

Latitude: 63.2093 **Quadrangle:** MH A-6

Longitude: 146.8569

Location description and accuracy:

The Mex prospect extends into parts of five sections near the divide between Clearwater and Little Clearwater Creeks. The location for this record is at the approximate center of a tungsten-rich part of the prospect. It is at an elevation of about 4,800 feet, 500 feet southeast of the center of section 6, T. 20 S., R. 5 E., Fairbanks Meridian. The prospect corresponds to locality A31 of Kurtak and others (1992); the area includes localities 13, 14, 15, 18, and 19 of Clautice and others (1989).

The Mex claims extend for about 2 miles to the north-northeast of the map site and include large parts of sections 29, 31, and 32, T. 19 S., R. 5 E. (G.A. Moerlein and R.A. Blakestad, written communications, 1980). This record describes only the claim block in and near section 6, T. 20 S., R. 5 E.

Commodities:

Main: Au, Sb, W

Other: Ag, Cu, Hg, Pb, Zn

Ore minerals: Chalcopyrite (?), galena (?), malachite, pyrite, scheelite, stibnite

Gangue minerals: Quartz

Geologic description:

The rocks at the Mex prospect are in the footwall of a major low-angle thrust fault zone. The footwall rocks include Paleozoic or possibly lower Mesozoic greenstone, tuff, argillite, shale, and sandstone. These rocks are intruded by quartz diorite, quartz monzonite, and monzonite. Mineral deposits are spatially linked to fine-grained felsitic intrusions (Clautice and others, 1989; Kurtak and others, 1992; Nokleberg and others, 1991).

Mineralization at the prospect is complex; base metal deposits are probably skarn deposits associated with granitic intrusives. Other mineralization seems more closely related to altered zones in and subparallel to the thrust faults. The complex juxtaposed metal suite and vuggy mineral textures suggest that some mineralization is epithermal.

Private sector geologists who mapped and sampled the deposit in about 1980 did not recognize thrust faulting, but they mapped the Mex and related occurrences as crudely stratabound deposits that parallel the later recognized thrusts (G. A. Moerlein and R. A. Blakestad, written communications, 1980).

The prospect contains a diverse metal suite. Minerals identified include primary scheelite, stibnite, pyrite, almost certainly galena and chalcopyrite, and secondary malachite. Zones particularly rich in tungsten (scheelite) occur at and near localities 18 and 19 of Clautice and others (1989). R.A. Blakestad found values of as much as 51 percent tungsten at locality 18 near the center of section 6 (T. 20 S., R. 5 E.). Scheelite also occurs in brecciated limestone and at a contact been shale and reddish carbonate rock at multiple localities 19 near the south boundary of section 6. Scheelite was panned from the headwaters of a drainage in the east part of adjacent section 1, T. 20 S., R. 4 E.

Small veins of massive stibnite occur locally. Veins that assay about 27 percent antimony contain from 0.058 to 0.06 ounce of gold per ton and 0.13 to 0.36 ounce of silver per ton and are anomalous in mercury (samples 1590-1591, Kurtak and others, 1992, table A31). Arsenic is also locally anomalous. The presence of galena or a related lead oxide mineral is suggested by 1.67 percent lead contained in malachite-stained pyritic metasedimentary rocks (sample 1405). Discrete lead and copper minerals, such as galena and chal-

copyrite, probably occur in a 9-foot-wide quartz vein on the south side of peak 5330 in the NE1/4 section 6, T. 20 S., R. 5 E., that assayed 240 parts per billion gold, 28 parts per millions (ppm) silver, 465 ppm arsenic, 0.27 percent copper, and 0.20 percent lead (Clautice and others, 1989).

Alteration:
Extensive quartz-carbonate type alteration; local skarn formation.

Age of mineralization:
Probably Late Cretaceous or early Tertiary, nearly synchronous with thrust faulting.

Deposit model:
Complex mineral deposit; replacement lodes related to thrust zones; local skarn. Epithermal mineralization associated with felsite dikes (Kurtak and others, 1992).

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:
Claims were first located about 1972. Geologic and geochemical work was done on the claims in 1980 by Mankomen Exploration Company partly on behalf of Occidental Minerals (Oxymin) (R.A. Blakestad and G.A. Moerlein, written communications, 1980). The area was examined in reconnaissance by Anaconda Minerals Company the same year (Ellis, 1980). In 1982, the claims were trenched and geophysically surveyed by magnetic, VLF, and EM methods. In 1983, the property was leased to Anshutz Mining Corp.; in 1988, it was briefly leased to Amax Exploration (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

References:
Ellis, 1980; Clautice and others, 1989; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Clautice and others, 1989; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/01/01

Site name(s): Unnamed (between Clearwater Creek and West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH049

Latitude: 63.2145 **Quadrangle:** MH A-6

Longitude: 146.8302

Location description and accuracy:
This occurrence is at an elevation of about 5,500 feet about midway between Clearwater Creek and the West Fork Maclaren River. The map site is near the top of the ridge about 0.4 mile west-northwest of VABM Little in section 15, T. 20 S., R. 5 E., Fairbanks Meridian. The occurrence corresponds to locality 8 in figure 4 of Cobb (1979 [OFR 79-238]) and to locality 15 in table 2 of Nokleberg and others (1991). The location is probably accurate within one-third mile.

Commodities:

Main: Ag, Cu

Other: Au

Ore minerals: Bornite, chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The country rock at this occurrence is basalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The mineral deposit is a vein in propylitically altered greenstone. A quartz-epidote vein in an approximately 9-foot-wide shear zone contains bornite, chalcocite, and malachite. Sample 79IL031A of vein material assayed 2.4 percent copper, 15 parts per million (ppm) silver, and 0.1 ppm gold (Nokleberg and others, 1991, locality 15).

Alteration:
Propylitic alteration of basalt.

Age of mineralization:
The copper deposits are younger than a pre-Late Jurassic period of folding of basaltic host series (Stout, 1976, p. 30-31). They are probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Copper-bearing vein in weakly cupriferous greenstone. Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence was probably first reported in the early 1970's (Smith and others, 1973, 1975); it was re-visited and sampled by the U.S. Geological Survey in the 1980's (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Smith and others, 1973; Smith and others, 1975; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/01/01

Site name(s): Mensim; Little Green; Green Tree

Site type: Prospect

ARDF no.: MH050

Latitude: 63.2496 **Quadrangle:** MH B-6

Longitude: 146.8435

Location description and accuracy:

This prospect is on the divide between Clearwater Creek and the West Fork Maclaren River at an elevation of about 5,000 feet. The prospect is approximately at the midpoint of the boundary between sections 19 and 20, T. 19 S., R. 5 E., Fairbanks Meridian. It corresponds to locality A29 of Kurtak and others (1992), approximately to the Green Tree claim (Heiner and Porter, 1972; Kardex site number KX68-85), and the Mensim and Little Green claims. The location is approximate, in the SW1/4 section 20, T. 19 S., R. 5 E., Fairbanks Meridian. The MAS/MILS number is 002680034.

Commodities:

Main: Cu

Other: Au, Ag, Fe

Ore minerals: Arsenopyrite, chalcopyrite (?), magnetite (?), pyrite

Gangue minerals: Carbonates, quartz

Geologic description:

The rocks near this prospect are argillite of probable Cretaceous age and are cut by quartz veins and granitic dikes. The rocks are iron-stained and contain disseminated pyrite, possibly chalcopyrite, and magnetite. The property was first located in 1964 for copper, gold, iron, and silver (Heiner and Porter, 1972; Kardex site number KX68-85). The U.S. Bureau of Mines (Kurtak and others, 1992) probably occupied and sampled this site in a search for molybdenite-bearing veins.

Kurtak and others (1992) reported disseminated pyrite and arsenopyrite in felsic dike rocks at the property. Some of the dikes and veins contain small amounts of gold; a felsic dike with disseminated pyrite (sample 949) contained 125 parts per billion (ppb) gold, and a quartz-carbonate vein (sample 602) contained 395 ppb gold. A quartz vein in rubble (sample 605) contained 0.98 ounce of silver per ton and 282 parts per million lead.

Alteration:

Age of mineralization:

Probably Late Cretaceous or younger. Veins and dikes cut argillite of probable Cretaceous age.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:

No reported workings. The area was sampled in reconnaissance by the U.S. Bureau of Mines (Kurtak and

others, 1992).

Production notes:

Reserves:

Additional comments:

References:
Heiner and Porter, 1972; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/30/01

Site name(s): Unnamed (west side of West Fork of the Maclaren River)

Site type: Occurrence

ARDF no.: MH051

Latitude: 63.2536 **Quadrangle:** MH B-6

Longitude: 146.8270

Location description and accuracy:

The occurrence is at an elevation of 4,800 feet on an unnamed east-flowing tributary to the west side of the West Fork Maclaren River. The unnamed creek is east of the divide at the head of Clearwater Creek. The occurrence is near the center of section 20, T. 19 S., R. 5 E., Fairbanks Meridian. The site corresponds to locality 12 of Kaufman (1964), locality 13 in figure 4 of Cobb (1979 [OFR 79-238), and locality 4 of MacKevett and Holloway (1977). The location is probably accurate within one-third mile.

Commodities:

Main: Cu, Mo

Other: Ag

Ore minerals: Chalcopyrite, pyrite, malachite, molybdenite

Gangue minerals: Iron-bearing carbonate mineral, quartz, white mica

Geologic description:

This occurrence consists of sulfide-bearing blocks of talus and of mineralized bedrock. Rocks near the occurrence are folded argillites of probable Cretaceous age (Nokleberg and others, 1991). The argillite is cut by dikes and, possibly, by a small stock of granite. The area is iron stained due to the oxidation of iron-bearing carbonate and of pyrite disseminated in the argillite; some of the talus blocks are also coated with malachite. Kaufman (1964, p. 7) inferred that the pyritic argillite was peripheral to fine- to medium-grained granite in a dike swarm or a small stock.

Talus fragments of granitic material contain abundant disseminated pyrite and sparsely disseminated chalcopyrite and molybdenite. Molybdenite also occurs in quartz-vein-rich talus. Grab samples of mineralized talus contained 0.15 to 0.25 percent molybdenum (Kaufman, 1964, p. 7).

A nearby area was investigated by the U.S. Bureau of Mines in a search for the source of the mineralized granitic material (Kurtak and others, 1992). One quartz-bearing sample contained 29 parts per million molybdenum; a quartz-carbonate vein contained 395 parts per billion gold, and another vein contained 0.98 ounce of silver per ton. The area is very rugged, and the main source of mineralized material may be buried by talus.

Alteration:

Age of mineralization:

Cretaceous or younger. Mineralized dikes cut argillite of probable Cretaceous age.

Deposit model:

Porphyry Cu-Mo (Cox and Singer, 1986; model 21a).

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

21a

Production Status: None

Site Status: Inactive

Workings/exploration:
The area has been mapped and sampled in reconnaissance (Kurtak and others, 1992); claims have been located in the area, but little physical prospecting has been done.

Production notes:

Reserves:

Additional comments:

References:
Kaufman, 1964; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kaufman, 1964; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (western 'Joy Creek' area)

Site type: Prospects

ARDF no.: MH052

Latitude: 63.2411 **Quadrangle:** MH A-6

Longitude: 146.8391

Location description and accuracy:

A cluster of mineral occurrences and prospects is about one-quarter mile west-northwest of the center of section 29, T. 19 S., R. 5 E., Fairbanks Meridian. This cluster includes mineral localities 1 to 3 on plate 2 of Clautice and others (1989). These localities probably correspond to localities 13 and 14 in table 2 of Nokleberg and others (1991) and locality 12 in figure 4 of Cobb (1979 [OFR 79-238]). This area is also described by Clautice and others (1989) and Smith and others (1973). The prospects are included in the locally named 'Joy Creek' area, which was mapped in detail by R.A. Blakestad and G.A. Moerlein (written communications, 1980).

Commodities:

Main: Cu

Other: Ag, Au, Pb, Zn

Ore minerals: Azurite, bornite, chalcopyrite, galena (?), malachite, pyrite, sphalerite (?)

Gangue minerals: Carbonates, iron carbonates, quartz

Geologic description:

The mineral occurrences in this area are in the footwall of a major low-angle thrust fault. The hanging wall of the thrust is composed of argillite and graywacke of Jurassic to Cretaceous age (Clautice and others, 1989, plate 1). The footwall host rocks of the mineral deposits are mainly highly faulted andesite-basalt of probable Late Triassic age. A pyritic felsic body has been emplaced along the thrust (?) fault in this locality (Clautice and others, 1989).

Clautice and others (1989) described the following deposits (localities 1 to 3): quartz-carbonate veins in brecciated greenstone assayed as much as 1,880 parts per billion (ppb) gold, 1,080 parts per million (ppm) lead, and 5,990 ppm zinc. Although galena and sphalerite are not reported at locality 1, the lead and zinc values indicate their probable presence. The deposit at locality 2 contains more than 1 percent copper in malachite-stained greenstone. The deposit at locality 3 contains abundant pyrite in greenstone; the pyrite is extensively altered to limonite, and chalcopyrite, azurite, and malachite are abundant locally. This last deposit is probably at the site reported by Clautice and others (1989) and Smith and others (1973) and by Cobb (1979 [OFR 79-238, locality 12, figure 4). It also probably corresponds to locality 13 of Nokleberg and others (1991, table 2), who reported the presence of bornite and iron-bearing carbonate minerals; a sample assayed 2.4 percent copper and 5 ppm silver. R.A. Blakestad (written communication, 1980) reported about 0.5 ppm gold in black Triassic argillite in the fault footwall of Jurassic argillite at sites close to those visited by Clautice and her associates.

The prospect is fairly old. Clautice and others (1989) noted a few shallow prospect pits near locality 3 of Clautice and others (1989). The so-called Joy Creek area was mapped in detail by Blakestad in 1980.

Alteration:

Age of mineralization:

Probably mid- to Late Cretaceous, during a period of regional deformation.

Deposit model:
Diverse polymetallic deposits in footwall of a major thrust fault.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
A few shallow prospect pits were dug before about 1970 (Clautice and others, 1989). The area was studied in reconnaissance by Clautice and others (1989) and in detail by Rodney A. Blakestad (written communication, 1980).

Production notes:

Reserves:

Additional comments:

References:
Smith and others, 1973; Cobb, 1979 (OFR 79-238); Clautice and others, 1989; Nokleberg and others, 1991.

Primary reference: Smith and others, 1972; Clautice and others, 1973

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/03/01

Site name(s): Unnamed (northern Clearwater Mountains west of peak 5315)

Site type: Occurrences

ARDF no.: MH053

Latitude: 63.2472 **Quadrangle:** MH A-6

Longitude: 146.8284

Location description and accuracy:
This record describes a mineralized area that includes several related deposits that occur from about 4,650 to 4,800 feet in elevation in a west-trending gully about a half-mile west of peak 5315. Another deposit is about 1,000 feet to the south at an elevation of about 4,600 feet. The location, which is near the middle of the south boundary of section 20, T. 19 S., R. 5 E., Fairbanks Meridian, is a general one for the group of occurrences.

Commodities:

Main: W

Other:

Ore minerals: Scheelite

Gangue minerals:

Geologic description:
Mineral deposits of this record probably occur in the same low-angle thrust fault zone as those at MH052 and MH054. Rocks at this site include metabasalt of Late Triassic age and limestone, probably of the same age, the inferred host of skarny scheelite deposits.
The location of the deposits was shown on a map prepared by G.A. Moerlein (written communication, 1980). The deposits themselves are not described, but by inference from records MH052 and MH054, they are crudely stratabound skarny bodies in the footwall of a major low-angle thrust fault zone.

Alteration:

Age of mineralization:
Probably mid- to Late Cretaceous, formed during a period of regional deformation and metamorphism.

Deposit model:
W skarn (?) (Cox and Singer, 1986; model 14a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
14a (?)

Production Status: None

Site Status: Inactive

Workings/exploration:
Deposits were discovered in about 1980 by either George A. Moerlein or Rodney A. Blakestad during detailed evaluation of a large mineralized area including MH052, MH054, and MH055.

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/03/01

Site name(s): Clearwater Mountain claims (Copper Knob block; Honey claims; Pat claims)

Site type: Prospects

ARDF no.: MH054

Latitude: 63.2355 **Quadrangle:** MH A-6

Longitude: 146.8319

Location description and accuracy:

Prospects in the Copper Knob block of the Clearwater Mountain claims (G.A. Moerlein, written communication, 1980) are in a steep, east-flowing creek that was called Copper Creek by Clautice and others (1989). Copper Creek is tributary to locally named Honey Creek, a tributary of the West Fork Maclaren River. The location is at the approximate center of a group of mineral deposits exposed along Copper Creek, at an elevation of about 4,800 feet in the approximate center of the SW1/4 section 29, T. 19 S., R. 5 E., Fairbanks Meridian. The location is accurate as the center of a group of deposits aligned along Copper Creek. The site corresponds approximately to the Honey claim prospects of Kurtak and others (1992, p. 147-149, locality A28) and represents occurrences 5 to 9 of Clautice and others (1989).

Commodities:

Main: Ag, Au, Cu

Other: Mo, W

Ore minerals: Arsenopyrite, chalcopyrite, malachite, molybdenite, pyrite, scheelite (?), tennantite (?), tetrahedrite

Gangue minerals: Carbonate mineral, epidote, quartz

Geologic description:

The rocks in the area are metabasalt and related rocks of the Nikolai Greenstone of Late Cretaceous age thrust-faulted against argillite, slate, and limestone of uncertain age. Possibly Cretaceous or early Tertiary felsic dikes intrude the layered rocks. Layered rocks are intruded by a hornblende pyroxene sill near deposits (occurrences) 6 and 7 (Clautice and others, 1989; Kurtak and others, 1992).

Mineralization in the Copper Creek (informal name) area is complex: it includes skarn, mineralized dikes and shear zones, and quartz veins. The deposits contain gold, silver, copper, molybdenum, and tungsten (Clautice and others, 1989; Kurtak and others, 1992). Primary metallic minerals of the area include arsenopyrite, chalcopyrite, molybdenite, pyrite, tetrahedrite, and possibly scheelite and tennantite. The rocks are locally gossanized or stained with malachite.

Mineral deposits (occurrences) 6 to 9 of Clautice and others (1989) are clustered in a small part of the area. A thin high-grade chalcopyrite-bearing zone assayed 1,500 parts per billion (ppb) gold, 85.4 parts per million (ppm) silver, and more than 1 percent copper (deposit 6). Another thin (4 to 5 inch) quartz-epidote vein contains 8,710 ppm copper and 460 ppb gold (deposit 5). Samples collected from a 300-foot-long 3-foot-thick quartz-carbonate zone at the base of a gabbroic sill contain from 350 to 540 ppb gold (deposit 7). Other nearby mineral occurrences consist of disseminated chalcopyrite-pyrite-molybdenite in felsic dike rock and auriferous massive pyrite.

Private studies also indicate substantial mineralization in the area. In 1980, R.A. Blakestad and G.A. Moerlein examined and mapped the property, respectively, for Mankomen Exploration Company and for Occidental Minerals. According to them, the most significant occurrence is a strongly pyritized fault zone as much as 15 feet wide; the zone strikes west-northwest in Copper Creek and can be traced from about 4,700 feet to 5,000 feet in elevation and for 500 feet on strike. The area is immediately east of deposits (occurrences) 6 to 9 of Clautice and others (1989). Five samples collected from the pyritic zone ranged

from 0.1 to 6 ppm gold and averaged 2.7 ppm gold (G.A. Moerlein, written communication, 1980). Moerlein believed that some of the rock previously mapped as gabbro was actually actinolite skarn. Probably the same pyritic zone recognized by Blakestad and Moerlein was also sampled and found auriferous by Anaconda Minerals Company in 1980 (Ellis, 1980).

Significant mineralization was also reported in roughly the same area by the U.S. Bureau of Mines (Kurtak and others, 1992), although the precise location from which the Bureau samples were taken is unknown. They reported pyrite, chalcopyrite, arsenopyrite, tetrahedrite, and possibly tennantite from quartz veins and skarn. An 8-foot channel sample collected across a 100-foot-long skarn zone assayed 1.81 percent copper, 1.86 ounce silver per ton, and 340 ppm tungsten. A 7-foot-long sample collected across a quartz breccia zone traceable for at least 500 feet on strike assayed 0.06 ounce of gold per ton, 0.57 ounce of silver per ton, and 200 ppm tungsten (Kurtak and others, 1992, p. 147-149). This occurrence may be the pyritic zone recognized and sampled by Blakestad and Moerlein.

Alteration:

Quartz-carbonate alteration; skarn replacement.

Age of mineralization:

Younger than Late Triassic; probably Cretaceous or early Tertiary related to emplacement of felsite and mafic igneous rocks.

Deposit model:

Skarn, mineralized shear zone, and vein deposits; polymetallic in character. Cu skarn and polymetallic veins (Cox and Singer, 1986; models 18b and 22c).

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

18b, 22c

Production Status: None

Site Status: Probably inactive

Workings/exploration:

The area has been explored by shallow test pits. The Pat claims were located in the area in 1972-74; the Honey claims were located in 1979 (Kurtak and others, 1992). George A. Moerlein (written communication, 1980) mapped the prospects in the Copper Knob block of the Clearwater Mountain claims of Mankomen Exploration Company. The area was also visited and sampled by Anaconda Mineral Company in 1980 (Ellis, 1980).

Production notes:

Reserves:

Additional comments:

Work by private companies and government agencies suggests a strongly mineralized area; trenching and drilling were recommended by the U.S. Bureau of Mines (Kurtak and others, 1992, p. 148).

References:

Ellis, 1980; Clautice and others, 1989; Kurtak and others, 1992.

Primary reference: Clautice and others, 1989

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/02/01

Site name(s): Clearwater Mountain claims; 'Joy Creek' block

Site type: Prospect

ARDF no.: MH055

Latitude: 63.2415 **Quadrangle:** MH A-6

Longitude: 146.8221

Location description and accuracy:

A cluster of mineral deposits at elevations of 4,200 to 4,600 feet occurs near the center of section 29, T. 19 S., R. 5 E., Fairbanks Meridian. The location for this record is about at the center of the section. The mineralized area includes locality 4 of Clautice and others (1989), which lies west-northwest of the center of section 29, and several mineral locations of R.A. Blakestad (written communication, 1980), which lie east of the center of section 29. The location is accurate as the approximate center of a group of mineral deposits. This site was called the Joy Creek area by Blakestad and G.A. Moerlein (written communications, 1980), who mapped the area in detail in about 1980.

Commodities:

Main: Au, Cu

Other: Ag, Mo, W

Ore minerals: Chalcopyrite, malachite, pyrite, scheelite

Gangue minerals: Epidote, quartz, 'skarn' minerals

Geologic description:

The mineral deposits of the locally named Joy Creek area are in complexly faulted rocks in the footwall of a major thrust (Clautice and others, 1989, plate 1). Mineralized rocks in the footwall zone include greenstone of probable Late Triassic age, skarn in limestone, also believed to be Triassic, and argillite and andesitic volcanic rocks of uncertain age.

Mineral deposits are of diverse types. A mineral deposit about 400 feet west-northwest of the center of section 29 consists of gray-green epidote-silica rock that contains disseminated pyrite and chalcopyrite; it is locally stained with malachite. A sample assayed 295 parts per billion (ppb) gold, 1,775 parts per million (ppm) copper, and 400 ppm tungsten (Clautice and others, 1989, locality 4). Several deposits are clustered about 500 feet east-southeast of the center of section 29. A gold-bearing copper skarn occurs south of , and parallel to, a quartz porphyry dike; gold also occurs in slightly altered sedimentary rocks east of a fault that appears to cut off the skarn body. The copper-bearing skarn contains as much as 5.5 ppm gold; the metasedimentary rocks contain as much as 7.6 ppm gold (R.A. Blakestad, written communication, 1980).

Anomalous values in stream-sediment and pan-concentrate samples seem to indicate widespread mineralization. Pan-concentrate samples collected by Blakestad from the small creeks below the mineral occurrences contained gold and scheelite and had anomalous values of silver. A pan-concentrate sample collected in the main drainage about one mile west of the tributary creeks contained anomalous amounts of gold, silver, tungsten, and molybdenum (O'Leary and others, 1982).

Alteration:

Silicification; formation of skarn in limy rocks.

Age of mineralization:

Possibly Cretaceous, synchronous with regional metamorphism and emplacement of quartz porphyry dikes.

Deposit model:
Complex epigenetic mineralization, including skarn and replacement deposits in limy sedimentary rocks. Cu skarn (?) (Cox and Singer, 1986; model 18b).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
The area was mapped and sampled in detail in 1980 by Rodney A. Blakestad for Mankomen Exploration and by George A. Moerlein for Occidental Minerals Co. (written communications, 1980). Regional geologic work and sampling was done on behalf of the U.S. Bureau of Mines by the Alaska Division of Geological and Geophysical Surveys (Clautice and others, 1988, 1989).

Production notes:

Reserves:

Additional comments:

References:
O'Leary and others, 1982; Clautice and others, 1988; Clautice and others, 1989.

Primary reference: Clautice and others, 1989

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/03/01

Site name(s): Unnamed (west of West Fork Maclaren River near VABM Little)

Site type: Occurrences

ARDF no.: MH056

Latitude: 63.2178 **Quadrangle:** MH A-6

Longitude: 146.8150

Location description and accuracy:

Numerous occurrences of copper minerals are at elevations of 5,200 to 5,900 feet near VABM Little, about 2 miles west of the West Fork Maclaren River. Most of the occurrences are on the north side of the mountain in the NE1/4 section 5 and NW1/4 section 4, T. 20 S., R. 5 E., Fairbanks Meridian. For this record the location is in the NE1/4 section 5 and is a general location for the occurrences. The site corresponds to locality A27 of Kurtak and others (1992), to locality 9 in figure 4 of Cobb (1979 [OFR 79-238]), and to locality 17 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Cu

Other: Au, Hg, Pb, Sb, W, Zn

Ore minerals: Bornite, chalcopyrite, covellite (?), galena, scheelite (?), sphalerite, tetrahedrite, tennantite (?)

Gangue minerals: Calcite, epidote, quartz

Geologic description:

The area is underlain by basalt and andesite of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1982, 1991). The volcanic rocks are sheared, faulted, and propylitized. Locally, faults are filled with quartz-calcite-epidote veins containing copper- and silver-bearing minerals that include bornite, chalcopyrite, and tetrahedrite and possibly covellite and tennantite. On the basis of metal concentrations found in assay, some of the veins probably contain galena, sphalerite, and scheelite.

The veins typically are discontinuous and narrow, less than 6 inches thick. One vein, however, widens to 2 feet thick and can be traced discontinuously through rubble crop for 250 feet (Kurtak and others, 1992, p. 144). According to assays reported by Kurtak and others (1992), propylitic basalt is weakly cupriferous (311 parts per million [ppm] copper, sample 637). Some of the veins are significantly richer. Representative samples composited from a 30-foot-wide rubble zone assayed 7.68 percent copper and 1.08 ounce silver per ton (sample 1298). Sample 1741 of a tetrahedrite-bearing vein contained 7.43 percent copper and 990 ppm tungsten; possibly this vein contains scheelite. Sample 1266 (1.0-foot-wide) from the vein that can be traced 250 feet assayed 16.9 percent copper and 0.85 ounce silver per ton. Sample 1852 showed that elevated base-metal and trace-element values and gold occur in one quartz-tetrahedrite vein that assayed 1.51 percent copper, 2.12 percent lead, 1.16 percent zinc, also 990 ppm arsenic, 400 parts per billion gold, 330 ppm tungsten, 323 ppm mercury, and 0.67 percent antimony. This vein almost certainly contains galena and sphalerite.

Alteration:

The mineralization is associated with quartz-calcite-epidote in propylitized intermediate and mafic volcanic rocks.

Age of mineralization:

Probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
Mineralization was first reported near VABM Little in the early 1970's (Smith and others, 1973). The area was examined and sampled by the U.S. Bureau of Mines in about 1990; the Bureau collected 15 samples, mostly in rubble crop, during the course of study of the Valdez Creek Mining District (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:
The U.S. Bureau of Mines recommended trenching in rubble crop areas to better define the veins, although it was recognized that the veins apparently were narrow and discontinuous (Kurtak and others, 1992).

References:
Smith and others, 1973; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1982; Nokleberg and others, 1991; Clautice and others, 1989; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/03/01

Site name(s): Unnamed (west of West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH057

Latitude: 63.2254 **Quadrangle:** MH A-6

Longitude: 146.8007

Location description and accuracy:
This occurrence is at an elevation of about 4,300 feet on the south side of an east-flowing tributary to the West Fork Maclaren River, in the SE1/4 NW1/4 section 33, T. 19 S., R. 5 E., Fairbanks Meridian. The occurrence corresponds to locality 11 in figure 4 of Cobb (1979 [OFR 79-238]) and to locality 16 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Chalcocite, covellite (?), malachite, pyrrhotite

Gangue minerals: Epidote, quartz

Geologic description:
The rock at this occurrence is propylitized basalt and andesite of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1982, 1991). Mineral deposits at the occurrences are quartz-epidote veins from 2 to 6 inches wide in a minor fault zone. The veins contain local concentrations of primary chalcocite, pyrrhotite, covellite (?), and secondary malachite (Smith and others, 1973, location B). Copper deposits hosted in the Nikolai Greenstone typically contain small amounts of silver.

Alteration:
Nikolai Greenstone is propylitized.

Age of mineralization:
Probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Basaltic Cu (Cox and Singer, 1986, model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
Natural outcrops and float.

Production notes:

Reserves:

Additional comments:

References:

Smith and others, 1973; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1982; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Smith and others, 1973

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/03/01

Site name(s): Unnamed (west side of West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH058

Latitude: 63.2210 **Quadrangle:** MH A-6

Longitude: 146.7828

Location description and accuracy:
This occurrence is on the west side of the West Fork Maclaren River valley at an elevation of approximately 3,600 feet, in the SE1/4SE1/4 section 33, T. 19 S., R. 5 E., Fairbanks Meridian. The occurrence corresponds to locality 10 of Kaufman (1964) and locality 10 in figure 4 of Cobb (1979 [OFR 79-238]). The location is probably accurate within one-third mile.

Commodities:

Main: Cu

Other: Ag

Ore minerals: Azurite, bornite, chalcocite, chrysocolla, malachite

Gangue minerals: Calcite, epidote, quartz

Geologic description:
The rock at this occurrence is Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1982, 1991). Copper-bearing float occurs throughout a rock slide at the locality (Kaufman, 1964). The float consists of propylitized greenstone containing copper-rich pods and copper-bearing quartz-epidote-calcite veins that cut the greenstone. The copper minerals bornite and chalcocite and their oxidation products (azurite, chrysocolla, and malachite) were observed at the site. The rocks were not sampled; small amounts of silver typically occur with copper in the Basaltic Cu-type deposits of the area.

Alteration:
The mineralization is associated with quartz-epidote-calcite veins in propylitized basalt and andesite of the Nikolai Greenstone.

Age of mineralization:
Probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

A traverse above the copper-bearing rock slide failed to reveal a source (Kaufman, 1964).

References:

Kaufman, 1964; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1982; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kaufman, 1964

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/03/01

Site name(s): Snowstrike

Site type: Prospect

ARDF no.: MH059

Latitude: 63.2678 **Quadrangle:** MH B-6

Longitude: 146.7494

Location description and accuracy:

A prospect that possibly corresponds to the Snowstrike reportedly is in an east-west drainage on the east side of the West Fork Maclaren River at an elevation of 3,400 feet about 2,000 feet east of the center of section 15, T. 19 S., R. 5 E., Fairbanks Meridian (Kaufman, 1964). Kaufman's location corresponds approximately to locality 14 in figure 4 of Cobb (1979 [OFR 79-238]) and locality 9 of MacKevett and Holloway (1977). Kurtak and others (1992) reported mineralization in this drainage between 3,700 and 4,800 feet (locality A17). The Kardex site number is KX68-193 (Heiner and Porter, 1972).

Commodities:

Main: Cu

Other: Ag, Fe

Ore minerals: Azurite, bornite, chalcopyrite, magnetite, malachite

Gangue minerals: Calcite, epidote, quartz

Geologic description:

The rocks at the prospect are andesitic to basaltic greenstone of possible Triassic age; a narrow dike of quartz hornblende diorite cuts the greenstone about 100 feet below the prospect (Kaufman, 1964, p. 8). Limestone is reported nearby (Saunders, 1961).

Azurite and malachite occur as irregular surface coatings for a distance of about 100 feet on the north side of the east-west creek. These minerals formed from the oxidation of chalcopyrite and bornite in quartz-calcite-epidote veins in fractures that cut greenstone. One set of mineralized fractures strikes north-south and is nearly vertical (Kaufman, 1964). The veins are widely separated and no more than several inches thick. Saunders (1961 [report for 1961]) reported an occurrence of massive magnetite nearby, probably in a limestone host.

Apparently Kurtak and others (1992) prospected vertically above Kaufman's locality. They reported limonite-stained metabasalt on the cirque wall near the top of the canyon. Quartz-rich float boulders contained as much as 0.12 percent copper.

Alteration:

Age of mineralization:

Epigenetic (Mid-Cretaceous?) copper occurrences in Triassic (?) andesite and basalt

Deposit model:

Copper-bearing veins in intermediate to mafic volcanic rocks. Basaltic Cu (Cox and Singer, 1986; model 23).

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

23

Production Status: None

Site Status: Inactive

Workings/exploration:

The area was prospected, and at least one claim (Snowstrike) was located. It was subsequently studied by the State of Alaska (Saunders, 1961 [report for 1961]; Kaufman, 1964) and the U.S. Bureau of Mines (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

References:

Kaufman, 1964; Saunders, 1961 (report for the year); MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Kurtak and others, 1992.

Primary reference: Kaufman, 1964

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (on east side of West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH060

Latitude: 63.2504 **Quadrangle:** MH B-6

Longitude: 146.7302

Location description and accuracy:
This occurrence is at an elevation of about 4,000 feet, about 1,300 feet south of the center of section 23, T. 19 S., R. 5 E., Fairbanks Meridian. The site corresponds to locality 16 in figure 4 of Cobb (1979 [OFR 79-238]). The location is probably accurate within one-quarter mile.

Commodities:

Main: Cu

Other: Ag (?)

Ore minerals: Chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
Rocks near the site are andesitic to basaltic volcanic rocks of the Nikolai Greenstone of Late Triassic age, a characteristic unit of the Wrangellia terrane (Nokleberg and others, 1981). Chalcocite or its oxidation product malachite occur in quartz-epidote veinlets and vesicles partly filled with quartz-epidote. The copper minerals also occur on fracture or joint surfaces of the host andesite and basalt. Copper is typically accompanied by some silver.

Alteration:

Age of mineralization:
Post-Late Triassic. It also postdates a folding event that occurred in pre-Late Jurassic time (Stout, 1976, p. 30-31). It probably occurred in the Cretaceous during regional metamorphism and granitic plutonism (Nokleberg and others, 1986) or in the early Tertiary at about the time of emplacement of dacite porphyry dikes (Stout, 1976, p. 23, 31).

Deposit model:
Weak copper mineralization of cupriferous volcanic rocks. Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: No

Site Status: Inactive

Workings/exploration:
Natural exposures; copper minerals were found during geochemical investigations (Smith and others, 1973, 1975).

Production notes:

Reserves:

Additional comments:

References:

Smith and others, 1973; Smith and others, 1975; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1986; Nokleberg and others, 1991.

Primary reference: Smith and others, 1973

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (east of West Fork Maclaren River)

Site type: Prospect

ARDF no.: MH061

Latitude: 63.2503 **Quadrangle:** MH B-6

Longitude: 146.7004

Location description and accuracy:
This prospect is in a cirque at an elevation of about 5,000 feet and about one-quarter mile south of the center of section 24, T. 19 S., R. 5 E., Fairbanks Meridian; it is about one-half mile southwest of peak 5590. This site corresponds to locality 17 on figure 4 of Cobb (1979 [OFR 79-238). The location is accurate within about one-quarter mile.

Commodities:

Main: Cu

Other: Ag (?)

Ore minerals: Chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rocks at this occurrence are mafic volcanic rocks of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). Chalcocite or its oxidation product malachite occurs in quartz-epidote veinlets, in vesicles partly filled with epidote, and on joint or other fracture surfaces of the volcanic rocks (Smith and others, 1973, 1975). Copper is typically accompanied by small amounts of silver.

Alteration:

Age of mineralization:
The copper occurrence is epigenetic to the Nikolai Greenstone of Late Triassic age. It probably formed in Cretaceous or early Tertiary time (see MH060).

Deposit model:
Characteristic epigenetic mineralization of cupriferous volcanic rocks. Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The site was found during geochemical appraisal of the area (Smith and others, 1973, 1975).

Production notes:

Reserves:

Additional comments:

References:

Smith and others, 1973; Smith and others, 1975; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Smith and others, 1973; Smith and others, 1975

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (on peak 6275)

Site type: Occurrence

ARDF no.: MH062

Latitude: 63.2631 **Quadrangle:** MH B-6

Longitude: 146.6753

Location description and accuracy:
This occurrence is on the divide between the West Fork Maclaren River and upper Cottonwood Creek. It is at an elevation of about 6,200 feet on the south side of peak 6275 and near the center of the S1/2SW1/4 section 18, T. 19 S., R. 6 E., Fairbanks Meridian. The location corresponds to locality 28 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au

Other: Cu (?)

Ore minerals: Chalcopyrite (?), pyrite

Gangue minerals: Epidote, quartz

Geologic description:
The rock at this the occurrence is metabasalt of the Nikolai Greenstone of Late Triassic age. The occurrence is a narrow quartz-epidote vein that contains pyrite and possibly chalcopyrite. A grab sample of vein material contained 5 parts per million (ppm) silver and 0.1 ppm gold (Nokleberg and others, 1991). Similar quartz-epidote veins near this site contain chalcopyrite or other copper minerals; copper was not, however, reported in the analysis from the occurrence on peak 6275.

Alteration:

Age of mineralization:
Younger than Late Triassic; probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Copper-bearing low-sulfide quartz vein. Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no workings reported at this site.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/30/01

Site name(s): Unnamed (east side of the West Fork Maclaren River)

Site type: Prospect

ARDF no.: MH063

Latitude: 63.2371 **Quadrangle:** MH A-6

Longitude: 146.7373

Location description and accuracy:
This prospect is approximately located on the east side of the West Fork Maclaren River at an elevation of about 3,500 feet, in the NE1/4SW1/4 section 26, T. 19 S., R. 5 E., Fairbanks Meridian. The site corresponds to locality 16 in figure 4 of Cobb (1979 [OFR 79-238]) and to locality 22 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rock at the prospect is propylitized metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The deposit consists of malachite or chalcocite in quartz-epidote veinlets, in vesicles, or on fracture or joint surfaces in the metabasalt (Saunders, 1961 [report for the year]). No assay data are available; small amounts of silver typically occur with the copper deposits of the Nikolai Greenstone.

Alteration:
Propyllitic alteration of metabasalt; oxidation of iron- and copper-bearing minerals.

Age of mineralization:
Probably Cretaceous (Nokleberg and others, 1986) or early Tertiary (Stout, 1976); see MH060 and MH100.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
Copper occurrences were found during geologic investigations in about 1960; there are no known workings.

Production notes:

Reserves:

Additional comments:

References:

Saunders, 1961 (report for the year); Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1986; Nokleberg and others, 1991.

Primary reference: Saunders, 1961 (report for the year)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/04/01

Site name(s): Unnamed (east of West Fork Maclaren River)

Site type: Prospect

ARDF no.: MH064

Latitude: 63.2437 **Quadrangle:** MH A-6

Longitude: 146.7202

Location description and accuracy:
This prospect is in a west-flowing tributary of the West Fork Maclaren River at an elevation of approximately 4,000 feet, in the NE1/4NE1/4,section 26, T. 19 S., R. 5 E., Fairbanks Meridian. The site corresponds to locality 17 in figure 4 of Cobb (1979 [OFR 79-239]) and to locality 24 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag (?)

Ore minerals: Chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
This deposits consists of small amounts of malachite or chalcocite in quartz-epidote veinlets, in vesicles, or on fracture or joint surfaces in propylitized metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991; Smith and others, 1973). Assay data are not available, but small amounts of silver typically accompany copper in the copper deposits of the Nikolai Greenstone.

Alteration:
Propylitic alteration; formation of quartz-epidote veins and vesicle fillings in metabasalt.

Age of mineralization:
The mineralization is probably Cretaceous (Nokleberg and others, 1986) or early Tertiary (Stout, 1976). See MH060 and MH100.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The copper minerals were reported by Smith and others (1973).

Production notes:

Reserves:

Additional comments:

References:

Smith and others, 1973; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1986; Nokleberg and others, 1991.

Primary reference: Smith and others, 1973

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/04/01

Site name(s): Viking; Sheba; Albertson-Pettyjohn

Site type: Prospect

ARDF no.: MH065

Latitude: 63.2458 **Quadrangle:** MH A-6

Longitude: 146.6753

Location description and accuracy:
This prospect lies on the divide between the East and West Forks Maclaren River at an elevation of 5,500 feet and in the NW1/4 section 30, T. 19 S., R. 6 E., Fairbanks Meridian. The prospect corresponds to locality A18 of Kurtak and others (1992) and Kardex site number KX68-79 (Heiner and Porter, 1972).

Commodities:

Main: Au, Cu

Other: Ag, Fe, W

Ore minerals: Chalcopyrite, magnetite, malachite, scheelite (?)

Gangue minerals: Carbonate

Geologic description:
At this prospect, magnetite-rich metabasalt of the Nikolai Greenstone of Late Triassic age is intruded by quartz monzonite of Jurassic or Cretaceous age (Nokleberg and others, 1982). Numerous malachite-stained chalcopyrite-bearing quartz-carbonate veins cut the basalt. The largest of the veins is about 10 feet wide and and can be followed at least 100 feet along strike.

The veins, like the metabasalt, are rich in magnetite. Some of the veins contain a significant amount of gold; others are enriched only in copper (Kurtak and others, 1992, table A18). Selected sample 2641 of a 1.4-foot-wide magnetite-rich vein in basalt contained 1.26 ounces of gold per ton and 0.12 percent tungsten; it possibly contained scheelite. Copper-rich veins average about 2.1 percent copper; a 4.5-foot-wide magnetite-carbonate vein that could be followed for about 100 feet assayed 6.3 percent copper (sample 3212). This vein also assayed 0.81 ounce of gold per ton and 0.78 ounce of silver per ton.

Partly because of the gold content of the veins, the U.S. Bureau of Mines assigned moderate potential to the prospect, but noted that the exposed length of veins was short (Kurtak and others, 1992).

Alteration:
Oxidation of iron- and copper-bearing minerals.

Age of mineralization:
The magnetite-rich mineralization is probably associated with the intrusion of the Jurassic or Cretaceous quartz monzonite.

Deposit model:
Copper-magnetite veins; probably some affinity to both Basaltic Cu and Cu skarn (Cox and Singer, 1986; models 23 and 18b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23, 18b

Production Status: None

Site Status: Probably inactive

Workings/exploration:

Viking claims were located on the prospect for copper, silver, and gold by Vernon Hanson in 1961 (Heiner and Porter, 1972; Kardex site number KX68-79). The site was sampled in the early 1990's by the U.S. Bureau of Mines (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

The veins contain significant concentrations of gold and copper, but exposed strike lengths are short (Kurtak and others, 1992).

References:

Heiner and Porter, 1972; Nokleberg and others, 1982; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/03/01

Site name(s): Unnamed (east of West Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH066

Latitude: 63.2242 **Quadrangle:** MH A-6

Longitude: 146.7128

Location description and accuracy:
This occurrence is at an elevation of about 4,000 feet in a west-flowing tributary to the West Fork Maclaren River, in the NW1/4SW1/4 section 36, T. 19 S., R. 5 E., Fairbanks Meridian. The site corresponds to locality 11 of Kaufman (1964), locality 18 in figure 4 of Cobb (1979 [OFR 79-238]), and locality 25 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Azurite, chalcopyrite, magnetite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rock near this prospect is propylitized metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). Some probably Cretaceous granitic material is exposed at the site.

Copper minerals are found in place and in float at the site. Kaufman (1964, p. 7, occurrence 11) speculated that the source of float minerals is probably a considerable distance upstream.

Chalcopyrite occurs in place in stringers in greenstone and intrusive material at the site of the occurrence. Float found in the creek bed at the 4,000-foot elevation consists of banded chalcopyrite-magnetite skarn and banded azurite-malachite.

Alteration:

Age of mineralization:
Uncertain. The banded chalcopyrite-magnetite skarn float is almost certainly derived from the Cretaceous Zackly skarn deposit (MH067), discovered in 1979.

Deposit model:
Basaltic Cu (?) (Cox and Singer, 1986; model 23); Cu skarn in float material (Cox and Singer, 1986, model 18b).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23 (?), 18b

Production Status: None

Site Status: Inactive

Workings/exploration:
Bedrock and float mineral specimens were found during geologic mapping (Kaufman, 1964). The source of float almost certainly is the Zackly skarn deposit (MH067).

Production notes:

Reserves:

Additional comments:

Kaufman (1964) noted the mineralized skarn float may have traveled a considerable distance downstream, a conclusion borne out with the discovery of the Zackly prospect (MH067) in 1979 by Resource Associates of Alaska.

References:

Kaufman, 1964; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Kaufman, 1964

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/04/01

Site name(s): Zackly

Site type: Prospect

ARDF no.: MH067

Latitude: 63.2181 **Quadrangle:** MH A-6

Longitude: 146.6984

Location description and accuracy:

The Zackly prospect is about one-half mile north-northwest of peak 5375, a northwest-aligned ridge about 1.8 miles east of the West Fork Maclaren River. The deposit is exposed from about 4,000 to 4,650 feet in elevation near the north end of the ridge. The location for this record is at the approximate center of the deposit, about 2,400 feet south of the center of section 36, T. 19 S., R. 5 E., Fairbanks Meridian. The property is accessible by a bulldozer trail from the Kathleen-Margaret mine trail (see MH087), not shown on the A-6 quadrangle. The location corresponds to locality [figure] A26 of Kurtak and others (1992) and locality 26 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Au, Cu

Other: Ag, Mo, W

Ore minerals: Azurite, bornite,chalcopyrite, copper (native), gold, malachite, molybdenite (?), scheelite (?)

Gangue minerals: Clay, clinopyroxene, garnet, limonite, pyroxene, quartz (var. chalcedony), wollastonite

Geologic description:

The Zackly skarn prospect is hosted in Triassic tuff and sedimentary rocks (Nokleberg and others, 1991). These rocks have been intruded by quartz monzodiorite and monzonite of Cretaceous age. Numerous east-trending high-angle faults cut out or repeat skarn, limestone, volcanic rocks, and intrusive rocks. In general, the contact between sedimentary and intrusive rocks that host the main ore body strikes nearly east-west and is very steep (Kurtak and others, 1992, figure A26). It can be traced for about a mile. The main so-called skarn ore body consists of pods and irregular stratabound lenses of skarn at the contact of Upper Triassic marble with albitized quartz monzodiorite. The body is crudely zoned; the mineral sequence outward from the quartz monzodiorite consists of: (1) brown garnet with chalcopyrite, (2) green garnet with bornite and chalcopyrite, (3) clinopyroxene and wollastonite, and (4) marble with magnetite and bornite. Fine-grained silica (chalcedony) and clay occur irregularly throughout and appear to be late, retrograde minerals.

Gold occurs only with skarn; the higher gold values are in a supergene (?) assemblage of malachite, limonite, chalcedony, and native copper. Unoxidized ore contains chalcopyrite and bornite. A high-grade sample collected by the U.S. Geological Survey assayed 6.6 percent copper, 4.4 parts per million (ppm) gold, 35 ppm silver, and 30 ppm molybdenum (Nokleberg and others, 1991). Sample 1681 collected by the Bureau of Mines assayed 0.18 ounce of gold per ton, 2.45 ounce of silver per ton, 7.1 percent copper, and 0.11 percent tungsten (Kurtak and others, 1992); a representative 7-foot sample (1675) cut across the skarn assayed 0.05 ounce of gold per ton, 0.31 ounce of silver per ton, 1.35 percent copper, and 430 ppm tungsten. Tungsten is probably contained in scheelite; molybdenum is either in molybdenite or in solid solution in scheelite. Lead, zinc, and arsenic are generally not strongly enriched in the ore.

A resource exists mainly in a gold-skarn body about 2,600 feet long and about 9 feet thick that has been followed down-dip about 1,000 feet. The deposit is fairly high grade; it contains about 1.24 million tons averaging 2.69 percent copper, 0.18 ounce of gold per ton, and 0.96 ounce of silver per ton (UNC Teton Exploration and Drilling, Inc., 1982).

Metallurgical testing by the U.S. Bureau of Mines suggests that most of the gold in the ore is particulate but fine grained. Oxidized copper minerals contained in the ore seem to be serious cyanogens. Ordinary

leaching with 20 pounds of NaCN per short ton of concentrate recovered only about 45 percent of the gold. Satisfactory recovery of gold was made on a test sample pre-leached with sulfuric acid to dissolve oxidized copper minerals (R.W. MacDonald, written communication, 1989); MacDonald pointed out the potential hazard involved with the acid pre-leach and later production of HCN if acid was not neutralized. An alkaline ammonia pre-leach of oxidized copper minerals apparently was not tried.

Alteration:

Alteration zoning is recognized within the endoskarn and exoskarn (Kurtak and others, 1992). Endoskarn development is related to the degree of original rock calcium metasomatism and spatial distribution of the original limestone and volcanic rocks (UNC Teton Exploration and Drilling, Inc. 1982). Four stages of exoskarn development are recognized: (1) skarnoid, (2) main, (3) hydrosilicate, and (4) late hydrothermal. The skarns consist mainly of garnet and clinopyroxene and have undergone retrograde metamorphism and silica-clay alteration (Kurtak and others, 1992).

Age of mineralization:

Cretaceous.

Deposit model:

Cu-gold skarn, similar to the Cu skarn of Cox and Singer (1986; model 18b).

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

Similar to 18b

Production Status: None

Site Status: Active

Workings/exploration:

Resource Associates of Alaska discovered the Zackly skarn deposit and staked claims in 1979-1980; they drilled 9,723 feet of core in 1981. A partnership with UNC Teton Exploration and Drilling, Inc. was formed, and 19,210 feet of diamond drilling was conducted in 1982 along with trenching and geophysical surveying. Copper, silver, and mercury soil geochemistry was successfully utilized to locate skarn mineralization in overburden areas (Ford, 1988; Resource Associates of Alaska, 1981). In 1986 the property reverted to Resource Associates of Alaska, which was subsequently bought out by Nerco. In 1987 a joint venture of Nerco and Boulder Gold conducted 12,000 feet of reverse circulation and 3,000 feet of diamond drilling. By 1990, the Zackly property was controlled by Pacific Northwest Resources and was optioned to Phelps Dodge Corporation, which completed a limited drilling program. The property was optioned to Hemlo Gold in 1993-34, which completed rock and soil sampling, IP geophysical surveys, and 1,500 feet of reverse circulation drilling. Since 1994 only limited exploration and assessment work has been done on the property.

The U.S. Bureau of Mines collected a 300-pound bulk sample for beneficiation studies at the U.S. Bureau of Mines Salt Lake Research Center (Kurtak and others, 1992). Only 18 percent of the gold in a sample that assayed 0.072 ounces of gold per ton were recovered in a bulk flotation test. Forty-five percent of the gold was recovered in a cyanide amenability test of a 1,000-gram sample ground to -325 mesh and leached for 72 hours (R.W. McDonald, written communication, 1989). Using a 3,965-gram sample ground to various sizes from +20 to -325 mesh improved recovery only to 48 percent. A factor that inhibits gold recovery is the high content of oxidized copper minerals in the ore, which interferes with the NaCN solution. Gold recovery increased to 98 percent after a sulfuric acid preleach of oxidized copper minerals (R.W. McDonald, written communication, 1989).

Production notes:

Reserves:

UNC Teton Exploration and Drilling, Inc. (1982) defined a resource of 1.24 million tons of 2.69 percent copper, 0.176 ounce of gold per ton, and 0.96 ounce of silver per ton. This mineralization occurs in a

steeply dipping east-west striking body with 2,600 feet of strike length and an average thickness of 8.5 feet extending 1,000 down-dip. U.S. Bureau of Mines beneficiation studies indicated enhanced gold recovery will be necessary for the deposit to become economic (Balen, 1990 [USBM OF 40-90]).

Ross Glanville and Associates (1996) estimated that the resource defined by exploration through 1989 consisted of 1,407,000 tons that graded 2.19 percent copper, 0.83 ounce of silver per ton, and 0.132 ounce of gold per ton. The reserves in the so-called main ore body are not yet sufficiently delineated to be able to carry out a feasibility study; however, a preliminary evaluation was completed by consultants in 1996. On the basis of the number of limiting input parameters and utilizing a mineable reserve of 1,080,000 tonnes of ore, the net present value of the Zackly project was calculated to be $0.7 million. A 50 percent increase in reserves was considered likely to be achieved by additional exploration, which would increase the net present value to $7.4 million (Ross Glanville and Associates, 1996).

Additional comments:

The copper-rich Nikolai Greenstone assimilated by the quartz monzodiorite is speculated to be the source of the metals in the skarn deposit (UNC Teton Exploration and Drilling, Inc., 1982). Pacific Alaska Resources (PO Box 145, Battleground, WA 98604; ph 360 687-2763) controls the property and has additional information about the Zackly prospect.

References:

Resource Associates of Alaska, 1981; UNC Teton Exploration and Drilling, Inc., 1982; Ford, 1988; Nokleberg and others, 1991; Balen, 1990 (USBM OF 40-90); Kurtak and others, 1992.

Primary reference: UNC Teton Exploration and Drilling, Inc., 1982; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/04/01

Site name(s): Unnamed (upper west headwaters of the Maclaren River)

Site type: Occurrence

ARDF no.: MH068

Latitude: 63.2170 **Quadrangle:** MH A-6

Longitude: 146.6829

Location description and accuracy:
This occurrence is at an elevation of about 4,600 feet in the headwaters of a west tributary of the Maclaren River. The occurrence is in the NW1/4NW1/4 section 6, T. 20 S., R. 6 E., Fairbanks Meridian. The occurrence corresponds to locality 19 in figure 4 of Cobb (1979 [OFR 79-238]) and to locality 27 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag

Ore minerals: Bornite, chalcocite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rock at this occurrence is propylitized metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The deposit consists of bornite, chalcocite, and malachite in quartz-epidote veinlets, in vesicles, and on fracture or joint surfaces in metabasalt (Saunders, 1961 [report for the year]; Smith and others, 1973). No assays are available, but small quantities of silver commonly occur in copper deposits in the Nikolai Greenstone.

Alteration:
Propylitic alteration of basalt.

Age of mineralization:
The deposit is probably Cretaceous or early Tertiary in age (see MH060 and MH100).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The deposit was found during regional mapping and sampling; there are no workings.

Production notes:

Reserves:

Additional comments:

References:

Saunders, 1961 (report for the year); Smith and others, 1973; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Saunders, 1961 (report for the year)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Corkscrew Creek

Site type: Occurrence

ARDF no.: MH069

Latitude: 63.0270 **Quadrangle:** MH A-6

Longitude: 146.9935

Location description and accuracy:
This placer location is at an elevation of about 2,850 feet in Corkscrew Creek, a south-flowing tributary of Clearwater Creek. The occurrence is on Corkscrew Creek about 0.9 mile above its confluence with Clearwater Creek, in the NW1/4 section 9, T. 22 S., R. 4 E., Fairbanks Meridian The occurrence corresponds to placer locality A35 of Kurtak and others (1992).

Commodities:

Main: Au

Other: Ag, Hg

Ore minerals: Gold

Gangue minerals:

Geologic description:
Corkscrew Creek flows on glaciofluvial material of Pleistocene and Holocene age. The creek was sampled at one site (Kurtak and others, 1992, table 32); sample 1192 indicated a recoverable gold content of only 0.00013 ounce of gold per cubic yard. The concentrate sample also contained 0.5 part per million (ppm) silver, 48 ppm mercury, and 20 ppm tungsten. It appears likely that this deposit represents material reconcentrated from very low grade glaciofluvial material.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a). Gold is probably reconcentrated from very low grade alluvium and outwash.

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:
Two placer claims were staked on Corkscrew Creek in 1974 (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

The gold content of a placer sample in not significant, and there is low potential for commercial recovery of placer gold (Kurtak and others, 1992).

References:

Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): Unnamed (south-flowing tributary of Clearwater Creek)

Site type: Occurrence

ARDF no.: MH070

Latitude: 63.0310 **Quadrangle:** MH A-6

Longitude: 146.9685

Location description and accuracy:
This placer occurrence is in an unnamed, one-mile-long, southeast-flowing tributary of Clearwater Creek south of the Denali Highway. The tributary enters Clearwater Creek about 0.8 mile above the confluence of the Clearwater and Corkscrew Creek. The occurrence is in the SW1/4SW1/4 section 3, T. 22 S. R. 4 E., Fairbanks Meridian. The occurrence corresponds to placer locality A34 of Kurtak and others (1992).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
This unnamed stream flows only on glaciofluvial material and apparently does not cut bedrock (Nokleberg and others, 1991). A placer mine application for the creek was made in 1982, but the site was not visited by the U.S. Bureau of Mines in their investigation of the Valdez Creek district, and no assessment of its value is available.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
A placer mining application was made in 1982 on the Jack L. Dees and Jack W. Frost claims (Kurtak and others, 1992). Apparently, little work has been done on the placer occurrence.

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): Clearwater Creek

Site type: Occurrence

ARDF no.: MH071

Latitude: 63.0492 **Quadrangle:** MH A-6

Longitude: 146.9230

Location description and accuracy:
The placer occurrence on Clearwater Creek is at an elevation of about 2,950 feet, 1.5 miles above its confluence with Little Clearwater Creek. The occurrence is about a quarter-mile north of the Denali Highway and about a quarter-mile south of the center of section 35, T. 21 S., R. 4 E., Fairbanks Meridian. The occurrence corresponds to placer location A33 of Kurtak and others (1992).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
Clearwater Creek cuts Quaternary glaciofluvial deposits in the vicinity of the claims; farther upstream, it drains bedrock that is principally Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991).
Clearwater Creek contains fine-grained gold, probably in negligible amounts. Sample 1194 contained only 0.00003 ounce of recoverable gold per cubic yard (Kurtak and others, 1992).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:
A U.S. Bureau of Mines placer sample contained only 0.00003 ounce of recoverable gold per cubic yard.

Production notes:

Reserves:

Additional comments:

The gold content of the placer sample is not significant, and there is low potential for placer gold (Kurtak and others, 1992).

References:

Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): Little Clearwater Creek

Site type: Occurrence

ARDF no.: MH072

Latitude: 63.0992 **Quadrangle:** MH A-6

Longitude: 146.8159

Location description and accuracy:
The Little Clearwater Creek placer extends from an elevation of about 3,000 feet near the Denali Highway upstream to 3,700 feet in section 33, T. 20 S., R. 5 E., Fairbanks Meridian. The location for this record is at an elevation of 3,300 feet, just below where the creek leaves the mountains and enters a broad flood plain. The occurrence corresponds to placer locality A32 of Kurtak and others (1992).

Commodities:

Main: Au

Other: Ag, Hg, W

Ore minerals: Cinnabar (?), gold, scheelite (?)

Gangue minerals: Magnetite

Geologic description:
The lower course of Little Clearwater Creek drains bedrock composed mainly of metabasalt of Nikolai Greenstone of Late Triassic age. In upper Little Clearwater Creek, diverse sedimentary, volcanic, and metamorphic rocks are juxtaposed by a series of low-angle thrust faults (Nokleberg and others, 1991). The thrust-faulted rocks are mineralized at several places, including at MH048, MH049, and MH056, thus furnishing potential source rocks for the placer deposit in lower Little Clearwater Creek (Clautice and others, 1989; Kurtak and others, 1992). The lode deposits in the upper course of Little Clearwater Creek are enriched in tungsten and mercury, trace elements that are found downstream in the placer deposits.

Seven samples of alluvium were collected in lower Little Clearwater Creek for placer evaluation (Kurtak and others, 1992, table A42). All contained visible particulate gold. Samples at four sites contained 0.001 ounce of recoverable gold per cubic yard. Sample 3142 contained 0.015 ounce gold per cubic yard. Concentrate samples contained as much as 2.4 parts per million (ppm) silver; all were enriched in tungsten. Sample 1869 contained 3,950 ppm tungsten, 379 ppm mercury, and 325 ppm arsenic, in addition to 0.001 ounce of recoverable gold per cubic yard. The concentrate probably contained scheelite, a tungsten mineral known at upstream site MH048, and possibly cinnabar (mercury sulfide).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:

Tammany Mining Company staked the Little Clearwater Creek claims in 1979 and subsequently dug a number of test pits along the creek. The U.S. Bureau of Mines collected a series of placer samples along the creek that contained as much as 0.015 ounce of recoverable gold per cubic yard; concentrate samples contained as much as 3,950 parts per million (ppm) tungsten and 379 ppm mercury (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

Little Clearwater Creek has moderate potential as a placer gold deposit (Kurtak and others, 1992); the placer possibly could produce tungsten and mercury as byproducts.

References:

Clautice and others, 1989; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): West Fork Maclaren River

Site type: Prospect

ARDF no.: MH073

Latitude: 63.1641 **Quadrangle:** MH A-6

Longitude: 146.5962

Location description and accuracy:
This placer prospect on West Fork Maclaren River is about 2 miles above its confluence with the Maclaren River at an elevation of about 3,100 feet. The location for this record is on the West Fork in the NW1/4SE1/4 section 21, T. 20 S., R. 6 E., Fairbanks Meridian, at the approximate midpoint of placer claims located in 1980. It corresponds to placer locality A25 of Kurtak and others (1992).

Commodities:

Main: Au

Other: Ag

Ore minerals: Gold

Gangue minerals:

Geologic description:
The West Fork Maclaren River drains the Nikolai Greenstone of Late Triassic age south of the Broxson Gulch fault and metamorphic rocks north of the fault. The fault is about 10 miles upstream from the placer prospect (Nokleberg and others, 1991). The West Fork is incised into a moderately steep canyon in the claim area.

The U.S. Bureau of Mines collected a sample of active stream gravel in this part of the creek; sample 1195 had 8 coarse, 36 fine, and 30 very fine particles of gold. The calculated recoverable value was 0.009 ounce of gold per cubic yard (Kurtak and others, 1992, table A25). The sample also contained 0.5 part per million silver.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:
Seven claims were staked on the creek in 1980. A U.S. Bureau of Mines sample contained 0.009 ounce of gold per cubic yard (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

The gold content of a sample of West Fork Maclaren River alluvium is significant, and the U.S. Bureau of Mines recommended backhoe trench sampling (Kurtak and others, 1992).

References:

Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Boulder Creek (Seven Mile claims)

Site type: Occurrence

ARDF no.: MH074

Latitude: 63.1794 **Quadrangle:** MH A-5

Longitude: 146.4480

Location description and accuracy:
This placer occurrence, located as the Seven Mile claims, is along a southwest-flowing section of Boulder Creek between 3,000 and 3,400 feet elevation. The location is the approximate midpoint of claims; it is about in the center of section 17, T. 20 S., R. 7 E., Fairbanks Meridian. The occurrence corresponds to placer locality A24 of Kurtak and others (1992).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
Boulder Creek flows through a broad flood plain approximately one-half mile across. The creek drops about 400 feet in 3 miles, steepening downstream. It drains an area of metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991).

The Seven Mile claims were active between 1978 and 1981, but there was no substantial mining during that period. Samples of active and bank alluvium contained a few flakes of gold but no significant values. Sample 1037 contained 0.0002 ounce of recoverable gold per cubic yard (Kurtak and others, 1992, table A24). Transient concentrations of gold may be present in river bar deposits.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:
The Seven Mile claims were located in 1978 and were active at least until 1981. The U.S. Bureau of Mines collected two placer samples, one of which contained 0.0002 ounce of gold per cubic yard; the other contained 2,900 parts per billion gold (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:
The creek has low potential for placer gold (Kurtak and others, 1992).

References:
Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/05/01

Site name(s): Richards

Site type: Occurrence

ARDF no.: MH075

Latitude: 63.1977 **Quadrangle:** MH A-5

Longitude: 146.3645

Location description and accuracy:
This occurrence is at an elevation of 4,000 feet northwest of the west end of Seven Mile Lake, in the SW1/4NW1/4 section 11, T. 20 S., R. 7 E., Fairbanks Meridian. It is Kardex site number KX68-086 (Heiner and Porter, 1972).

Commodities:

Main: Cu (?)

Other: Ag, Au, Fe

Ore minerals:

Gangue minerals: Epidote, quartz

Geologic description:
The area near the Richards claims is mostly colluvium overlying Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). Bedrock, where exposed, consists of metabasalt, locally altered, cut by quartz-epidote veins. Sample 2811 of limonite-stained altered metabasalt cut by quartz veins was essentially barren (Kurtak and others, 1992, table A23), but the U.S. Bureau of Mines spent little time in the area and noted that more prospecting was needed.

The Richards claims were located for copper, iron, gold, and silver (Heiner and Porter, 1972). Primary ore mineralogy is unknown.

Alteration:
Locally 'altered', probably propylitized basalt (Kurtak and others, 1992).

Age of mineralization:

Deposit model:
Basaltic Cu (?) (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23 (?)

Production Status: None

Site Status: Inactive

Workings/exploration:
The ten Richards claims were staked in 1964-1966 by Northland Mines (Heiner and Porter, 1972; Kurtak and others, 1992). A sample collected from altered metabasalt cut by quartz veinlets was barren (Kurtak and others, 1992).

The area is now covered by claims staked by MAN Resources, which mostly are for platinum and associated metals (W.T. Ellis, written communication, 2001).

Production notes:

Reserves:

Additional comments:
Kurtak and others (1992) proposed that additional prospecting was needed.

References:
Heiner and Porter, 1972; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): Unnamed (south of upper Sevenmile Lake)

Site type: Occurrence

ARDF no.: MH076

Latitude: 63.1760 **Quadrangle:** MH A-5

Longitude: 146.2138

Location description and accuracy:
This occurrence is at an elevation of about 4,400 feet, a quarter-mile south of upper Sevenmile Lake. It is in the center of the S1/2SE1/4 section 16, T. 20 S., R. 8 E., Fairbanks Meridian.

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Azurite, bornite, chalcopyrite, malachite, pyrite

Gangue minerals: Calcite, epidote, quartz

Geologic description:
This occurrence is in Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991), which was mapped as Boulder Creek volcanics by Stout (1976). The deposit consists of quartz-epidote-calcite veins that contain pyrite, chalcopyrite, bornite, and secondary azurite and malachite. The veins range from less than an inch to about 1 foot thick and occupy steep north- to northeast-trending faults and joints that cut and are not deformed by the Amphitheater syncline (Stout, 1976). The deposit was not sampled; silver is typically present in the copper deposits of the Nikolai Greenstone.

Alteration:

Age of mineralization:
The quartz veins are localized in north-northeast-trending faults and joints that cut across the folded limbs of the Amphitheater syncline. They post-date the folding, which is of Jurassic age, and are probably either Cretaceous, related to regional metamorphism and granitic plutonism (Nokleberg and others, 1986; Kurtak and others, 1992), or early Tertiary (Stout, 1976).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no significant workings at the site.

Production notes:

Reserves:

Additional comments:

References:

Stout, 1976; Nokleberg and others, 1986; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Stout, 1976

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): Unnamed (ridge between Two Plate Creek and Cathedral Creek)

Site type: Occurrence

ARDF no.: MH077

Latitude: 63.3058 **Quadrangle:** MH B-6

Longitude: 146.6134

Location description and accuracy:
This occurrence is at an elevation of about 5,450 feet on the ridge between Two Plate Creek and Cathedral Creek, in the SW1/4SW1/4 section 33, T. 18 S., R. 6 E., Fairbanks Meridian. The site corresponds to locality 30 in table 2 of Nokleberg and others (1991). The location is probably accurate within one-half mile.

Commodities:

Main: Cu

Other: Co

Ore minerals: Pyrite, chalcopyrite

Gangue minerals: Calcite, quartz

Geologic description:
The rock at the site is the Slana Spur Formation of Pennsylvanian and Permian age (Nokleberg and others, 1991). An intrusive metadacite porphyry occurs nearby. At the site, cherty rocks of the Slana Spur unit contain disseminated pyrite and chalcopyrite. Grab sample 79CH040A of the mineralized rock contained 3,000 parts per million (ppm) copper and 1,000 ppm cobalt (Nokleberg and others, 1991). The cobalt mineral is unknown.

Alteration:
Oxidation of iron- and copper-bearing minerals.

Age of mineralization:
Pennsylvanian or younger; possibly syngenetic with the the deposition of the Slana Spur Formation.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no workings at the site.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Cathedral Creek (Neversweat claims; Dog claims)

Site type: Prospect

ARDF no.: MH078

Latitude: 63.3167 **Quadrangle:** MH B-6

Longitude: 146.5973

Location description and accuracy:

The Cathedral Creek lode is in upper Cathedral Creek; it occupies part of the basin at the head of the creek. The location for this record is approximately central to the lode; it is at an elevation of about 3,900 feet in the NE1/4NE1/4 section 33, T. 18 S., R. 6 E., Fairbanks Meridian. According to Kurtak and others (1992), mineralized rock extends up hill to 5,700 feet elevation. The site corresponds approximately to locality A10 of Kurtak and others (1992) and to Kardex site number KX68-30 (Heiner and Porter, 1972).

Commodities:

Main: Cu

Other: W

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Carbonates, garnet, quartz

Geologic description:

The rocks at the Cathedral lode prospect include argillite, graywacke, phyllite, marble, and intermediate to mafic volcanic rocks of the Maclaren Glacier metamorphic belt defined by Nokleberg and others (1982). The layered rocks are invaded by quartz monzonite and diorite of Jurassic or Cretaceous age (Kurtak and others, 1992, locality A10).

Mineralization consists of quartz-carbonate stockworks in metasedimentary rocks, pyrite-chalcopyrite disseminations in igneous rocks, as well as weakly developed garnet skarn. The system is large but apparently of low grade. Samples of sulfide-bearing diorite contain as much as 0.2 percent copper (Kurtak and others, 1992, table A10, nos. 1839 and 1840); garnet skarn contains from 50 to 120 parts per million (ppm) tungsten (nos. 1828 to 1830). Precious metals are rarely present; float sample 1836 contained 200 parts per billion (ppb) gold; the maximum silver content of 23 samples was 1 ppm.

Locally rocks may have a higher gold content; pan-concentrate sample 2998 from Cathedral Creek contained six very fine gold flakes and, by assay, 1,100 ppb gold (Kurtak and others, 1992).

Alteration:

Age of mineralization:

Probably Jurassic or Cretaceous, related to emplacement of a composite pluton of diorite to quartz monzonite composition.

Deposit model:

Porphyry Cu (Cox and Singer, 1986; model 17).

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

17

Production Status:

Site Status: Inactive

Workings/exploration:

Lode claims (Neversweat) were staked by J. Riley in upper Cathedral Creek in 1954 (Heiner and Porter, 1972); Resource Associates of Alaska staked claims (Dog group) at the site in 1982. The area was sampled in reconnaissance by the U.S. Bureau of Mines (Balen, 1990 [USBM OFR 34-90]; Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

Low-grade resource in a remote location.

References:

Heiner and Porter, 1972; Nokleberg and others, 1982; Balen, 1990 (USBM OFR 34-90); Kurtak and others, 1992.

Primary reference: Balen, 1990 (USBM OFR 34-90); Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Unnamed (on ridge above Two Plate Creek)

Site type: Occurrence

ARDF no.: MH079

Latitude: 63.3041 **Quadrangle:** MH B-6

Longitude: 146.5921

Location description and accuracy:
This occurrence is at an elevation of about 5,000 feet on the south side of the ridge between Two Plate Creek and Cathedral Creek, at the north edge of the NE1/4NE1/4 of section 4, T. 19 S., R. 6 E., Fairbanks Meridian. The site corresponds to locality 31 in table 2 of Nokleberg and others (1991). The location is probably accurate within one-half mile.

Commodities:

Main: Ag

Other: Mo

Ore minerals: Molybdenite (?), pyrite

Gangue minerals:

Geologic description:
This occurrence consists of altered diorite porphyry, probably of Pennsylvanian and (or) Permian age, that contains disseminated pyrite and possibly a trace of molybdenite; a grab sample of pyritic porphyry contained 5 parts per million (ppm) silver and 50 ppm molybdenum (locality 31, table 2, Nokleberg and others, 1991).

Alteration:
'Altered' diorite porphyry.

Age of mineralization:
Pennsylvanian and (or) Permian.

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

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

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no extensive workings at the site.

Production notes:

Reserves:

Additional comments:

The porphyry character of the deposit is inferred from reconnaissance examination and one sample.

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Cottonwood Creek

Site type: Occurrences

ARDF no.: MH080

Latitude: 63.2672 **Quadrangle:** MH B-6

Longitude: 146.6184

Location description and accuracy:

This site represents several small copper mineral occurrences on the east side of Cottonwood Creek at elevations ranging from about 4,200 to 4,700 feet. The site is near the center of the west boundary of section 16, T. 19 S., R. 6 E., Fairbanks Meridian. The occurrences apparently are aligned about north-northwest. The site includes localities 20, 21, and 22 on figure 4 of Cobb (1979 [OFR 79-238]), multiple localities 15 of Kaufman (1964), and locality 29 in table 2 of Nokleberg and others (1991), and it corresponds closely to locality A16 of Kurtak and others (1992). It also corresponds approximately to copper occurrences discovered along Cottonwood Creek by prospectors E.O. Albertson and F.S. Pettyjohn, Jr., which were reported to Chapman and Saunders (1954). The location is accurate as a generalized one for copper occurrences along the east side of Cottonwood Creek.

Commodities:

Main: Ag, Cu

Other: Pb, W, Zn

Ore minerals: Bornite, chalcocite, chalcopyrite, galena (?), malachite, pyrite (?), scheelite (?), sphalerite (?)

Gangue minerals: Epidote, quartz

Geologic description:

The rock in the area of these copper occurrences is metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The host metabasalt is limonite-stained in a north-northwest zone subparallel to Cottonwood Creek; this zone contains copper-bearing veins and disseminations. The limonite is probably due to oxidation of disseminated pyrite and copper-iron sulfides; locally the metabasalt is stained with malachite. Kaufman (1964, locality 15, p. 8) reported the occurrence of chalcopyrite, bornite, chalcocite, and malachite in association with quartz-epidote veins; he also noted copper minerals as fillings in amygdules in the metabasalt.

The area may originally have been prospected by E.O. Albertson and F.S. Pettyjohn, Jr., in 1950 to 1952. These men reported that specimens from copper-bearing veins assayed 0.5 to 1.5 percent copper and that one piece of float material assayed 40.85 percent copper. Samples from a quartz vein about 4.3 feet thick assayed as much as 1.49 percent copper (Chapman and Saunders, 1954, p. 5). The area was also visited by Kaufman (1964). Sample 647 from a chalcopyrite-bearing vein contained as much as 8.58 percent copper (Kurtak and others, 1992, locality A16); this sample also contained 60 parts per billion gold, 3.7 ounces of silver per ton, 464 parts per million (ppm) lead, 450 ppm zinc, and 180 ppm tungsten. The values of lead, zinc, and tungsten are sufficiently high that the copper-rich vein filling probably contains small amounts of galena, sphalerite, and a tungsten mineral such as scheelite.

Alteration:

Oxidation of iron- and copper-bearing minerals.

Age of mineralization:

Younger than Late Triassic; probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Cu-bearing disseminations and veins in cupriferous metabasalt. Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings are reported. The area was prospected between about 1950 and 1952 (Chapman and Saunders, 1954) and later sampled by the U.S. Bureau of Mines (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

References:
Chapman and Saunders, 1954; Kaufman, 1964; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Chapman and Saunders, 1954; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Unnamed (Two Plate Creek drainage area)

Site type: Occurrence

ARDF no.: MH081

Latitude: 63.2972 **Quadrangle:** MH B-6

Longitude: 146.5903

Location description and accuracy:

This occurrence, or possibly two occurrences, is on the south side of Two Plate Creek and about 2,000 feet east of the center of section 4, T. 19 S., R. 6 E., Fairbanks Meridian. The occurrence corresponds to locality 19 of Kaufman (1964), locality 23 on figure 4 of Cobb (1979 [OFR 79-238]), probably to locality 11 of Kurtak and others (1992), and possibly the Clara Marie or Kardex site number KX68-28 of Heiner and Porter (1972). Two occurrences are suggested by differences in rocks reported at the supposed site by Kaufman and by Kurtak and co-authors.

Commodities:

Main: Cu

Other: Au

Ore minerals: Bornite, chalcocite, chalcopyrite

Gangue minerals: Carbonate mineral, epidote, quartz

Geologic description:

The rocks at and near the site on the south side of Two Plate Creek are reported to include greenstone and hornblende diorite (Kaufman, 1964) and argillite, hornfels, and andesite (Kurtak and others, 1992, table A11). At Kaufman's site, mineralized talus near the south valley wall contains bornite, chalcopyrite, and chalcocite associated with quartz-epidote vein material. The area is underlain by greenstone cut by hornblende diorite (Kaufman, 1964, p. 9-10). Weakly mineralized argillite and hornfels cut by quartz and quartz-carbonate veins occur in the same general area (Kurtak and others, 1992). A sample of limonite-stained argillite cut by quartz veinlets contained 2 parts per million silver and 0.43 percent copper.

Gravel in Two Plate Creek is somewhat auriferous; pan-concentrate sample 1154 collected near the mouth of the creek had four very fine flakes of gold (Kurtak and others, 1992).

Alteration:

Age of mineralization:

Uncertain; possible association with a hornblende diorite pluton of Cretaceous (?) age.

Deposit model:

Low-sulfide copper-bearing quartz veins; possible association with hornblende diorite intrusion or Basaltic Cu (Cox and Singer, 1986; model 23).

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

23 (?)

Production Status: No

Site Status: Inactive

Workings/exploration:

Two Plate Creek was located as a placer prospect in 1954 (U.S. Bureau of Mines, 1973); one lode claim, the Clara Marie, may have been staked for copper (Heiner and Porter, 1972, Kardex site number KX68-28).

Production notes:

Reserves:

Additional comments:

References:

Kaufman, 1964; Heiner and Porter, 1972; U.S. Bureau of Mines, 1973; Cobb, 1979 (OFR 79-238); Kurtak and others, 1992.

Primary reference: Kaufman, 1964; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Spray Creek

Site type: Occurrence

ARDF no.: MH082

Latitude: 63.2912 **Quadrangle:** MH B-6

Longitude: 146.5544

Location description and accuracy:

This lode occurrence is at an elevation of about 3,900 feet on the north side of Spray Creek, in the SW1/4SW1/4 section 2, T. 19 S., R. 6 E., Fairbanks Meridian. Mineralization probably extends into the eastern part of section 10 of the previously cited township and range. The location corresponds approximately to locality 24 on figure 4 of Cobb (1979 [OFR 79-238]); to locality 18 of Kaufman (1964); to locality A12 of Kurtak and others (1992); and possibly to McLaren Copper (Heiner and Porter, 1972, Kardex site number KX68-41). The location cited here is probably within 500 feet of locality A12 of Kurtak and others (1992).

Commodities:

Main: Cu

Other: Ag, Au, W

Ore minerals: Bornite, chalcopyrite, malachite, tetrahedrite

Gangue minerals: Carbonates, epidote, quartz

Geologic description:

The occurrence is hosted in basaltic greenstone of the Nikolai Greenstone of Late Triassic age, a characteristic unit of the Wrangellia terrane (Nokleberg and others, 1982, 1991).

The basalt is well exposed in an incised lower canyon of Spray Creek. Randomly oriented shear zones, as much as 5 feet across, cut epidotized basalt. The shear zones can be traced for as much as 100 feet on strike. Mineralized quartz-carbonate veinlets in the shear zones contain bornite and tetrahedrite and are stained with malachite. Grab samples of vein material contain as much as 3.17 percent copper and 9 parts per million (ppm) silver; sample 1651 assayed 760 parts per billion gold and 145 ppm tungsten (Kurtak and others, 1992, table A12). Kaufman (1964, locality 18) earlier reported bornite and chalcopyrite in randomly oriented fractures on the steep north wall of the canyon.

Alteration:

Introduction of epidote into basaltic greenstone.

Age of mineralization:

Probably Cretaceous or early Tertiary (see MH060).

Deposit model:

Low-sulfide copper-bearing quartz-carbonate veins. Basaltic Cu (Cox and Singer, 1986; model 23).

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

23

Production Status: None

Site Status: Inactive

Workings/exploration:

The area has been staked variously as the Tiny Tim, KAA, and McLaren Copper claims nos. 1-4. Claims were first staked in 1955; one claim was located as recently as 1989 (Heiner and Porter, 1972; U.S. Bureau of Mines, 1973; Kurtak and others, 1992). There are no important workings.

Production notes:

Reserves:

Additional comments:

References:

Kaufman, 1964; Heiner and Porter, 1972; U.S. Bureau of Mines, 1973; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1982; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kaufman, 1964; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Cottonwood Creek

Site type: Prospect

ARDF no.: MH083

Latitude: 63.2385 **Quadrangle:** MH A-6

Longitude: 146.5845

Location description and accuracy:
The Cottonwood Creek placer prospect is west of the Maclaren River, mainly in sections 27 and 28, T. 19 S., R. 6 E., Fairbanks Meridian, and at an elevation of about 3,600 feet; The location for this record represents a section of the creek that extends from an elevation of about 3,000 feet to about 3,900 feet. The site corresponds to locality A19 of Kurtak and others (1992).

Commodities:

Main: Au

Other: Ag, W

Ore minerals: Gold

Gangue minerals:

Geologic description:
Cottonwood Creek flows southeasterly through alluvium and glacial outwash on the west side of the Maclaren River. Bedrock, locally cut by the creek, consists of basalt of Late Triassic age. Samples collected along the course of Cottonwood Creek suggest that most of the alluvium contains near-background concentrations of gold, although very fine flakes of gold were seen in all pan-concentrate samples (Kurtak and others, 1992, p. 125-126). One sample of active stream gravel contained three visible flakes and 4,450 parts per billion gold. Two other samples contained sub-background gold concentrations as determined by assay (Kurtak and others, 1992). Silver was detected in two samples, and tungsten ranged between 50 and 60 parts per million in four pan-concentrate samples.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
There are no substantial workings at the prospect. The claims were located in 1979.

Production notes:

Reserves:

Additional comments:

References:

Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Lakeview

Site type: Prospect

ARDF no.: MH084

Latitude: 63.2412 **Quadrangle:** MH A-6

Longitude: 146.5383

Location description and accuracy:
The Lakeview prospect is at an elevation of about 3,150 feet on a knob just southeast of Hidden Lake in the valley of the Maclaren River. The prospect is about 500 feet northeast of the center of section 26, T. 19 S., R. 6 E., Fairbanks Meridian. The prospect corresponds to locality A20 of Kurtak and others (1992); it is Kardex site number KX68-45 (Heiner and Porter, 1972).

Commodities:

Main: Cu

Other: Ag, Au

Ore minerals: Bornite, chalcopyrite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rocks at the Lakeview prospect consist mainly of amygdaloidal basalt of Late Triassic age. The basalt is altered propylitically, and Kurtak and others (1992) speculated that local occurrences of copper minerals at the prospect are associated with a buried (?) shear zone.

The Lakeview (or Lake View) claim of A.R. Ghezzi was located for gold, silver, and copper in 1955 (Saunders, 1957; Heiner and Porter, 1972). There are at least two copper-bearing zones 1 to 5 feet wide about 200 feet apart at the prospect. The mineralized zones consist of quartz-epidote veins that contain bornite, chalcopyrite, and, on the surface, malachite. Copper minerals also occur as amygdule fillings.

A grab sample collected by the U.S. Bureau of Mines assayed 0.19 ounce of silver per ton and 2.88 percent copper; another sample contained 0.26 ounce silver per ton and 1.88 percent copper (Kurtak and others, 1992, p. 125-126). Although Mr. Ghezzi located his claims for gold, silver, and copper, the Bureau found almost no gold at the property.

Alteration:
Propylitic alteration of basalt.

Age of mineralization:
Probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Cu-Ag quartz -epidote veins typical of propylitically altered basalt. Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
Small pits were excavated by A.R. Ghezzi in 1955.

Production notes:
Possible small production during prospecting.

Reserves:

Additional comments:

References:
Saunders, 1957; Heiner and Porter, 1972; Stout, 1976; Nokleberg and others, 1982; Kurtak and others, 1992.

Primary reference: Saunders, 1957; Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Hidden Lake

Site type: Occurrence

ARDF no.: MH085

Latitude: 63.2463 **Quadrangle:** MH A-6

Longitude: 146.5475

Location description and accuracy:
This occurrence is northwest of Hidden Lake at an elevation of about 3,200 feet, about on the boundary between sections 23 and 26, T. 19 S., R. 6 E., Fairbanks Meridian. The site corresponds to locality 16 of Kaufman (1964), probably to locality 13 of Saunders (1961 [report for the year]), and to locality 26 of Cobb (1979 [OFR 79-238]).

Commodities:

Main: Cu

Other:

Ore minerals: Bornite, chalcopyrite, oxidized copper minerals

Gangue minerals: Epidote, quartz

Geologic description:
The host rock of this occurrence is basaltic greenstone, probably equivalent to the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). Disseminated and pod-like masses of bornite, chalcopyrite, and oxidized copper minerals occur with quartz-epidote veins. There is little apparent continuity in the distribution of copper at the site (Kaufman, 1964, p. 8).

Alteration:
Oxidation of iron- and copper-bearing minerals.

Age of mineralization:
The epigenetic copper deposits are younger than Late Triassic and formed after a pre-Late Jurassic folding event (Stout, 1976). The deposits could have formed in Cretaceous or early Tertiary time (see MH060) during weak greenschist metamorphism of the Nikolai Greenstone.

Deposit model:
Low-sulfide copper-bearing quartz-epidote veins. Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no reported workings.

Production notes:

Reserves:

Additional comments:

References:

Saunders, 1961 (report for the year); Kaufman, 1964; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Saunders, 1961

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Mary Joe

Site type: Prospect

ARDF no.: MH086

Latitude: 63.2634 **Quadrangle:** MH B-6

Longitude: 146.5349

Location description and accuracy:
The Mary Joe placer prospect is on the west side of the Maclaren River 2 miles north of the confluence of Cottonwood Creek with the Maclaren River. The approximate midpoint of the prospect is at an elevation of about 3,000 feet, in the SW1/4SE1/4 section 14, T. 19 S., R. 6 E., Fairbanks Meridian. It corresponds to locality A15 of Kurtak and others (1992).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
The Maclaren River at the site of the Mary Joe gold placer prospect has a mile-wide alluvial gravel channel. The placer prospect is on the west side of the Maclaren alluvial deposit, possibly at the site of an old outwash channel. In 1950, when aerial photography for the Mount Hayes B-6 topographic quadrangle was taken, the Maclaren Glacier occupied the upper valley about 2 miles north of the site of the Mary Joe placer. The Maclaren Glacier has receded since then. Bedrock at the site of the prospect is mainly metabasalt of probable Late Triassic age; the placer almost certainly also contains alluvial material derived from metamorphic rocks exposed upstream (Nokleberg and others, 1982, 1991).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
Claims were located at the Mary Joe prospect in 1954. The U.S. Bureau of Mines examined the area in the early 1990's, but they did no extensive sampling work at the site (Kurtak and others, 1992).

Production notes:

The prospect was held for several years, but there is no record of any production.

Reserves:

Additional comments:

References:

Nokleberg and others, 1982; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Kathleen-Margaret; K-M

Site type: Mine

ARDF no.: MH087

Latitude: 63.2821 **Quadrangle:** MH B-6

Longitude: 146.5513

Location description and accuracy:

The Kathleen-Margaret or K-M mine (Cobb, 1979 [OFR 79-238, p. 39-40]) is at an elevation of about 4,100 feet on the north side of what is locally named Discovery Creek, a tributary of the Maclaren River. (Discovery Creek is not named on the Mount Hayes B-6 quadrangle, 1973 edition.) The mine is in the NW1/4SW1/4 section 11, T. 19 S., R. 6 E., Fairbanks Meridian. The site corresponds to locality 17 of Kaufman (1964), Kardex site number KX68-4 (Heiner and Porter, 1972), locality 33 in table 2 of Nokleberg and others (1991), and locality A13 of Kurtak and others (1992). The location is accurate within 250 feet.

Commodities:

Main: Cu

Other: Ag, Au, Hg, Sb, Sn, W

Ore minerals: Bornite, chalcocite, chalcopyrite, copper (native), malachite, pyrite, sphalerite (?), stibnite (?)

Gangue minerals: Calcite, epidote, quartz

Geologic description:

Rock at the Kathleen-Margaret or K-M mine consists of basalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The rock is generally weakly cupriferous, and a 1- to 3-foot-thick layer of olivine basalt near the mine contains disseminated native copper and bornite (Saunders, 1961, p. 39 [report for the year]). The basalt is faulted and is cut by diabase and intermediate porphyry dikes of probable Late Cretaceous or early Tertiary age. A porphyry dike occupies a fissure a few feet from, and subparallel to, the main vein of the mine. Characteristic alteration minerals in the deposit include epidote, which occurs in quartz veins and in the vein walls.

Copper occurs mainly in a swarm of veins that strike nearly north and dip steeply. Most of the veins in the swarm are less than 3 feet thick and can only be traced for 100 feet or less (Chapman and Saunders, 1954; Kaufman, 1964). The main vein of the mine, which has been developed in open cuts and underground workings, is locally more than 10 feet wide. This vein contained an ore shoot about 60 feet long, 5 feet wide, and 100 feet high. Material in the ore shoot was rich in copper. A shipment of about 15 tons of high-grade ore from the shoot assayed about 16.15 percent copper, 1.5 ounces of silver per ton, and 0.066 ounce of gold per ton.

Copper-bearing veins, including the main vein, are either cut off or are weaker south of an east-west cross-structure. Veins consist mainly of quartz, calcite, bornite, chalcopyrite, and, where oxidized, malachite; locally they contain chalcocite, and barren parts of the veins are pyritic (MacKevett, 1964; Kurtak and others, 1992).

Anomalous levels of trace elements suggest that other minerals are present in small amounts. Antimony is generally present in assay quantities; its maximum detected concentration is 0.43 percent, an amount that led Kurtak and others (1992) to speculate that stibnite is present in the veins. Zinc content of about 500 parts per million (ppm) in a few samples suggests the presence of sphalerite. Mercury was detected in a few samples; the mercury content of the high antimony sample (sample 1124) is 721 ppm. Samples of vein material contain as much as 230 ppm tungsten, and 700 ppm tin was found in a sample that contained 13 percent copper (Nokleberg and others, 1991, 79IL036 sample series).

Most vein samples contain at least small amounts of gold and silver (Kurtak and others, 1992, table A13). It appears that the main ore shoot, described above, contained about 1.5 ounces of silver per ton and 0.066 ounce of gold per ton on an average basis. A 7-foot vein segment sampled by Chapman and Saunders (1954) assayed 0.18 ounce of gold per ton, 1.2 ounces of silver per ton, and 8.99 percent copper. An adjacent 1.75-foot copper-rich vein segment contained no gold, but it assayed 2.55 ounces of silver per ton and 30.45 percent copper. The high tin (700 ppm) sample of Nokleberg and others (1991) cited above also contained 300 ppm silver and 3.2 ppm gold.

Alteration:

Formation of epidote; alteration of vein walls.

Age of mineralization:

The age is uncertain; judged from parallelism of the main vein and a porphyry dike of hypabyssal character, implying occupation of the same set of faults, the deposit is significantly younger than its Late Triassic host rock. The deposit could be as old as mid-Cretaceous, correlating with the regional metamorphism of the greenstone (Nokleberg and others, 1991), or as young as early Tertiary, correlating with emplacement of hypabyssal dikes. Stout (1976) proposed that copper deposits of Triassic basalt series were younger than Late Triassic and postdated a pre-Late Jurassic period of folding. It appears possible, probably likely, that copper was mobilized from the relatively copper-rich Nikolai Greenstone in more than one episode.

Deposit model:

Copper-bearing quartz vein in cupriferous metabasalt host.
Basaltic Cu (Cox and Singer, 1986; model 23).

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

23

Production Status: None

Site Status: Inactive

Workings/exploration:

The Kathleen-Margaret was probably rediscovered by F.S. Pettyjohn, Jr., in 1952 after an original discovery in about 1918 (Stout, 1976; Martin, 1920). The property was examined in August 1953 by the U.S. Geological Survey and the Alaska Territorial Department of Mines (Chapman and Saunders, 1954). The outcrop of the main vein was sufficiently attractive to promote development. By 1961, more than 800 feet of workings had been driven and more than 2,000 feet of exploratory holes drilled (Saunders, 1961 [report for the year]). The U.S. Bureau of Mines determined that the copper minerals could be concentrated by flotation. A concentrate of 36.7 percent copper was made from ore grading 1.2 percent copper; copper recovery was more than 95 percent (Wells, 1956). Some geobotanical work was done on the property; only a copper-tolerant moss, Rhacomitrium sudeticom, grew on the copper-rich vein outcrops (Shacklette, 1965). Although surface exposures encouraged exploration, the small size of the ore shoot and possible loss of vein to faulting discouraged further work after about 1961.

Production notes:

Total production is reported to be 15 tons of ore that contained 4,900 pounds of copper, 23 ounces of silver, and 1 ounce of gold (Kurtak and others, 1992, p. 108).

Reserves:

Indicated and inferred reserves calculated at the close of a government-supported exploration program comprised 15,000 tons grading 3.5 percent copper (Zoldak and Albee, 1959). Mainly on the basis of geologic criteria, MacKevett (1964) calculated a copper resource of 46,000 tons grading 5.2 percent copper.

Additional comments:

References:

Martin, 1920; Chapman and Saunders, 1954; Wells, 1956; Zoldak and Albee, 1959; Saunders, 1961 (report for the year); Kaufman, 1964; MacKevett, 1964; Shacklette, 1965; Heiner and Porter, 1972; Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992; MacKevett, 1964

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

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

Site type: Occurrence

ARDF no.: MH088

Latitude: 63.3236 **Quadrangle:** MH B-6

Longitude: 146.5015

Location description and accuracy:
This occurrence is on the east side of the Maclaren Glacier valley at about 4,250 feet elevation, in the SE1/4 section 25, T. 19 S., R. 6 E., Fairbanks Meridian. The location is approximate; it corresponds to locality A6 of Kurtak and others (1992), who gave a range of elevation of between 4,000 and 4,500 feet. The location is probably accurate within a quarter of a mile.

Commodities:

Main: Ag, Au

Other: Cu, Sb

Ore minerals: Chalcopyrite (?), malachite

Gangue minerals: Ankerite, quartz

Geologic description:
The rocks near the occurrence are schist, argillite, and slate of late Paleozoic protolith age (Nokleberg and others, 1991). Quartz-ankerite veins about 0.2 foot wide cut across the metamorphic structure. Quartz veins, as much as 0.3 foot wide, in zones as much as 30 feet thick, parallel schistosity. Sulfides are sparse; the rocks are locally stained with malachite, suggesting that chalcopyrite occurs locally in the quartz-ankerite veins (Kurtak and others, 1992, p. 92). Quartz and quartz-ankerite veins contain small concentrations of metals. Of six total samples collected at the site, five contained from 2 to 3 parts per million (ppm) silver; a malachite-stained quartz-carbonate vein contained 276 ppm copper and 80 parts per billion (ppb) gold. Another quartz vein contained 185 ppb gold. Antimony is slightly enriched; three of the six samples contain from 20 to 45 ppm antimony (Kurtak and others, 1992).

Alteration:
Oxidation of iron- and copper-bearing minerals.

Age of mineralization:
Late Paleozoic or younger; possibly related to Cretaceous regional metamorphism (Nokleberg and others, 1982).

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

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

Production Status: None

Site Status: Inactive

Workings/exploration:

There are no workings. The veins were discovered during U.S. Bureau of Mines study of the area (Kurtak and others, 1992).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1982; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/31/01

Site name(s): Maclaren Glacier lode

Site type: Prospect

ARDF no.: MH089

Latitude: 63.3007 **Quadrangle:** MH B-5

Longitude: 146.4874

Location description and accuracy:

This prospect is in a lode deposit at least one-half mile long. It is on the east side of the Maclaren Glacier valley at elevations ranging from 4,000 to 5,500 feet. The location is a general or approximate midpoint location for the prospect; it is in the NW1/4NW1/4 section 6, T.19 S., R. 7 E., Fairbanks Meridian. The location corresponds to locality 7 of Rose (1966 [ADMM GR 20]), locality 27 on figure 4 of Cobb (1979 [OFR 79-238]), locality 36 in table 2 of Nokleberg and others (1991), and to the Maclaren Glacier lode (locality A9) of Kurtak and others (1992).

Commodities:

Main: Cu, Fe

Other: Ag, Au, Cr, Ni, Zn

Ore minerals: Azurite, chalcopyrite, gold, magnetite, malachite, sphalerite

Gangue minerals: Calcite, diopside, garnet

Geologic description:

At the Maclaren Glacier lode prospect, a steeply dipping fault that strikes west-northwest separates interlayered Triassic limestone and gabbro (on the south) from argillite, also of Triassic age (Nokleberg and others, 1991). Locally, the argillite is intruded by granodiorite of probable Cretaceous age (Rose, 1966 [ADMM GR 20]; Nokleberg and others, 1986). Limestone is replaced by magnetite-rich skarn, but the deposit is poorly exposed because of gravel cover.

The skarn contains from 10 to 20 percent magnetite, and, locally, sphalerite and chalcopyrite, which is partly oxidized to azurite and malachite.

The iron-rich skarn also locally contains chromium and nickel; sample 644 of magnetite-rich skarn assayed 16.9 percent iron, 2.8 percent copper, 0.12 percent chromium, 0.14 percent nickel, 45 parts per billion (ppb) gold, and 1 ppb silver (Kurtak and others, 1992, table A9). Locally the skarn contains more zinc and precious metals; sample 79IL054A assayed 5.5 percent zinc, 2.5 percent copper, 30 parts per million (ppm) silver, and 3.7 ppm gold (Nokleberg and others, 1991).

Alteration:

Age of mineralization:

Probably Cretaceous, associated with granitic plutonism (Nokleberg and others, 1986).

Deposit model:

Cu skarn (?) (Cox and Singer, 1986; model 18b).

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

18b (?)

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence is covered by active MAN Resources claims (W.T. Ellis, written communication, 2001).

Production notes:

Reserves:

Additional comments:

References:
Rose, 1966 (ADMM GR 20); Cobb, 1979 (OFR 79-238); Nokleberg and others, 1986; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Rose, 1966 (ADMM GR 20)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): Unnamed (south of East Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH090

Latitude: 63.2614 **Quadrangle:** MH B-5

Longitude: 146.4997

Location description and accuracy:
The occurrence is approximately located at an elevation of about 3,100 feet, one-half mile south of lowermost East Fork Maclaren River. The location is essentially on the boundary between the Mount Hayes B-5 and B-6 quadrangles. The location corresponds to locality 35 in table 2 of Nokleberg and others (1991). Nokleberg and others (1991), however, reported the latitude of the occurrence as 145o 29' 09, which would definitely place the occurrence on the B-5 quadrangle. The location is uncertain by a mile or so.

Commodities:

Main: Cu

Other: Ag

Ore minerals: Azurite, malachite

Gangue minerals: Quartz

Geologic description:
The host rock of this occurrence is metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The deposit consists of metabasalt cut by quartz veins containing azurite and malachite, secondary minerals after unknown primary copper minerals. Grab sample 79RM028C containing azurite and malachite assayed 1.5 percent copper (Nokleberg and others, 1991). Copper deposits of the Nikolai Greenstone typically contain small amounts of silver.

Alteration:

Age of mineralization:
The deposit is probably Cretaceous or early Tertiary (see MH060 and MH100).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence is covered by active MAN Resources claims (W.T. Ellis, written communication, 2001).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): Unnamed (west of lower Eureka Glacier)

Site type: Occurrence

ARDF no.: MH091

Latitude: 63.3048 **Quadrangle:** MH B-5

Longitude: 146.4349

Location description and accuracy:
This occurrence is at an elevation of about 5,000 feet in a south-flowing tributary of the East Fork Maclaren River about 2 miles west of the toe of Eureka Glacier. The occurrence is at the southeast corner of section 32 T. 18 S. R. 7 E. Fairbanks Meridian, and corresponds to locality A8 of Kurtak and others (1992).

Commodities:

Main: Cr, Ni

Other: Pd, Pt

Ore minerals:

Gangue minerals: Quartz

Geologic description:
This occurrence is approximately on a major east-west fault that separates granitic rocks of Jurassic or Cretaceous age (on the north) from Paleozoic metasedimentary rocks or Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). A steep northwest cross fault was mapped at about this locality by Rose (1966 [ADMM GR 20, figure 3). Rose also mapped lenticular masses of dunite and gabbro farther north, within dioritic rocks of the granitic complex.

The U.S. Bureau of Mines traversed along the gulch that exposes the occurrence between about 4,500 and 5,500 feet elevation and found inclusions or dikes of serpentinized dunite in a granitic host that they called quartz monzonite (Kurtak and others, 1992, locality A 8). The serpentinized dunite contained 0.21 to 0.24 percent nickel and 0.13 to 0.15 percent chromium. The mineral host(s) of the nickel and chromium is unknown. Silicified quartz monzonite in a fault zone contained 12 parts per billion palladium and 5 parts per million platinum. Platinum and palladium were also detected in creek gravel and dunite float (Kurtak and others, 1992, table A8).

Alteration:
Silicification of quartz monzonite; serpentinization of dunite (Kurtak and others, 1992).

Age of mineralization:
Mesozoic (?), possibly the age of the ultramafic host rocks.

Deposit model:
Ultramafic related.

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:

U.S. Bureau of Mines geologists traversed the deep gulch that crosses the intrusive rock-metasedimentary rock contact (Kurtak and others, 1992). Their samples of serpentinized dunite contained as much as 0.24 percent nickel and 0.15 percent chromium; an altered quartz monzonite contained 12 parts per billion palladium.

The occurrence is on active MAN Resources claims (W.T. Ellis, written communication, 2001).

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/16/01

Site name(s): Unnamed (west of lower Eureka Glacier)

Site type: Occurrence

ARDF no.: MH092

Latitude: 63.3155 **Quadrangle:** MH B-5

Longitude: 146.4291

Location description and accuracy:
This occurrence is at an elevation of about 6,500 feet on peak 6580, about 2 miles west of the toe of Eureka Glacier, near the north end of the boundary between sections 32 and 33, T. 18 S., R.7 E., Fairbanks Meridian. The occurrence corresponds to locality 37 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals: Olivine, serpentine

Geologic description:
This occurrence is in an Upper Triassic mafic intrusive complex (Nokleberg and others, 1991). Rose (1966 [ADMM GR 20, figure 3]) mapped the complex as diorite, quartz diorite, and gabbro. The occurrence consists of chromite disseminated in a serpentinized olivine cumulate inclusion in metagabbro. Sample 79NK242B contained more than 0.5 percent chromium (Nokleberg and others, 1991).

Alteration:
The olivine cumulate inclusion is serpentinized.

Age of mineralization:
Late Triassic, the age of the ultramafic inclusion.

Deposit model:
Disseminated chromite in mafic-ultramafic rock.

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

Production Status: None

Site Status: Active

Workings/exploration:
This occurrence was discovered during geologic mapping (Nokleberg and others, 1991). It is on active MAN Resources claims (W.T. Ellis, unpublished field notes, 2001).

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/16/01

Site name(s): Unnamed (west of Eureka Glacier)

Site type: Occurrence

ARDF no.: MH093

Latitude: 63.3259 **Quadrangle:** MH B-5

Longitude: 146.3800

Location description and accuracy:
This occurrence is at an elevation of about 5,300 feet, a third-mile west of lower Eureka Glacier. It is southeast of the center of section 27, T. 18 S., R. 7 E., Fairbanks Meridian. The occurrence corresponds to locality 38 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr, Cu, Ni

Other: Pd, Pt

Ore minerals: Chalcopyrite, chromite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Olivine, serpentinite

Geologic description:
This occurrence is in Upper Triassic ultramafic and mafic rocks that are enclosed in a Tertiary to Cretaceous composite granitic to dioritic pluton (Nokleberg and others, 1991). Rose (1966 [ADMM GR 20, figure 3]) mapped dunite bodies within diorite, quartz diorite, and gabbro in this area. The Broxson Gulch thrust appears to form the hanging wall of the intrusive series, and it has been inferred that dunite bodies formed a well-lubricated layer in the footwall of the thrust (Kurtak and others, 1992, p. 94). The hanging wall of the thrust consists of schist.

This occurrence consists of chromite and magnetite disseminated in a serpentinized olivine cumulate inclusion in metagranodiorite (Nokleberg and others, 1991, locality 38, table 2). Grab sample 79NK051D contained more than 0.5 percent chromium. Also at this site, rubble of olivine melagabbro and feldspathic peridotite hosts sulfide mineralization (W.T. Ellis, unpublished data, 2001). The rock float at this site appears to be derived from a sill-like body of Upper Triassic gabbro and serpentinized peridotite and dunite in the cliffs on the south side of the cirque to the west. The sulfide mineralization consists of coarse-grained clots and disseminations of pyrrhotite, chalcopyrite, and pentlandite. Sulfide abundance rarely exceeds about 5 percent in the float. Samples assay results had not been obtained by the time of this report (W.T. Ellis, unpublished data, 2001).

Alteration:
The olivine cumulates are serpentinized.

Age of mineralization:
Late Triassic, synchronous with emplacement of the mafic-ultramafic rocks.

Deposit model:
Disseminated chromite in layered mafic-ultramafic complex and Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: No

Site Status: Active

Workings/exploration:

The occurrence was found during geologic reconnaissance (Nokleberg and others, 1991). Sulfide mineralization was discovered during July 2001 (W.T. Ellis, unpublished field notes, 2001). The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991; Kurtak and others, 1992; this report.

Primary reference: Nokleberg and others, 1991; this report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/16/01

Site name(s): Bird Beak

Site type: Prospect

ARDF no.: MH094

Latitude: 63.3179 **Quadrangle:** MH B-5

Longitude: 146.3946

Location description and accuracy:
The Bird Beak occurrence is at an elevation of about 5,900 feet, about 1,600 feet southwest of peak 6120, and about three-quarters of a mile west of lower Eureka Glacier. It is in the SW1/4SW1/4 section 27, T. 18 S., R. 7 E., Fairbanks Meridian. The occurrence corresponds to locality A7 of Kurtak and others (1992).

Commodities:

Main: Ni, Pd, Pt

Other: Cr, Cu

Ore minerals: Chalcopyrite, chromite, magnetite, moncheite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The Bird Beak prospect is in Upper Triassic ultramafic and mafic rocks that are enclosed in a Tertiary to Cretaceous composite granitic to dioritic pluton (Nokleberg and others, 1991). Rose (1966 [ADMM GR 20, figure 3]) mapped dunite bodies within diorite, quartz diorite, and gabbro in this area. The Broxson Gulch thrust appears to form the hanging wall of the intrusive series, and it has been inferred that dunite bodies formed a well-lubricated layer in the footwall of the thrust (Kurtak and others, 1992, p. 94). The hanging wall of the thrust consists of schist. Olivine melagabbro and serpentinized dunite are the predominant ultramafic rock types that host sulfide mineralization (W.T. Ellis, unpublished data, 2001).

The U.S. Bureau of Mines collected samples of dunite and gabbro at the locality (Kurtak and others, 1992, table A7). Sample 3038 of olivine gabbro containing disseminated pyrrhotite and chalcopyrite assayed 0.15 percent copper, 0.21 percent chromium, 0.36 percent nickel, 550 parts per billion (ppb) palladium, and 80 ppb platinum. Sample 2644 of limonite-stained serpentine contained 0.13 percent copper, 896 parts per million (ppm) nickel, 280 ppb palladium, and 570 ppb platinum. A pentlandite(?) -bearing pyroxenite sample assayed 0.2 percent nickel and 25 ppb platinum.

Alteration:
All of the ultramafic rock units are moderately to strongly serpentinized.

Age of mineralization:
Late Triassic, synchronous with emplacement of the mafic-ultramafic rocks.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

The prospect was sampled by the U.S. Bureau of Mines (Kurtak and others, 1992). A sulfide-bearing olivine gabbro sample contained 0.36 percent nickel and 550 parts per billion (ppb) palladium. The highest platinum concentration (570 ppb) was in sample 2644 of limonite-stained serpentinite. Foley (1992) reported similar concentrations in a red, iron-oxide-stained, sulfide-rich, olivine gabbro; microprobe examination of the gabbro showed minute particles of moncheite (PtTe) along grain boundaries between chalcopyrite and ferromagnesian silicate minerals.

The occurrence is on active MAN Resources claims (W.T. Ellis, unpublished field notes, 2001).

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991; Foley, 1992; Kurtak and others, 1992; this report.

Primary reference: Kurtak and others, 1992; this report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/16/01

Site name(s): Unnamed (north of upper East Fork Maclaren River)

Site type: Occurrence

ARDF no.: MH095

Latitude: 63.2977 **Quadrangle:** MH B-5

Longitude: 146.4177

Location description and accuracy:
This occurrence is at an elevation of about 4,250 feet in a south-flowing tributary of the East Fork Maclaren River about 1.5 miles west of the foot of Eureka Glacier. The tributary creek is locally called Compass Creek. The occurrence is about 500 feet west of the center of section 4, T. 19 S., R.7E. , Fairbanks Meridian. The site corresponds to locality 6 on page 21 of Rose, 1966 [ADMM GR 20]) and to locality 28 in figure 4 of Cobb (1979 [OFR 79-238]). (Rose's text gives the location as T. 18 S., instead of the correct location in T. 19 S., as shown on his figure 3.)

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Chlorite, opal

Geologic description:
The rock at this occurrence is metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The formation was mapped as the Amphitheater Basalt by Rose (1966 [ADMM GR 20, figure 3]). Vesicles in propylitized basalt are filled with opal, chlorite, pyrite and minor amounts of chalcopyrite (Rose, 1966, locality 6 [ADMM GR 20, p. 21]).

Alteration:
Propylitic alteration of basalt.

Age of mineralization:
The mineralization post-dates Late Jurassic folding. It is probably either Cretaceous, related to regional metamorphism or granitic plutonism (Nokleberg and others, 1986), or early Tertiary (Stout, 1976).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence is covered by active claims of Fort Knox Gold Resources Company (W.T. Ellis, unpublished field notes, 1996).

Production notes:

Reserves:

Additional comments:
This is a minor copper occurrence, typical of the Nikolai Greenstone.

References:
Rose, 1966 (ADMM GR 20); Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1986; Nokleberg and others, 1991.

Primary reference: Rose, 1966 (ADMM GR 20)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/16/01

Site name(s): Unnamed (west of the terminus of Eureka Glacier)

Site type: Occurrence

ARDF no.: MH096

Latitude: 63.2876 **Quadrangle:** MH B-5

Longitude: 146.3695

Location description and accuracy:
This occurrence is at an elevation of about 3,600 feet at the west edge of the terminus of Eureka Glacier (as shown on the 1951 [rev. 1978] edition of the Mount Hayes B-5 topographic map). The occurrence is in the NE1/4NE1/4 section 10, T. 19 S., R. 7 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni

Other: Pd, Pt

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
This occurrence is in the westernmost exposure of the Fish Lake ultramafic complex, a large layered lopolith of Late Triassic age considered to be comagmatic with the Upper Triassic Nikolai Greenstone (Nokleberg and others, 1991). This occurrence consists of sulfide minerals disseminated in the ultramafic complex. Chalcopyrite and pyrrhotite form about 5 to 7 percent of the olivine-clinopyroxene wehrlite. The wehrlite is about 100 feet stratigraphically below locally pegmatitic gabbro. Grab samples of sulfide-bearing wehrlite contained as much as 1,180 parts per million (ppm) copper, 1,650 ppm nickel, 58 parts per billion (ppb) palladium, and 50 ppb platinum (W.T. Ellis, unpublished data, 1996).

Alteration:
The wehrlite is weakly serpentinized.

Age of mineralization:
Late Triassic, synchronous with emplacement of the mafic-ultramafic rocks.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is covered by active Fort Knox Gold Resources claims (W.T. Ellis, unpublished field notes, 1996).

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/01

Site name(s): East Fork Maclaren River

Site type: Prospect

ARDF no.: MH097

Latitude: 63.2681 **Quadrangle:** MH B-5

Longitude: 146.4426

Location description and accuracy:
This placer prospect extends from elevations of about 3,000 to 3,350 feet on the East Fork Maclaren River, about 2 miles west of the outwash plain of the Eureka Glacier. The prospect is near the center of section 17, T. 19 S., R. 7 E., Fairbanks Meridian. The site corresponds to the approximate midpoint of placer locality A14 of Kurtak and others (1992). This is Kardex site number KX86-206 (Heiner and Porter, 1972).

Commodities:

Main: Au

Other: Ag, PGMs (platinum-group metals)

Ore minerals: Gold, PGMs

Gangue minerals:

Geologic description:
The upper East Fork Maclaren River below Eureka Glacier cuts tuffaceous rocks of Triassic age. Lowermost Eureka Glacier appears to cross a dunite-rich zone of the Fish Lake mafic-ultramafic complex about a mile wide (Stout, 1976, plate 1). Eureka Glacier trends nearly north-south; the uppermost East Fork Maclaren River trends about east-west; consequently it is uncertain if the glacier scoured the upper East Fork and removed any placer concentrations of pre-glacial age.

The U.S. Bureau of Mines collected three pan-concentrate samples from this placer (Kurtak and others, 1992, table A14). All contained particulate gold. Sample 1036 contained 0.0019 ounce of recoverable gold per cubic yard. Platinum-group metals were not determined. Sample 1576 (bank gravel) had 1 fine and 30 very fine gold flakes; a pan-concentrate sample assayed 40 parts per billion (ppb) platinum, 6 ppb palladium, and 1 part per million silver.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The Three Bears claims were staked along the East Fork in 1979-80. From 1981 to 1986, claims were

tested by backhoe test holes and by suction dredging. During its investigation of the Valdez Creek district, the U.S. Bureau of Mines collected three placer samples (Kurtak and others, 1992), one of which contained 0.0019 ounce of recoverable gold per cubic yard. Another sample contained 40 parts per billion (ppb) platinum and 6 ppb palladium.

The occurrence is now covered by claims owned by MAN Resources (W.T. Ellis, written communication, 2001).

Production notes:

Reserves:

Additional comments:

The presence of gold and platinum-group metals suggests that more testing is warranted.

References:

Stout, 1976; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/06/01

Site name(s): Azurite

Site type: Occurrence

ARDF no.: MH098

Latitude: 63.2619 **Quadrangle:** MH B-5

Longitude: 146.4071

Location description and accuracy:
This occurrence is at an elevation of about 3,750 feet in a north-flowing tributary to the East Fork Maclaren River and about 3 miles southwest of the terminus of the Eureka Glacier. The occurrence is in the SW1/4SE1/4 section 16, T. 18 S., R. 7 E., Fairbanks Meridian.

Commodities:

Main: Ag, Au, Cu

Other: Pd

Ore minerals: Azurite, chalcopyrite, pyrite

Gangue minerals:

Geologic description:
The rock at this occurrence is metabasalt of the Nikolai Greenstone of Late Triassic age. This formation was mapped as the Amphitheater Basalt by Rose (1966 [ADMM GR 20]). At this locality a 30- by 50-foot area contains abundant copper-stained and pyrite-bearing basalt. Two samples from this site contain 578 and 697 parts per billion (ppb) gold, 31 and 69 parts per million silver, 31 and 108 ppb palladium, and 7.8 and 15.3 percent copper (W.T. Ellis, oral communication, 2001).

Alteration:
Chlorite-epidote alteration of the volcanic host rock; local oxidation of copper minerals.

Age of mineralization:
Cretaceous or younger.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence is on active claims of MAN Resources. Two samples from this site contain contain 578 and 697 parts per billion (ppb) gold, 31 and 69 parts per million silver, 31 and 108 ppb palladium, and 7.8 and 15.3 percent copper (W.T. Ellis, oral communication, 2001).

Production notes:

Reserves:

Additional comments:
This is a copper occurrence typical of the Nikolai Greenstone.

References:
Rose, 1966 (ADMM GR 20); this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group) and W.J. Nokleberg (USGS)

Last report date: 8/19/02

Site name(s): Sunshine; Greentree

Site type: Prospect

ARDF no.: MH099

Latitude: 63.2393 **Quadrangle:** MH A-5

Longitude: 146.4422

Location description and accuracy:
This prospect is on the ridge between Boulder Creek and the Maclaren River at an elevation of approximately 4,400 feet and about 1,000 feet east of the center of section 29, T. 19 S., R. 7 E., Fairbanks Meridian. The location is probably accurate within 1,000 feet. This occurrence corresponds to locality A21 of Kurtak and others (1992).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcocite (?), 'copper oxides', malachite

Gangue minerals: Carbonate, epidote, quartz

Geologic description:
Bedrock in the area consists of northwest-striking metabasalt of the Nikolai Greenstone of Late Triassic age (Kurtak and others, 1992; Nokleberg and others, 1991). U.S. Bureau of Mines investigators found several small areas that contained copper-bearing blebs and veins mainly consisting of quartz-carbonate-epidote. Copper minerals include malachite, probably chalcocite, and unspecified 'copper oxide' minerals (Kurtak and others, 1992, table A21). Four of six grab samples collected by the Bureau contained more than 0.1 percent copper. One sample of an epidote-carbonate vein contained 0.71 percent copper. Samples contained only near background concentrations of gold and silver.

Alteration:
Propylitic alteration of metabasalt; formation of copper-bearing quartz-epidote-carbonate segregations in veins and as blebs.

Age of mineralization:
Probably Cretaceous or early Tertiary (see MH060).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The Sunshine claims were staked by Northland Mines in 1974 and 1975.

Production notes:

Reserves:

Additional comments:
The copper occurrences are very small, extending only a few feet along strike (Kurtak and others, 1992).

References:
Stout, 1976; Nokleberg and others, 1986; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/03/01

Site name(s): Greenstone Occurrence

Site type: Occurrence

ARDF no.: MH100

Latitude: 63.2255 **Quadrangle:** MH A-5

Longitude: 146.4105

Location description and accuracy:

The Greenstone Occurrence claims are on a flat-topped ridge on the east side of upper Boulder Creek at an elevation of about 3,900 feet and about 750 feet east of the center of section 33, T. 19 S., R. 7 E., Fairbanks Meridian (Stout, 1976, plate 1). The site corresponds to locality A22 of Kurtak and others (1992), locality 29 in figure 4 of Cobb (1979 [OFR 79-238]), and locality 39 in table 2 of Nokleberg and others (1991). The location is accurate within 1,000 feet.

Commodities:

Main: Cu

Other: Ag, Au

Ore minerals: Bornite, chalcocite, chalcopyrite, malachite

Gangue minerals: Epidote, quartz

Geologic description:

The rock at the Greenstone Occurrence claims is propylitized metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991); this unit was previously mapped with the Boulder Creek Volcanics by Stout (1976).

Mineral deposits are copper-bearing quartz-epidote veins. The quartz veins occur in an en echelon set, strike about N 25 E, and are steeply dipping. They are exposed intermittently for about 300 feet on strike and for about 120 feet vertically (Kurtak and others, 1992, p. 131).

Veins range from a few inches to 1 foot thick. They are mainly composed of quartz; epidote occurs in the veins or on their margins. Copper-bearing minerals identified at the site are chalcocite, chalcopyrite, bornite, and malachite. Copper content of the veins ranges from less than 0.1 percent to 2.15 percent (Kurtak and others, 1992, table A22). Gold is enriched to a maximum of 410 parts per billion (ppb) (sample 1409). The copper-bearing vein that contains 2.15 percent copper assayed 0.18 ounce per ton silver and 145 ppb gold (sample 1669). No other trace elements significantly exceed background.

According to the U.S. Bureau of Mines, the veins are too small to be an economic source of copper and do not contain significant values of silver (Kurtak and others, 1992).

Alteration:

Propylitic alteration of basaltic bedrock.

Age of mineralization:

The mineralization is post-Late Triassic and also postdates a folding event that occurred before the Late Jurassic (Stout, 1976); it probably occurred in Cretaceous time, during regional metamorphism and granitic plutonism (Nokleberg and others, 1986) or in the early Tertiary at about the time of emplacement of dacite porphyry dikes (Stout, 1976).

Deposit model:

Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
Two hundred and eighty-six claims were staked in the area between 1966 and 1976, but there are no significant exploration workings.

Production notes:

Reserves:

Additional comments:

References:
Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1986; Nokleberg and others, 1991; Kurtak and others, 1992.

Primary reference: Kurtak and others, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/04/01

Site name(s): BOS

Site type: Occurrence

ARDF no.: MH101

Latitude: 63.3349 **Quadrangle:** MH B-5

Longitude: 146.3201

Location description and accuracy:
This occurrence is at an elevation of 5,100 feet about one-half mile east of the Eureka Glacier. It is about one-half mile northwest of peak 6563 in a hanging glacier cirque. The deposit is in the SE1/4SW1/4 section 24, T. 18 S., R. 7 E., Fairbanks Meridian.

Commodities:

Main: Au, Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The rock float at the BOS occurrence is derived from a sill-like body of Upper Triassic gabbro and serpentinized peridotite and dunite in the cliffs at the head of the cirque. The sill-like body is part of the Eureka ultramafic complex, which occupies strands of the Broxson Gulch thrust fault (W.T. Ellis, oral communication, 2001).

At this occurrence, coarse-grained clots and disseminations of pyrrhotite, chalcopyrite, and pentlandite occur in olivine melagabbro and feldspathic peridotite. Sulfide abundance rarely exceeds about 5 percent in the float (W.T. Ellis, oral communication, 2001). A float sample from this occurrence contains 117 parts per billion (ppb) gold, 393 ppb platinum, 493 ppb palladium, 0.14 percent copper, and 0.4 percent nickel.

Alteration:
Moderate to strong serpentinization.

Age of mineralization:
Late Triassic.

Deposit model:
Differentiated mafic-ultramafic sill-form Ni-Cu-PGE.

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

Production Status: None

Site Status: Active

Workings/exploration:
American Copper and Nickel Company collected samples about one-half mile east of this site that contain 0.26 percent nickel, 24 parts per billion (ppb) palladium, and 30 ppb platinum (W.T. Ellis, oral communication, 1996). A float sample from the BOS occurrence contains 117 parts per billion (ppb) gold, 393 ppb platinum, 493 ppb palladium, 0.14 percent copper, and 0.4 percent nickel (W.T. Ellis, oral communication,

2001. The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group) and W.J. Nokleberg (USGS)

Last report date: 8/19/02

Site name(s): Boot Flap

Site type: Prospect

ARDF no.: MH102

Latitude: 63.3229 **Quadrangle:** MH B-5

Longitude: 146.3152

Location description and accuracy:
The Boot Flap prospect is at an elevation of 5,100 feet three-quarters of a mile east of the toe of the Eureka Glacier. It is about one-half mile south of peak 6563, in the SE1/4SE1/4 section 25, T. 18 S., R. 7 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The rocks at the Boot Flap prospect appear to be a sill-like body of Upper Triassic gabbro and serpentinized peridotite and dunite (Rose, 1966 [ADMM GR 20, figure 2]). The body is informally called the Eureka ultramafic complex, which occupies strands of the Broxson Gulch thrust fault (W.T. Ellis, unpublished data, 1996).

At the prospect, coarse-grained disseminated sulfides, principally pyrrhotite, occur in olivine melagabbro. Sulfide abundance increases to a maximum of about 10 percent downward in the sill-like body, and small amounts of magnetite, chalcopyrite, and pentlandite accompany the pyrrhotite. Samples contain as much as 0.03 percent copper, 0.09 percent nickel, 20 parts per billion (ppb) palladium, and 20 ppb platinum (W.T. Ellis, unpublished data, 1996).

Alteration:
All of the ultramafic rock units are moderately to strongly serpentinized.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): FL Feeder

Site type: Prospect

ARDF no.: MH103

Latitude: 63.3049 **Quadrangle:** MH B-5

Longitude: 146.3060

Location description and accuracy:
The FL Feeder prospect is at an elevation of about 4,700 feet one mile east of the toe of the Eureka Glacier, in the SE1/4SE1/4 section 36, T. 18 S., R. 7 E., Fairbanks Meridian. It is in a tributary to locally named Landslide Creek (see figure 3 of Rose, 1966 [ADMM GR 20]).

Commodities:

Main: Cu

Other: Ag, Au, Ni

Ore minerals: Chalcopyrite, pyrite

Gangue minerals:

Geologic description:
The rocks in the area of the FL Feeder prospect occur within a body of diorite, quartz diorite, and gabbro that intrude andesite, dacite, and graywacke (Rose, 1966 [ADMM GR 20, figure 3]). A quartz monzonite crops out to the south of the gabbro body. The gabbroic body is possibly a sill (Nokleberg and others, 1991).

The FL Feeder prospect consists of chalcopyrite- and pyrite-bearing hornblende-biotite gabbro breccia that trends southeasterly and cuts the enclosing gabbro at a high angle. The breccia is intensely amphibolitized and contains large porphyroblastic biotite crystals. The chalcopyrite and pyrite occur in clasts and matrix of the breccia. Samples of breccia assay as much as 1.1 percent copper, 0.1 percent nickel, 10 parts per million silver, and 192 parts per billion gold (W.T. Ellis, written communication, 1996).

Alteration:
Secondary amphibole and biotite are strongly developed in the FL Feeder breccia.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/181/01

Site name(s): Tres Equis

Site type: Prospect

ARDF no.: MH104

Latitude: 63.2796 **Quadrangle:** MH B-5

Longitude: 146.3087

Location description and accuracy:

The Tres Equis prospect is located one-quarter mile northwest of peak 3710, east of the headwaters of Eureka Creek below Eureka Glacier. The prospect is at the center of the SE1/4 section 12, T. 19 S., R.7 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd

Other: Co, Pt

Ore minerals: Chalcopyrite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:

The Tres Equis prospect is in the Fish Lake ultramafic-mafic intrusive complex, a layered lopolith of Late Triassic age considered to be a comagmatic with lava flows of the Nikolai Greenstone (Nokleberg and others, 1991). The rocks at the Tres Equis prospect consist of layered wehrlite cut by irregular, mainly gabbroic dikes. A 50- to 100-foot-thick layer of taxitic gabbro overlies the wehrlite and is overlain in turn by a thick, massive peridotite of a later magmatic cycle. The taxitic gabbro contains leucocratic and anothorositic phases and commonly has clinopyroxenitic margins. The dikes range from melagabbro to leucrocratic pegmatite.

Magmatic layering in the lopolith strikes east to southeast and dips 45 to 50 degrees to the south. The dikes also strike east to southeast but cut the layering at high angles. All units are cut by high-angle, north- to northeast- trending faults having offsets of 20 to 50 feet.

The Tres Equis deposit is a magmatic breccia in the lower portion of the gabbroic unit of the second magmatic cycle of the Fish Lake complex. The breccia strikes east to southeast, subparallel to the gabbroic dikes. The breccia is along the margin of an irregular dike and consists of clasts of peridotite and gabbro in an oxidized and leached (post-mineralization) matrix. Some of the clasts, which are as much as 2 feet in diameter, contain disseminated pyrrhotite, chalcopyrite, and pentlandite. The sulfides also form networks and massive clots containing individual crystals more than an inch across. The average grade of six clasts containing massive sulfides was 3.2 percent copper, 5.2 percent nickel, 0.33 percent cobalt, 1,750 parts per billion (ppb) palladium, and 28 ppb platinum. A net-textured clast assayed 0.3 percent copper, 1.0 percent nickel, 0.07 percent cobalt, 712 ppb palladium, and 100 ppb platinum (W.T. Ellis, unpublished data, 1996).

Alteration:

The host rock is oxidized and leached. The peridotite is moderately serpentinized; hairline joint fractures are filled with fibrous serpentine (chrysotile). The gabbro dikes are amphibolitized along their margins but are essentially fresh for a half -inch into the dikes.

Age of mineralization:

Late Triassic, the age of the host rock.

Deposit model:

Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

One hydraulically washed hand trench 20 to 30 feet wide and 100 feet long was completed in 1996. A 627-foot hole was drilled in 1997; two 200-foot holes were drilled in 1998. None of the drill holes penetrated significant mineralization.

The occurrence is covered by active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

The Tres Equis breccia prospect is important because it demonstrates that the Fish Lake complex contains high-grade nickeliferous massive sulfide.

References:

Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/01

Site name(s): Unnamed (north of the head of Eureka Creek)

Site type: Occurrence

ARDF no.: MH105

Latitude: 63.2771 **Quadrangle:** MH B-5

Longitude: 146.3026

Location description and accuracy:
This occurrence is at an elevation of about 3,700 feet on peak 3710, northeast of the head of Eureka Creek, and in the SE1/4SE1/4 section 12, T. 19 S., R.7 E., Fairbanks Meridian. The occurrence corresponds to locality 40 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals: Olivine, pyroxene

Geologic description:
This occurrence is in olivine-pyroxene cumulate in the Fish Lake ultramafic complex. The complex is a lopolithic feeder of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). Chromite is disseminated in the olivine-pyroxene cumulate. Grab sample 79ZN070A contained more than 5,000 parts per million chromium (Nokleberg and others, 1991, table 2).

Alteration:

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Chromite disseminated in a layered mafic-ultramafic complex.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is covered by active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/01

Site name(s): Landslide Creek (east of lower Eureka Glacier)

Site type: Prospect

ARDF no.: MH106

Latitude: 63.3227 **Quadrangle:** MH B-5

Longitude: 146.2847

Location description and accuracy:

This prospect is at an elevation of about 5,100 feet, about 1.5 miles east of the toe of the Eureka Glacier. It is in the headwaters of informally named Landslide Creek, a south-flowing tributary of Eureka Creek (see figure 3 of Rose (1966 [ADMM GR 20]). The prospect is about one-quarter mile south of the center of section 30, T. 18 S., R. 8 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Au, Cr

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Diopside, epidote, serpentine

Geologic description:

The rock in the area of this prospect consists of Upper Triassic serpentinized peridotite and mafic gabbro interleaved with quartz diorite (Rose, 1966 {ADMM GR 20, figure 3]). The serpentinized rocks, informally called the Eureka ultramafic complex, occupy strands of the Broxson Gulch thrust fault (Nokleberg and others, 1991).

Disseminated sulfide minerals are present in several ultramafic lithologies and in skarn of probable ultramafic parentage in upper Landslide Creek. Plagioclase peridotite that contains accessory pyrite, pyrrhotite, pentlandite, and chalcopyrite assayed 0.15 percent copper, 0.35 percent nickel, 0.4 percent chromium, 300 parts per billion (ppb) palladium, and 380 ppb platinum. A sample of magnetite-chalcopyrite-epidote-diopside skarn assayed 0.5 percent copper and 130 ppb gold (Foley and others, 1989; Foley and Summer, 1990; Foley, 1992; W.T. Ellis, unpublished data, 1996).

Alteration:

All of the ultramafic rock units are moderately to strongly serpentinized; also present is locally developed diopside-epidote skarn.

Age of mineralization:

Late Triassic, the age of the host rock.

Deposit model:

Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

The occurrence is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Foley and others, 1989; Foley and Summers, 1990; Nokleberg and others, 1991; Foley, 1992.

Primary reference: Rose, 1966 (ADMM GR 20); Foley, 1992; this report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): UM Landslide (north of upper Eureka Creek)

Site type: Occurrence

ARDF no.: MH107

Latitude: 63.3053 **Quadrangle:** MH B-5

Longitude: 146.2721

Location description and accuracy:

This mile-long and half-mile-wide occurrence is on the west side of an upper southeast-flowing tributary of Eureka Creek. The tributary creek is informally named Landslide Creek (Rose, 1966 (ADMM GR 20, figure 3]). The location for this record is at an elevation of 4,700 feet in the NW1/4NE1/4 section 6, T. 18 S., R. 8 E., Fairbanks Meridian. It is about one-third mile southeast of peak 5460. The location is accurate.

Commodities:

Main: Au, Pd, Pt

Other: Hg

Ore minerals: Cinnabar, gold, magnetite, pyrite

Gangue minerals:

Geologic description:

This mineral occurrence comprises conglomerate composed mostly of ultramafic rock, principally peridotite and dunite, and lesser amounts of gabbro (Foley, 1992). The conglomerate caps the ridge east-southeast of and below peak 5460 (Rose, 1966 [ADMM GR 20, figure 3]). The east-sloping hill is mainly covered with landslide deposits derived from the ultramafic-rich conglomerate. The slide is about one mile long and one-half mile wide. Conglomeratic material in the slide consists of angular to subrounded boulders, cobbles, and pebbles in a sand-size matrix rich in magnetite. The magnetite particles are as much as an inch in diameter.

The conglomerate possibly is a diatreme that contains as much as 700 parts per billion (ppb) platinum and palladium (L.D. Hulbert, oral communication, 2000). U.S. Bureau of Mines grab samples of the conglomerate and heavy-mineral concentrates produced by panning pulverized conglomerate and regolith overlying the conglomerate were found to contain traces of gold and platinum-group minerals. The maximum values detected were 102 ppb gold, 150 ppb palladium, and 240 ppb platinum (Foley and others, 1989; Foley and Summers, 1990). Pan concentrates from informally named Landslide Creek below the occurrence contained abundant pyrite and cinnabar and gold particles as heavy as 4 milligrams.

Alteration:

The ultramafic clasts in the conglomerate are remarkably fresh looking and essentially unaltered (L. Hulbert, oral communication, 2000).

Age of mineralization:

The landslide and associated placer deposits are Holocene. The underlying diatreme is undated but is probably Late Triassic.

Deposit model:

Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

39a

Production Status: None

Site Status: Active

Workings/exploration:

The U.S. Bureau of Mines found abundant pyrite and cinnabar, along with fine gold particles weighing as much as 4 milligrams by panning alluvium along informally named Landslide Creek.

The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Foley and others, 1989; Foley and Summers, 1990; Foley, 1992.

Primary reference: Rose, 1966 (ADMM GR 20); Foley, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/13/01

Site name(s): Lower Crash

Site type: Prospect

ARDF no.: MH108

Latitude: 63.3154 **Quadrangle:** MH B-5

Longitude: 146.2564

Location description and accuracy:
The Lower Crash prospect is at an elevation of about 4,700 feet and is about midway between Broxson Gulch and lower Eureka Glacier. It is on the east side of a southeast-flowing tributary of Eureka Creek that is locally called Landslide Creek. The prospect is in the E1/2NW1/4 section 32, T. 18 S., R. 8 E., Fairbanks Meridian.

Commodities:

Main: Pd, Pt

Other: Au, Cu, Ni

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The rock in the area of this prospect consists mainly of Upper Triassic gabbro and sepentinized dunite what are part of a sill that can be traced for more than 5 miles (Rose, 1966 [ADMM GR 20, figure 3]). The sill is part of the Eureka ultramafic complex (Nokleberg and others, 1991; W.T. Ellis, unpublished data, 1996).

The deposit consists of iron-stained olivine-rich peridotite that contains disseminated sulfides and magnetite. The sulfides are mainly pyrrhotite and small amounts of chalcocite and pentlandite. A sample from the prospect contains 0.23 percent copper, 0.39 percent nickel, 193 parts per billion (ppb) palladium, 157 ppb platinum, and 101 ppb gold (W.T. Ellis, oral communication, 2001).

Alteration:
Moderate to strong serpentinization.

Age of mineralization:
Late Triassic.

Deposit model:
Differentiated mafic-ultramafic sill-form Ni-Cu-PGE.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect is on active MAN Resources claims. A sample from the prospect contains 0.23 percent copper, 0.39 percent nickel, 193 parts per billion (ppb) palladium, 157 ppb platinum, and 101 ppb gold (W.T. Ellis, oral communication, 2001).

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 8/19/02

Site name(s): Unnamed (east of lower Eureka Glacier)

Site type: Occurrence

ARDF no.: MH109

Latitude: 63.3187 **Quadrangle:** MH B-5

Longitude: 146.2576

Location description and accuracy:

This occurrence is at an elevation of 4,700 feet about 2.25 miles east of lower Eureka Glacier. It is in the eastern headwaters of locally named Landslide Creek, a south-flowing tributary of Eureka Creek, and about one-half mile south-southwest of the center of section 29, T. 18 S., R. 8 E., Fairbanks Meridian. The occurrence corresponds to locality 41 in table 2 of Nokleberg and others (1991) and to locality 6 in figure 3 of Rose (1966 [ADMM GR 20]).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite, magnetite

Gangue minerals: Calcite, chrysotile (brittle), opal, serpentine

Geologic description:

This occurrence is in an Upper Triassic sill-like body of serpentinized dunite that can be traced continuously for more than 5 miles (Rose, 1966 [ADMM GR 20, figure 3]). The body is the main unit of the informally named Eureka ultramafic complex that occupies strands of the Broxson Gulch thrust fault (Nokleberg and others, 1991; W.T. Ellis, unpublished data, 1996).

The occurrence consists of veins and discontinuous lenses of opal, calcite, chrysotile, magnetite, chromite, and an unidentified green glassy mineral (Rose, 1966 [ADMM GR 20, p. 20]). Chromite is also disseminated in the dunite. No assay data are available.

Alteration:

All of the ultramafic rock units are moderately to strongly serpentinized.

Age of mineralization:

Late Triassic, the age of the host rock.

Deposit model:

Disseminated and vein-like masses of chromite in a mafic-ultramafic sill-like body.

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

Production Status: None

Site Status: Active

Workings/exploration:

The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991.

Primary reference: Rose, 1966 (ADMM GR-20)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): West Crash

Site type: Prospect

ARDF no.: MH110

Latitude: 63.3138 **Quadrangle:** MH B-5

Longitude: 146.2378

Location description and accuracy:
The West Crash prospect is at an elevation of about 5,200 feet and about midway between Broxson Gulch and lower Eureka Glacier. It is northeast of locally named Landslide Creek, a south-flowing tributary of Eureka Creek (see figure 3 of Rose, 1966 [ADMM GR 20]). The prospect is about one-third mile east-northeast of the center of section 32, T. 18 S., R. 8 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The rock in the area of this prospect consists mainly of Upper Triassic gabbro and serpentinized dunite that are part of a sill that can be followed for more than 5 miles (Rose, 1966 [ADMM GR 20, figure 3]). The sill is part of the informally named the Eureka ultramafic complex (Nokleberg and others, 1991; W.T. Ellis, unpublished data, 1996).

The mineral deposit consists of olivine melagabbro that contains as much as 7 percent disseminated sulfides and magnetite. The sulfides are mainly pyrrhotite and small amounts of chalcopyrite and pentlandite. Samples assayed as much as 0.3 percent copper, 0.11 percent nickel, 100 parts per billion (ppb) palladium, and 80 ppb platinum (W.T. Ellis, unpublished data, 1996).

Alteration:
All of the ultramafic rock units are moderately to strongly serpentinized.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): PP Diatreme

Site type: Prospect

ARDF no.: MH111

Latitude: 63.3159 **Quadrangle:** MH B-5

Longitude: 146.2475

Location description and accuracy:
The PP Diatreme prospect is at an elevation of 5,200 feet, about midway between Broxson Gulch and lower Eureka Glacier. It is on the east side of a southeast-flowing tributary to Eureka Creek that is locally called Landslide Creek (a name not shown on the 1978 edition of the B-5 topographic map). The prospect is in the NW1/4NE1/4 section 32, T. 18 S., R 8 E., Fairbanks Meridian.

Commodities:

Main: Pd, Pt

Other: Au

Ore minerals:

Gangue minerals:

Geologic description:
The rock in the area of this prospect consists mainly of Upper Triassic gabbro and serpentinized dunite that are part of a sill that can be traced for more than 5 miles (Rose, 1966 [ADMM GR 20, figure 3]). The sill intrudes Upper Paleozoic metasedimentary rocks and is part of the Eureka ultramafic complex (Nokleberg and others, 1991; W.T. Ellis, oral communication, 1996).

The mineralized material is a brecciated diatreme that cuts Upper Paleozoic metasedimentary rock. No sulfides were noted, but there is strong iron staining, and platinum and palladium values are anomalous (794 parts per billion (ppb) platinum and palladium; W.T. Ellis, oral communication, 1996). A sample from this prospect contained 37 ppb gold, 261 ppb platinum, and 533 ppb palladium (W.T. Ellis, oral communication, 2001). The prospect is about 150 south of (below) the north-dipping ultramafic sill that hosts the West Crash prospect (MH110).

Alteration:
Moderate to strong serpentinization.

Age of mineralization:
Probably Late Triassic.

Deposit model:
Differentiated mafic-ultramafic sill-form Ni-Cu-PGE.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect is on active MAN Resources claims. An anomalous sample from this site contains contained

37 ppb gold, 261 ppb platinum, and 533 ppb palladium (W.T. Ellis, oral communication, 2001).

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 8/19/02

Site name(s): Notar

Site type: Prospect

ARDF no.: MH112

Latitude: 63.3187 **Quadrangle:** MH B-5

Longitude: 146.2031

Location description and accuracy:
The Notar prospect is at an elevation of about 4,850 feet in the headwaters of an east-flowing tributary to the stream(s) in Broxson Gulch. It is in the NW1/4NW1/4 section 34, T. 18 S., R. 8 E., Fairbanks Meridian. The location is accurate within 1,000 feet.

Commodities:

Main: Cu, Ni

Other: Pd, Pt

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The rock in the area of this prospect consists mainly of Upper Triassic serpentinized dunite that is part of a sill that can be followed for more than 5 miles (Rose, 1966 [ADMM GR 20, figure 3]). The sill is part of the informally named Eureka ultramafic complex (Nokleberg and others, 1991; W.T. Ellis, unpublished data, 1996).

The mineral deposit consists of olivine melagabbro that contains as much as 7 percent disseminated sulfides and magnetite. The sulfides are mainly pyrrhotite and small amounts of chalcopyrite and pentlandite. Samples assayed as much as 0.11 percent copper, 0.17 percent nickel, 42 parts per billion (ppb) palladium, and 40 ppb platinum (W.T. Ellis, unpublished data, 1996).

Alteration:
All of the ultramafic rock units are moderately to strongly serpentinized.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (west of Broxson Gulch)

Site type: Prospect

ARDF no.: MH113

Latitude: 63.3167 **Quadrangle:** MH B-5

Longitude: 146.1988

Location description and accuracy:
This prospect is at an elevation of about 4,600 feet in the headwaters of an east-flowing tributary to the stream(s) in Broxson Gulch, in the NW1/4NW1/4 section 34, T. 18 S., R. 8 E., Fairbanks Meridian. The locality corresponds to locality 5 on figure 3 of Rose (1966 [ADMM GR 20]) and to locality 42 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Cu

Other: Au

Ore minerals: Bornite, chalcopyrite, malachite, pyrite

Gangue minerals: Chlorite, epidote

Geologic description:
The rock at this prospect consists of dacite agglomerate of the Slana Spur Formation of Late Paleozoic age (Rose, 1966 [ADMM GR 20, figure 3]; Nokleberg and others, 1991). Nokleberg and others proposed that the rock is meta-andesite porphyry.

The prospect is on a mineralized shear zone that strikes N85W and dips 35 degrees southwest; the shear zone can be traced for several hundred feet. Locally, the sheared andesite is altered to a chlorite-epidote rock that contains pyrite, chalcopyrite, and bornite. Some of the mineralized rock is coated with malachite. A foot-wide sample collected by Rose (1966 [ADMM GR 20]) assayed 2.95 percent copper and 2.2 ounces of silver per ton. Samples 79IL047A and B collected by the U.S. Geological Survey assayed as much as 3.8 percent copper, 50 parts per million (ppm) silver and 0.1 ppm gold (Nokleberg and others, 1991).

Alteration:
Chlorite-epidote alteration of the volcanic host rock; local oxidation of copper minerals.

Age of mineralization:
Late Paleozoic or younger; the mineralized shear zone cuts Upper Paleozoic rocks.

Deposit model:
Low-sulfide copper vein.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect was staked by a Moneta-Porcupine Company prospector in 1964. Surface workings include a shallow trench and several small pits. A sample across a one-foot width assayed 2.95 percent copper and

2.2 ounces of silver per ton (Rose, 1966 [ADMM GR 20]).
The prospect is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991.

Primary reference: Rose, 1966 (ADMM GR 20)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Crash

Site type: Prospect

ARDF no.: MH114

Latitude: 63.3166 **Quadrangle:** MH B-5

Longitude: 146.2210

Location description and accuracy:
The Crash prospect is at an elevation of about 5,200 feet, in the headwaters of an east-flowing tributary to the west fork of Broxson Gulch. The prospect is about 1,800 feet east of peak 5540, in the NW1/4NE1/4 section 33, T. 18 S., R. 8 E., Fairbanks Meridian.

Commodities:

Main: Ni, Pd, Pt

Other: Cr, Cu

Ore minerals: Chalcopyrite, chromite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The rock in the area of this prospect consists mainly of Upper Triassic gabbro and serpentinized dunite that are part of a sill that can be followed for more than 5 miles (Rose, 1966 [ADMM GR 20, figure 3]). The sill is part of the informally named Eureka ultramafic complex (Nokleberg and others, 1991; W.T. Ellis, unpublished data, 1996).

The mineral deposit consists of olivine melagabbro that contains as much as 7 percent disseminated sulfides and magnetite. The sulfides are mainly pyrrhotite and small amounts of chalcopyrite and pentlandite. Samples assayed as much as 0.09 percent copper, 0.42 percent nickel, 630 parts per billion (ppb) palladium, and 475 ppb platinum (W.T. Ellis, unpublished data, 1996).

Alteration:
All of the ultramafic rock units are moderately to strongly serpentinized.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (west of Broxson Gulch)

Site type: Occurrence

ARDF no.: MH115

Latitude: 63.3040 **Quadrangle:** MH B-5

Longitude: 146.1916

Location description and accuracy:
This occurrence is at an elevation of about 4,000 feet in the headwaters of an east-flowing tributary to the stream(s) in Broxson Gulch and in the NE1/4NW1/4 section 3, T. 19 S., R. 8 E., Fairbanks Meridian. The occurrence corresponds to locality 44 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Au

Other:

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
This occurrence is in a pyritic dacite porphyry unit of the Slana Spur Formation of Late Paleozoic age (Nokleberg and others, 1991). The dacite forms sills and stocks. Grab sample 79NK037 of the pyritic rock assayed 0.10 parts per million gold (Nokleberg and others, table 2, locality 44).

Alteration:
Pyritization of host rock.

Age of mineralization:
Pennsylvanian and (or) Permian (?), the age of the host rock.

Deposit model:

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (west side of Broxson Gulch)

Site type: Prospect

ARDF no.: MH116

Latitude: 63.3204 **Quadrangle:** MH B-5

Longitude: 146.1708

Location description and accuracy:
This prospect is at an elevation of about 3,350 feet on the west side of the west fork of the stream(s) in Broxson Gulch, in the SW1/4SW1/4 section 26, T. 18 S., R. 8 E., Fairbanks Meridian. The occurrence corresponds to locality 43 in table 2 of Nokleberg and others (1991) and to locality 4 on figure 3 of Rose (1966 [ADMM GR 20]).

Commodities:

Main: Zn

Other: Co, Cu, Mo, Pb, Y

Ore minerals: Pyrite, sphalerite (?)

Gangue minerals:

Geologic description:
The rock at this prospect is Paleozoic (?) pyritic black phyllite of the Maclaren terrane (Nokleberg and others, 1991). The deposit was described by Rose (1966 [ADMM GR 20]) as a zone of limonite-cemented talus (ferricrete?) as much as 10 feet wide next to an old pit in black 'slate'. A sample of the limonitic material contained 1,000 parts per million (ppm) zinc, 375 ppm lead, 115 ppm copper, and 12 ppm molybdenum. Nokleberg and others (1991) collected samples of pyritic limonite-cemented breccia in black phyllite at probably the same site; their samples 79IL049-051 assayed 1,800 ppm zinc, 500 ppm cobalt, and 700 ppm yttrium (table 2, locality 43). The zinc values are high enough to suggest the presence of sphalerite or an oxidized zinc mineral.

Alteration:
Oxidation of iron-bearing mineral(s).

Age of mineralization:
Unknown; possibly Paleozoic, the presumed age of the host rock.

Deposit model:
Unknown; the occurrence suggests a sedimentary-exhalative deposit.

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

Production Status: None

Site Status: Active

Workings/exploration:
An old pit does not appear to have reached the black phyllite bedrock. The prospect is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1966 (ADMM GR 20); Nokleberg and others, 1991.

Primary reference: Rose, 1966 (ADMM GR 20)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (west side of Broxson Gulch)

Site type: Occurrence

ARDF no.: MH117

Latitude: 63.3155 **Quadrangle:** MH B-5

Longitude: 146.1672

Location description and accuracy:
This occurrence is at an elevation of 3,500 feet at the mouth of an east-flowing tributary to the stream(s) in Broxson Gulch, approximately in the center of the NW1/4 section 35, T. 18 S., R. 8 E., Fairbanks Meridian. The occurrence corresponds to locality 17 of MacKevett and Holloway (1977), locality 33 in figure 4 of Cobb (1979 [OFR 79-238]), and locality 3 on figure 3 of Rose (1966 [ADMM GR 20]).

Commodities:

Main: Asbestos

Other: Cu, Pb, Zn

Ore minerals: Chrysotile

Gangue minerals: Serpentine

Geologic description:
This record describes two mineral localities: asbestos in dunite, and base metals in slate near the dunite.
The asbestos deposit is in an Upper Triassic serpentinized dunite sill that can be followed for more than 5 miles (Rose, 1966 [ADMM GR 20, figure 3]). The dunite is part of the informally named Eureka ultramafic complex that occupies strands of the Broxson Gulch thrust fault (Nokleberg and others, 1991; W.T. Ellis, unpublished data, 1996). The deposit consists of chrysotile asbestos in the dunite. Rose (1966 [ADMM GR 20, p. 20]) reported 0.25-inch veinlets of chrysotile in bedrock at the site and found prospectors' samples of larger veins nearby.
Paleozoic slate near the dunite is marked by gossan that carries anomalous amounts of copper, lead, and zinc (MacKevett and Holloway, 1977, p. 37, locality 17).

Alteration:

Age of mineralization:
The dunite host of chrysotile is of Late Triassic age; the chrysotile may have formed during Cretaceous faulting and regional metamorphism (Nokleberg and others, 1991). The base metal-bearing gossan in slate is Paleozoic or younger.

Deposit model:
Serpentinite-hosted asbestos (Cox and Singer,1986; model 8d). The base metal-bearing gossan in slate may be a sedimentary-exhalative deposit.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
8d

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1966 (ADMM GR 20); MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1982; Nokleberg and others, 1991.

Primary reference: Rose, 1966 (ADMM GR 20); MacKevett and Holloway, 1977

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Middle fork of Broxson Gulch

Site type: Mine

ARDF no.: MH118

Latitude: 63.3292 **Quadrangle:** MH B-5

Longitude: 146.1289

Location description and accuracy:
This placer deposit is near the mouth of the locally named middle fork of the stream that flows in Broxson Gulch (see figure 2 of Rose, 1965). The location is for the approximate midpoint of the mine, at an elevation of about 3,550 feet in the N1/2 section 25, T. 18 S., R. 8 E., Fairbanks Meridian.

Commodities:

Main: Au

Other: Pb

Ore minerals: Galena, gold

Gangue minerals:

Geologic description:
The lower middle fork of the stream that flows in Broxson Gulch probably flows across complexly intermixed and faulted peridotite and gabbro of the Upper Triassic ultramafic-mafic intrusive complexes and metasedimentary and metavolcanic rocks of the Slana Spur Formation of Late Paleozoic age (Rose, 1965, figure 2; Nokleberg and others, 1991).
The placer deposit was test mined in 1996 and 1997; gold and abundant gray nuggets were recovered. The gray nuggets, originally supposed to be platinum metals, are galena (W.T. Ellis, unpublished data, 1997). The source of the placer gold is uncertain.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (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:
Small-scale placer mining occurred in 1996-1997. The area is on active MAN Resources claims.

Production notes:
Small-scale placer mining occurred in 1996-1997, with 'fairly good results' (W.T. Ellis, unpublished data, 1997).

Reserves:

Additional comments:

References:
Rose, 1965; Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (ridge between the middle and east forks in Broxson Gulch)

Site type: Occurrence

ARDF no.: MH119

Latitude: 63.3484 **Quadrangle:** MH B-5

Longitude: 146.0802

Location description and accuracy:
This occurrence is at an elevation of 4,900 feet on the ridge between the locally named middle and east forks of the stream(s) in Broxson Gulch (see figure 2 of Rose, 1965). The occurrence is at the southeast corner of section 18, T. 18 S., R. 9 E, Fairbanks Meridian. This location corresponds to locality 20 on figure 2 of Rose (1965).

Commodities:

Main: Ag, Ni

Other: Au, Cu

Ore minerals: Pyrrhotite

Gangue minerals:

Geologic description:
The rock at this site appears to be sandstone or quartzite of the Slana Spur Formation of Late Paleozoic age faulted into Upper Triassic peridotite (Rose, 1965).
The deposit consists of pyrrhotite disseminated in sandstone. A sample assayed 0.2 percent nickel, 0.18 ounce of silver per ton, and small amounts of copper and gold (Rose, 1965, p. 31). Stream-sediment sample 284 collected below the occurrence contained 420 parts per million nickel (Rose, 1965).

Alteration:
The sandstone apparently is hornfelsed to quartzite.

Age of mineralization:

Deposit model:
Pyrrhotite-bearing replacement (?) of sandstone in fault contact with mafic-ultramafic rocks.

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

Production Status: None

Site Status: Active

Workings/exploration:
A sample contained 0.2 parts per million nickel. The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (ridge between middle and east forks in Broxson Gulch)

Site type: Occurrence

ARDF no.: MH120

Latitude: 63.3488 **Quadrangle:** MH B-5

Longitude: 146.0670

Location description and accuracy:
This occurrence is at an elevation of 5,350 feet on the ridge between the locally named middle fork and the east fork of the stream(s) in Broxson Gulch (see figure 2 of Rose, 1965). The occurrence is in the SE1/4SW1/4 section 17, T. 18 S., R. 9 E., Fairbanks Meridian; it corresponds to locality 48 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ni

Other: Ag, Au

Ore minerals: Pyrite, pyrrhotite (?)

Gangue minerals:

Geologic description:
The rock at this occurrence is Upper Triassic gabbro and peridotite that intrudes Upper Triassic metabasalt (Nokleberg and others, 1991). The gabbro forms a sill-like body more than 1,000 feet long and 10 feet thick. It is sheared and highly iron stained and contains disseminated pyrite and possibly pyrrhotite. Grab sample 79NK008A of mineralized gabbro assayed 0.15 percent nickel, 3 parts per million (ppm) silver, and 0.10 ppm gold (Nokleberg and others, 1991, locality 48, table 2).

Alteration:
Pyritization and iron staining of host rock.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (ridge between middle and east forks in Broxson Gulch)

Site type: Occurrence

ARDF no.: MH121

Latitude: 63.3456 **Quadrangle:** MH B-5

Longitude: 146.0831

Location description and accuracy:
This occurrence is at an elevation of 4,900 feet on the north side of the ridge between the locally named middle and east forks of the stream(s) in Broxson Gulch (see figure 2 of Rose, 1965). It is in the NE1/4NE1/4 section 19, T. 18 S., R. 9 E., Fairbanks Meridian. The occurrence corresponds to locality 19 on figure 2 of Rose (1965), to locality 18 of MacKevett and Holloway (1977), and to locality 47 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag, Au, Co, Ni, Pd, Pt, Zn

Ore minerals: Chalcopyrite, pentlandite, pyrite, pyrrhotite

Gangue minerals:

Geologic description:
This occurrence is in amphibolitized 'serpentinite' inferred to be in the hanging wall of a major thrust fault (Rose, 1965, figure 2, locality 19). Boulders of massive sulfide material were found along a 20-foot-wide zone on the north side of the ridge. Mineralized material assayed 0.9 percent copper, a trace of zinc, and less than 0.1 percent nickel (Rose, 1965). Fifty feet south of this zone a layer of pyrrhotite a few inches thick crops out for several feet. The amphibole 'serpentinite' in this area is considerably pyritized and sheared. Sample 79IL029A of float that contained pyrite, pyrrhotite, pentlandite, and chalcopyrite assayed 500 parts per million (ppm) cobalt (Nokleberg and others, 1991, locality 47). Later sampling determined higher metal values and a wider suite of metals (Foley, 1992). The massive sulfide lenses in the Broxson Gulch area sampled by Foley assayed as much as 2.4 percent copper, 0.66 percent nickel, 0.1 percent cobalt, 13 ppm silver, 416 ppm gold, and 137 parts per billion each platinum and palladium.

Alteration:
The amphibole 'serpentinite' is considerably pyritized and sheared (Rose 1965).

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

This occurrence was discovered by Rose (1965). It subsequently was examined by Nokleberg and others (1991) and Foley (1992). The area is currently claimed by MAN Resources.

Production notes:

Reserves:

Additional comments:

Rose (1965) recommended more prospecting at this locality, a suggestion supported by the higher metal values reported by Foley (1992).

References:

Rose, 1965; MacKevett and Holloway, 1977; Nokleberg and others, 1991; Foley, 1992.

Primary reference: Rose, 1965; Foley, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (ridge between middle and east forks in Broxson Gulch)

Site type: Occurrence

ARDF no.: MH122

Latitude: 63.3429 **Quadrangle:** MH B-5

Longitude: 146.0845

Location description and accuracy:
The occurrence is at an elevation of about 4,900 feet on the ridge between the locally named middle fork and the east fork of the stream(s) in Broxson Gulch (see figure 2 of Rose, 1965). The occurrence is in the SE1/4NE1/4 section 19, T. 18 S., R. 9 E., Fairbanks Meridian; it corresponds to locality 46 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other: Pb

Ore minerals: Chromite

Gangue minerals: Olivine, serpentine

Geologic description:
A fault-bottomed block of Upper Triassic cumulate gabbro and melagabbro overlies the Slana Spur Formation of Late Paleozoic age at this site (Rose, 1965, figure 2; Nokleberg and others, 1991). The olivine cumulate contains disseminated chromite. Sample 79NK009A of the cumulate assayed more than 5,000 parts per million chromium (Nokleberg and others, 1991, locality 46, table 2). Stream-sediment sample 282 collected a few hundred feet north of the site was moderately anomalous in lead (Rose, 1965).

Alteration:
All of the ultramafic rock units are moderately to strongly serpentinized.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Chromite disseminated in layered mafic-ultramafic complex.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): East fork of Broxson Gulch

Site type: Mine

ARDF no.: MH123

Latitude: 63.3260 **Quadrangle:** MH B-5

Longitude: 146.0907

Location description and accuracy:
The locally named east fork of Broxson Gulch (see figure 2 of Rose, 1965) has been placer mined at several locations. For this record, the mine site is at an elevation of about 3,550 feet at a placer mine site reported by Rose. The mine is at the mouth of a steep-west flowing tributary to the east fork, about 1,000 feet east of the center of section 30, T. 18 S., R. 9 E., Fairbanks Meridian. The most recent place mining was about 3 miles south of the site described here, in the west bend of the east fork (W.T. Ellis, unpublished data, 1997).

Commodities:

Main: Au

Other: Cu, Ni, Pb, Pt

Ore minerals: Galena, gold

Gangue minerals: Epidote, garnet, magnetite

Geologic description:
The east fork of Broxson Gulch drains fault-juxtaposed bedded rocks of the Slana Spur Formation of Late Paleozoic age and complex thrust slices of Upper Triassic ultramafic intrusive complexes (Nokleberg and others, 1991; W.T. Ellis, unpublished data, 1996). At this placer mine site near the Broxson airstrip (built since the publication of the 1978 edition of the Mount Hayes B-5 topographic map) a tributary creek drains a small fault-bounded wedge of Tertiary conglomerate (W.T. Ellis, unpublished data, 1996). This conglomerate may be the material mapped as a Quaternary fan by Stout (1976). The upper course of this tributary crosses the Airport Fault that also juxtaposes Upper Triassic ultramafic rocks and volcaniclastic strata of the Slana Spur Formation (Rose, 1965, figure 2); Nokleberg and others, 1991).

Little is known about the early placer mining here. Rose (1965, p. 35) deduced that the mine probably operated until about 1940 but that it had only small-scale activity after that. According to Rose (1965), gravel within a foot or two of the surface contained 4 to 7 colors of gold per pan; magnetite, pink garnet, and epidote occur in the concentrates. The headwaters of the tributary creek include lode mineral deposits (MH124, MH125, and MH136).

Alteration:

Age of mineralization:
Holocene and Tertiary.

Deposit model:
Placer Au-PGE (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:

The placer workings are mainly at the mouth of the tributary to the east fork of Broxson Gulch, just north of the airstrip (built since the publication of the 1978 edition of the Mount Hayes B-5 topographic map). Equipment is scattered around the north end of the airstrip, and there is evidence that the gravel was bulldozed and run through a wash plant and sluice. Water was brought in by more than 2 miles of ditches. The main period of operation of the mine was probably about 1940 (Rose, 1965). The most recent mining occurred 3 miles to the south, at the west bend in the east fork of the stream in Broxson Gulch (W.T. Ellis, written communication, 1997). Production from this site was reported to be small, the gold very fine, and bedrock was not reached.

The claims are now owned by MAN Resources.

Production notes:

There has been intermittent placer mining since the early 1900's. The amount of production is uncertain but probably small.

Reserves:

Additional comments:

References:

Rose, 1965; Stout, 1976; Nokleberg and others, 1991; this record.

Primary reference: Rose, 1965; this record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date:

Site name(s): BGM Breccia

Site type: Occurrence

ARDF no.: MH124

Latitude: 63.3222 **Quadrangle:** MH B-5

Longitude: 146.0654

Location description and accuracy:
The BGM Breccia occurrence is at an elevation of 4,500 feet in the headwaters of an unnamed east tributary to the east fork of the stream in Broxson Gulch, about 800 feet north-northeast of peak 4825 in the SE1/4SW1/4 section 29, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, pentlandite, pyrite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The Airstrip Fault (Rose 1965, figure 2) is subparallel to the gulch that hosts this occurrence. Rocks south of the fault include Upper Triassic melagabbro and peridotite. Float in the upper creek contains mineralized magmatic-breccia cobbles and boulders with dunite and gabbro clasts in a coarse-grained pyroxene-rich matrix (W.T. Ellis, unpublished data, 1996). A grab sample of breccia containing about 4 percent total sulfide assayed 0.43 percent copper, 0.88 percent nickel, 412 parts per billion (ppb) palladium, and 245 ppb platinum. Pyrrhotite is the dominant sulfide, along with minor pentlandite, pyrite, and chalcopyrite. The ultramafic host rocks are serpentinized.

Alteration:
The ultramafic host rocks are strongly serpentinized.

Age of mineralization:
Late Triassic, the age of the host breccia.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (upper Specimen Creek)

Site type: Occurrence

ARDF no.: MH125

Latitude: 63.3178 **Quadrangle:** MH B-5

Longitude: 146.0600

Location description and accuracy:
This prospect is at an elevation of 4,400 feet in the headwaters of an unnamed west fork of Specimen Creek, in the NW1/4NE1/4 section 32, T. 18 S., R. 9 E., Fairbanks Meridian. The occurrence corresponds to localities 51 and 52 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Au, Cr

Other: Cu

Ore minerals: Chromite, malachite

Gangue minerals: Epidote, quartz

Geologic description:
The rock at this occurrence consists of Upper Triassic olivine cumulate intruded by a metadiabase dike (Nokleberg and others, 1991). Rose (1965, figure 2) mapped a peridotite body in the headwaters of Specimen Gulch.

The olivine cumulate contains disseminated chromite; sample 79CH010B assayed more than 5,000 parts per million chromium (Nokleberg and others, 1991). Malachite occurs along fractures in the metadiabase dike; grab sample 79CH010C of dike material contained 150 parts per billion gold.

Alteration:
Oxidation of copper mineral(s).

Age of mineralization:
The chromite is Late Triassic, the presumed age of the ultramafic host rock. The copper and gold are Late Triassic or younger.

Deposit model:
Disseminated chromite in ultramafic rocks; epigenetic (?) shear zone mineralization.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Green Wonder

Site type: Prospect

ARDF no.: MH126

Latitude: 63.3060 **Quadrangle:** MH B-5

Longitude: 146.0782

Location description and accuracy:

The Green Wonder prospect is at an elevation of 4,600 feet, a mile east of the east fork of the stream(s) in Broxson Gulch, and about 1,800 feet southwest of peak 5304 on the boundary between sections 31 and 32, T. 18 S., R. 9 E., Fairbanks Meridian. The prospect corresponds to locality 55 in table 2 of Nokleberg and others (1991), locality 38 on figure 4 of Cobb (1979 [OFR 79-238]), and locality 13 on figure 2 of Rose (1965).

Commodities:

Main: Cu, Zn

Other: Ag, Cr, Cu, Ni, V

Ore minerals: Chalcopyrite, pyrite, sphalerite

Gangue minerals: Diopside, garnet (uvarovite), quartz

Geologic description:

The Green Wonder prospect is in an amphibolitized serpentine unit in contact with graywacke and meta-andesite of the Slana Spur Formation of Late Paleozoic age (Rose, 1965; Nokleberg and others, 1991). The serpentinized unit is part of the informally named Eureka ultramafic complex of Late Triassic age that is emplaced on strands of the Broxson Gulch thrust fault (W.T. Ellis, unpublished data, 1996).

At the prospect site, the altered serpentinite is converted to an almost white, diopside-garnet-quartz skarn. The deposit is a mineralized zone less than a foot wide of a bright green rock composed of sphalerite and uvarovite (a chrome garnet) and minor pyrite. The rock assayed 10 percent or more zinc, 4 percent chrome, and 2 percent nickel (Rose, 1965, p. 29).

A 60-foot-wide diabase dike cuts meta-andesite near the Green Wonder prospect site. The dike contains disseminated chalcopyrite. Sample 79IL020C of Nokleberg and others (1991, locality 55, table 2) assayed 0.72 percent copper, 0.3 percent vanadium, and 7 parts per million silver.

Alteration:

Pervasive quartz-garnet-diopside skarn alteration of amphibolitized serpentinite; a sphalerite-uvarovite skarn formed at the Green Wonder mineral locality.

Age of mineralization:

Late Triassic or younger.

Deposit model:

Skarn affiliated with mafic-ultramafic host rock.

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

Production Status: None

Site Status: Inactive

Workings/exploration:

The Green Wonder deposit was located and trenched in 1964 by Moneta-Porcupine Company. The area was subsequently mapped by Rose (1965).

The prospect is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

Zinc mineralization at this site is unique in the area between Broxson Gulch and the Rainy Creek area.

References:

Rose, 1965; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (east of lower Broxson Gulch)

Site type: Occurrence

ARDF no.: MH127

Latitude: 63.3010 **Quadrangle:** MH B-5

Longitude: 146.0829

Location description and accuracy:
This occurrence is at an elevation of about 4,050 feet on the east side of the east fork of the stream(s) in Broxson Gulch, in the NE1/4NE1/4 section 6, T. 19 S., R. 9 E., Fairbanks Meridian. The occurrence corresponds to locality 12 on figure 3 of Rose (1965) and locality 39 in figure 4 of Cobb (1979 [OFR 79-238]).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, malachite

Gangue minerals: Serpentine

Geologic description:
The rock at this occurrence is mainly serpentinized dunite of the informally named Eureka ultramafic complex. This Upper Triassic complex occupies strands of the Broxson Gulch thrust fault (W.T. Ellis, unpublished data, 1996).
At the site, a copper-stained limestone block occurs in association with a chalcopyrite-bearing, 5-foot-wide zone in serpentine. The chalcopyrite-bearing zone is iron-stained and trends N60W (Rose, 1965).

Alteration:
Serpentinization of dunite; oxidation of iron- and copper-bearing mineral(s).

Age of mineralization:
Late Triassic or younger.

Deposit model:
Cu in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (east of lower Broxson Gulch)

Site type: Prospect

ARDF no.: MH128

Latitude: 63.2995 **Quadrangle:** MH B-5

Longitude: 146.0732

Location description and accuracy:
This prospect is at an elevation of 4,300 feet on the east side of the east fork of stream(s) in Broxson Gulch, in the SW1/4NW1/4 section 5, T. 19 S., R. 9 E., Fairbanks Meridian. The prospect corresponds to locality 11 in figure 2 of Rose (1965).

Commodities:

Main: Cu

Other:

Ore minerals: Malachite

Gangue minerals:

Geologic description:
The rocks at this occurrence consist mainly of serpentine and limestone. Copper-stained and strongly iron stained rocks occur in float at the site, but copper-bearing bedrock has not been reported (Rose, 1965). The source of the float may be Upper Triassic mafic or ultramafic rocks that occur in the area (Nokleberg and others, 1982).

Alteration:
Oxidation of iron- and copper-bearing minerals.

Age of mineralization:
Possibly Late Triassic or younger.

Deposit model:
Copper-bearing float possibly derived from mafic or ultramafic rocks.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims. The site had been prospected when visited by Rose (1965).

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Nokleberg and others, 1982.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (ridge between the middle and east forks in Broxson Gulch)

Site type: Prospects

ARDF no.: MH129

Latitude: 63.3485 **Quadrangle:** MH B-5

Longitude: 146.0481

Location description and accuracy:

This location represents several prospects at about 4,800 feet in elevation on the east side of the ridge between the locally named middle and east forks of the stream(s) in Broxson Gulch (Rose, 1965, figure 2). It is at the southeast corner of section 17, T. 18 S., R. 9 E., Fairbanks Meridian. The site corresponds to locality 18 on figure 2 of Rose (1965), locality 19 of MacKevett and Holloway (1977), and locality 50 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au, Co, Cu, Ni

Other: Pd, Pt

Ore minerals: Chalcopyrite, magnetite, marcasite, pentlandlte, pyrite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:

This deposit consists of sulfide lenses along the contact between peridotite and sheared serpentinized olivine cumulate, layered units of an Upper Triassic ultramafic intrusive complex (Rose, 1965, figure 2; Nokleberg and others, 1991). The deposit was discovered by Rose (1965), who described six lenses of massive sulfide in an area having a radius of 100 feet. The largest lens was 3 feet thick by 6 feet long. The massive sulfides are mainly marcasite, but chalcopyrite, pyrrhotite, pentlandite, and probably magnetite are also present. The marcasite is probably a retrograde product of pyrrhotite.

The occurrence was also sampled by Nokleberg and others (1991). Their samples 79IL030A-D of massive pyrrhotite containing disseminated chalcopyrite and pyrite assayed as much as 2 percent copper, 1,000 parts per million (ppm) cobalt, and 2,000 ppm nickel (locality 50, table 2). Foley (1992) collected massive sulfide samples assaying as much as 13 ppm silver, 416 parts per billion (ppb) gold, 137 ppb palladium, 2.4 percent copper, 0.66 percent nickel, and 0.08 percent cobalt.

Alteration:

Some of the peridotite and olivine cumulate is serpentinized, mainly near their contacts, but it mostly is relatively unaltered (Rose, 1965).

Age of mineralization:

Late Triassic, the age of the host rock.

Deposit model:

Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

The massive sulfide lenses in the Broxson Gulch area assay as much as 13 parts per million silver, 416 parts per billion (ppb) gold, 137 ppb palladium, 137 ppb platinum, 2.4 percent copper, 0.66 percent nickel, and 0.08 percent copper (Foley, 1992).

The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; MacKevett and Holloway, 1977; Nokleberg and others, 1991; Foley, 1992.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): East Broxson Au

Site type: Occurrence

ARDF no.: MH130

Latitude: 63.3475 **Quadrangle:** MH B-5

Longitude: 146.0015

Location description and accuracy:
The occurrence is located at an elevation of about 4,400 feet near the headwaters of the east fork of Broxson Gulch and about one-half mile north-northeast of the center of section 22, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Au, Cu, Pd, Pt

Other:

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals:

Geologic description:
The Rainy ultramafic-mafic complex is a steeply north dipping dike-like body of dunite that varies from less than 100 foot thick to more than 6,000 feet thick and extends for more than 12 miles in length. A discontinuous marginal gabbro extends along most of the southern (lower) contact and is more discontinuous along the northern (upper) contact (W.T. Ellis, oral communication, 2001). The Rainy complex of Late Triassic age intrudes the Slana Spur Formation of Pennsylvanian age (Nokelberg and others, 1992).

On the western side of the complex the layered marginal gabbro sequence is as much as 1,500 feet thick. Prominent rock types are gabbronorites, very coarse grained clinopyroxene mafic gabbro, and wherlite. This prospect consists of disseminated pyrrhotite and pentlandite in a peridotite near the northern contact of the Rainy complex. A mineralized sample contained 0.05 percent nickel, 0.58 percent copper, 1,950 parts per billion (ppb) gold, 36 palladium, and 140 ppb platinum (W.T. Ellis, oral communication, 2001).

Alteration:

Age of mineralization:
Late Triassic, synchronous with emplacement of Rainy complex.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
Exploration on the Rainy property was carried out by American Copper and Nickel Company working with Fort Knox Gold Resources Inc. Exploration to date to the east of this occurrence includes sampling, airborne and ground geophysical surveys, and completion of one diamond drill hole since 1994 (W.T. Ellis,

oral communication, 2001).

MAN Resources geologists collected a mineralized sample that contained 0.05 percent nickel, 0.58 percent copper, 1,950 parts per billion (ppb) gold, 36 ppb palladium, and 140 ppb platinum (W.T. Ellis, oral communication, 2001).

The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 8/19/02

Site name(s): East Canyon

Site type: Occurrence

ARDF no.: MH131

Latitude: 63.3386 **Quadrangle:** MH B-4

Longitude: 145.9963

Location description and accuracy:
This occurrence is approximately 1 mile north-northwest of peak 6346 at an elevation of about 4,800 feet. It is east of the east fork of Broxson Gulch below an unnamed hanging glacier, near the center of section 22, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Ni, Pd, Pt

Other:

Ore minerals: Pentlandite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The Rainy ultramafic complex is a steeply north dipping dike-like body of dunite that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length. A discontinuous marginal gabbro extends along most of the southern (lower) contact and is more discontinuous along the northern (upper) contact (W.T. Ellis, oral communication). The Rainy ultramafic/mafic complex of Late Triassic age intrudes the Slana Spur Formation of Pennsylvanian age (Nokelberg and others, 1992).

On the western side of the complex the marginal gabbro sequence is as much as 1,500 feet thick. Prominent rock types are gabbronorites, very coarse grained clinopyroxene mafic gabbro, and wherlite. Mineralization consists of disseminated pyrrhotite and pentlandite in a peridotite near the southern contact of the Rainy complex. A mineralized sample contained 0.187 percent nickel, 282 parts per billion (ppb) palladium, and 108 ppb platinum (W.T. Ellis, oral communication, 2001).

Alteration:
The olivine melagabbro and peridotite are variably serpentinized.

Age of mineralization:
Late Triassic, synchronous with emplacement of Rainy complex, which is part of a 120-mile long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
Exploration on the Rainy property was done by American Copper and Nickel Company (ACNC) working

with Fort Knox Gold Resources Inc. Exploration since 1994 includes sampling, airborne and ground geophysical surveys, and completion of one diamond drill hole (W.T. Ellis, oral communication, 2001).

The East Peak occurrence (MH135) was discovered and staked by ACNC in 1995, but the claims were allowed to lapse in 1999. MAN geologists collected a mineralized sample that contained 0.187 percent nickel, 282 parts per billion (ppb) palladium, and 108 ppb platinum (W.T. Ellis, oral communication, 2001).

The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 05/14/02

Site name(s): Unnamed (southeast headwaters of the east fork in Broxson Gulch)

Site type: Occurrence

ARDF no.: MH132

Latitude: 63.3342 **Quadrangle:** MH B-5

Longitude: 146.0057

Location description and accuracy:
This occurrence is at an elevation of about 5,000 feet in the southeast headwaters of the locally named east fork in Broxson Gulch (Rose, 1965, figure 2), in the SW1/4SW1/4 section 22, T. 18 S., R. 9 E., Fairbanks Meridian. This occurrence corresponds to locality 16 on figure 2 of Rose (1965), locality 22 of MacKevett and Holloway (1977), and locality 58 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au, Cu

Other: Zn

Ore minerals: Chalcopyrite, magnetite, pyrite, pyrrhotite

Gangue minerals: Garnet, pyroxene

Geologic description:
The rocks in the area of this occurrence are carbonate strata of the Slana Spur Formation of Pennsylvanian and Permian age (Nokleberg and others, 1991). The strata are cut by Upper Triassic gabbro dikes. The mineral deposits are skarn bodies as much as 3 feet thick that both parallel and intersect the bedding of the strata adjacent to the gabbro dikes. The skarn is composed mainly of clinopyroxene, garnet, and magnetite and contains small amounts of pyrite, chalcopyrite, and pyrrhotite. Sample 79NK225C of copper-bearing skarn assayed 5.6 percent copper, 1.2 parts per million (ppm) gold, 300 ppm silver, and 720 ppm zinc (Nokleberg and others, 1991).

Alteration:
The skarn is dark green and consists chiefly of clinopyroxene, garnet, and magnetite and small amounts of glaucophane, biotite, calcite, pyrite, chalcopyrite and, locally, pyrrhotite (Rose, 1965).

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Skarn related to gabbro dikes.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): West Bowl (Rainy)

Site type: Occurrences

ARDF no.: MH133

Latitude: 63.3385 **Quadrangle:** MH B-4

Longitude: 145.9750

Location description and accuracy:
The West Bowl occurrences are at elevations of 5,200 to 5,600 feet in a cirque basin west of upper North Fork Rainy Creek. They are in the west-central part of section 23, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Ag, Au, Cu, Pd

Other:

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals: Calcite, garnet, olivine

Geologic description:
One occurrence is a skarn zone in a large Upper Paleozoic carbonate inclusion in the Rainy mafic-ultramafic complex of Late Triassic age. The skarn consists of garnet, yellow foresterite (olivine), calcite, chalcopyrite, and pyrrhotite (L.D. Hulbert, oral communication, 2001). The other occurrence is 1,000 feet to the north and contains poddy skarn mineralization in a marble unit along the north contact of the Rainy ultramafic-mafic complex.

Mineralized rock samples collected by MAN Resources of the West Bowl inclusion contained 4.6 percent copper, 1,040 parts per billion (ppb) gold, 7.7 parts per million silver, 52 ppb palladium, and 11 ppb platinum. Samples of the upper West Bowl skarn 1,000 feet to the north contained 2.5 percent copper, 258 ppb gold, 263 ppb palladium, and 55 ppb platinum (L.D. Hulbert, oral communication, 2001).

The Rainy ultramafic-mafic complex is a steeply north-dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
Marble is altered to calcite-garnet-olivine skarn.

Age of mineralization:
Late Triassic.

Deposit model:
Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: No

Site Status: Active

Workings/exploration:

Exploration on the Rainy property has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources, Inc. Exploration from 1995 through 1998 included rock sampling, airborne and ground geophysical surveys. and completion of one diamond drill hole (W.T. Ellis, oral communication, 2001). This occurrence was not found by ACNC, and the claims were allowed to lapse in 1999.

MAN Resources (MAN) subsequently discovered the mineralized occurrences in 2000, and they are now covered by active claims. Mineralized rock samples collected by MAN of the West Bowl inclusion contained 4.6 percent copper, 1,040 parts per billion (ppb) gold, 7.7 parts per million silver, 52 ppb palladium, and 11 ppb platinum. Samples of the upper West Bowl skarn 1,000 feet to the north contained 2.5 percent copper, 258 ppb gold, 263 ppb palladium, and 55 ppb platinum (L.D. Hulbert, oral communication, 2001).

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 04/10/02

Site name(s): Unnamed (east of peak 6346)

Site type: Occurrence

ARDF no.: MH134

Latitude: 63.3251 **Quadrangle:** MH B-4

Longitude: 145.9793

Location description and accuracy:
This occurrence is on the southeast side of a ridge about 0.4 mile southeast of the top of peak 6346 at an elevation of about 5,900 feet. It is on the west side of the North Fork Rainy Creek about 0.4 mile west of the center of section 26, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Au, Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The Rainy mafic-ultramafic complex is a steeply north dipping dike-like body of dunite that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length. A discontinuous marginal gabbro package extends along most of the southern (lower) contact and is more discontinuous along the northern (upper) contact (W.T. Ellis, oral communication, 2001). The Rainy complex of Late Triassic age intrudes the Slana Spur Formation of Pennsylvanian age in the Wrangellia terrane (Nokelberg and others, 1992).

On the western side of the complex the layered marginal gabbro sequence is as much as 1,500 feet thick. Prominent rock types are gabbronorites, very coarse grained clinopyroxene mafic gabbro, wherlite, and mineralized mafic gabbro. The mineralized gabbro contains 5 to 15 percent disseminated pyrrhotite with minor chalcopyrite and pentlandite and is iron and copper stained. Two anomalous samples contained 0.15 to 0.23 percent copper, 0.12 to 0.21 percent nickel, 153 to 180 parts per billion (ppb) palladium, 58 to 72 ppb platinum, and 18 to 51 ppb gold (W.T. Ellis, oral communication, 2001).

Alteration:
The coarse-grained clinopyroxene olivine gabbro (melagabbro) is variably serpentinized.

Age of mineralization:
Late Triassic, synchronous with emplacement of Rainy complex.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration on the Rainy property was carried out by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources Inc. Exploration since 1994 includes sampling, airborne and ground geophysical surveys, and one diamond drill hole (W.T. Ellis, oral communication, 2001). Two anomalous samples contained 0.15 to 0.23 percent copper, 0.12 to 0.21 percent nickel, 153 to 180 parts per billion (ppb) palladium, 58 to 72 ppb platinum, and 18 to 51 ppb gold (W.T. Ellis, oral communication, 2001).

The nearby East Peak occurrence (MH135) was discovered and staked by ACNC in 1995, but the claims were allowed to lapse in 1999. The occurrence is now on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 05/14/02

Site name(s): East Peak (Rainy)

Site type: Occurrence

ARDF no.: MH135

Latitude: 63.3284 **Quadrangle:** MH B-4

Longitude: 145.9898

Location description and accuracy:
The East Peak (Rainy) occurrence is a few hundred feet east of peak 6346 at an elevation of 6,000 feet. It is on the west side of North Fork Rainy Creek in SW1/4NE1/4 section 27, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Co

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The East Peak (Rainy) occurrence is in an Upper Triassic ultramafic-mafic complex (the Rainy complex) that intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). In this area a layered marginal gabbro sequence is as much as 1,500 feet thick. Prominent rock types are gabbronorites, clinopyroxene megacrystic melagabbro, and wherlite. The East Peak showing is in a melagabbro layer near the lower contact of the complex.

Mineralization consists of 5 to 15 percent disseminated pyrrhotite and minor chalcopyrite and pentlandite in a coarse-grained olivine melagabbro with 15 to 25 percent feldspar. Two rock samples collected by American Copper and Nickel Company respectively contained 0.27 and 0.30 percent copper, 0.13 and 0.08 percent nickel, 84 and 510 parts per billion (ppb) palladium, and 110 and 55 ppb platinum. A sample collected by MAN Resources contained 46 ppb gold, 0.03 percent copper, 0.085 percent nickel, 510 ppb palladium, and 55 ppb platinum (W.T. Ellis, oral communication, 2001).

The Rainy ultramafic-mafic complex is a steeply north-dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
The olivine melagabbro is variably serpentinized.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration on the Rainy property has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources, Inc. Exploration from 1995 through 2001 included rock sampling, airborne and ground geophysical surveys, and completion of one diamond drill hole (W.T. Ellis, oral communication, 2001).

The occurrence was discovered and staked by ACNC in 1995, but the claims were allowed to lapse in 1999. It is now (since 2000) on active claims of MAN Resources (MAN). Two rock samples collected by ACNC respectively contained 0.27 and 0.30 percent copper, 0.13 and 0.08 percent nickel, 84 and 510 parts per billion (ppb) palladium, and 110 and 55 ppb platinum. A sample collected by MAN contained 46 ppb gold, 0.03 percent copper, 0.085 percent nickel, 510 ppb palladium, and 55 ppb platinum (W.T. Ellis, oral communication, 2001).

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/02

Site name(s): Unnamed (tributary of the east fork in Broxson Gulch)

Site type: Occurrence

ARDF no.: MH136

Latitude: 63.3223 **Quadrangle:** MH B-5

Longitude: 146.0569

Location description and accuracy:
This occurrence is at an elevation of about 4,700 feet in the headwaters of an unnamed east tributary to the east fork the stream(s) in Broxson Gulch. The occurrence is about a quarter-mile northeast of peak 4825 in section 29, T. 18 S., R. 9 E., Fairbanks Meridian. This occurrence corresponds to locality 54 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au

Other: Mo

Ore minerals: Pyrite (?)

Gangue minerals: Quartz

Geologic description:
The rocks in the area of this occurrence are andesitic tuffs and breccias of the Slana Spur Formation of Late Paleozoic age (Nokleberg and others, 1991). The occurrence is about one-quarter mile north of the Airstrip Fault that bounds the Slana Spur unit on the south (Rose, 1965, figure 2). The mineral deposit consists of sheared and silicified metavolcanic graywacke; grab sample 79IL027E assayed 2.3 parts per million (ppm) gold, 150 ppm silver, and 30 ppm molybdenum (Nokleberg and others, 1991, locality 54, table 2).

Alteration:
Silicification of the host rock.

Age of mineralization:
Possibly mid-Cretaceous, related to faulting and regional metamorphism (Nokleberg and others, 1982).

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

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; Nokleberg and others, 1982; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (east side of upper Specimen Creek)

Site type: Prospect

ARDF no.: MH137

Latitude: 63.3199 **Quadrangle:** MH B-5

Longitude: 146.0284

Location description and accuracy:

This prospect is at an elevation of about 5,050 feet on the south flank of a ridge at the head of an unnamed east fork of Specimen Creek. The prospect is about 2,000 feet south of the center of section 28, T. 18 S., R. 9 E., Fairbanks Meridian. The location corresponds to locality 15 on figure 2 of Rose (1965), locality 21 of MacKevett and Holloway (1977), locality 41 of Cobb (1979 [OFR 79-238]), and locality 57 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au, Cu

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Actinolite, epidote, magnetite

Geologic description:

The rock at this prospect has been described either as amphibole 'serpentinite' by Rose (1965) or as metabasalt of the Nikolai Greenstone of Late Triassic age by Nokleberg and others (1991, locality 57). A thin section examined by Rose was composed mainly of olivine and amphibole with minor amounts of epidote, pyrite, and chalcopyrite. He also identified actinolite and glaucophane.

The deposit consists of a copper-bearing shear zone that trends about N35 E. Rose (1965) noted that irregular pods of dark- and light-colored rock were present along this zone and that quartz was present in the lighter colored rock. W.T. Ellis (unpublished data, 1996) interpreted the mineralized zone to be magnetite-bearing skarn associated with the contact of the lighter colored felsic intrusive rock . A 4-foot sample collected by Rose (1965) assayed 0.09 ounce of gold per ton, 1.18 ounces of silver per ton, 0.75 percent copper, and a trace of nickel. Nokleberg and others (1991, table 2) collected samples that assayed as much as 0.75 percent copper 1.05 ounces of silver per ton, and 0.8 ounce of gold per ton.

Alteration:

Silicification, along with magnetite-amphiobole alteration of the host rock.

Age of mineralization:

Epigenetic mineralization in a shear zone in the Upper Triassic host rock is possibly Cretaceous, the age of faulting and regional metamorphism. If the mineralization is skarn related to the felsic intrusion, it could be of Late Cretaceous to Early Tertiary age.

Deposit model:

Uncertain, possible copper skarn (Cox and Singer, 1986; model 18b).

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

18b (?)

Production Status: None

Site Status: Active

Workings/exploration:
The deposit was discovered by Rose (1965). The area is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1982; Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (head of Specimen Creek)

Site type: Occurrence

ARDF no.: MH138

Latitude: 63.3158 **Quadrangle:** MH B-5

Longitude: 146.0524

Location description and accuracy:
This occurrence is at an elevation of 4,350 feet in an unnamed upper west fork of Specimen Creek, in the NE1/4NE1/4 section 32, T. 18 S., R. 9 E., Fairbanks Meridian. The occurrence corresponds to locality 53 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other: Sn

Ore minerals: Chromite

Gangue minerals: Olivine

Geologic description:
The rock at this site consists of olivine cumulate in dunite or peridotite that is part of an Upper Triassic ultramafic intrusive complex (W.T. Ellis, unpublished data, 1996). The olivine cumulate is brecciated and sheared in a zone traceable for about 50 feet on strike. Grab sample 79CH009C of sheared ultramafic rock contained more than 5,000 parts per million (ppm) chromium and 50 ppm tin (Nokleberg and others, 1991, locality 53, table 2).

Alteration:

Age of mineralization:
The chromite is Late Triassic, the presumed age of the ultramafic host rock. The copper and gold are Late Triassic or younger. The shear-controlled mineralization is possibly younger.

Deposit model:
Disseminated chromite in ultramafic rocks; epigenetic (?) shear zone mineralization.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Specimen Creek

Site type: Mine

ARDF no.: MH139

Latitude: 63.3113 **Quadrangle:** MH B-5

Longitude: 146.0425

Location description and accuracy:
The Specimen Creek placer mine is at an elevation of about 4,000 feet in the upper part of Specimen Creek. The location is approximate but is probably about 1,800 feet west of the center of section 33, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Au

Other: Cu, Ni, Zn

Ore minerals: Gold, malachite

Gangue minerals:

Geologic description:
The course of upper Specimen Creek is apparently controlled by a steep fault that strikes north-northeast and that separates mafic-ultramafic rocks of the Upper Triassic Eureka ultramafic complex on the east from Pennsylvanian and Permian strata to the west (Rose, 1965, figure 2; Nokleberg and others, 1991).

The placer mine is marked by remnants of sluice boxes; it probably was worked on a small scale. The source of the gold is uncertain; Rose (1965) suggested that it may include pyritic rocks (his group A), ultramafic rocks, and high gravels. Rose (1965, locality 14, figure 2) noted copper-stained areas in metavolcanic rocks on the west bank of Specimen Creek. His stream-sediment samples 220 and 223 were anomalous in copper, zinc, and nickel.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Active

Workings/exploration:
Several placer claims and remnants of sluices were found on the upper part of Specimen Creek (Rose, 1965).

The occurrence is on active Online Exploration claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Lower Specimen Creek

Site type: Prospect

ARDF no.: MH140

Latitude: 63.2787 **Quadrangle:** MH B-5

Longitude: 146.0526

Location description and accuracy:
This placer prospect is at an elevation of about 3,350 feet on lower Specimen Creek. The location is for the approximate midpoint of the placer prospect, in the SE1/4SE1/4 section 8, T. 19 S., R. 9 E., Fairbanks Meridian (W.T. Ellis, oral communication, 1998).

Commodities:

Main: Au

Other: Pt

Ore minerals: Gold

Gangue minerals:

Geologic description:
Alluvium in lower Specimen Creek contains 0.02 to 0.04 ounce of gold per cubic yard and traces of platinum. The gold averages about 35 mesh and is finer than 16 mesh (James Adler, written communication, 2001, on the basis of test work by Richard Hughes, P.E.). The source of the gold is unknown, but mineralized rocks (see MH125, MH137-MH139) occur upstream in the Slana Spur Formation of Late Paleozoic age, which is intruded by gabbro and ultramafic rock of Late Triassic age (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Active

Workings/exploration:
Three test pits were hand-dug in 1986. The results of the tests indicate that alluvium contains 0.02 to 0.04 ounce of gold and a trace of platinum per cubic yard. In 1998, several back-hoe test pits were dug and sampled (W.T. Ellis, oral communication, 1998).
On-Line Exploration staked 15 claims on the placer in 1993.

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (east of Specimen Creek)

Site type: Occurrence

ARDF no.: MH141

Latitude: 63.2990 **Quadrangle:** MH B-5

Longitude: 146.0082

Location description and accuracy:
This occurrence is at an elevation of about 5,200 feet on an east-west-trending ridge east of Specimen Creek, in the SW1/4NW1/4 section 3, T. 19 S., R. 9 E., Fairbanks Meridian. This occurrence corresponds to locality 10 on figure 2 of Rose (1965), locality 43 on figure 4 of Cobb (1979 [OFR 79-238), and locality 63 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, marcasite, pyrite, pyrrhotite

Gangue minerals: Garnet, pyroxene

Geologic description:
The rocks in the area of this occurrence consist of a limestone mass of the Slana Spur Formation of Late Paleozoic age engulfed in mafic-ultramafic intrusive rock of the Upper Triassic Eureka complex. The rocks at this deposit consist of sulfide-bearing skarn composed chiefly of brown garnet and greenish pyroxene, highly pyritized limestone (?) that overlies the skarns, and a capping sequence of nearly unaltered limestone. Float collected below the skarn contains pyrite and pyrrhotite and lesser amounts of chalcopyrite and marcasite (Rose, 1965).

Alteration:
Sulfide minerals are disseminated in a matrix of brown garnet and greenish pyroxene skarn. Limestone overlying the skarn is pyritized.

Age of mineralization:
Late Triassic, the age of the mafic-ultramafic intrusive rocks.

Deposit model:
Skarn affiliated with mafic-ultramafic intrusive rocks.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/01

Site name(s): Unnamed (southwest of West Fork Rainy Creek)

Site type: Occurrence

ARDF no.: MH142

Latitude: 63.2957 **Quadrangle:** MH B-4

Longitude: 145.9860

Location description and accuracy:
This occurrence is at an elevation of about 4,900 feet on a southeast-trending ridge southwest of West Fork Rainy Creek. It is in the NE1/4SE1/4 section 3, T. 19 S., R. 9 E., Fairbanks Meridian. It corresponds to locality S65 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals:

Geologic description:
This occurrence is in Late Triassic gabbro that intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Rock sample 79NK027A contains more than 5,000 parts per million chromium (Nokleberg and others, 1991). Chromite is probably sparsely disseminated in olivine cumulate at the site.

Alteration:

Age of mineralization:
Late Triassic.

Deposit model:
Chromite disseminated in a layered mafic-ultramafic complex.

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

Production Status: No

Site Status: Active

Workings/exploration:
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:
The Broxson Gulch cat trail cuts through the area.

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/7/02

Site name(s): West Fork Rainy Creek

Site type: Prospect

ARDF no.: MH143

Latitude: 63.2942 **Quadrangle:** MH B-4

Longitude: 145.9636

Location description and accuracy:
This placer prospect is at an elevation of about 4,100 feet on the north bank of the West Fork Rainy Creek. It is in the NW1/4SE1/4 section 2, T. 19 S., R. 9 E., Fairbanks Meridian. It is near locality 7 of Rose (1965, p. 34) and locality S3 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
Gold occurs in alluvial gravels probably derived from older glacial deposits (Rose, 1965). The bedrock in the West Fork Rainy Creek drainage includes part of the Slana Spur Formation of Pennsylvanian age and minor gabbro associated with Upper Triassic ultramafic-mafic intrusions in the Wrangellia terrane (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (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:
Rose (1965) noted some placer workings on the north side of West Fork Rainy Creek. Exploration or mining activity was noted during the summer of 1996-1998 below the showing on the West Fork (W.T. Ellis, oral communication, 1998).
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/7/02

Site name(s): Unnamed (south of West Fork Rainy Creek)

Site type: Occurrence

ARDF no.: MH144

Latitude: 63.3037 **Quadrangle:** MH B-4

Longitude: 145.9972

Location description and accuracy:
This occurrence is at an elevation of about 5,000 feet on a northeast-facing slope on the southwest side of West Fork Rainy Creek. It is in the NE1/4NW1/4 section 3, T. 19 S., R. 9 E., Fairbanks Meridian. The occurrence corresponds to locality 8 of Rose (1965), locality 1 of Cobb (1979 [OFR 79-238]), and locality S34 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au, Cu, Ni

Other: Pd (?), Pt (?)

Ore minerals: Chalcopyrite, marcasite, pyrite

Gangue minerals:

Geologic description:
This occurrence consists of a 2- to 3-foot-thick by 10-foot-long lens of marcasite, chalcopyrite, and minor pyrite (Rose, 1965). The lens is in the hanging wall immediately above a fault that strikes N85W and dips 40 SW. The fault cuts Triassic amphibolite and serpentinite. The rock immediately overlying the sulfide lens contains garnet, olivine(?), and pyroxene. Rock 20 feet farther from the lens is partly altered to plagioclase(?) and zeolite (Rose, 1965). The marcasite is probably an alteration product of pyrrhotite.

A sample of the sulfide lens assayed 0.37 percent copper, 0.5 percent nickel, 0.03 ounce of gold per ton, and 0.33 ounce of silver per ton (Rose, 1965). A U.S. Geological Survey sample contained 0.43 percent copper and 12.5 parts per million silver (Nokleberg and others, 1991).

Alteration:
The rock immediately overlying the sulfide lens contains garnet, olivine(?), and pyroxene. Rock 20 feet farther from the lens is partly altered to plagioclase(?) and zeolite (Rose, 1965). The marcasite is probably an alteration product of pyrrhotite.

Age of mineralization:
Late Paleozoic or younger.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill; possible Cu skarn (Cox and Singer, 1968; model 18b).

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

Production Status: None

Site Status: Active

Workings/exploration:

Surface workings are present. A sample of the sulfide lens assayed 0.37 percent copper, 0.5 percent nickel, 0.03 ounce of gold per ton, and 0.33 ounce of silver per ton (Rose, 1965). A U.S. Geological Survey sample contained 0.43 percent copper and 12.5 parts per million silver (Nokleberg and others, 1991).

The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/7/02

Site name(s): Unnamed (northeast side of West Fork Rainy Creek)

Site type: Prospect

ARDF no.: MH145

Latitude: 63.3031 **Quadrangle:** MH B-4

Longitude: 145.9786

Location description and accuracy:
This prospect is at an elevation of about 4,200 feet on the north side of West Fork Rainy Creek. It is in the NW1/4NW1/4 section 2 T. 19 S., R. 9 E., Fairbanks Meridian. This site corresponds to locality 7 of Rose (1965) and locality S67 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au, Cu

Other:

Ore minerals: Chalcopyrite, galena, gold, magnetite, pyrite, secondary copper minerals

Gangue minerals: Amphibole, calcite, epidote, garnet, pyroxene, quartz

Geologic description:
Chalcopyrite and oxide-copper minerals occur in two skarn bodies (Rose, 1965). One skarn consists of pyrite, chalcopyrite, magnetite, garnet pyroxene, and quartz in cherty limestone that strikes N75E and dips 68SE. The other skarn consists of amphibole, epidote, and calcite adjacent to a gabbro dike about 150 feet downstream. The limestone is part of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). The gabbro could be associated with an Upper Triassic ultramafic-mafic intrusive complex (W. T. Ellis, oral communication, 1996).

Rose (1965) collected a sample of skarn that assayed 0.42 percent copper, 0.01 ounce of gold per ton, and 0.40 ounce of silver per ton. The U.S. Geological Survey collected grab samples assaying 5.6 percent copper, 0.07 percent zinc, 0.009 ounce of silver per ton, and 0.035 ounce of gold per ton (Nokleberg and others, 1991).

Alteration:
A zone several feet wide in a cherty limestone is replaced by skarn with oxidized copper minerals (Rose, 1965).

Age of mineralization:
Late Paleozoic or Triassic.

Deposit model:
Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: None

Site Status: Active

Workings/exploration:

Trenches and prospect pits, along with evidence of some placer gold mining, are present. Rose (1965) collected a sample of skarn that assayed 0.42 percent copper, 0.01 ounce of gold per ton, and 0.40 ounce of silver per ton. The U.S. Geological Survey collected grab samples assaying 5.6 percent copper, 0.07 percent zinc, 0.009 ounce of silver per ton, and 0.035 ounce of gold per ton (Nokleberg and others, 1984 [C 939]).

The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; Lange and others, 1981; Nokleberg and others, 1984 (C 939); Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/7/02

Site name(s): Unnamed (northeast side of West Fork Rainy Creek)

Site type: Occurrence

ARDF no.: MH146

Latitude: 63.2926 **Quadrangle:** MH B-4

Longitude: 145.9454

Location description and accuracy:
This occurrence is at an elevation of about 4,300 feet on a south-facing slope on the northeast side of West Fork Rainy Creek. It is in the SW1/4SW1/4 section 1, T. 19 S., R. 9 E., Fairbanks Meridian. The site corresponds to locality 9 of Rose (1965) and locality S68 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Copper oxide(s), pyrite

Gangue minerals: Amphibole, calcite, epidote

Geologic description:
Minor copper staining occurs in tactite composed of amphibole, epidote, and calcite containing local pods of pyrite (Rose, 1965). The tactite is adjacent to a gabbro dike that is probably an apophysis of an Upper Triassic ultramafic-mafic intrusion (Nokleberg and others, 1991).

Alteration:
The country rock adjacent to dike is altered to an amphibole-epidote-calcite skarn. Copper minerals are oxidized.

Age of mineralization:
Probably Late Triassic.

Deposit model:
Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/7/02

Site name(s): Unnamed (west of North Fork Rainy Creek)

Site type: Occurrence

ARDF no.: MH147

Latitude: 63.3090 **Quadrangle:** MH B-4

Longitude: 145.9804

Location description and accuracy:
This occurrence is at an elevation of about 4,350 feet at the head of an unmapped east -flowing tributary of North Fork Rainy Creek. It is in the NW1/4SW1/4 section 35, T. 18 S., R. 9 E., Fairbanks Meridian. It corresponds to locality S65 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals:

Geologic description:
This occurrence is in Late Triassic gabbro that intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). The occurrence consists of a silicified zone 6.5 feet wide by 10 feet long in gabbro. Grab sample 79NK014B collected by the U.S. Geological Survey contains more than 5,000 parts per million chromium (Nokleberg and others, 1991). Chromite is probably sparsely disseminated in gabbro at the site.

Alteration:
The alteration consists of a silicified zone 2 meters wide by 3 meters long in the gabbro.

Age of mineralization:
Late Triassic.

Deposit model:
Disseminated chromite in a layered mafic-ultramafic complex.

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

Production Status: No

Site Status: Active

Workings/exploration:
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/7/02

Site name(s): Pioneer; Eastern Star; Rainbow; Ghezzi

Site type: Prospects

ARDF no.: MH148

Latitude: 63.3134 **Quadrangle:** MH B-4

Longitude: 145.9856

Location description and accuracy:
This prospect area is centered near the southwest end of a small ridge above the divide between North Fork and West Fork Rainy Creek. It is at an elevation of about 4,900 feet in the SE1/4NE1/4 section 34, T. 18 S., R. 9 E., Fairbanks Meridian. It corresponds to locality 5 of Rose (1965), locality 3 of Cobb (1979 [OFR 79-238]), and locality S61 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au, Cu

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals:

Geologic description:
The rocks in the prospect area are amphibole 'serpentinite' intruded by two main varieties of gabbro: dark, fine-grained, unmineralized gabbro, and dikes, pods, and plugs of a light-colored propylitically altered and mineralized leucogabbro (Rose, 1965).

The mineralization consists of chalcopyrite and pyrite in fractures in shear zones and as disseminations. The gabbro is Late Triassic; it intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). The shear zones strike northeast and range to as much as a meter wide and several meters long. A composite surface sample of the mineralized gabbro assayed 1.0 percent copper, 0.01 ounce of gold per ton, and 0.22 ounce of silver per ton (Rose, 1965). A U.S. Geological Survey grab sample contained 6.0 percent copper and 0.017 ounce of gold per ton (Nokleberg and others, 1991).

Alteration:
The propylitically altered gabbro contains saussuritized and albitized plagioclase, and the mafic minerals are altered to actinolite (Rose, 1965).

Age of mineralization:
Late Triassic.

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

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

Production Status: None

Site Status: Active

Workings/exploration:

Workings include several pits and trenches and an undetermined number of drill holes completed in 1974 (W.T. Ellis, oral communication, 1996). A composite surface sample of the mineralized gabbro assayed 1.0 percent copper, 0.01 ounce of gold per ton, and 0.22 ounce of silver per ton (Rose, 1965). A U.S. Geological Survey grab sample contained 6.0 percent copper and 0.017 ounce of gold per ton (Nokleberg and others, 1991).

The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

A sulfur isotope analysis by American Copper and Nickel returned a Del S34 value of 0 (W.T. Ellis, oral communication, 1996). A zero value suggests that the mineralization is probably primary magmatic in origin.

References:

Rose, 1965; Berg and Cobb, 1967; Mulligan, 1974; Stout, 1976; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991; this report.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/02

Site name(s): Moneta-Porcupine

Site type: Prospect

ARDF no.: MH149

Latitude: 63.3182 **Quadrangle:** MH B-4

Longitude: 145.9921

Location description and accuracy:
This prospect is at an elevation of about 5,200 feet on a narrow ridge northeast of upper West Fork Rainy Creek. It is in the NW1/4NE1/4 section 34, T. 18 S., R. 9 E., Fairbanks Meridian. It corresponds to locality 6 of Rose (1965) and locality S60 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au, Cu

Other:

Ore minerals: Bornite, chalcopyrite, malachite

Gangue minerals:

Geologic description:
According to Rose (1965), this prospect consists of chalcopyrite and bornite in a fine-grained tactite or hornfels. The host rock is metaserpentinite composed of pale brown hornblende and light-yellow diopside. The tactite is about 3 feet thick and appears to strike N55E. According to Nokleberg and others (1991), chalcopyrite, bornite, and malachite occur in and next to fractures in meta-andesite tuff. The sulfide-bearing zones are as much as a meter wide and several meters long and occupy north-northeast-trending fractures. The meta-andesite tuff is part of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Late Paleozoic or Triassic.

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect was staked in 1964 for Moneta-Porcupine Mining Co. (Rose, 1965). Surface work included prospect pits.
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/02

Site name(s): Unnamed (west of upper North Fork Rainy Creek)

Site type: Occurrence

ARDF no.: MH150

Latitude: 63.3200 **Quadrangle:** MH B-4

Longitude: 145.9661

Location description and accuracy:
This occurrence is at an elevation of 4,800 feet on the south side of a gully on the west side of North Fork Rainy Creek. It is in the SW1/4SE1/4 section 26, T. 18 S., R. 9 E., Fairbanks Meridian. It corresponds to locality 4 of Rose (1965) and locality S62 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au, Cu, Ni

Other:

Ore minerals: Chalcopyrite, marcasite, pentlandite (?), pyrite

Gangue minerals:

Geologic description:
This occurrence consists of several small sulfide lenses in hornfels near a small gabbro plug (Rose, 1965). The sulfides are mainly pyrrhotite (probably nickeliferous) partly altered to marcasite and minor amounts of chalcopyrite and pyrite. Upper Triassic leucogabbro is exposed a few hundred feet south of the mineral occurrence, which is in hornfelsed Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). A major fault passes a few hundred feet north of the prospect (Rose, 1965).

Alteration:
The rock is epidotized and silicified pyroxene-bearing hornfels.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: No

Site Status: Active

Workings/exploration:
A sample of mineralized hornfels assayed less than 0.1 percent each of copper and nickel, 0.02 ounce of gold per ton, and 0.4 ounce of silver per ton (Rose, 1965). A U.S. Geological Survey sample assayed 0.6 percent copper, 0.2 percent cobalt, 0.004 ounce of gold per ton, and 0.09 ounce of silver per ton (Nokleberg and others, 1991).
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/02

Site name(s): Unnamed (west of upper North Fork Rainy Creek)

Site type: Occurrence

ARDF no.: MH151

Latitude: 63.3224 **Quadrangle:** MH B-4

Longitude: 145.9683

Location description and accuracy:
This occurrence is at an elevation of 5,250 feet on a steep ridge on the west side of upper North Fork Rainy Creek. It is in the SE1/4SW1/4 section 26, T. 18 S., R. 9 E., Fairbanks Meridian. It is approximately 500 feet up-slope and northwest of locality 4 of Rose (1965); see MH150.

Commodities:

Main: Ag, Au, Co, Cu

Other:

Ore minerals: Bornite, chalcopyrite, pyrite

Gangue minerals: Calcite, garnet

Geologic description:
At this occurrence garnet-skarn-hosted massive sulfide bands as much as one meter wide by several meters long strike northwest (Rose, 1965). An Upper Triassic gabbro crops out a few meters away across talus where it intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Other sulfide bands crop out about 500 feet down-slope in a similar setting. A grab sample of massive chalcopyrite, pyrite, and bornite assayed 0.6 percent copper, 0.2 percent cobalt, and 0.9 ounce of silver per ton (Nokleberg and others, 1991).

Alteration:
A garnet-calcite skarn has developed at this prospect.

Age of mineralization:
Late Paleozoic or Late Triassic.

Deposit model:
Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: No

Site Status: Active?

Workings/exploration:
A U.S. Geological Survey grab sample of massive chalcopyrite, pyrite, and bornite assayed 0.6 percent copper, 0.2 percent cobalt, and 0.9 ounce of silver per ton (Nokleberg and others, 1991).
The occurrence may be on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1965; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/10/02

Site name(s): Hail Creek

Site type: Prospect

ARDF no.: MH152

Latitude: 63.3269 **Quadrangle:** MH B-4

Longitude: 145.9291

Location description and accuracy:
This prospect is at an elevation of 4,200 feet in a west-flowing tributary, informally called Hail Creek, to upper North Fork Rainy Creek. It is in the SW1/4NE1/4 section 25, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Co

Ore minerals: Chalcopyrite, magnetite, malachite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
At Hail Creek, an elongate east-northeast-trending magnetic high coincides with nine airborne electromagnetic anomalies. The eastern string of four anomalies marks an iron oxide-stained, serpentinized and silicified zone in a dunite that contains local copper-stained limonitic fractures (W.T. Ellis, oral communication, 2001). To the west, downhill along this trend, the dunite is intruded by a variably serpentinized taxitic olivine gabbro.

A copper-stained and sulfide-bearing serpentinized zone is present in one location along the poorly exposed gabbro contact. The sulfide minerals noted include trace to 2 percent disseminated chalcopyrite, pentlandite, pyrrhotite, and magnetite. Strong large-loop electromagnetic geophysical conductors were detected on three surveyed lines. The surrounding rocks are part of the Rainy ultramafic-mafic complex of Late Triassic age (W.T. Ellis, oral communication, 2001).

The Rainy ultramafic-mafic complex is a steeply north dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex , which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
Local silicification and serpentinization of dunite and gabbro.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration in this area has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources, Inc. Exploration from 1995 through 1998 included rock sampling, airborne and ground geophysical surveys, and completion of one diamond drill hole (W.T. Ellis, oral communication, 2001).

The general area was staked by ACNC in 1995, but the Hail Creek occurrence was not discovered until 1998 when the exploration followed up a reconnaissance large-loop geophysical survey and an anomalous float sample found in 1995. The float sample contained 0.39 percent nickel, 0.24 percent copper, 0.09 percent cobalt, 216 parts per billion (ppb) palladium, and 295 ppb platinum. UTEM geophysical conductors coincide with the east-northeast-trending Hail Creek zone. A rock grab sample from the occurrence assayed 0.25 percent nickel, 0.48 percent copper, 68 ppb palladium, and 95 ppb platinum. One 250-foot drill hole completed in 1998 failed to penetrate significant mineralization at one of the stronger UTEM anomalies.

The occurrence is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/12/02

Site name(s): North Rainy

Site type: Occurrence

ARDF no.: MH153

Latitude: 63.3424 **Quadrangle:** MH B-4

Longitude: 145.9313

Location description and accuracy:
The North Rainy prospect is located at an elevation of 4,200 feet on the east valley wall of upper North Fork Rainy Creek. It is in the SW1/4NE1/4 section 24, T. 18 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Co

Ore minerals: Chalcopyrite, magnetite, malachite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
At the North Rainy occurrence a cluster of eight airborne electromagnetic anomalies marks a subcircular magnetic high (W.T. Ellis, oral communication, 2001). The rocks in this area are variably serpentinized dunite near a fine-grained gabbro intrusion. There is a well-developed breccia zone at the dunite-gabbro contact that is locally mineralized. The breccia consists of angular dunite clasts of various sizes (and at least one large inclusion of hornfelsed Tetelna sedimentary rocks) in a fine-grained gabbro matrix.

Mineralization consists of 2 to 4 percent pyrrhotite, chalcopyrite, and pentlandite (?) disseminated in the gabbro (W.T. Ellis, oral communication, 2001). Float of sulfide-bearing dunite, gossan, and copper-stained serpentine occur in a few places along the breccia contact. Rock samples contain as much as 0.18 percent nickel, 0.63 percent copper, 0.02 percent cobalt, 76 parts per billion (ppb) palladium, and 80 ppb platinum.

The Rainy ultramafic-mafic complex is a Late Triassic steeply north dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
Irregular serpentinization; oxidization of iron and copper minerals.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration on the North Rainy property has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources, Inc. Exploration from 1995 through 1998 included rock sampling, airborne and ground geophysical surveys, and completion of one diamond drill hole (W.T. Ellis, oral communication, 2001).

The general area was staked by ACNC in 1995, but the North Rainy occurrence was not discovered until 1998 when the exploration followed up a reconnaissance large-loop geophysical survey. There is a moderately strong UTEM geophysical conductor that coincides with the occurrence. Rock samples contain as much as 0.18 percent nickel, 0.63 percent copper, 0.02 percent cobalt, 76 parts per billion (ppb) palladium, and 80 ppb platinum.

The occurrence is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/12/02

Site name(s): Unnamed (west of head of North Fork Rainy Creek)

Site type: Occurrence

ARDF no.: MH154

Latitude: 63.3492 **Quadrangle:** MH B-4

Longitude: 145.9468

Location description and accuracy:
This occurrence is at an elevation of 4,700 feet west of the head of North Fork Rainy Creek. It is in the SW1/4SW1/4 section 13, T. 18 S., R. 9 E., Fairbanks Meridian. It corresponds to locality 17 of Rose (1965) and to locality S59 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, oxidized copper mineral(s), pyrite

Gangue minerals:

Geologic description:
At this occurrence, chalcopyrite and secondary copper minerals are in a shear zone that strikes N70E (Rose, 1965). The mineralized zone is about 6.5 feet wide by 10 feet long and is hosted in pyrite-altered dacite porphyry that intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:
Pyritization of dacite host rock; oxidation of copper minerals.

Age of mineralization:
Late Paleozoic or younger.

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

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

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/12/02

Site name(s): Unnamed (head of the north fork of Ann Creek)

Site type: Occurrence

ARDF no.: MH155

Latitude: 63.3481 **Quadrangle:** MH B-4

Longitude: 145.8759

Location description and accuracy:
This occurrence is at the head of the north fork of Ann Creek at an elevation of 4,300 feet. It is in the SE1/4SW1/4 section 17, T. 18 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Ag, Au, Cu

Other:

Ore minerals: Chalcopyrite, malachite, pyrite, pyrrhotite

Gangue minerals:

Geologic description:
This occurrence consists of sulfide-bearing copper-stained fine-grained sedimentary rocks of the Slana Spur Formation of Pennsylvanian age. Pyrite, pyrrhotite, and chalcopyrite form pods that cut hornfelsed strata below strongly serpentinized peridotite of an Upper Triassic ultramafic-mafic intrusion (W.T. Ellis, oral communication, 2001). Samples of sulfide-bearing sedimentary rocks contain as much as 1.3 percent copper and 629 parts per billion gold.

Alteration:
The peridotite is serpentinized; the sedimentary rocks are hornfelsed; copper minerals are oxidized.

Age of mineralization:
Probably Late Triassic.

Deposit model:
Cu 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:
Samples of sulfide-bearing sedimentary rocks contain as much as 1.3 percent copper and 629 parts per billion gold (W.T. Ellis, oral communication, 2001).

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/14/02

Site name(s): Rainy Breccia

Site type: Occurrence

ARDF no.: MH156

Latitude: 63.3333 **Quadrangle:** MH B-4

Longitude: 145.8981

Location description and accuracy:
The Rainy Breccia occurrence is located at an elevation of 5,700 feet on the divide between North Fork Rainy Creek and Ann Creek. It is in the SW1/4SE1/4 section 19, T. 18 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Co

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The Rainy Breccia occurrence contains as much as 6 percent coarse-grained sulfides in a melagabbro-norite matrix that hosts subrounded dunite clasts. The unit is several hundred feet long and approximately 50 feet thick. The breccia strikes S65E and dips 75N and is just below the upper (northern) contact of the Rainy ultramafic-mafic intrusive complex of Late Triassic age (W.T. Ellis, oral communication, 2001).

The disseminated sulfide minerals are predominantly pyrrhotite and magnetite and traces of chalcopyrite and pentlandite as inclusions in the pyrrhotite. A grab sample of the sulfide-bearing breccia contained 0.12 percent nickel, 0.15 percent copper, 0.01 percent cobalt, 26 parts per billion (ppb) palladium, and 25 ppb platinum.

The Rainy ultramafic-mafic complex is a steeply north dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
Irregular serpentinized zones occur along the breccia contact.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration in this area has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources, Inc. Exploration from 1995 through 1998 included rock sampling, airborne and ground geophysical surveys, and completion of one diamond drill hole (W.T. Ellis, oral communication, 2001).

This occurrence was discovered and staked by ACNC in 1995. A grab sample of the sulfide-bearing breccia contained 0.12 percent nickel, 0.15 percent copper, 0.01 percent cobalt, 26 part per billion (ppb) palladium, and 25 ppb platinum. A moderate airborne electromagnetic anomaly coincides with the east-southeast-trending breccia zone (W.T. Ellis, oral communication, 2001).

The occurrence is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/12/02

Site name(s): Unnamed (east of North Fork Rainy Creek)

Site type: Occurrences

ARDF no.: MH157

Latitude: 63.3254 **Quadrangle:** MH B-4

Longitude: 145.9039

Location description and accuracy:
This location is at the approximate center of a half-mile-long area of three similar occurrences (Nokleberg and others, 1991, localities S150, S151, S152). It is also within one-quarter mile of a native copper occurrence reported by Foley (1992). For this record the site is at about 5,600 feet elevation at the center of section 30, T. 18 S., R. 10E., Fairbanks Meridian.

Commodities:

Main: Co, Cr, Cu

Other: Pt

Ore minerals: Chalcocite (?), chromite, copper, digenite (?), magnetite

Gangue minerals: Olivine

Geologic description:
The occurrences consist of chromite and minor to trace amounts of native copper and copper sulfide(s) (?) in olivine cumulate (dunite) in the middle part of the Rainy ultramafic-mafic complex of Late Triassic age (Nokleberg and others, 1991). U.S. Geological Survey grab samples of dunite contained more than 5,000 parts per million (ppm) chrome and 500 ppm cobalt (Nokleberg and others, 1991).

Very fine grained disseminated native copper blebs in dunite were observed by U.S. Bureau of Mines geologists (Foley, 1992). U.S. Bureau of Mines microprobe analyses of several dunite samples identified platinian copper (platinian copper alloy with 19.5 to 28.6 percent platinum) that occurs as 5- to 15-micron grains in the chromite, along with chromian-magnetite and copper sulfide (chalcocite or digenite).

The Rainy ultramafic-mafic complex is a steeply north dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:

Age of mineralization:
Late Triassic.

Deposit model:
Disseminated chromite in a layered mafic-ultramafic complex.

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

Production Status: No

Site Status: Inactive

Workings/exploration:

Exploration in this area has been by American Copper and Nickel Company working with Fort Knox Gold Resources, Inc. Exploration from 1995 through 1998 included rock sampling, airborne and ground geophysical surveys, and completion of one diamond drill hole (W.T. Ellis, oral communication, 2001).

U.S. Bureau of Mines microprobe analyses of several dunite samples identified platinian copper (platinian copper alloy with 19.5 to 28.6 percent platinum) that occurs as 5- to 15-micron grains in the chromite, along with chromian-magnetite and copper sulfide (chalcocite or digenite).

The occurrences are on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991; Foley, 1992.

Primary reference: Nokleberg and others, 1991; Foley, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/12/02

Site name(s): White Band (east of upper North Fork Rainy Creek)

Site type: Occurrence

ARDF no.: MH158

Latitude: 63.3185 **Quadrangle:** MH B-4

Longitude: 145.9127

Location description and accuracy:
This occurrence is on the east valley wall of the upper North Fork Rainy Creek valley at an elevation of 4,800 feet. It is in the NW1/4NW1/4 section 31, T. 18 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Au, Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, malachite, pyrite, pyrrhotite

Gangue minerals:

Geologic description:
This occurrence consists of 2 to 3 percent of disseminated pyrite, pyrrhotite, and chalcopyrite in a white marker band of anothorositic gabbro in a feldspathic peridotite unit near the southern north-dipping contact of the Rainy ultramafic-mafic intrusive of Late Triassic age (W.T. Ellis, oral communication, 2001). The gabbro is locally copper stained. Samples of sulfide-bearing anothorositic gabbro contained 3,688 parts per billion (ppb) gold, 210 ppb palladium, 95 ppb platinum, 0.27 percent copper, and 0.11 percent nickel (W. T. Ellis, oral communication, 2001).

Alteration:
The olivine-bearing ultramafic rocks are variably serpentinized; copper minerals are locally oxidized.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: No

Site Status: Active

Workings/exploration:
Samples of sulfide-bearing anothorositic gabbro contained 3,688 parts per billion (ppb) gold, 210 ppb palladium, 95 ppb platinum, 0.27 percent copper, and 0.11 percent nickel (W.T. Ellis, oral communication, 2001).
The occurrences are on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/14/02

Site name(s): Rainy Creek

Site type: Mine

ARDF no.: MH159

Latitude: 63.2915 **Quadrangle:** MH B-4

Longitude: 145.8934

Location description and accuracy:
Surface placer workings extend for about 1.5 miles downstream from the junction of the North Fork and West Fork Rainy Creek (Rose, 1965). For this record the site is at their junction, in the SE1/4SE1/4 section 6, T. 19 S., R. 10 E., Fairbanks Meridian. This mine corresponds to locality S4 in table 3 of Nokleberg and others (1991).

Commodities:

Main: Au, Pd, Pt

Other: Cr

Ore minerals: Chromite, gold

Gangue minerals:

Geologic description:
Placer gold occurs in alluvial gravels probably derived in part from older glacial deposits (Rose, 1965; Cobb, 1973 [B 1374]). The bedrock in the drainage is part of the Slana Spur Formation of Pennsylvanian age and Upper Triassic ultramafic-mafic intrusions (Nokleberg and others, 1991).
A U.S. Bureau of Mines placer concentrate sample assayed 7.324 ounces of gold per ton, 0.06 ounce of palladium per ton, and 0.207 ounce of platinum per ton (Foley and others, 1990).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au-PGE (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:
Surface placer workings extend for about 1.5 miles downstream from the junction of the North and West Forks Rainy Creek (Rose, 1965). A U.S. Bureau of Mines placer concentrate sample assayed 7.324 ounces of gold, 0.06 ounce of palladium per ton, and 0.207 ounce of platinum per ton (Foley and others, 1989).
The occurrence is on active placer claims.

Production notes:

Placers were worked sporadically from 1900 to at least 1930 and since the early 1990's. Placer mining was first reported in Wilder Creek (later known as Rainy Creek) by Mendenhall and Schrader (1903). In 1901, 20 to 30 miners began sluicing in the new district, but results were unsatisfactory and the field was abandoned (Mendenhall, 1905). Rose (1965) reported that at least some of the gold occurs in a sticky orange-brown (glacial) clay that would not break down easily and that large boulders also cause difficulties.

Reserves:

Additional comments:

References:

Mendenhall and Schrader, 1903; Mendenhall, 1905; Moffit, 1912; Rose, 1965; Rose, 1966 (ADMM GR 20); Cobb, 1973 (B 1374); Cobb, 1979 (OFR 79-238); Mulligan, 1974; Stout, 1976; MacKevett and Holloway, 1977; Foley and others, 1989; Nokleberg and others, 1991.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/7/02

Site name(s): Unnamed (northwest flank of Rainy Mountain); Copter lode

Site type: Prospect

ARDF no.: MH160

Latitude: 63.2783 **Quadrangle:** MH B-4

Longitude: 145.8714

Location description and accuracy:
The approximate location of this prospect is at an elevation of 3,300 feet on the northwest flank of Rainy Mountain. It in the SE1/4SW1/4 section 8, T. 19 S., R. 10 E., Fairbanks Meridian. The location is within a mile of Cobb's locality 8 (1979 [OFR-79-238]) and locality S80 in table 2 of Nokleberg and others (1991). Martin (1920) described copper deposits 7 miles from Millers Roadhouse, and the Copter lode claims are also in the area (Brooks, 1918; Mulligan, 1974). No evidence of surface workings or mineralization was found at these claims in 1993 (W.T. Ellis, oral communication, 1996).

Commodities:

Main: Cu

Other: Au

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals: Chlorite, epidote, garnet

Geologic description:
Chalcopyrite- and pyrrhotite-bearing diorite and altered limestone (skarn) reportedly were collect in this area by A.H. McNeer (Brooks, 1918). The Copter lode prospect consists of sparse chalcopyrite and pyrrhotite and minor gold in garnet-epidote-chlorite skarn hosted in limestone of the Eagle Creek Formation of Pennsylvanian age and in adjacent Triassic gabbro (Nokleberg and others, 1991).

Alteration:
A specimen from the prospect was an altered limestone skarn made up of garnet, epidote, and chlorite and disseminated sulfides.

Age of mineralization:
Late Paleozoic or Triassic.

Deposit model:
Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: None

Site Status: Active

Workings/exploration:
Surface workings with 'considerable crosscutting' were reported by Martin (1920).
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Brooks, 1918; Martin, 1920; Mulligan, 1974; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Brooks, 1918

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/7/02

Site name(s): Unnamed (midway between lower Rainy Creek and Ann Creek); Southeast Rainy

Site type: Occurrences

ARDF no.: MH161

Latitude: 63.3039 **Quadrangle:** MH B-4

Longitude: 145.8315

Location description and accuracy:
The area of the occurrences is at an elevation of about 4,150 feet about midway between lower Rainy Creek and Ann Creek. It is in the NE1/4NE1/4 section 4, T. 19 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Au, Cu, Ni, Pd, Pt

Other: Cr

Ore minerals: Chalcopyrite, chromite, malachite, pyrrhotite

Gangue minerals:

Geologic description:
There are three occurrences. One consists of orange lichen-covered boulders of dunite containing traces of pyrite and pyrrhotite (W.T. Ellis, oral communication, 2001). About 2,000 feet to the southwest chalcopyrite is disseminated in malachite-stained hornfelsed strata adjacent to a gabbro dike that cuts the dunite (W. T. Ellis, oral communication, 2001). A sample of chromite-bearing dunite collected about 1,000 feet to the northeast contained more than 5,000 parts per million chromium (Nokleberg and others, 1991, sample 79HZ005A). Airborne magnetic data for this area show a large circular high that connects with the southeast part of the Rainy ultramafic-mafic complex intrusive (MH164) of Late Triassic age. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:
Local serpentinization of ultramafic rocks; contact metamorphism of sedimentary rocks; oxidation of copper minerals.

Age of mineralization:
Late Triassic or younger.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill; Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: No

Site Status: Active

Workings/exploration:
A sulfide-bearing dunite sample collected by American Copper And Nickel Company contained 0.43 percent nickel, 0.24 percent copper, 216 parts per billion (ppb) palladium, 295 ppb platinum, and 245 ppb

gold. A sample of copper-bearing hornfels contained 8.9 percent copper, 0.006 percent zinc, and 140 ppb gold.

The occurrences are on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991; this record.

Primary reference: Nokleberg and others, 1991; this record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/14/02

Site name(s): Unnamed (south of Ann Creek)

Site type: Occurrence

ARDF no.: MH162

Latitude: 63.3214 **Quadrangle:** MH B-4

Longitude: 145.8486

Location description and accuracy:
This occurrence is at an elevation of 4,450 feet on a ridge south of a northeast-flowing tributary of Ann Creek. It is in the SW1/4SW1/4 section 28, T. 18 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Chalcopyrite, malachite, pyrite

Gangue minerals:

Geologic description:
This occurrence consists of sulfide-bearing copper-stained fine-grained andesite of the Slana Spur Formation of Pennsylvanian age. The sulfide pods and sulfide-bearing quartz veins cutting the andesite contain pyrite and chalcopyrite (W.T. Ellis, oral communication, 2001). Airborne magnetic data suggest that the area may also be underlain by a southeast extension of the the Rainy ultramafic-mafic intrusion of Late Triassic age (see MH164). Samples of quartz veins and semimassive sulfide pods contain as much as 0.73 percent copper and 4.3 ppm silver.

The Rainy ultramafic-mafic complex is a steeply north dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
Oxidation of copper minerals.

Age of mineralization:
Late Triassic or younger.

Deposit model:
Cu skarn (?) (Cox and Singer, 1986; model 18b).

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

Production Status: No

Site Status: Active

Workings/exploration:

Samples of quartz veins and semimassive sulfide pods contain as much as 0.73 percent copper and 4.3 parts per million silver.

The occurrences are on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/14/02

Site name(s): Unnamed (southwest of upper Ann Creek); East Rainy skarn

Site type: Occurrences

ARDF no.: MH163

Latitude: 63.3287 **Quadrangle:** MH B-4

Longitude: 145.8607

Location description and accuracy:

These occurrences are at an elevation of about 4,200 feet on a southwest tributary to the north fork of Ann Creek. They are in the SE1/4NE1/4 section 29, T. 18 S., R. 10 E., Fairbanks Meridian. The site is the same as Foley's (1992) upper Ann Creek occurrence.

Commodities:

Main: Cu, Ni, Zn

Other: Co, Pd, Pt

Ore minerals: Chalcopyrite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Calcite, diopside, garnet (?)

Geologic description:

At the east end of the Rainy ultramafic-mafic complex intrusion of Late Triassic age, carbonate beds and serpentinized dunite are intruded by a Cretaceous (?) diorite (quartz-bearing gabbro?) (Foley, 1992). Garnet-pyroxene skarn, marble, basalt, diorite, gabbro, and serpentinite contain disseminated and nearly massive pods of pyrite, pyrrhotite, chalcopyrite, and sphalerite. In this area the ultramafic body thins rapidly to less than 1,000 feet thick. Airborne magnetic data indicate that the Rainy intrusion may connect with the Ann Creek ultramafic body 3 miles to the east (MH166) (W.T. Ellis, oral communication, 2001).

This skarn mineralization was discovered by the U.S. Bureau of Mines (Foley and others, 1989). Their samples contained as much as 1.3 percent nickel, 2.65 percent copper, 0.07 percent cobalt, 450 parts per billion (ppb) palladium, and 130 ppb platinum. American Copper and Nickel Company sampled skarn mineralization that contained as much as 0.17 percent nickel, 0.9 percent copper, 0.04 percent cobalt, 4.6 percent zinc, 126 ppb palladium, and 55 ppb platinum.

The Rainy ultramafic-mafic complex is a steeply north dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:

Garnet-pyroxene skarn has replaced marble beds, and the dunite is strongly serpentinized adjacent to the diorite intrusion.

Age of mineralization:

Late Triassic or Cretaceous (?).

Deposit model:

Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: None

Site Status: Active

Workings/exploration:
The skarn mineralization at this site was discovered by the U.S. Bureau of Mines (Foley and others, 1989). Their samples contained as much as 1.3 percent nickel, 2.65 percent copper, 0.07 percent cobalt, 450 parts per billion (ppb) palladium, and 130 ppb platinum. American Copper and Nickel Company sampled skarn mineralization that contained as much as 0.17 percent nickel, 0.9 percent copper, 0.04 percent cobalt, 4.6 percent zinc, 126 ppb palladium, and 55 ppb platinum.
The occurrences are on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
Foley and others, 1989; Foley, 1992; this record.

Primary reference: Foley, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/14/02

Site name(s): East Rainy

Site type: Prospect

ARDF no.: MH164

Latitude: 63.3307 **Quadrangle:** MH B-4

Longitude: 145.8773

Location description and accuracy:
The East Rainy prospect is at an elevation of 4,900 feet about midway between the heads of the forks of Ann Creek. It is in the center of the NW1/4 section 29, T. 18 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Co, Ir, Os, Rh, Ru

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The East Rainy prospect consists of an 800-foot-long and as much as 150-foot-wide float train of mineralized olivine melagabbro. Melagabbro rubble blocks lie below a covered contact between Tetelna [Volcanics] volcanic rocks and barren fine-grained gabbro (W.T. Ellis, oral communication, 2001). At one location where the olivine melagabbro appears to be in place, it strikes N85E and dips vertically. The melagabbro weathers chocolate brown, is medium to coarse grained, contains 1 to 2 percent phlogopite, and commonly has 1 to 3 percent sulfide (as much as 10 percent maximum).

The disseminated sulfide minerals are predominantly pyrrhotite and magnetite and traces of chalcopyrite and pentlandite as inclusions in the pyrrhotite. A grab sample of the mineralized melagabbro contained 0.9 percent nickel, 0.82 percent copper, 0.035 percent cobalt, 1,210 parts per billion (ppb) palladium, 800 ppb platinum, and 512 ppb gold. The sample was relatively low in sulfide but contained 3.55 parts per million (0.1 ounce) of platinum group elements (PGE)-plus-gold per ton, along with only 0.9 percent nickel, 0.8 percent copper, and 4.6 percent sulfur.

The Rainy ultramafic-mafic complex is a Late Triassic steeply north dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
The mineralized olivine melagabbro is moderately serpentinized.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration in this area has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources, Inc. Exploration from 1995 through 1998 included rock sampling, airborne and ground geophysical surveys, and completion of one diamond drill hole (W.T. Ellis, oral communication, 2001).

This occurrence was discovered and staked by ACNC in 1995. A grab sample of the mineralized mela-gabbro contained 0.9 percent nickel, 0.82 percent copper, 0.035 percent cobalt, 1,210 parts per billion (ppb) palladium, 800 ppb platinum, and 512 ppb gold. A sample analyzed for total platinum group elements (PGE) and gold by ACNC yielded 949.5 ppb platinum, 946 ppb palladium, 198.5 ppb iridium, 642.5 ppb osmium, 395 ppb ruthenium, 97.9 ppb rhodium, and 320.1 ppb gold (W T. Ellis, oral communication, 2001). The sample was relatively low in sulfide but contained 3.55 parts per million (0.1 ounce) of PGE-plus-gold per ton and only 0.9 percent nickel, 0.8 percent copper, and 4.6 percent sulfur.

The occurrence is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/13/02

Site name(s): Unnamed (northeast of upper Ann Creek); Marsha

Site type: Occurrence

ARDF no.: MH165

Latitude: 63.3441 **Quadrangle:** MH B-4

Longitude: 145.8456

Location description and accuracy:
This occurrence is located at an elevation of 4,250 feet northeast of upper Ann Creek. It is in the NE1/4NW1/4 section 21, T. 18 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Chalcopyrite, pyrite, pyrrhotite

Gangue minerals:

Geologic description:
This occurrence consists of massive sulfide-bearing float boulders as much as 1.5 feet in diameter (W.T. Ellis, oral communication, 2001). The boulders contain 60 to 70 percent massive pyrrhotite and subordinate amounts of pyrite and chalcopyrite. The float is on a slope just below a serpentinized Upper Triassic ultramafic sill that intrudes the Slana Spur Formation of Pennsylvanian age (W.T. Ellis, oral communication, 2001).

Alteration:
The ultramafic rocks are extensively serpentinized.

Age of mineralization:
Late Triassic or younger.

Deposit model:
Cu skarn (?) (Cox and Singer, 1986; model 18b).

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

Production Status: No

Site Status: Active

Workings/exploration:
Samples of the massive sulfide contained 1.8 percent copper and 12.8 ppm silver (W.T. Ellis, oral communication, 2001).
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/14/02

Site name(s): Ann Creek (Bee Mining)

Site type: Prospect

ARDF no.: MH166

Latitude: 63.3398 **Quadrangle:** MH B-4

Longitude: 145.7770

Location description and accuracy:

This prospect is located at an elevation of 3,200 feet in a north tributary to lower Ann Creek. It is just south of the center of section 23, T. 18 S., R. 10 E., Fairbanks Meridian. The site corresponds to locality 3 of Rose (1965) and locality 11 of Cobb (1979 [OFR 79-238]); it combines localities S84 and S85 in table 2 of Nokleberg and others (1991). It is the same as Foley's (1992) Ann Creek showing.

Commodities:

Main: Ag, Au, Cu, Ni

Other: Cr, Pb, Pd, Pt

Ore minerals: Chalcopyrite, pentlandite, pyrite, pyrrhotite, galena, sperrylite

Gangue minerals: Serpentine

Geologic description:

A tabular intrusive body of partly serpentinized ultramafic and gabbroic rocks that trends approximately east-west is exposed in a small creek on the north side of Ann Creek (Rose, 1965). North of the intrusion the rocks are dark, siliceous sedimentary rocks and light-colored tuff. To the south they are andesitic and dacitic volcanic rocks. The rocks are part of the Slana Spur Formation of Pennsylvanian age, but their differences on either side of the ultramafic body suggest that they were intruded along a fault (Rose, 1965). Airborne magnetic data indicated that this body may connect with the Rainy ultramafic-mafic intrusion (Late Triassic age) 3 miles to the west (see MH164) (W.T. Ellis, oral communication, 2001).

The rocks in the Ann Creek body vary from fairly fresh dunite, peridotite, and mafic gabbronorite to serpentinite. A dike of serpentinized peridotite extends southeastward from the mafic gabbro, and it appears to be cut off by a fault. Near the east end of the ultramafic zone, shattered and serpentinized diorite or quartz diorite is in contact with the dunite. According to Rose (1965), the diorite may be a differentiate of the ultramafic-gabbro sequence.

Small lenses of massive sulfide occur in an approximately 50-foot-thick zone of of gabbro that also contains disseminated pyrrhotite, pyrite, pentlandite, chalcopyrite, and a trace of galena (Rose, 1965, locality 3). Serpentinite at this location also carries small amounts of sulfides. Disseminated and massive sulfide samples contained 0.17 to 2.01 percent nickel and 0.1 to 0.61 percent copper (Saunders, 1962 [PE 68-08]). Samples of sulfides from a 1-foot vein (several hundred feet southwest of Rose's locality 3) assayed 0.20 ounce of gold per ton and 0.32 ounce of silver per ton (Rose, 1965). A sample of a massive sulfide lens in the Ann Creek ultramafic body contains 1.9 percent nickel, 3.5 percent copper, 0.02 percent cobalt, 540 parts per billion (ppb) palladium, and 340 ppb platinum (Foley, 1992). Sperrylite was identified in a gabbronorite sample that contained 0.44 percent nickel, 0.3 percent copper, 0.02 percent cobalt, and 340 ppb palladium.

Alteration:

Local serpentinization.

Age of mineralization:

Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: Undetermined.

Site Status: Active

Workings/exploration:
Disseminated and massive sulfide samples contained 0.17 to 2.01 percent nickel and 0.1 to 0.61 percent copper (Saunders, 1962 [PE 68-08]). Samples of sulfides from a 1-foot vein (several hundred feet southwest of locality 3) assayed 0.20 ounce of gold per ton and 0.32 ounce of silver per ton (Rose, 1965). A sample of a massive sulfide lens in the Ann Creek ultramafic body contains 1.9 percent nickel, 3.5 percent copper, 0.02 percent cobalt, 540 parts per billion (ppb) palladium, and 340 ppb platinum (Foley, 1992). Sperrylite was identified in a gabbronorite sample that contained 0.44 percent nickel, 0.3 percent copper, 0.02 percent cobalt, and 340 ppb palladium.

Production notes:

Reserves:

Additional comments:
Mineralization at the prospect is similar to that at the Rainbow Mountain prospect (Emerick) (MH209).

References:
Saunders, 1961 (PE 68-07); Saunders, 1962 (PE 68-08); Rose, 1965; Berg and Cobb, 1967; Mulligan, 1974; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Foley and others, 1989; Nokleberg and others, 1991; Foley, 1992.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/14/02

Site name(s): Unnamed (east side of North Fork Rainy Creek)

Site type: Occurrences

ARDF no.: MH167

Latitude: 63.3181 **Quadrangle:** MH B-4

Longitude: 145.9221

Location description and accuracy:
This record represents an area of several occurrences east of North Fork Rainy Creek at an elevation of 4,250 feet in the NE1/4NE1/4 section 36, T. 18 S., R. 9 E., Fairbanks Meridian. This location is approximated from Foley and others (1989) and corresponds to locality S79 in table 2 of Nokleberg and others, 1991).

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Au, Co, Cr, Ir, Rh, Ru

Ore minerals: Chalcopyrite, chromite, cobaltite, magnetite, malachite, pentlandite, pyrite, pyrrhotite, safflorite

Gangue minerals: Garnet, olivine, pyroxene, serpentine

Geologic description:
The occurrences consist of several sulfide-bearing, garnet-pyroxene skarns in carbonate beds intruded by the Rainy ultramafic-mafic complex of Late Triassic age and of sulfide-bearing basalt, diorite, gabbro, and serpentinite (Foley, 1992). The mineralized mafic rock and skarn came from rubble near the southern contact of the Rainy complex.

The sulfide minerals form disseminations and nearly massive pods of pyrite, pyrrhotite, magnetite, and chalcopyrite and trace amounts of pentlandite, cobaltite, and safflorite. Sample 79CH019A of chromite-bearing olivine cumulate collected by Nokleberg and others (1991) contained more than 5,000 parts per million chromium. A U.S. Bureau of Mines sample of gabbronorite rubble contained 0.9 percent nickel, 0.25 percent copper, 0.02 percent cobalt, 1,070 parts per billion (ppb) palladium, 725 ppb platinum, 300 ppb iridium, 70 ppb rhodium, and 60 ppb ruthenium. Massive sulfide float contains 0.41 percent copper, 0.09 percent cobalt, and 65 ppb palladium (Foley, 1992). Mineralized skarn samples contain as much as 6.2 ppm silver, 85 ppb gold, 0.05 percent cobalt, 2.0 percent copper, and 0.09 percent nickel.

The Rainy ultramafic-mafic complex is a steeply north dipping tablular intrusion of dunite, peridotite, and gabbro that varies from less than 100 feet thick to more than 6,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). Discontinuous marginal gabbro extends along most of the southern (lower) contact and is less continuous along the northern (upper) contact. The complex intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Magmatic mineralization is synchronous with emplacement of the Rainy complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill; Disseminated chromite in a layered mafic-ultramafic complex; Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: No

Site Status: Active

Workings/exploration:
A U.S. Bureau of Mines sample of gabbronorite rubble contained 0.9 percent nickel, 0.25 percent copper, 0.02 percent cobalt, 1,070 parts per billion (ppb) palladium, 725 ppb platinum, 300 ppb iridium, 70 ppb rhodium, and 60 ppb ruthenium. Massive sulfide float contains 0.41 percent copper, 0.09 percent cobalt, and 65 ppb palladium (Foley, 1992). Mineralized skarn samples contain as much as 6.2 parts per million (ppm) silver, 85 ppb gold, 0.05 percent cobalt, 2.0 percent copper, and 0.09 percent nickel. A U.S. Geological Survey grab sample contains disseminated chromite in olivine cumulate with more than 5,000 ppm chromium (Nokleberg and others, 1991).
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
Foley and others, 1989; Nokleberg and others, 1991; Foley, 1992.

Primary reference: Nokleberg and others, 1991; Foley, 1992

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/12/02

Site name(s): Lucky 7

Site type: Occurrence

ARDF no.: MH168

Latitude: 63.2615 **Quadrangle:** MH B-5

Longitude: 146.2105

Location description and accuracy:
The Lucky 7 occurrence is at an elevation of 3,700 feet on the north-facing slope of a hill about one-half mile south of upper Eureka Creek. It is in the SE1/4SE1/4 section 16, T. 19 S., R.8 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The Lucky 7 occurrence is hosted by the Fish Lake mafic-ultramafic complex, which is considered to be a lopolithic feeder to the basalt flows of the Upper Triassic Nikolai Greenstone (Nokleberg and others, 1991).

The occurrence consists of disseminated sulfides in a melagabbro in the lower part of the gabbroic unit of the second magmatic cycle of the Fish Lake complex (W.T. Ellis, unpublished data, 1996). The gabbroic package at the site includes leucocratic taxitic gabbro, troctolite, two-pyroxene gabbro, gabbronorite, and olivine melagabbro. The sulfides are disseminated in a 5-foot-thick melagabbro layer. The layer strikes about southeast and dips 45 degrees south. Sulfides, chiefly pyrrhotite and trace amounts of chalcopyrite and pentlandite, form 3 to 7 percent of the rock. Samples contain as much as 0.14 percent copper, 0.17 percent nickel, 94 parts per billion (ppb) palladium, and 94 ppb platinum (W.T. Ellis, unpublished field data, 1996).

Alteration:

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/01

Site name(s): Unnamed (south of upper Eureka Creek)

Site type: Occurrence

ARDF no.: MH169

Latitude: 63.2539 **Quadrangle:** MH B-5

Longitude: 146.2215

Location description and accuracy:
This occurrence is approximately located at an elevation of 4,000 feet, on the north-facing slope of a hill one mile south of upper Eureka Creek, and at the center of section 21, T. 19 S., R. 8 E., Fairbanks Meridian. The occurrence corresponds to locality 45 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals: Olivine, serpentine

Geologic description:
The occurrence is in the Fish Lake ultramafic complex, a lopolithic feeder of basaltic flows of the Nikolai Greenstone of Late Triassic age (Wrangellia terrane) (Nokleberg and others, 1991). The occurrence consists of chromite disseminated in serpentinized olivine-rich cumulate. Grab sample 79ZN031A contained more than 5,000 parts per million chromium (Nokleberg and others, 1991, table 2).

Alteration:
Serpentinization.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Chromite disseminated in a layered mafic-ultramafic complex.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is covered by active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/01

Site name(s): Eb No. 4

Site type: Prospect

ARDF no.: MH170

Latitude: 63.2528 **Quadrangle:** MH B-5

Longitude: 146.1887

Location description and accuracy:
The Eb No. 4 prospect is at an elevation of 3,950 feet on the north-facing slope of a hill a mile south of upper Eureka Creek. The prospect is about 500 feet southeast of the center of section 22, T. 19 S., R. 8 E., Fairbanks Meridian. The location is accurate within one-tenth mile.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The Eb No. 4 prospect is hosted by the Fish Lake mafic-ultramafic complex, a lopolithic feeder of Late Triassic age of the Nikolai basalt flows (Nokleberg and others, 1991). The prospect lies in lower portion of the gabbroic unit of the second magmatic cycle of the Fish Lake ultramafic complex (W.T. Ellis, unpublished data, 1996).

The prospect consists of float of sulfide-bearing coarse-grained pyroxenite; samples assay as much as 0.1 percent copper, 0.08 percent nickel, 140 parts per billion (ppb) palladium, and 85 ppb platinum. The metallic minerals are mainly pyrrhotite, along with chalcopyrite and pentlandite. The deposit does not crop out, but a good geophysical conductor is present that has been interpreted to be caused by sulfide accumulations (W.T. Ellis, unpublished data, 1996). Twelve hundred feet along strike a drill hole intersected 54 feet of pyroxenite grading 0.1 percent copper, 0.15 percent nickel, 198 ppb palladium, and 123 ppb platinum. This pyroxenite contained from 7 to 10 percent sulfides (W.T. Ellis, unpublished data, 1996).

Alteration:

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/01

Site name(s): BM-75

Site type: Occurrence

ARDF no.: MH171

Latitude: 63.2477 **Quadrangle:** MH A-5

Longitude: 146.2080

Location description and accuracy:
The BM-75 occurrence is at an elevation of about 4,300 feet in the headwaters of a north-flowing tributary of upper Eureka Creek and is in the SE1/4SE1/4 section 21, T. 19 S., R. 8 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The BM-75 occurrence is hosted by the Fish Lake mafic-ultramafic intrusive complex, which is of Late Triassic age and believed to be a lopolithic feeder of the Nikolai basalt flows (Nokleberg and others, 1991). The occurrence is in a pod of serpentinized peridotite in a gabbroic unit of the third magmatic cycle of the Fish Lake complex. The pod of serpentinized peridotite contains a few percent disseminated pyrrhotite, chalcopyrite, pentlandite, and magnetite (Foley, 1992; Foley and others, 1989) A grab sample contained 70 parts per billion (ppb) palladium and 70 ppb platinum (U.S. Bureau of Mines, unpublished data, 1985).

Alteration:
The peridotite is serpentinized.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Foley and others, 1989; Nokleberg and others, 1991; Foley, 1992.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): LFF

Site type: Prospect

ARDF no.: MH172

Latitude: 63.2515 **Quadrangle:** MH B-5

Longitude: 146.1632

Location description and accuracy:
The LFF prospect is at an elevation of 3,750 feet on the north-facing slope of a hill one mile south of Eureka Creek. It is 2.1 miles southwest of the confluence of Eureka Creek and stream in Broxson Gulch. The prospect is in the SW1/4 section 23, T.19 S., R. 8.E., Fairbanks Meridian. The location is accurate within two-tenths of a mile.

Commodities:

Main: Ni, Pd

Other: Cu, Pt

Ore minerals: Chalcopyrite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
The LFF prospect is hosted by the Fish Lake mafic-ultramafic intrusive complex, which is Late Triassic in age and is believed to be a lopolithic feeder of the Nikolai basalt flows (Nokleberg and others, 1991). The prospect is poorly exposed; rubble and subcrop of pyroxenite and feldspathic peridotite probably are from the top of the first magmatic cycle of the Fish Lake complex (W.T. Ellis, unpublished data, 1996). The ultramafic rocks contain disseminations of pyrrhotite, chalcopyrite, and pentlandite; grab samples assay as much as 1.05 percent nickel, 0.19 percent copper, 1,580 parts per billion palladium, and 80 parts per million platinum (W.T. Ellis, unpublished data, 1996).

Alteration:

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active Fort Knox Gold Resource claims. Grab samples contained as much as 1.05 percent nickel and 1,580 parts per billion palladium.

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Tv Bas

Site type: Occurrence

ARDF no.: MH173

Latitude: 63.2309 **Quadrangle:** MH A-5

Longitude: 146.1725

Location description and accuracy:
The Tv Bas occurrence is at an elevation of about 4,400 feet 3.3 miles north of the east tip of Sevenmile Lake. It is just inside the northwest corner of section 35, T. 19 S., R. 8 E., Fairbanks Meridian. The location is accurate within 0.2 mile.

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Epidote, zeolite (?)

Geologic description:
The TV Bas occurrence is in outcrop and rubble crop of Tertiary gray to red-brown, locally vesicular olivine basalt that unconformably overlies mafic-ultramafic rocks of the Fish Lake complex of Late Triassic age (Nokleberg and others, 1991). The basalt is porphyritic; light green olivine phenocrysts occur in a fine-grained matrix. Vesicles contain epidote, zeolite (?), pyrite, and chalcopyrite fillings (W.T. Ellis, oral communication, 2001). Grab samples of vesicular basalt contain as much as 254 parts per million copper.

Alteration:
Epidote and zeolite (?) filling in vesicles.

Age of mineralization:
Tertiary.

Deposit model:
Unclassified.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The occurrence is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (northeast of Sevenmile Lake)

Site type: Occurrence

ARDF no.: MH174

Latitude: 63.2192 **Quadrangle:** MH A-5

Longitude: 146.1466

Location description and accuracy:
This occurrence is at an elevation of 3,950 feet about 2.6 miles northeast of the east tip of Sevenmile Lake. It is in the southeast corner of section 35, T. 19 S., R. 8 E., Fairbanks Meridian. The occurrence corresponds to locality 69 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Zn

Other:

Ore minerals: Sphalerite (?)

Gangue minerals:

Geologic description:
The rocks at this occurrence are limy argillite interlayered with metabasalt, probably of Late Paleozoic age (Nokleberg and others, 1991). Sphalerite was tentatively identified in limy argillite grab sample 79NW129A, which assayed 810 parts per million (ppm) zinc and 5 ppm silver (Nokleberg and others, 1991, table 2, locality 69).

Alteration:

Age of mineralization:
Late Paleozoic, the presumed age of the host rock.

Deposit model:
Unclassified.

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

Production Status: None

Site Status: Active

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (west of Fish Lake)

Site type: Occurrence

ARDF no.: MH175

Latitude: 63.2354 **Quadrangle:** MH A-5

Longitude: 146.0664

Location description and accuracy:
This occurrence, west of Fish Lake at an elevation of 4,100 feet, is about a half-mile west-northwest of VABM Wild. It is in the SE1/4SW1/4 section 29, T. 19 S., R. 9 E., Fairbanks Meridian. The occurrence corresponds to locality 70 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals: Olivine, serpentine

Geologic description:
The rock at this occurrence is the Fish Lake mafic-ultramafic intrusive complex of Late Triassic age, which is believed to be a lopolithic feeder of the Nikolai basalt flows (Nokleberg and others, 1991). The occurrence consists of serpentinized olivine-pyroxene cumulate containing disseminated chromite. Grab sample 79ZN026A of this material contained more than 5,000 parts per million chromium (Nokleberg and others, 1992, table 2, locality 70).

Alteration:
Serpentinization.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Chromite disseminated in layered mafic-ultramafic complex.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Wild One

Site type: Occurrence

ARDF no.: MH176

Latitude: 63.2275 **Quadrangle:** MH A-5

Longitude: 146.0606

Location description and accuracy:
The Wild One occurrence, west of Fish Lake at an elevation of about 4,000 feet, is 0.4 mile southwest of VABM Wild. It is about 800 feet north of the center of section 32, T. 19 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni

Other: Pd, Pt

Ore minerals: Chalcopyrite, pentlandite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The rock at this occurrence is the Fish Lake mafic-ultramafic intrusive complex of Late Triassic age, which is believed to be a lopolithic feeder of the Nikolai basalt flows (Nokleberg and others, 1991). A gabbroic unit of the third magmatic cycle of the complex hosts the occurrence, which consists of angular boulders and rubble composed of sulfide-bearing melagabbro and gabbro (W.T. Ellis, unpublished data, 1996). The melagabbro is serpentinized and contains about 5 percent disseminated pyrrhotite and about 1 percent chalcopyrite and pentlandite as inclusions in the pyrrhotite. An American Copper and Nickel Company sample contained 0.14 percent copper, 0.13 nickel, 56 parts per billion (ppb) palladium, and 40 ppb platinum (W.T. Ellis, unpublished data, 1996).

Alteration:
Serpentinization of the olivine melagabbro.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
Grab samples collected by American Copper and Nickel Company contained as much as 0.14 percent copper, 0.13 percent nickel, 56 parts per billion (ppb) palladium, and 40 ppb platinum.
The occurrence is on active Fort Knox Gold Resource.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (west of Fish Lake)

Site type: Occurrence

ARDF no.: MH177

Latitude: 63.2278 **Quadrangle:** MH A-5

Longitude: 146.0321

Location description and accuracy:
This occurrence, west of Fish Lake at an elevation of about 4,000 feet, is about 3,400 feet east-southeast of VABM Wild. It is in the SE1/4NW1/4 section 33, T. 19 S., R. 9 E., Fairbanks Meridian. The location is probably accurate within one-quarter mile. The occurrence corresponds to locality 71 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals: Olivine

Geologic description:
The rock at this occurrence is the Fish Lake mafic-ultramafic intrusive complex of Late Triassic age, which is believed to be a lopolithic feeder of the Nikolai basalt flows (Nokleberg and others, 1991). The occurrence consists of chromite disseminated in an olivine cumulate. Grab sample 79ZN024B contained more than 5,000 parts per million chromium (Nokleberg and others, 1991, table 2, locality 71).

Alteration:

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Chromite disseminated in layered mafic-ultramafic complex.

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

Production Status: None

Site Status: Active

Workings/exploration:
The occurrence is on active Fort Knox Gold Resource claims.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (Fish Lake)

Site type: Occurrence

ARDF no.: MH178

Latitude: 63.2172 **Quadrangle:** MH A-4

Longitude: 145.9316

Location description and accuracy:
This occurrence is located on the hill southeast of Fish Lake at an elevation of 3,900 feet. It is in the NW1/4NE1/4 section 1, T. 20 S., R. 9 E., Fairbanks Meridian. The site corresponds to locality S72 in table 2 of Nokleberg and others (1991) and represents localities S73 and S74, which were similar occurrences within a mile of this one.

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals: Olivine, serpentine

Geologic description:
The rocks in the area of this occurrence are part of the Fish Lake mafic-ultramafic intrusive complex of Late Triassic age, which may be a lopolithic feeder of the Nikolai basalt flows of the Wrangellia terrane (W. T. Ellis, oral communication, 1998). Serpentinized olivine-pyroxene cumulate in the complex contains sparsely disseminated chromite. Grab samples contain 5,000 (or more) parts per million chromium (Nokleberg and others, 1991, see sample 9ZN022A).

The Fish Lake ultramafic-mafic complex is a south-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 3,000 feet thick to more than 7,000 feet thick and extends for more than 24 miles in length (W.T. Ellis, oral communication, 2001). The complex intrudes the Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Tangle complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of the Fish Lake complex , which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
The olivine-pyroxene cumulate inclusion is serpentinized.

Age of mineralization:
Late Triassic.

Deposit model:
Disseminated chromite in a layered mafic-ultramafic complex.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration on the Fish Lake property has been by American Copper and Nickel Company working with Fort Knox Gold Resources Inc. Exploration through 2001 included rock sampling, hand trenching, airborne and ground geophysical surveys, and completion of eight diamond drill holes (W.T. Ellis, oral communication, 2001).

The area is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991; this record.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Antler

Site type: Occurrence

ARDF no.: MH179

Latitude: 63.2102 **Quadrangle:** MH A-4

Longitude: 145.9144

Location description and accuracy:
This occurrence is at an elevation of 3,800 feet on the south flank of peak 3924 about 2.5 miles southeast of Fish Lake. It is in the NW1/4SW1/4 section 6, T. 20 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni

Other: Pd, Pt

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The Antler occurrence is near the east end of the Fish Lake mafic-ultramafic intrusive complex of Late Triassic age. The occurrence was discovered by American Copper and Nickel Corporation (ACNC) geologists in 1995 and consists of disseminated pyrrhotite and chalcopyrite in wehrlite and in adjacent gabbro dikes that strike N45E and dip 75 SE. ACNC grab samples contain 0.14 percent nickel, 0.17 percent copper, 90 parts per billion (ppb) palladium, and 45 ppb platinum.

The Fish Lake complex is a south-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 3,000 feet thick to more than 7,000 feet thick and extends for more than 24 miles in length (W.T. Ellis, oral communication, 2001). It may be a lopolithic feeder of the Nikolai basalt flows of the Wrangellia Terrane (W.T. Ellis, oral communication, 2001). The complex intrudes the Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Tangle complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of the Fish Lake complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
The peridotite is moderately serpentinized.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration on the Fish Lake property has been by American Copper and Nickel Company working with Fort Knox Gold Resources Inc. Exploration through 2001 included rock sampling, hand trenching, airborne and ground geophysical surveys, and completion of eight diamond drill holes (W.T. Ellis, oral communication, 2001).

The occurrence is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Delta River

Site type: Mine

ARDF no.: MH180

Latitude: 63.2007 **Quadrangle:** MH A-4

Longitude: 145.8153

Location description and accuracy:
This placer mine is located near a cabin at the mouth of Garrett Creek, a southeast tributary of the Delta River. The mine is approximately 3 miles south of Eureka Creek in the NW1/4NW1/4 section 10, T. 20 S., R. 10 E., Fairbanks Meridian. The site corresponds to locality 10 of Cobb (1979 [OFR 79-238]), to locality 62 in MacKevett and Holloway (1977), and to locality S5 in table 3 of Nokleberg and others (1991). The location is probably accurate within one-half mile.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
The gravel bars of the Delta River contain small amounts of fine gold, but not enough of the metal has been found to be important commercially (Moffit, 1912). There is no record of any production from this site, although small amounts were recovered in the early 1900's (Moffit, 1912).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Inactive

Workings/exploration:
Gold was panned by members of Moffit's party in 1910 near 'Garretts cabin' on the Delta River, approximately 3 miles south of Eureka Creek. Gold-bearing gravels in this area have been known since 1898 (Moffit, 1912).

Production notes:

Reserves:

Additional comments:

Placer gold was discovered in 1900 on Wilder Creek, which later became known as Rainy Creek (Mendenhall and Schrader, 1903). The Eureka Mining District was formed in 1901, and 200 to 250 people entered the district, mainly on Rainy Creek and Eureka Creek tributaries. The results were unsatisfactory, and the field was largely abandoned (Moffit, 1912).

References:

Mendenhall and Schrader, 1903; Mendenhall, 1905; Moffit, 1912; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Moffit, 1912

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Unnamed (west of Landmark Gap Lake)

Site type: Occurrence

ARDF no.: MH181

Latitude: 63.1449 **Quadrangle:** MH A-5

Longitude: 146.1031

Location description and accuracy:
This occurrence is at an elevation of about 4,000 feet on the west side of the north end of Landmark Gap Lake (Stout, 1976, plate 1). It is in the NW1/4NW1/4 section 31, T. 20 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Azurite, bornite, chalcopyrite, malachite, pyrite

Gangue minerals: Calcite, epidote, quartz

Geologic description:
This occurrence is in Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The unit was mapped as Boulder Creek volcanics by Stout (1976). The deposit consists of quartz-calcite-epidote veins that contain disseminated pyrite, chalcopyrite, and bornite and the oxidized copper minerals azurite and malachite. The veins occupy steep north- to northeast-trending joints that cut the limbs of the Amphitheater syncline (Stout, 1976). The veins range from less than an inch to about a foot thick.

Alteration:
Oxidation of the copper minerals.

Age of mineralization:
The quartz veins are localized in north-northeast-trending faults and joints that cut across the folded limbs of the Amphitheater syncline. They post-date the folding, which is of Jurassic age, and are probably either Cretaceous, related to regional metamorphism and granitic plutonism (Nokleberg and others, 1986; Kurtak and others, 1992), or early Tertiary (Stout, 1976).

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Stout, 1976; Nokleberg and others, 1986; Nokleberg and others, 1991.

Primary reference: Stout, 1976

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Landmark Gap

Site type: Prospect

ARDF no.: MH182

Latitude: 63.1375 **Quadrangle:** MH A-5

Longitude: 146.0964

Location description and accuracy:
The Landmark Gap prospect is at an elevation of about 3,950 feet and west of Landmark Gap Lake. It is about at the center of section 31, T. 20 S., R. 9 E., Fairbanks Meridian. The location is accurate within about 800 feet.

Commodities:

Main: Cu

Other:

Ore minerals: Bornite, chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:
The prospect is in metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). Mineralization at the site is stratiform; it ranges from 1 inch to 3 feet thick and consists of disseminated to massive chalcopyrite, pyrite, and minor bornite. The sulfides occur in cherty bands and in irregular quartz veins that surround pillows and breccia clasts. The prospect was discovered in 1996 by American Copper and Nickel Company; samples contained as much as 3.5 percent copper (W.T. Ellis, unpublished data, 1996). The deposit probably is syngenetic and possibly of Cyprus type.

Alteration:
Silicification.

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Although most of the deposits in the Nikolai Greenstone are of basaltic copper type (Cox and Singer, 1986; model 23), the Landmark Gap deposit is stratiform and possibly of Cyprus type (model 24a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23, 24a (?)

Production Status: None

Site Status: Inactive

Workings/exploration:
American Copper and Nickel Company discovered the site in 1996 and collected samples as rich as 3.5 percent copper (W.T. Ellis, unpublished data, 1996). The area is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:
The mineralization is characterized by abundant vermilion so-called copper lichen.

References:
Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (west of lower Landmark Gap Lake)

Site type: Occurrence

ARDF no.: MH183

Latitude: 63.1019 **Quadrangle:** MH A-5

Longitude: 146.1080

Location description and accuracy:
This occurrence is at an elevation of 3,500 feet; about one-half mile west of the south end of Landmark Gap Lake. It is at the northwest corner of section 18, T. 21 S., R. 9 E., Fairbanks Meridian. The location is accurate within about 800 feet.

Commodities:

Main: Fe

Other:

Ore minerals: Pyrrhotite

Gangue minerals:

Geologic description:
This prospect is hosted by an Upper Triassic mafic-ultramafic intrusive complex that is comagmatic with the basalt flows of the Nikolai Greenstone (Nokleberg and others, 1991; L. Hulbert, oral communication, 2001). Net-textured to massive pyrrhotite was found in a gabbro sill near the base of the Nikolai Greenstone at this site. There are virtually no base or precious metals associated with the sulfides (L.D. Hulbert, oral communication, 2001).

Alteration:

Age of mineralization:
Late Triassic, the age of the host rock.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
This occurrence is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 07/18/01

Site name(s): White Socks

Site type: Occurrence

ARDF no.: MH184

Latitude: 63.0885 **Quadrangle:** MH A-5

Longitude: 146.1031

Location description and accuracy:
This occurrence is located one mile south-southwest of Landmark Gap Lake at an elevation of 3,200 feet and is in the SW1/4SW1/4 section 18, T. 21 S., R. 9 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni

Other: Pd, Pt

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
The White Socks prospect is hosted by an Upper Triassic mafic-ultramafic intrusive complex that is co-magmatic with the basalt flows of the Nikolai Greenstone (Nokleberg and others, 1991; L.D. Hulbert, oral communication, 2001). This complex may connect at depth with the Fish Lake complex at the base of the Amphitheater syncline (W.T. Ellis, oral communication, 2001).

At the prospect, locally iron-stained and gossany float and rubble crop of serpentinized olivine clinopyroxenite and olivine melagabbro contain as much as 5 percent disseminated pyrrhotite and magnetite. Small amounts of chalcopyrite and pentlandite occur in association with the pyrrhotite. Samples collected by American Copper and Nickel Company contained as much as 0.13 percent nickel, 0.08 percent copper, 8 parts per billion (ppb) palladium, and 30 ppb platinum (W.T. Ellis, unpublished data, 1996).

Alteration:
Serpentinization of the ultramafic host rocks along with local iron staining.

Age of mineralization:
Late Triassic, the age of the host rock. Phlogopite from Tangle complex ultramafic rocks yielded an age of 323 +/- 2 Ma (L. Hulbert, oral communication, 2001).

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
The prospect was sampled by American Copper and Nickel Company in 1996. It is on active MAN Resources claims.

Production notes:

Reserves:

Additional comments:
American Copper and Nickel Company samples contained as much as 0.13 percent nickel and 30 parts per billion platinum.

References:
Nokleberg and others, 1991; this report.

Primary reference: This report

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/01

Site name(s): Unnamed (west-northwest of Lower Tangle Lake)

Site type: Occurrence

ARDF no.: MH185

Latitude: 63.1468 **Quadrangle:** MH A-4

Longitude: 145.9979

Location description and accuracy:
The occurrence is at an elevation of 4,100 feet in a small cirque west-northwest of Lower Tangle Lake. It is in the SE1/4SW1/4 section 27, T. 20 S., R. 9 E., Fairbanks Meridian. This location corresponds to locality S75 in table 2 of Nokleberg and others (1991), locality 9 of Cobb (1979 [OFR 79-238]), and an occurrence described by Stout (1976, p. 30 and plate 1).

Commodities:

Main: Cu

Other:

Ore minerals: Bornite, chalcopyrite, malachite

Gangue minerals: Quartz

Geologic description:
This occurrence includes two types of deposits. One consists of pods as much as a foot thick of massive chalcopyrite and bornite in metabasalt of Nikolai Greenstone of Late Triassic age (Stout, 1976). The other consists of chalcopyrite, bornite, and copper oxide-bearing quartz veins in north-northeast-striking joints in the greenstone. Malachite-coated copper nuggets occur in stream gravels in a nearby cirque.

The quartz veins are localized in north-northeast-trending joints that cut across the folded limbs of the Amphitheater syncline. The veins post-date late Jurassic deformation and are probably either Cretaceous related to regional metamorphism and granitic plutonism (Nokleberg and others, 1986) or early Tertiary (Stout, 1976).

Alteration:

Age of mineralization:
Late Triassic and Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Stout, 1976; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Stout, 1976

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Unnamed (northeast flank of Sugarloaf Mountain)

Site type: Occurrence

ARDF no.: MH186

Latitude: 63.1517 **Quadrangle:** MH A-4

Longitude: 145.9099

Location description and accuracy:
This occurrence is on the northeast flank of Sugarloaf Mountain at an elevation of 4,500 feet. It is in the NE1/4SW1/4 section 30, T. 20 S., R. 10 E., Fairbanks Meridian. It corresponds to locality 3 of Rose (1966 [ADMM GR 19]).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcocite, secondary copper mineral(s)

Gangue minerals: Epidote, quartz

Geologic description:
This occurrence consists of copper staining and tiny veinlets of chalcocite in float of Nikolai Greenstone of Late Triassic age (Rose, 1966 [ADMM GR 19]). The basalt displays epidote alteration similar to basalt-hosted copper occurrences on Paxson Mountain (Rose and Saunders, 1965). The quartz veins are localized in north-northeast-trending joints that cut across the folded limbs of the Amphitheater syncline. The veins post-date late Jurassic deformation and are probably either Cretaceous related to regional metamorphism and granitic plutonism (Nokleberg and others, 1986) or early Tertiary (Stout, 1976).

Alteration:
The basalt displays epidote alteration; copper minerals are oxidized (Rose, 1966 [ADMM GR 19]).

Age of mineralization:
Late Triassic and Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Rose and Saunders, 1965; Rose, 1966 (ADMM GR 19).

Primary reference: Rose, 1966 (ADMM GR 19)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Unnamed (southeast foot of Sugarloaf Mountain)

Site type: Occurrence

ARDF no.: MH187

Latitude: 63.1346 **Quadrangle:** MH A-4

Longitude: 145.9128

Location description and accuracy:
This occurrence is at an elevation of 3,950 feet on the southeast flank of Sugarloaf Mountain. It is at the center of SW1/4 section 31, T. 20 S., R. 10 E., Fairbanks Meridian. It corresponds to locality 4 of Rose (1966 [ADMM GR 19]).

Commodities:

Main: Fe

Other:

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
Permian black shale and calcareous black shale at this location contain abundant pyrite, including lenses of almost massive pyrite as much as one-half inch thick (Rose, 1966 [ADMM GR 19]). Analysis of a chip sample showed only 35 parts per million (ppm) copper, 105 ppm zinc, 20 ppm lead, and 9 ppm molybdenum (Rose, 1966 [GR 19]). L.D. Hulbert (oral communication, 2001) suggested that the mineralization could be magmatic, related to the emplacement of high-level metal-depleted gabbroic sills that may be feeders to the Nikolai Greenstone of Late Triassic age.

Alteration:

Age of mineralization:
Permian or Late Triassic.

Deposit model:
Shale-hosted sulfide.

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

Production Status: None

Site Status: Active

Workings/exploration:
Lithochemical sampling by MAN Resources indicates extreme metal depletion.
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 19); this record.

Primary reference: Rose, 1966 (ADMM GR 19); this record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

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

Site type: Prospect

ARDF no.: MH188

Latitude: 63.0943 **Quadrangle:** MH A-4

Longitude: 145.8300

Location description and accuracy:
This occurrence is at an elevation of 4,650 feet, about 1.5 miles northwest of Fourteenmile Lake. It is in the NW1/4SE1/4 section 16, T. 21 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
This occurrence consists of float of gabbro, gabbronorite, pyroxenite, olivine melagabbro, and dunite (W. T. Ellis, oral communication, 2001). The rocks are variably serpentinized, and some contain as much as 8 percent sulfide, chiefly in pyrrhotite and chalcopyrite. A sample of sulfide-bearing gabbro contained 0.18 percent nickel, 0.05 percent copper, 46 parts per billion (ppb) palladium, and 15 ppb platinum (W.T. Ellis, oral communication, 2001). Another sample of coarse-grained pyroxenite with 8 percent pyrrhotite and minor chalcopyrite contained 0.12 percent nickel, 0.07 percent copper, 22 ppb palladium, and 35 ppb platinum.

The bedrock source of the float is the Tangle ultramafic-mafic intrusive complex of Late Triassic age, which may be a lopolithic feeder of the Nikolai basalt flows of the Wrangellia Terrane (W.T. Ellis, oral communication, 2001). The Tangle complex is a north-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 2,000 feet thick to more than 4,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). The complex intrudes Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Fish Lake complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of Tangle complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
The peridotite is locally serpentinized.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

A sample of sulfide-bearing gabbro contained 0.18 percent nickel, 0.05 percent copper, 46 parts per billion (ppb) palladium, and 15 ppb platinum (W.T. Ellis, oral communication, 2001). Another sample of coarse-grained pyroxenite with 8 percent pyrrhotite and minor chalcopyrite contained 0.12 percent nickel, 0.07 percent copper, 22 ppb palladium, and 35 ppb platinum.

The prospect is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Unnamed (south tributary to Fielding Lake)

Site type: Occurrence

ARDF no.: MH189

Latitude: 63.1080 **Quadrangle:** MH A-4

Longitude: 145.7733

Location description and accuracy:
This occurrence is along the principal south tributary of Fielding Lake at an elevation of 3,300 feet. It is in the NW1/4SE1/4 section 11, T. 21 S., R. 10 E., Fairbanks Meridian. It corresponds to locality 1 in Rose (1966 [ADMM GR 19]).

Commodities:

Main: Fe, Ti

Other: Cu, Ti

Ore minerals: Ilmenite, titaniferous magnetite

Gangue minerals:

Geologic description:
At this site rusty-weathering gabbro contains as much as 28 percent titaniferous magnetite and ilmenite (Rose, 1966 [ADMM GR 19]). The magnetite-bearing gabbro appears to be a layer that dips 42 N. It is 100 to 150 feet thick and is exposed for a length of 500 feet in the valley bottom before it becomes covered with glacial deposits. The base of the magnetite-bearing layer grades within a few feet into gabbro containing minor orthopyroxene. The overlying rock is mafic gabbro, but the contact is covered. The magnetite zone is probably a differentiate of the gabbro magma.

These rocks are part of the Tangle ultramafic-mafic intrusive complex of Late Triassic age, which may be a lopolithic feeder of the Nikolai basalt flows of the Wrangellia Terrane (Nokleberg and others, 1991; W.T. Ellis, oral communication, 2001). The Tangle complex is a north-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 2,000 feet thick to more than 4,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). The complex intrudes the Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Fish Lake complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of Tangle complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
Oxidation of iron mineral(s)

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

A chip sample across the magnetite-bearing zone assayed 22.1 percent acid soluble iron and 0.15 percent copper (Rose, 1966 [ADMM GR 19]). A magnetic concentrate separated from the sample contained 47.1 percent total iron, 11.1 percent TiO2, 0.16 percent sulfur, and 0.02 percent potassium. The high titanium content suggests that about 20 percent of the magnetic concentrate is ilmenite.

The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

Thin sections of the country rock show that they are gabbro, norite, and magnetite gabbro (Rose, 1966 [ADMM GR 19]).

References:

Rose, 1966 (ADMM GR 19).

Primary reference: Rose, 1966 (ADMM GR 19)

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Unnamed (south of Fielding lake)

Site type: Prospect

ARDF no.: MH190

Latitude: 63.1088 **Quadrangle:** MH A-4

Longitude: 145.7679

Location description and accuracy:
This prospect is at an elevation of 3,300 feet on the east bank of the principal south tributary of Fielding Lake. It is in the NW1/4SE1/4 section 11, T. 21 S., R. 10 E., Fairbanks Meridian. It corresponds to locality 2 in Rose (1966 [ADMM GR 19]) and locality S86 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu, Ni

Other: Pd (?), Pt (?)

Ore minerals: Chalcopyrite, pyrrhotite, secondary copper mineral(s)

Gangue minerals: Quartz

Geologic description:
This prospect is a copper-stained quartz vein about 1 foot thick that cuts fine-grained gabbro and minor pyroxenite. Nearby sparse float of gabbro contains disseminated chalcopyrite and pyrrhotite (Rose, 1966 [ADMM GR 19]). The vein strikes N10W and dips vertically.

The rocks are part of the Tangle ultramafic-mafic intrusive complex of Late Triassic age, which may be a lopolithic feeder of the Nikolai greenstone basalt flows of the Wrangellia Terrane (W.T. Ellis, oral communication, 2001). The Tangle complex is a north-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 2,000 feet thick to more than 4,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). The complex intrudes the Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Fish Lake complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of Tangle complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:

Age of mineralization:
Late Triassic and Cretaceous.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill; Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Active

Workings/exploration:
Several small pits have been dug on the quartz vein. The prospect is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1966 (ADMM GR 19); this record.

Primary reference: Rose, 1966 (ADMM GR 19); this record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Norel

Site type: Occurrence

ARDF no.: MH191

Latitude: 63.1152 **Quadrangle:** MH A-4

Longitude: 145.7532

Location description and accuracy:
The Norel occurrence is at an elevation of 3,300 feet on the east valley wall of the principal south tributary to Fielding Lake. It is in the NW1/4NW1/4 section 12, T. 21 S., R. 10 E., Fairbanks Meridian. This site corresponds to locality S86 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ni, Pd, Pt

Ore minerals: Pyrite, pyrrhotite

Gangue minerals: Olivine, serpentine

Geologic description:
This occurrence consists of disseminated pyrite and pyrrhotite in a serpentinized peridotite sill intruded by leucogabbro (W.T. Ellis, oral communication, 2001). A sample of the sulfide-bearing peridotite contained 0.12 percent nickel, 0.01 percent copper, 34 parts per billion (ppb) palladium, and 15 ppb platinum. A grab sample of pyritic, sheared, serpentinized, and iron-stained olivine cumulate near the gabbro contained 3,200 parts per million copper (Nokleberg and others, 1991).

The country rocks are part of the Tangle ultramafic-mafic intrusive complex of Late Triassic age that may be a lopolithic feeder of the Nikolai greenstone basalt flows of the Wrangellia Terrane (W.T. Ellis, oral communication, 2001). The Tangle complex is a north-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 2,000 feet thick to more than 4,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). The complex intrudes the Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Fish Lake complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of Tangle complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
Local iron staining; serpentinization of the peridotite.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: No

Site Status: Active

Workings/exploration:

A sample of sulfide-bearing peridotite contained 0.12 percent nickel, 0.01 percent copper, 34 parts per billion (ppb) palladium, and 15 ppb platinum (W.T. Ellis, oral communication, 2001). A U.S. Geological Survey grab sample of pyritic, sheared, serpentinized, and iron-stained olivine cumulate near a gabbro contained 3,200 parts per million copper (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991; this record.

Primary reference: Nokleberg and others, 1991; this record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Unnamed (northeast of Fourteenmile Lake)

Site type: Occurrence

ARDF no.: MH192

Latitude: 63.1003 **Quadrangle:** MH A-4

Longitude: 145.7460

Location description and accuracy:
This occurrence is at an elevation of 4,050 feet about 2 miles north-northeast of Fourteenmile Lake. It is in the NE1/4NW1/4 section 13, T. 21 S., R. 10 E., Fairbanks Meridian. This site corresponds to locality S87 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cr

Other:

Ore minerals: Chromite

Gangue minerals: Olivine

Geologic description:
The occurrence is represented by a grab sample of olivine-pyroxene cumulate containing sparsely disseminated chromite (Nokleberg and others, 1991, sample 79ZN012A). The sample contained more than 5,000 parts per million chromium.

The rocks at this occurrence are part of the Tangle mafic-ultramafic intrusive complex of Late Triassic age, which may be a feeder of the Nikolai greenstone basalt flows of the Wrangellia Terrane (W.T. Ellis, oral communication, 2001). The Tangle complex is a north-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 2,000 feet thick to more than 4,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). The complex intrudes the Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Fish Lake complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of Tangle complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:

Age of mineralization:
Late Triassic.

Deposit model:
Disseminated chromite in a layered mafic-ultramafic complex.

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

Production Status: No

Site Status: Active

Workings/exploration:
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Gravel Pit

Site type: Occurrence

ARDF no.: MH193

Latitude: 63.0560 **Quadrangle:** MH A-4

Longitude: 145.7501

Location description and accuracy:

This occurrence is in a gravel pit at an elevation of 3,650 feet on the north side of the Denali Highway, 1.9 miles southeast of Fourteenmile Lake. It is in the NW1/4NW1/4 section 36, T. 21 S., R. 10 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Au

Ore minerals: Pyrrhotite

Gangue minerals: Olivine, serpentine

Geologic description:

Peridotite in a borrow pit on the side of the Denali Highway contains as much as 1 percent disseminated pyrrhotite and traces of platinum group elements (L.D. Hulbert, oral communication, 2001). The peridotite probably is part of the Tangle ultramafic-mafic complex of Late Triassic age. Two grab samples collected by MAN Resources respectively contained 0.11 percent nickel, 0.01 percent copper, 67 ppb palladium, and 146 ppb platinum and 0.27 percent nickel, 0.09 percent copper, 58 parts per billion (ppb) palladium, 51 ppb platinum, and 51 ppb gold (L.D. Hulbert, oral communication, 2001).

The Tangle complex is a north-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 2,000 feet thick to more than 4,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). The complex is believed to be a lopolithic feeder of the Nikolai basalt flows of the Wrangellia Terrane (W.T. Ellis, oral communication, 2001). The complex intrudes the Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Fish Lake complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of the Tangle complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:

The peridotite is locally serpentinized.

Age of mineralization:

Late Triassic.

Deposit model:

Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Two grab samples collected by MAN Resources respectively contained 0.11 percent nickel, 0.01 percent copper, 67 parts per billion (ppb) palladium, and 146 ppb platinum and 0.27 percent nickel, 0.09 percent copper, 58 ppb palladium, 51 ppb platinum, and 51 ppb gold.

The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Dunite Hill

Site type: Occurrence

ARDF no.: MH194

Latitude: 63.0685 **Quadrangle:** MH A-4

Longitude: 145.7458

Location description and accuracy:
This occurrence is at an elevation of 4,000 feet on the east side of peak 4220 about 1.6 miles east-southeast of Fourteenmile Lake. It is in the SE1/4NW1/4 section 25, T. 21 S., R. 10 E., Fairbanks Meridian. Peak 4220 is informally called Dunite Hill.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Pyrrhotite

Gangue minerals: Olivine, serpentine

Geologic description:
Dunite Hill (as it is informally called) is underlain by partly serpentinized massive gray dunite that is part of the Tangle mafic-ultramafic intrusive complex (W.T. Ellis, oral communication, 2001). The complex may be a lopolithic feeder of the Nikolai basalt flows of the Wrangellia Terrane. A grab sample reported by MAN Resources contained 0.16 percent nickel, 0.22 percent copper, 101 parts per billion (ppb) palladium, and 53 ppb platinum.

The Tangle complex is a Late Triassic north-dipping layered intrusion of dunite, peridotite, and gabbro that varies from less than 2,000 feet thick to more than 4,000 feet thick and extends for more than 12 miles in length (W.T. Ellis, oral communication, 2001). The complex intrudes the Tangle Formation of Permian age (Nokleberg and others, 1991). It may connect with the Fish Lake complex at depth below the Amphitheater synform. Magmatic mineralization is synchronous with emplacement of the Tangle complex, which is part of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Alteration:
The dunite is locally serpentinized.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
A grab sample reported by MAN Resources contained 0.16 percent nickel, 0.22 percent copper, 101 parts

per billion (ppb) palladium, and 53 ppb platinum.
The occurrence is on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Unnamed (north flank of Paxson Mountain)

Site type: Occurrence

ARDF no.: MH195

Latitude: 63.0866 **Quadrangle:** MH A-4

Longitude: 145.6433

Location description and accuracy:
This occurrence is at an elevation of 3,700 feet on the north flank of Paxson Mountain. It is one-tenth of a mile southeast of the Denali Highway, in the NW1/4NE1/4 section 21, T. 21 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 9 in Rose and Saunders (1965) and to locality S88 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Bornite

Gangue minerals: Quartz

Geologic description:
This occurrence consists of bornite in a half-inch-thick vein (Rose and Saunders, 1965). The vein trends N35E and cuts metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). Several pieces of mineralized float occur downslope from the vein.

Alteration:
The vesicular basalt host rock is altered to chlorite and epidote.

Age of mineralization:
Probably Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
Surface workings include hand-dug prospect pits.

Production notes:

Reserves:

Additional comments:

References:

Rose and Saunders, 1965; Cobb, 1979 (OFR 79-238); MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/02

Site name(s): Tripp

Site type: Prospect

ARDF no.: MH196

Latitude: 63.0909 **Quadrangle:** MH A-4

Longitude: 145.6322

Location description and accuracy:
This prospect is at an elevation of 3,600 feet at the north flank of Paxson Mountain about 0.1 mile south of mile 7 on the Denali Highway. It is in the SE1/4SE1/4 section 16, T. 21 S., R. 11 E., Fairbanks Meridian. The prospect corresponds to locality 10 in Rose and Saunders (1965) and to locality S89 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Cu

Other: Au

Ore minerals: Bornite, chalcocite, chalcopyrite, chrysocolla, digenite, pyrite

Gangue minerals: Epidote, quartz

Geologic description:
At this prospect Nikolai Greenstone of Late Triassic age contains copper minerals that occur in and adjacent to veins, pods, and amygdules of quartz and epidote (Rose and Saunders, 1965). The veins and pods are generally less than 1 inch wide and can be traced only for a few feet. Bornite, digenite, chalcocite, chalcopyrite, chrysocolla, and pyrite are present in a few places but generally are very sparse.

Alteration:
The vesicular basalt host rock is altered to chlorite, prehnite, and epidote.

Age of mineralization:
Late Triassic and Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
The prospect was discovered in 1962 by Jack Tripp of Fairbanks, who dug by hand trenches and pits. A grab sample of quartz veins containing chalcopyrite and bornite assayed 1.38 percent copper, trace gold, and 0.30 ounce of silver per ton (Saunders, 1962 [PE 68-09]). A sample collected by the U.S. Geological Survey contained 2 percent copper and 20 parts per million silver (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Saunders, 1962 (PE 68-09); Rose and Saunders, 1965; Berg and Cobb, 1967; Mulligan, 1974; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/17/02

Site name(s): Unnamed (north flank of Paxson Mountain)

Site type: Occurrence

ARDF no.: MH197

Latitude: 63.0729 **Quadrangle:** MH A-4

Longitude: 145.6366

Location description and accuracy:
This occurrence is at an elevation of 4,050 feet on the north flank of Paxson Mountain, south of the Denali Highway. It is in the NE1/4NE1/4 section 28, T. 21 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 7 of Rose and Saunders (1965) and locality S91 in table 2 in Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Bornite, chalcocite, chrysocolla, malachite

Gangue minerals: Opal, quartz

Geologic description:
Several bornite-bearing quartz veinlets, as much as a half-inch wide, cut purplish vesicular metabasalt at this location (Rose and Saunders, 1965). Some vesicles are filled with opal. Minor amounts of chalcocite accompany the bornite, and both are partly oxidized to malachite and chrysocolla. The host rock is Nikolai Greenstone of Late Triassic age.

Alteration:
The metabasalt is altered to chlorite and epidote; copper mineral(s) are oxidized.

Age of mineralization:
Probably Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

Mineralized float can be traced about 100 feet along the strike of the zone.

References:

Rose and Saunders, 1965; Berg and Cobb, 1967; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/02

Site name(s): Unnamed (north flank of Paxson Mountain)

Site type: Occurrence

ARDF no.: MH198

Latitude: 63.0846 **Quadrangle:** MH A-4

Longitude: 145.6295

Location description and accuracy:
This occurrence is at an elevation of about 3,650 feet on the north flank of Paxson Mountain. It is approximately one-half mile south of the Denali Highway in the SW1/4NW1/4 section 22, T. 21 S., R. 11 E., Fairbanks Meridian. This location corresponds to locality 8 in Rose and Saunders (1965) and locality S90 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Bornite, chrysocolla, malachite

Gangue minerals:

Geologic description:
An area about 20 feet long and 2 to 3 feet high on a cliff face in a gorge is coated with chrysocolla and malachite (Rose and Saunders, 1965). The coating is due to oxidation of minor bornite in the country rock, which is vesicular metabasalt of Nikolai Greenstone of Late Triassic age. A light-colored hornblende-andesite dike intrudes metabasalt a few hundred feet west of the occurrence. The dike and the mineralization at this occurrence are in line with the strike of the bornite veinlets at MH197 (Rose and Saunders, 1965).

Alteration:
The metabasalt host rock is altered to chlorite and epidote; oxidation of copper mineral(s) is also present.

Age of mineralization:
Probably Late Triassic.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
Copper-bearing float occurs in a gully a few tens of feet north of the mineralized outcrop, and an old (pre-1960?) claim post and stakes are at the top of the cliff (Rose and Saunders, 1965). Traces of copper were also found on the opposite side of the gorge.

Production notes:

Reserves:

Additional comments:

References:
Rose and Saunders, 1965; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/02

Site name(s): Unnamed (northeast flank of Paxson Mountain)

Site type: Occurrence

ARDF no.: MH199

Latitude: 63.0540 **Quadrangle:** MH A-4

Longitude: 145.5889

Location description and accuracy:
This occurrence is at an elevation of 3,600 feet on the northeast flank of Paxson Mountain, approximately one-half mile south of the Denali Highway. It is in the SE1/4NW1/4 section 35, T. 21 S., R. 11 E., Fairbanks Meridian. This occurrence corresponds to locality 6 in Rose and Saunders (1965) and to locality S92 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Chrysocolla

Gangue minerals: Epidote, prehnite, quartz

Geologic description:
This occurrence consists of a 2-foot pod of chrysocolla and quartz in a highly altered vesicular basalt of the Nikolai Greenstone of Late Triassic age (Rose and Saunders, 1965). A massive non-vesicular hornblende basalt or andesite dike (?) is exposed about 3 feet above the copper-bearing pod.

Alteration:
Alteration minerals noted in the basalt are quartz, epidote, and prehnite; copper mineral(s) are oxidized.

Age of mineralization:
Probably Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Rose and Saunders, 1965; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/02

Site name(s): Unnamed (west of Mud Lake)

Site type: Occurrence

ARDF no.: MH200

Latitude: 63.0313 **Quadrangle:** MH A-4

Longitude: 145.5540

Location description and accuracy:
This occurrence is at an elevation of 3,200 feet on the northeast flank of Paxson Mountain, 1 mile west of the south end of Mud Lake. It is on an east-flowing creek at the SE1/4SW1/4 section 1, T. 22 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 2 in Rose and Saunders (1965) and to locality S94 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Bornite, chrysocolla

Gangue minerals:

Geologic description:
This occurrence consists of a quartz-epidote vein, 3 inches thick, that contains bornite partly oxidized to chrysocolla (Rose and Saunders, 1965). The vein is in altered and sheared pillow metabasalt of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991). The metabasalt locally is altered to epidote and chlorite and is cut by a dark aphanitic dike.

Alteration:
The metabasalt host rock is altered to chlorite and epidote; copper mineral(s) are oxidized.

Age of mineralization:
Probably Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Rose and Saunders, 1965; Berg and Cobb, 1967; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/02

Site name(s): Paxson's

Site type: Occurrence

ARDF no.: MH201

Latitude: 63.0372 **Quadrangle:** MH A-4

Longitude: 145.5638

Location description and accuracy:
This occurrence is at an elevation of 3,500 feet on the northeast flank of Paxson Mountain, 1 mile west of Mud Lake. It is on the steep east slope of an abandoned glacial stream channel in the NW1/4SW1/4 section 1, T. 22 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 3 in Rose and Saunders (1965) and locality S93 in table 2 of Nokleberg and others (1991). It may be the prospect referred to by Martin (1920).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcocite, chrysocolla

Gangue minerals:

Geologic description:
Chrysocolla and chalcocite occur in highly vesicular, purplish-brown metabasalt of the Nikolai Greenstone of Late Triassic age (Rose and Saunders, 1965). The chrysocolla and chalcocite are most abundant near a fracture or fault at the north side of the exposure and appear to die out near the south side of the vesicular zone. The mineralized zone strikes N75E and dips about 35NW. Faulting apparently truncates the mineralized rock at both the north and south sides of the exposure. A chip sample across a thickness of 10 feet of the mineralized zone assayed 6.9 percent copper but no gold or silver (Rose and Saunders, 1965).

Alteration:
The vesicular basalt host rock is altered to chlorite and epidote; copper mineral(s) are oxidized.

Age of mineralization:
Late Triassic or Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
This occurrence has been prospected by hand-dug pits. A chip sample across a thickness of 10 feet of the mineralized zone assayed 6.9 percent copper but no gold or silver (Rose and Saunders, 1965). The grade is encouraging, but the mineralization appears to be limited in every direction except into the hillside.

Production notes:

Reserves:

Additional comments:

References:

Martin, 1920; Rose and Saunders, 1965; Berg and Cobb, 1967; Mulligan, 1974; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/02

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

Site type: Occurrence

ARDF no.: MH202

Latitude: 63.0432 **Quadrangle:** MH A-4

Longitude: 145.5540

Location description and accuracy:
This occurrence is at an elevation of 3,100 feet on the northeast flank of Paxson Mountain, 1 mile northwest of Mud Lake. It is in the NE1/4NW1/4 section 1, T. 22 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 4 in Rose and Saunders (1965).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcocite, chrysocolla

Gangue minerals:

Geologic description:
Several pieces of copper-stained float containing minor chalcocite occur in a frost boil at this location (Rose and Saunders, 1965). The float is vesicular basalt of Nikolai Greenstone of Late Triassic age. The metabasalt is partly altered to epidote.

Alteration:
The basalt is partly altered to epidote (Rose and Saunders, 1965); copper mineral(s) are oxidized.

Age of mineralization:
Late Triassic or Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: No

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Martin, 1920; Rose and Saunders, 1965; Berg and Cobb, 1967; Mulligan, 1974; MacKevett and Holloway, 1977.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/02

Site name(s): Unnamed (west of Mud Lake)

Site type: Occurrence

ARDF no.: MH203

Latitude: 63.0350 **Quadrangle:** MH A-4

Longitude: 145.5433

Location description and accuracy:
This occurrence is at an elevation of 3,100 feet one-half mile west of Mud Lake. It is in the SE1/4SE1/4 section 1, T. 22 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 1 in Rose and Saunders (1965) and locality S95 of table 2 in Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Bornite, chalcopyrite, chrysocolla

Gangue minerals: Actinolite, epidote, quartz

Geologic description:
At this locality bornite-chalcopyrite quartz veins several inches or less thick cut vesicular metabasalt of Nikolai Greenstone of Late Triassic age (Rose and Saunders, 1965). The veins strike N85W and dip 75N. Chrysocolla occurs nearby in vesicles in epidotized basalt. Asbestiform actinolite occurs in one vein.

Alteration:
The vesicular basalt is altered to chlorite epidote and quartz; copper mineral(s) are oxidized.

Age of mineralization:
Late Triassic or Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Rose and Saunders, 1965; Berg and Cobb, 1967; Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/18/02

Site name(s): Unnamed (southeast flank of Paxson Mountain)

Site type: Occurrence

ARDF no.: MH204

Latitude: 63.0064 **Quadrangle:** MH A-4

Longitude: 145.5712

Location description and accuracy:
This occurrence is at an elevation of 4,500 feet approximately one-half mile southeast of the top of Paxson Mountain. It is in an east-flowing creek in the NE1/4SE1/4 section 14, T. 22 S., R. 11 E., Fairbanks Meridian. This site corresponds to locality S97 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Azurite, bornite, malachite

Gangue minerals: Quartz

Geologic description:
At this locality bornite occurs in 1-centimeter-wide quartz veins that cut Nikolai Greenstone metabasalt of Late Triassic age (Nokleberg and others, 1991). Copper minerals also occur in amygdules in metabasalt. A composite chip sample across a 6.5-foot zone of malachite and azurite in amygdules contained 2.6 percent copper and 20 parts per million silver (Nokleberg and others, 1991).

Alteration:
The vesicular basalt host rock is altered in part to chlorite and epidote; copper mineral(s) are oxidized.

Age of mineralization:
Late Triassic and Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: No

Site Status: Inactive

Workings/exploration:
A composite chip sample across a 6.5-foot zone of malachite and azurite in amygdules contained 2.6 percent copper and 20 parts per million silver (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/02

Site name(s): Unnamed (southwest of Mud Lake)

Site type: Occurrence

ARDF no.: MH205

Latitude: 63.0167 **Quadrangle:** MH A-4

Longitude: 145.5507

Location description and accuracy:
This occurrence is at an elevation of 3,700 feet approximately 1 mile east of the top of Paxson Mountain and about 1.3 miles south-southwest of Mud Lake. It is in the SE1/4SW1/4 section 12, T. 22 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 5 in Rose and Saunders (1965) and locality S96 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Bornite, chalcopyrite, pyrite

Gangue minerals: Epidote, quartz

Geologic description:
This occurrence consists of a zone about 30 feet wide of quartz-epidote veinlets and vuggy pods as much as 1 foot long and 6 inches wide that contain pyrite, chalcopyrite, and bornite (Rose and Saunders, 1965). The mineralized zone is limonite stained and extends along the wall of a gorge for 250 feet. The zone appears to dip north 20 degrees and is copper stained on its southern end. The host rock is metabasalt of Nikolai Greenstone of Late Triassic age that locally is highly fractured and altered to chlorite and epidote (Rose and Saunders, 1965).

Alteration:
The metabasalt host rock is highly fractured and altered to chlorite and some epidote.

Age of mineralization:
Probably Cretaceous.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Rose and Saunders, 1965; Berg and Cobb, 1967; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/19/02

Site name(s): Unnamed (south of Millers Roadhouse)

Site type: Occurrence

ARDF no.: MH206

Latitude: 63.3325 **Quadrangle:** MH B-4

Longitude: 145.7299

Location description and accuracy:
This occurrence is at an elevation of 2,650 feet just east of the Richardson Highway approximately 2.5 miles south of Millers Roadhouse. It is in the NE1/4NE1/4 section 25, T. 18 S., R. 10 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, locality 3), and it corresponds to locality 18 in Cobb (1979 [OFR 79-238]) and locality S103 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Cu, Pb

Other: Ag, As, Au

Ore minerals: Azurite, chalcopyrite, galena, malachite, pyrite

Gangue minerals: Quartz

Geologic description:
This occurrence consists of discontinuous and irregular quartz veins as much as 6 inches thick that contain disseminated chalcopyrite, galena, and pyrite (Hanson, 1963). Some of the chalcopyrite is oxidized to azurite and malachite. The veins cut metadacite of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). A grab sample of a three-quarter-inch quartz vein with chalcopyrite, malachite, and azurite contained 5,600 parts per million (ppm) copper, 180 ppm lead, 4,200 ppm zinc, 10 ppm silver, and 5,000 ppm arsenic (Nokleberg and others, 1991). Samples of the mineralized quartz veins assayed 0.4 to 0.5 percent copper, 0.4 to 0.5 percent lead, and a trace of gold (Hanson, 1963).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
A grab sample of a three-quarter-inch quartz vein with chalcopyrite, malachite, and azurite contained 5,600 parts per million (ppm) copper, 180 ppm lead, 4,200 ppm zinc, 10 ppm silver, and 5,000 ppm arsenic (Nokleberg and others, 1991). Samples of the mineralized quartz veins assayed 0.4 to 0.5 percent copper, 0.4 to 0.5 percent lead, and a trace of gold (Hanson, 1963).

Production notes:

Reserves:

Additional comments:

References:
Hanson, 1963; Rose, 1965; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Yukon Corporation; Miller Mine

Site type: Mine

ARDF no.: MH207

Latitude: 63.3378 **Quadrangle:** MH B-4

Longitude: 145.7299

Location description and accuracy:
This site is on the east side of the Richardson Highway about 2 miles south of Millers Roadhouse. It is called the 'Miller Mine' on the Mount Hayes B-4 topographic map. The site corresponds to locality S6 in table 3 of Nokleberg and others (1991) and to locality 12 in Cobb (1973 [B 1374]).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
Placer gold mining in bench gravels at this site was reported in 1946 (Wedow and others, 1954). A placer concentrate contained less than 0.001 percent eU (Wedow and others, 1954).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Inactive

Workings/exploration:
There are remains of camp and shop facilities at the roadside site.

Production notes:

Reserves:

Additional comments:

References:
Wedow and others, 1954; Cobb, 1973 (B 1374); MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-

238); Nokleberg and others, 1991.

Primary reference: Wedow and others, 1954

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/20/02

Site name(s): Unnamed (north flank of Rainbow Ridge)

Site type: Occurrence

ARDF no.: MH208

Latitude: 63.3467 **Quadrangle:** MH B-4

Longitude: 145.7019

Location description and accuracy:

This occurrence at an elevation of 2,800 feet at the north end of a canyon about 1.1 miles northeast of the 'Miller Mine' on the Richardson Highway. It is in the NE1/4NE1/4 section 19, T. 18 S., R. 11 E., Fairbanks Meridian. Access to the property is by a dirt road (not shown on the 1984 topographic map) on the east side of the highway approximately 1 mile south of Millers Roadhouse. This occurrence corresponds to locality S101 in table 2 of Nokleberg and others (1991) and is described by Rose (1965, p. 24).

Commodities:

Main: Ag, Au, Cu

Other: Mo, Pb, Sb

Ore minerals: Bornite, chalcopyrite, malachite

Gangue minerals: Quartz

Geologic description:

Rose (1965) described a horizontal quartz vein at this site that assayed 0.46 ounce of gold per ton. Nokleberg and others (1991) collected a composite grab sample of several mineralized quartz veins at the same site; the veins contain chalcopyrite, bornite, and malachite and cut metamorphosed and silicified dacite, volcanic breccia, and basalt. A composite grab sample of the mineralized quartz veins contained 4,800 parts per million (ppm) copper, 400 ppm lead, 30 ppm silver, 1.9 ppm gold, 100 ppm molybdenum, and 300 ppm antimony (Nokleberg and others, 1991). The veins strike north-south and range in thickness from one-half inch to 3 feet; pyrite is disseminated in adjacent iron-stained wall rocks. The host rocks are part of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

This occurrence may be an extension of one at an iron-stained knob across the valley a quarter-mile to the north (MH210).

Alteration:

The host rocks are silicified; copper minerals are oxidized.

Age of mineralization:

Permian (?) or younger.

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: Active

Workings/exploration:

A composite grab sample of the mineralized quartz veins contained 4,800 parts per million (ppm) copper, 400 ppm lead, 30 ppm silver, 1.9 ppm gold, 100 ppm molybdenum, and 300 ppm antimony (Nokleberg and others, 1991).

The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1965; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Emerick; Rainbow Ridge; Miller Creek

Site type: Prospect

ARDF no.: MH209

Latitude: 63.3569 **Quadrangle:** MH B-4

Longitude: 145.6994

Location description and accuracy:

This prospect is at an elevation of 2,900 feet at the north end of Rainbow Ridge. It is about a mile southeast of Millers Roadhouse on the Richardson Highway and in the SE1/4NE1/4 section 18, T. 18 S., R. 11 E., Fairbanks Meridian. Access to the property is by a dirt road (not shown on the 1984 topographic map) from the east side of the highway (at mile 213.5) approximately a mile south of the roadhouse. The prospect is described by Rose (1965, figure 4) and corresponds to locality 13 of Cobb (1979 [OFR 79-238]) and locality S99 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Au, Co, Ir, Os, Rh

Ore minerals: Bornite, chalcopyrite, garnierite, malachite, pentlandite, pyrite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:

This prospect consists of a sheared and mineralized gabbronorite dike and serpentinized peridotite (Barker, 1988). The rocks are adjacent to the Broxson Gulch Fault near its intersection with the Denali Fault (Barker, 1988). The ore minerals occur as disseminations and lenses of pyrrhotite, pentlandite, chalcopyrite, bornite, garnierite, and pyrite in serpentinized gabbronorite and peridotite. The copper minerals are locally oxidized to malachite.

Sanders (1962 [PE 68-08]) described nine mineralized lenses as much as 20 feet long and 10 feet wide. They generally strike approximately parallel to the northwest trend of the peridotite (Hanson, 1963; Rose, 1965). The rocks adjacent to the lenses are strongly sheared and brecciated and are part of the Upper Triassic ultramafic-mafic complex that intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Mineralization is Late Triassic, synchronous with emplacement of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Samples from the northernmost prospect pit averaged 0.91 percent copper and 3.4 percent nickel; those from the southernmost pit averaged 1.0 percent copper and 2.6 percent nickel. (Saunders, 1961 [PE 68-07). Samples of three other showings between the two pits averaged 1.1, 2.6, 0.6 percent copper and 7.6, 8.1, and 2.6 percent nickel respectively (Saunders, 1961 [PE 68-07]). U.S. Bureau of Mines samples from the Emerick property averaged about 1.0 percent copper and nickel each and 0.02 percent cobalt, 193 parts per billion (ppb) gold, 977 ppb palladium, 989 ppb platinum, and minor amounts osmiridium, osmium, and rhodium (Barker, 1988).

Alteration:

The peridotite and gabbronorite are sheared and serpentinized. Copper minerals are oxidized.

Age of mineralization:

Late Triassic or younger.

Deposit model:

Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

The prospect was discovered in the early 1950's by Rollie Emerick of Delta Junction, Alaska (Saunders, 1962 [PE 68-08]). Newmont Mining Company conducted dozer trenching, mapping, and sampling at the prospect in 1962. Inco examined the property in the early 1970's and completed a magnetic survey. COMINCO staked the property in 1989 and also completed a magnetic survey. Northeast Mining acquired the claims in 1994 and optioned the claims to Falconbridge in 1997. Falconbridge completed an airborne magnetic and electromagnetic survey and a large-loop ground electromagnetic survey and drilled two core holes. The property continues (in 2002) to be actively explored by Northeast Exploration.

Samples from the northernmost prospect pit averaged 0.91 percent copper and 3.4 nickel; those from the southernmost pit averaged 1.0 percent copper and 2.6 percent nickel (Saunders, 1961 [PE 68-07]). Samples of three other showings between the two pits averaged 1.1, 2.6, and 0.6 percent copper and 7.6, 8.1, and 2.6 percent nickel respectively (Saunders, 1961 [PE 68-07]). U.S. Bureau of Mines samples from the Emerick property averaged about 1.0 percent copper and nickel each and 0.02 percent cobalt, 193 parts per billion (ppb) gold, 977 ppb palladium, 989 ppb platinum, and minor amounts of iridium, osmium, and rhodium (Barker, 1988).

Production notes:

Reserves:

Additional comments:

Platinum group element minerals identified by the U.S. Bureau of Mines using a scanning-electron microprobe include merenskyite, palarstanide, and irarsite.

References:

Saunders, 1961 (PE 68-07); Saunders, 1962 (PE 68-08); Hanson, 1963; Rose, 1965; Mulligan, 1974; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Barker, 1988; Foley and others, 1989; Nokleberg and others, 1991; Foley, 1992.

Primary reference: Barker, 1988

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Unnamed (Gossan Hill)

Site type: Prospect

ARDF no.: MH210

Latitude: 63.3491 **Quadrangle:** MH B-4

Longitude: 145.7024

Location description and accuracy:
This prospect is at an elevation of 2,800 feet on a conspicuous iron-stained knob at the north end of a canyon, about 0.7 mile east of the Richardson Highway. Access to the property is by a dirt road (not shown on the 1984 topographic map) on the east side of the highway approximately 1 mile south of Millers Roadhouse. The prospect is in the SE1/4SE1/4 section 18, T. 18 S., R. 11 E., Fairbanks Meridian. This prospect was first described by Hanson (1963, p. 67) and later by Rose (1965, p. 24).

Commodities:

Main: Ag, Cu

Other: Au

Ore minerals: Chalcopyrite, pyrite

Gangue minerals:

Geologic description:
This prospect consists of pyritized metadacite of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Small amounts of lead were reported (Rose, 1965, p. 24) in the pyritized and iron-stained knob, locally called Gossan Hill, at the north end of a canyon. A sample of the pyritic metadacite assayed 2.2 percent copper and a half-ounce of silver per ton (W.T. Ellis, oral communication, 1998).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

Deposit model:
Polymetallic vein(s) (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Active

Workings/exploration:
Northeast Mining has dug prospects pits on this property. A sample of the pyritic metadacite assayed 2.2 percent copper and a half-ounce of silver per ton (W.T. Ellis, oral communication, 1998).

Production notes:

Reserves:

Additional comments:

References:
Hanson, 1963; Rose, 1965; this record.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (northeast of 'Miller Mine')

Site type: Occurrence

ARDF no.: MH211

Latitude: 63.3473 **Quadrangle:** MH B-4

Longitude: 145.6968

Location description and accuracy:
This occurrence is at an elevation of 3,500 feet at the north end of Rainbow Ridge about 1.25 miles northeast of 'Miller Mine' on the Richardson Highway. It is at the northeast corner of section 19, T. 18 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 1 in Hanson (1963), locality 15 in Cobb (1979 [OFR 79-238]), and locality S100 of table 2 in Nokleberg and others (1991).

Commodities:

Main: Ag, Cu, Pb

Other: Au

Ore minerals: Chalcopyrite, galena

Gangue minerals: Quartz

Geologic description:
This occurrence consists of disseminated to massive chalcopyrite and galena in a small swarm of quartz veins as much as 3 inches wide (Hanson, 1963). The veins cut sedimentary and volcanic rocks of the Slana Spur Formation of Pennsylvanian age, which is locally intruded by granodiorite and dacite (Nokleberg and others, 1991). Samples of veins assay 1.6 to 1.7 percent copper, 2.0 to 2.1 percent lead, a trace of gold, and 2.4 ounces of silver per ton (Hanson, 1963).

Alteration:

Age of mineralization:
Permian(?) or younger.

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Active

Workings/exploration:
Samples of veins assay 1.6 to 1.7 percent copper, 2.0 to 2.1 percent lead, a trace of gold, and 2.4 ounces of silver per ton (Hanson, 1963).
The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:
Hanson, 1963; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Unnamed (northeast of 'Miller Mine')

Site type: Occurrence

ARDF no.: MH212

Latitude: 63.3453 **Quadrangle:** MH B-4

Longitude: 145.7003

Location description and accuracy:
This occurrence is at an elevation of 2,700 feet at the north end of Rainbow Ridge about 1.1 miles northeast of the 'Miller Mine' on the Richardson Highway (Hanson, 1963, p. 71). It is near the foot of a steep canyon in the NE1/4NE1/4 section 19, T. 18 S., R. 11 E., Fairbanks Meridian. This location corresponds to locality S101 of table 2 in Nokleberg and others (1991) and to locality 16 of Cobb (1979 [OFR 79-238]).

Commodities:

Main: Au, Cu

Other:

Ore minerals: Chalcopyrite, gold, pyrite

Gangue minerals:

Geologic description:
At this locality disseminated pyrite and chalcopyrite occur in graywacke and conglomerate with pyrite and chalcopyrite (Hanson, 1963, p. 71). The mineralized rock is iron stained and is exposed over a few hundred square feet. Samples of the mineralized conglomerate assayed 0.12 ounce of gold per ton (Hanson, 1963). The host rocks are part of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:
The rocks are iron stained.

Age of mineralization:
Permian (?) or younger.

Deposit model:
Polymetallic vein(s) (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Active

Workings/exploration:
Samples of the mineralized conglomerate assayed 0.12 ounce of gold per ton (Hanson, 1963).
The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; Rose, 1965; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/20/02

Site name(s): Unnamed (east-northeast of 'Miller Mine')

Site type: Occurrence

ARDF no.: MH213

Latitude: 63.3395 **Quadrangle:** MH B-4

Longitude: 145.7028

Location description and accuracy:
This occurrence is at an elevation of 3,200 feet at the north end of Rainbow Ridge about 4,500 feet east-northeast of the 'Miller Mine' on the Richardson Highway. It is in the NE1/4SE1/4 section 19, T. 18 S., R. 11 E., Fairbanks Meridian. The occurrence corresponds to locality 2 in Hanson (1963), to locality 17 of Cobb (1979 [OFR 79-238]), and to locality S102 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu, Zn

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:
At this occurrence a 1.5-foot-thick replacement zone borders a quartz vein that strikes east-west and dips 65S (Hanson, 1963). The zone contains chalcopyrite and pyrite and is near a mineralized dike (Nokleberg and others, 1991). A U.S. Geological Survey grab sample of a 6.5-foot-thick pyritic metadacite dike intruding metagraywacke contained 1,000 ppm zinc. The vein cuts sedimentary and volcanic rocks of the Slana Spur Formation of Pennsylvanian age, which are locally intruded by granodiorite and dacite (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Permian (?) or younger.

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: Active

Workings/exploration:
The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/20/02

Site name(s): Unnamed (southeast of VABM Canwell)

Site type: Occurrence

ARDF no.: MH214

Latitude: 63.3233 **Quadrangle:** MH B-4

Longitude: 145.6627

Location description and accuracy:
This occurrence is at an elevation of 4,750 feet about 4,500 feet southeast of VABM Canwell on the west side of Rainbow Ridge. It is in the NW1/4SW1/4 section 28, T. 18 S., R. 11 E., Fairbanks Meridian. The occurrence is described in Hanson (1963, p. 67) and corresponds to locality S107 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
At this occurrence, pyrite forms disseminations and coats fractures in Permian (?) metadacite intrusive rocks and in fragmental volcanic rocks of the Slana Spur Formation of Pennsylvanian age (Hanson, 1963). This occurrence is one of the four prominent areas of pyrite and chalcopyrite disseminated in dacitic tuff noted by Hanson (1963, p. 67, figure 5).

Alteration:

Age of mineralization:
Permian (?) or younger.

Deposit model:
Polymetallic veins; Porphyry Cu (Cox and Singer, 1986; model 22c, model 17).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c, 17

Production Status: No

Site Status: Inactive

Workings/exploration:
The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:
Hanson, 1963; Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Unnamed (southwest flank of Rainbow Ridge)

Site type: Occurrence

ARDF no.: MH215

Latitude: 63.3162 **Quadrangle:** MH B-4

Longitude: 145.6730

Location description and accuracy:
This occurrence is at an elevation of 4,250 feet on the southwest flank of Rainbow Ridge about 1.2 miles west-northwest of the top of Rainbow Mountain. It is in the NE1/4NE1/4 section 32, T. 18 S., R. 11 E., Fairbanks Meridian. This site corresponds to locality 5 in Hanson (1963), locality 20 of Cobb (1979 [OFR 79-238]), and locality S108 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Ag, Cu

Other: Au, Pb

Ore minerals: Chalcopyrite, galena

Gangue minerals: Quartz

Geologic description:
At this location chalcopyrite and galena occur in quartz veins 6 or more inches thick that strike N5W and dip 70 to 80W (Hanson, 1963). The veins form a subparallel set that cuts tuffaceous sedimentary rocks of the Slana Spur Formation of Pennsylvanian age near a Permian dacite hypabyssal intrusion (Nokleberg and others, 1991). Hanson (1963) collected samples that assayed 3.99 percent copper, 0.02 ounce of gold per ton, and 1.4 ounces of silver per ton.

Alteration:

Age of mineralization:
Probably Permian.

Deposit model:
Polymetallic veins; Porphyry Cu (Cox and Singer, 1986; model 22c, model 17).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c, 17

Production Status: None

Site Status: Inactive

Workings/exploration:
Hanson (1963) collected samples that assayed 3.99 percent copper, 0.02 ounce of gold, and 1.4 ounces of silver per ton.
The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:
Hanson, 1963; Rose, 1965; Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Glacier Lake; Forbes

Site type: Prospect

ARDF no.: MH216

Latitude: 63.3520 **Quadrangle:** MH B-4

Longitude: 145.6600

Location description and accuracy:

This prospect is at an elevation of 3,600 feet on the southwest valley wall of lower Canwell Glacier. Access to the property is by a mile-long trail from the end of a dirt road (not shown on the 1984 topographic map) on the east side of the Richardson Highway about a mile south of Millers Roadhouse. The prospect is in the NW1/4SE1/4 section 16, T. 18 S., R. 11 E., Fairbanks Meridian. The prospect is locality 2 in Rose (1965), locality 14 in Cobb (1979 [OFR 79-238]), and locality S104 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu, Ni, Pd, Pt

Other: Au, Co, Ir, Os, Rh

Ore minerals: Chalcopyrite, pentlandite, pyrite, pyrrhotite

Gangue minerals: Quartz, serpentine

Geologic description:

The prospect is in a roof pendant of Upper Triassic serpentinized peridotite and melagabbro in a stock of Cretaceous(?) quartz diorite (Rose, 1965). Pyrrhotite, chalcopyrite, and pentlandite occur in a narrow zone along the contact between the peridotite and gabbro, and chalcopyrite and pyrite are disseminated in the quartz diorite (Barker, 1988). The gabbro locally contains lenses composed of 20 to 50 percent pyrrhotite; chalcopyrite and pentlandite along with quartz and disseminated sulfides are present in serpentinized peridotite away from the contact. The mineralized zone is approximately 25 feet long by 3 feet wide (Hanson, 1963).

Grab samples of a massive sulfide lens in gabbro and of quartz diorite with disseminated sulfides at the contact of serpentinized peridotite contained as much as 16,000 parts per million (ppm) copper, 7 ppm silver, 700 ppm cobalt, and more than 5,000 ppm nickel (Nokleberg and others, 1991).

Alteration:

The peridotite and melagabbro are extensively silicified and serpentinized near the quartz diorite contact.

Age of mineralization:

The deposit occurs in Late Triassic ultramafic-mafic rocks and Cretaceous (?) quartz diorite. Mineralization is Late Triassic, synchronous with emplacement of a 120-mile-long belt of mafic-ultramafic and associated rocks in the east-central Alaska Range.

Deposit model:

Ni-Cu-PGE in differentiated mafic-ultramafic sill; Porphyry Cu (?) (Cox and Singer, 1986; model 17).

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

17 (?)

Production Status: None

Site Status: Active

Workings/exploration:

The Glacier Lake prospect was discovered in 1962 by R.B. Forbes of the University of Alaska (Hanson, 1963). Since then the prospect has been intermittently explored by claimholders, and the claims are currently (2002) controlled by Northeast Exploration (W.T. Ellis, oral communication, 2002). Exploration to date has been primarily surface trenching and airborne and ground geophysical surveys.

Samples containing disseminated sulfides assayed from 1.9 to 6.0 percent copper, 1.0 to 1.5 percent nickel, and a trace to 0.4 ounce of gold per ton; a massive sulfide lens assayed 1.1 percent copper, 6.6 percent nickel, and 0.04 ounce of gold per ton (Hanson, 1963). A 3-foot chip sample across the contact of peridotite and diorite assayed 2.1 percent copper, 0.05 percent nickel, a trace of gold, and 0.35 ounce of silver per ton, and a massive sulfide sample contained 8.1 percent nickel (Rose, 1965). The U.S. Bureau of Mines collected nine mineralized samples that averaged 1.46 percent copper, 2.89 percent nickel, 0.07 percent cobalt, 25 parts per billion (ppb) gold, 90 ppb iridium, 495 ppb palladium, 410 ppb platinum, 57 ppb rhodium, and 29 ppb ruthenium (Barker, 1988).

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; Rose, 1965; Mulligan, 1974; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Barker, 1988; Foley and others, 1989; Nokleberg and others, 1991; Foley, 1992.

Primary reference: Rose, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Upper Glacier

Site type: Prospect

ARDF no.: MH217

Latitude: 63.3391 **Quadrangle:** MH B-4

Longitude: 145.6180

Location description and accuracy:
The prospect is at an elevation of 4,150 feet on the southwest valley wall of lower Canwell Glacier. It is in the NW1/4SW1/4 section 22, T. 18 S., R. 11 E., Fairbanks Meridian. Access to the property is by a 3-mile-long trail from the end of a dirt road (not shown on the 1984 topographic map) on the east side of the Richardson Highway at mile 213.5, approximately 1 mile south of Millers Roadhouse.

Commodities:

Main: Au, Co, Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, magnetite, malachite, pentlandite, pyrite, pyrrhotite

Gangue minerals: Serpentine

Geologic description:
At this prospect disseminated pyrrhotite, pyrite, and traces of chalcopyrite and pentlandite are in feldspathic peridotite near the base of the Canwell mafic-ultramafic intrusive complex of Late Triassic age (W. T. Ellis, oral communication, 1998). The peridotite is cut by high-angle shears containing copper-stained magnetite seams as much as 1 inch thick. The complex is a 2.5-mile-long by 0.5-mile-wide sill that dips southwest and is intruded by a 6-mile-long Cretaceous or Tertiary quartz diorite to quartz monzonite stock (Barker, 1988). The sill complex consists of a dunite core that grades outward into wehrlite, feldspathic peridotite, and melagabbro (W.T. Ellis, oral communication, 1998).

Alteration:
Oxidation of copper minerals.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
Exploration in the area of this prospect has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources Inc. (W.T. Ellis, oral communication, 2001). Exploration from 1993 to 2001 included rock sampling, hand trenching, airborne and ground geophysical surveys, and completion of five diamond drill holes. The prospect was discovered by ACNC in 1995. A grab sample of dis-

seminated sulfide mineralization contained 0.2 percent nickel, 0.27 percent copper, 107 parts per billion (ppb) gold, 362 ppb palladium, and 445 ppb platinum (W.T. Ellis, oral communication, 1998). A sample of the copper-stained magnetite seams contained 1.4 percent copper and 1,955 ppb gold (W.T. Ellis, oral communication, 2001).

The prospect is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Odie

Site type: Prospect

ARDF no.: MH218

Latitude: 63.3327 **Quadrangle:** MH B-4

Longitude: 145.6138

Location description and accuracy:
This prospect is at an elevation of 4,200 feet on the southwest valley wall of lower Canwell Glacier. It is in the NW1/4NE1/4 section 27, T. 18 S., R. 11 E., Fairbanks Meridian. Access to the property is by a 3-mile-long trail from the end of a dirt road (not shown on the 1984 topographic map) on the east side of the Richardson Highway at mile 213.5, approximately 1 mile south of Millers Roadhouse.

Commodities:

Main: Au, Co, Cu, Ni, Pd, Pt

Other: Ir, Os, Rh, Ru

Ore minerals: Chalcopyrite, magnetite, malachite, pentlandite, pyrite, pyrrhotite

Gangue minerals:

Geologic description:
At the prospect, magnetite clots, pyrite, disseminated pyrrhotite, and traces of chalcopyrite and pentlandite occur within and at the margin of a fine- to medium-grained gabbronorite dike that cuts dunite (W.T. Ellis, oral communication, 1998). There is local copper staining in the dike. The rocks are part of the Canwell mafic-ultramafic intrusion of Late Triassic age. The complex is a 2.5-mile-long by 0.5-mile-wide sill that dips southwest and is intruded by a 6-mile-long Cretaceous quartz diorite to quartz monzonite stock (Barker, 1988). The Canwell complex consists of a dunite core that grades outward into wehrlite, feldspathic peridotite, and melagabbro (W.T. Ellis, oral communication, 1998). A total platinum group element (PGE) analysis of a high-grade sample from the prospect contained 0.86 percent copper, 1.2 percent nickel, 137 parts per billion (ppb) gold, 12,330 ppb platinum, 1,247 ppb palladium, 537 ppb osmium, 289 ppb iridium, 89 ppb rhodium, and 662 ppb ruthenium (W.T. Ellis, oral communication, 1998).

Alteration:
Oxidation of copper minerals.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
Exploration in the area of this prospect has been by American Copper and Nickel Company working with

Fort Knox Gold Resources Inc. (W.T. Ellis, oral communication, 1998). Exploration from 1994 through 2001 included rock sampling, hand trenching, airborne and ground geophysical surveys, and completion of five diamond drill holes (W.T. Ellis, oral communication, 1998). The prospect was discovered in 1995. A total platinum group element (PGE) analysis of a high-grade sample from the prospect contained 0.86 percent copper, 1.2 percent nickel, 137 parts per billion (ppb) gold, 12,330 ppb platinum, 1,247 ppb palladium, 537 ppb osmium, 289 ppb iridium, 89 ppb rhodium, and 662 ppb ruthenium (W.T. Ellis, oral communication, 1998).

The prospect is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Unnamed (southwest of VABM Canwell)

Site type: Occurrence

ARDF no.: MH219

Latitude: 63.3284 **Quadrangle:** MH B-4

Longitude: 145.6909

Location description and accuracy:
This occurrence is at an elevation of 4,200 feet about 0.4 mile southwest of VABM Canwell, near the northwest end of Rainbow Ridge. It is in the SW1/4NW1/4 section 29, T. 18 S., R. 11 E., Fairbanks Meridian. The occurrence is locality 4 of Hanson (1963), locality 19 of Cobb (1979 [OFR 79-238]), and locality S106 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Cu, Pb

Other: Au

Ore minerals: Azurite, chalcopyrite, galena, malachite, pyrite

Gangue minerals: Quartz

Geologic description:
At this locality, small quartz veins containing pyrite, chalcopyrite, and galena are stained with malachite and azurite (Hanson, 1963). The veins vary in attitude and cut sedimentary, volcanic, and dacite intrusive rocks of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Sulfide minerals are also disseminated in metatuff near a dacite intrusion (Nokleberg and others, 1991). Selected samples assayed 9.9 to 10.0 percent copper, 0.4 to 0.5 percent lead, and traces of gold and silver (Hanson, 1963). Grab samples collected by the U.S. Geological Survey assayed 10 percent copper, 0.5 percent lead, and a trace of gold (Nokleberg and others, 1991).

Alteration:
Oxidation of copper minerals.

Age of mineralization:
Permian (?) or younger.

Deposit model:
Polymetallic veins; Porphyry Cu (Cox and Singer, 1986; model 22c, model 17).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c, 17

Production Status: None

Site Status: Inactive

Workings/exploration:
Selected samples assayed 9.9 to 10.0 percent copper, 0.4 to 0.5 percent lead, and traces of gold and silver (Hanson, 1963). Grab samples collected by the U.S. Geological Survey assayed 10 percent copper, 0.5 percent lead, and a trace of gold (Nokleberg and others, 1991).

The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963; Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Verona Pick

Site type: Occurrence

ARDF no.: MH220

Latitude: 63.3229 **Quadrangle:** MH B-4

Longitude: 145.6512

Location description and accuracy:
This occurrence is at an elevation of 4,750 feet on Rainbow Ridge and about 1.1 miles north-northwest of the top of Rainbow Mountain. It is in the SE1/4SW1/4 section 28, T. 18 S., R. 11 E., Fairbanks Meridian.

Commodities:

Main: Ag, Au, Pb, Zn

Other:

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, quartz

Geologic description:
At this location semimassive to massive pyrite, chalcopyrite, galena, and sphalerite occur in rubble and a veinlike outcrop zone that is 6 feet across (D. Johnson, oral communication, 2001). The zone is in Permian (?) dacite porphyry that cuts the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). The dacite is intensely silicified, and chlorite is developed at the margin of the veinlike zone. This occurrence was discovered by Northeast Exploration during the summer of 2001, and only hand trenching has been completed to date (2002). Selected samples assay as much as 22.5 percent zinc, 8.02 percent lead, 1.3 ounces of silver per ton, and 0.4 ounce of gold per ton (D. Johnson, oral communication, 2001).

Alteration:
The dacite porphyry is intensely silicified, and chlorite is developed on the margin of the veinlike zone.

Age of mineralization:
Permian (?) or younger.

Deposit model:
Polymetallic vein(s) (Cox and Singer, 1986; model 22c).

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

Production Status: No

Site Status: Active

Workings/exploration:
This occurrence was discovered by Northeast Exploration during the summer of 2001, and only hand trenching has been completed to date (2002). Selected samples assay as much as 22.5 percent zinc, 8.02 percent lead, 1.3 ounces of silver per ton, and 0.4 ounce of gold per ton (D. Johnson, oral communication, 2001).
The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Unnamed (south-southeast of VABM Canwell)

Site type: Occurrence

ARDF no.: MH221

Latitude: 63.3266 **Quadrangle:** MH B-4

Longitude: 145.6786

Location description and accuracy:
This occurrence is at an elevation of 4,900 feet about a half-mile south-southeast of VABM Canwell near the northwest end of Rainbow Ridge. It is at the center of section 29, T. 18 S., R. 11 E., Fairbanks Meridian. The occurrence is described in Hanson (1963, p. 67).

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
At this occurrence, pyrite forms disseminations and coats fractures in Permian (?) metadacite intrusive rocks and in fragmental volcanic rocks of the Slana Spur Formation of Pennsylvanian age (Hanson, 1963). This occurrence is one of the four prominent areas of pyrite and chalcopyrite disseminated in dacitic tuff noted by Hanson (1963, p. 67, figure 5).

Alteration:

Age of mineralization:
Permian (?) or younger.

Deposit model:
Polymetallic veins; Porphyry Cu (Cox and Singer, 1986; model 22c, model 17).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c, 17

Production Status: No

Site Status: Inactive

Workings/exploration:
The occurrence is on active claims of Northeast Exploration.

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Unnamed (east side of Richardson Highway near Phelan Creek)

Site type: Occurrence

ARDF no.: MH222

Latitude: 63.2985 **Quadrangle:** MH B-4

Longitude: 145.6694

Location description and accuracy:
This occurrence is at an approximate elevation of 2,850 feet on the east side of the Richardson Highway near Phelan Creek. It is in the SE1/4NE1/4 section 5, T. 19 S., R. 11 E., Fairbanks Meridian. This location is accurate within a quarter-mile. The occurrence corresponds to locality S110 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Bornite, chalcopyrite, malachite

Gangue minerals: Quartz

Geologic description:
At this location, quartz veins in joints cut meta-andesite agglomerate of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). A composite chip sample of quartz containing chalcopyrite, malachite, and bornite contained 10,000 parts per million (ppm) copper and 20 ppm silver.

Alteration:
Oxidation of copper minerals.

Age of mineralization:
Pennsylvanian or younger.

Deposit model:
Polymetallic veins (Cox and Singer, 1989; model 22c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Unnamed (Rainbow Ridge south of Rainbow Mountain)

Site type: Occurrence

ARDF no.: MH223

Latitude: 63.2891 **Quadrangle:** MH B-4

Longitude: 145.6306

Location description and accuracy:
This occurrence is at an elevation of 5,000 feet 1.4 miles south of the top of Rainbow Mountain. It is in the northeast corner of section 10, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, plate 5, locality 6) and corresponds to locality 21 in Cobb (1979 [OFR 79-238]) and locality S111 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Cu, Pb

Other: Ag, Au

Ore minerals: Chalcopyrite, galena

Gangue minerals: Quartz

Geologic description:
At this location a swarm of ten subparallel quartz veins (Hanson, 1963) that range from 0.2 to 1.0 inch thick strikes N30W and dips 55E. The veins contain scattered chalcopyrite and galena and traces of gold and silver. They cut dacite lapilli tuff of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Samples of veins assay as much as 0.8 percent copper, 0.3 percent lead, and a trace of gold and silver (Hanson, 1963).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Samples of veins assay as much as 0.8 percent copper, 0.3 percent lead, and a trace of gold and silver (Hanson, 1963).

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (Rainbow Mountain)

Site type: Occurrences

ARDF no.: MH224

Latitude: 63.3089 **Quadrangle:** MH B-4

Longitude: 145.6263

Location description and accuracy:
This occurrence is at an elevation of 6,550 feet, about 0.2 mile southeast of the top of Rainbow Mountain. It is in the SW1/4SW1/4 section 34, T. 18 S., R. 11 E., Fairbanks Meridian. This record combines two occurrences, one discovered by American Copper and Nickel Company (W.T. Ellis, oral communication, 1996) and a nearby occurrence that corresponds to locality S109 in table of Nokelberg and others (1991).

Commodities:

Main: Ag, Cu

Other: Au, Pb, Zn

Ore minerals: Chalcocite, malachite, pyrite

Gangue minerals: Calcite, quartz

Geologic description:
The rocks at the top of Rainbow Mountain are Slana Spur Formation of Pennsylvanian age and fragmental andesite and dacite volcanic rocks that are intruded by Permian metadacite porphyry (Nokleberg and others, 1991). A quartz-calcite-chalcocite-veined copper-stained zone at this locality was sampled by American Copper and Nickel Company (W.T. Ellis, oral communication, 1998). Their samples contained 8.7 percent copper, 33 parts per million (ppm) silver, and 76 parts per billion gold. The U.S. Geological Survey collected a composite chip sample of nearby iron-stained, pyritic metadacite porphyry that contained 700 ppm zinc and 300 ppm lead (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Probably Permian.

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: Active

Workings/exploration:
American Copper and Nickel Company (W.T. Ellis, oral communication, 1998) samples contained 8.7 percent copper, 33 parts per million (ppm) silver, and 76 parts per billion gold. The U.S. Geological Survey collected a composite chip sample of nearby iron-stained, pyritic metadacite porphyry that contained 700 ppm zinc and 300 ppm lead (Nokleberg and others, 1991).

The occurrences are on active claims of MAN Resources.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/21/02

Site name(s): Unnamed (west of lower Canwell Glacier)

Site type: Occurrence

ARDF no.: MH225

Latitude: 63.3266 **Quadrangle:** MH B-4

Longitude: 145.5916

Location description and accuracy:
This occurrence is at an elevation of 4,800 on the west valley wall of lower Canwell Glacier. It is one-quarter mile due west of the center of section 26, T. 18 S., R. 11 E., Fairbanks Meridian. This record combines the description of the occurrence by Hanson (1963, p. 72) with that of locality S116 of table 2 in Nokelberg and others (1991).

Commodities:

Main: Ag, Au, Cu

Other:

Ore minerals: Arsenopyrite, chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:
Hanson (1963) described this location as pyrite- and arsenopyrite-bearing silicified granodiorite. Nokelberg and others (1991) described it as a 25- by 50-foot silicified zone of chalcopyrite- and pyrite-bearing quartz veins in fractures in silicified mid-Cretaceous quartz diorite. W.T. Ellis (oral communication, 1996) described the host rock as quartz monzonite that grades into quartz diorite where it intrudes the Canwell mafic-ultramafic sill of Late Triassic age.

An American Copper and Nickel Company sample of silicified and iron-stained quartz monzonite contained 1,030 parts per million (ppm) copper (W.T. Ellis, oral communication, 1996). A grab sample of the 25- by 50-foot silicified zone contained 12,000 ppm copper, 30 ppm silver, and 0.10 ppm gold (Nokleberg and others, 1991).

Alteration:
The granitic host rocks are variably silicified; iron sulfide minerals are oxidized.

Age of mineralization:
Probably mid-Cretaceous.

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

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

Production Status: No

Site Status: Inactive

Workings/exploration:
An American Copper and Nickel Company sample of silicified and iron-stained quartz monzonite con-

tained 1,030 parts per million (ppm) copper (W.T. Ellis, oral communication, 1996). A grab sample of the 25- by 50-foot silicified zone contained 12,000 ppm copper, 30 ppm silver, and 0.10 ppm gold (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; Nokleberg and others, 1991; this record.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/8/02

Site name(s): Canwell Ridge

Site type: Prospect

ARDF no.: MH226

Latitude: 63.3301 **Quadrangle:** MH B-4

Longitude: 145.5932

Location description and accuracy:
The prospect is at an elevation of 4,700 feet on the southwest valley wall of lower Canwell Glacier. It is in the NW1/4NW1/4 section 26, T. 18 S., R. 11 E., Fairbanks Meridian. Access to the property is by a 3-mile-long trail from the end of a dirt road (not shown on the 1984 topographic map) on the east side of the Richardson Highway at mile 213.5 approximately 1 mile south of Millers Roadhouse.

Commodities:

Main: Au, Co, Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, garnierite, malachite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:
At this prospect segregations of disseminated pyrrhotite, chalcopyrite, and pentlandite occur in oxidized iron-, copper-, and nickel-stained mafic gabbro at the base of the Canwell mafic-ultramafic intrusive complex of Late Triassic age. The gabbro is in contact with quartz monzonite (W.T. Ellis, oral communication, 1998). The complex is a 2.5-mile-long by 0.5-mile-wide southwest-dipping sill that is intruded by a Cretaceous or Tertiary quartz diorite to quartz monzonite stock (Barker, 1988). The complex consists of a dunite core that grades outward into wehrlite, feldspathic peridotite, and mafic gabbro (W.T. Ellis, oral communication, 1998).

The Canwell Ridge prospect was discovered by American Copper and Nickel Company (ACNC) in 1995. ACNC chip samples from a 10-foot-long hand-dug trench contained 0.59 percent nickel, 0.64 percent copper, 232 parts per billion (ppb) gold, 687 ppb palladium, and 687 ppb platinum. A high-grade grab sample from the same trench contained 8.6 percent nickel, 0.86 percent copper, 0.2 percent cobalt, 466 ppb gold, 3,160 ppb palladium, and 1,860 ppb platinum (A.T. MacGibbon, written communications, 1997-2001). ACNC drilled one hole to intersect the basal zone of the sill at depth, but it intersected the quartz monzonite at the 700-foot target depth.

Alteration:
The mafic gabbro is moderately silicified and serpentinized; copper, iron, and nickel minerals are oxidized.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration in the area of this prospect has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources Inc. Exploration from 1994 through 2001 included rock sampling, hand trenching, airborne and ground geophysical surveys, and completion of five diamond drill holes.

The Canwell Ridge prospect is at the east end of a 3,000-foot-long electromagnetic conductor detected by a large-loop survey completed by ACNC in 1998 (W.T. Ellis, oral communication, 1998).

ACNC chip samples from a 10-foot-long hand-dug trench contained 0.59 percent nickel, 0.64 percent copper, 232 parts per billion (ppb) gold, 687 ppb palladium, and 687 ppb platinum. A high-grade grab sample from the same trench contained 8.6 percent nickel, 0.86 percent copper, 0.2 percent cobalt, 466 ppb gold, 3,160 ppb palladium, and 1,860 ppb platinum (A.T. MacGibbon, written communications, 1997-2001). ACNC drilled one hole to intersect the basal zone of the sill at depth, but it intersected the quartz monzonite at the 700-foot target depth.

The prospect is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

Barker, 1988; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/8/02

Site name(s): Upper Canwell

Site type: Prospect

ARDF no.: MH227

Latitude: 63.3294 **Quadrangle:** MH B-4

Longitude: 145.5871

Location description and accuracy:

The prospect is at an elevation of 4,500 feet on the southwest valley wall of lower Canwell Glacier. It is in the SE1/4NW1/4 section 26, T. 18 S., R. 11 E., Fairbanks Meridian. Access to the property is by a 3-mile-long trail from the end of a dirt road (not shown on the 1984 topographic map) on the east side of the Richardson Highway at mile 213.5, approximately 1 mile south of Millers Roadhouse.

Commodities:

Main: Au, Co, Cu, Ni, Pd, Pt

Other: Ir, Os, Ru, Rh

Ore minerals: Chalcopyrite, garnierite, malachite, pentlandite, pyrrhotite

Gangue minerals:

Geologic description:

At this prospect segregations of disseminated to massive pyrrhotite, chalcopyrite, and pentlandite occur in a gabbronorite dike approximately 200 feet above the basal mafic gabbro of the mafic-ultramafic Canwell intrusive complex of Late Triassic age (W.T. Ellis, oral communication, 1998). The complex is a 2.5-mile-long by 0.5-mile-wide southwest-dipping sill that is intruded by a Cretaceous or Tertiary quartz diorite to quartz monzonite stock (Barker, 1988). The complex consists of a dunite core that grades outward into wehrlite, feldspathic peridotite, and mafic gabbro (W.T. Ellis, oral communication, 1998).

The Upper Canwell prospect was discovered by American Copper and Nickel Company (ACNC) in 1995. ACNC chip samples from a 45-foot-long hand-dug trench on the prospect averaged 0.34 percent nickel, 0.1 percent copper, 161 parts per billion (ppb) palladium, and 142 ppb platinum (W.T. Ellis, oral communication, 1998). A high-grade grab sample of massive sulfide from the trench contained 6.9 percent nickel, 2.3 percent copper, 0.13 percent cobalt, 2,190 ppb gold, 4,960 ppb palladium, 4,110 ppb platinum, and 230 ppb iridium (A.T. MacGibbon, written communications, 1997-2001). Another sample of massive sulfide from the same zone contained 3.3 percent nickel, 0.96 percent copper, 0.06 percent cobalt, 270 ppb gold, 1,700 ppb palladium, and 1,770 ppb platinum (Barker, 1988).

A 6-foot-thick massive sulfide body that crops out approximately 75 feet to the west of the trench contains 5.4 percent nickel, 1.2 percent copper, 0.09 percent cobalt, 500 ppb gold, 2,420 ppb palladium, and 2,480 ppb platinum (A.T. MacGibbon, written communications, 1997-2001). A core hole drilled by ACNC intersected 17 feet of this body approximately 200 feet down-dip that contained 0.78 percent nickel, 0.55 percent copper, 234 ppb gold, 863 ppb palladium, and 755 ppb platinum (A.T. MacGibbon, written communications, 1997-2001). ACNC had a total platinum group element (PGE) analysis done on a high-grade sample from this prospect that contained 1.2 percent copper, 4.4 percent nickel, 368 ppb gold, 2,293 ppb platinum, 1,583 ppb palladium, 143 ppb osmium, 120 ppb iridium, 105 ppb rhodium, and 294 ppb ruthenium (W.T. Ellis, oral communication, 1998).

Alteration:

The rocks locally are intensely serpentinized; copper, iron, and nickel minerals are oxidized.

Age of mineralization:

Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:
Exploration in the area of this prospect has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources Inc. Exploration from 1994 through 2001 included rock sampling, hand trenching, airborne and ground geophysical surveys, and completion of five diamond drill holes.

ACNC chip samples from a 45-foot-long hand-dug trench on the prospect averaged 0.34 percent nickel, 0.1 percent copper, 161 parts per billion (ppb) palladium, and 142 ppb platinum (W.T. Ellis, oral communication, 1998). A high-grade grab sample of massive sulfide from the trench contained 6.9 percent nickel, 2.3 percent copper, 0.13 percent cobalt, 2,190 ppb gold, 4,960 ppb palladium, 4,110 ppb platinum, and 230 ppb iridium (A.T. MacGibbon, written communications, 1997-2001). Another sample of massive sulfide from the same zone contained 3.3 percent nickel, 0.96 percent copper, 0.06 percent cobalt, 270 ppb gold, 1,700 ppb palladium, and 1,770 ppb platinum (Barker, 1988).

A 6-foot-thick massive sulfide body that crops out approximately 75 feet to the west of the trench contains 5.4 percent nickel, 1.2 percent copper, 0.09 percent cobalt, 500 ppb gold, 2,420 ppb palladium, and 2,480 ppb platinum (A.T. MacGibbon, written communications, 1997-2001). A core hole drilled by ACNC intersected 17 feet of this body approximately 200 feet down-dip that contained 0.78 percent nickel, 0.55 percent copper, 234 ppb gold, 863 ppb palladium, and 755 ppb platinum (A.T. MacGibbon, written communications, 1997-2001). ACNC had a total platinum group element (PGE) analysis done on a high-grade sample from the prospect that contained 1.2 percent copper, 4.4 percent nickel, 368 ppb gold, 2,293 ppb platinum, 1.583 ppb palladium, 143 ppb osmium, 120 ppb iridium, 105 ppb rhodium, and 294 ppb ruthenium (W.T. Ellis, oral communication, 1998).

The prospect is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:
Barker, 1988; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/8/02

Site name(s): Lower Canwell

Site type: Prospect

ARDF no.: MH228

Latitude: 63.3284 **Quadrangle:** MH B-4

Longitude: 145.5882

Location description and accuracy:

The prospect is at an elevation of 4,600 feet on the southwest valley wall of lower Canwell Glacier, just south of MH227. It is in the SE1/4NW1/4 section 26, T. 18 S., R. 11 E., Fairbanks Meridian. Access to the property is by a 3-mile-long trail from the end of a dirt road (not shown on the 1984 topographic map) on the east side of the Richardson Highway at mile 213.5, approximately 1 mile south of Millers Roadhouse. The site described by Barker (1988) corresponds to American Copper and Nickel Company's Lower Canwell prospect (W.T. Ellis, oral communication, 1998).

Commodities:

Main: Au, Co, Cu, Ni, Pd, Pt

Other: Os, Rh, Ru

Ore minerals: Chalcopyrite, malachite, pentlandite, pyrrhotite

Gangue minerals: Chrysotile, serpentine

Geologic description:

At this prospect, disseminations and massive segregations of pyrrhotite, chalcopyrite, and pentlandite, with associated cobalt, platinum group element (PGE) minerals, and gold, are in serpentinite, gabbronorite dikes and sills, and contact-related deposits (Foley and others, 1989). The sulfides are also disseminated in mafic gabbro at the base of the mafic and ultramafic rocks of the Canwell complex of Late Triassic age, a 2.5-mile-long by 0.5-mile-wide southwest-dipping sill that is intruded by a Cretaceous or Tertiary quartz diorite to quartz monzonite stock (W.T. Ellis, oral communication, 1998). Locally, the chalcopyrite is oxidized to malachite, and the serpentine is altered to chrysotile. The complex consists of a dunite core that grades outward into wehrlite, feldspathic peridotite, and mafic gabbro (W.T. Ellis, oral communication, 1998).

Fort Knox Gold Resources, Inc. has reported that a mineralized mafic gabbro grab sample contained 0.42 percent nickel, 0.87 percent copper, 332 parts per billion (ppb) gold, 790 ppb palladium, and 825 ppb platinum (A.T. MacGibbon, written communications, 1997-2001). A U.S. Bureau of Mines total PGE analysis of a grab sample of quartz diorite or mafic gabbro containing disseminated sulfides assayed 1.55 percent copper, 2.65 percent nickel, 368 ppb gold, 400 ppb platinum, 600 ppb palladium, 100 ppb osmium, 45 ppb rhodium, and 40 ppb ruthenium (Barker, 1988). A U.S. Bureau of Mines gabbronorite sample contained 0.6 percent copper, 0.37 percent nickel, 137 ppb gold, 200 ppb platinum, and 370 ppb palladium (Barker, 1988).

Alteration:

Local oxidation of chalcopyrite to malachite, and alteration of the serpentine to chrysotile.

Age of mineralization:

Late Triassic.

Deposit model:

Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Active

Workings/exploration:

Exploration in this area has been by American Copper and Nickel Company (ACNC) working with Fort Knox Gold Resources, Inc. Exploration from 1994 through 2001 included rock sampling, hand trenching, airborne and ground geophysical surveys, and completion of five diamond drill holes.

Fort Knox Gold Resources has reported that a mineralized mafic gabbro grab sample contained 0.42 percent nickel, 0.87 percent copper, 332 parts per billion (ppb) gold, 790 ppb palladium, and 825 ppb platinum (A.T. MacGibbon, written communications, 1997-2001). A U.S. Bureau of Mines total platinum group element (PGE) analysis of a grab sample of quartz diorite or mafic gabbro containing disseminated sulfides that assayed 1.55 percent copper, 2.65 percent nickel, 368 ppb gold, 400 ppb platinum, 600 ppb palladium, 100 ppb osmium, 45 ppb rhodium, and 40 ppb ruthenium (Barker, 1988). A U.S. Bureau of Mines gabbronorite sample contained 0.6 percent copper, 0.37 percent nickel, 137 ppb gold, 200 ppb platinum, and 370 ppb palladium (Barker, 1988).

The prospect is on active claims of Fort Knox Gold Resources.

Production notes:

Reserves:

Additional comments:

References:

Barker, 1988; Foley and others, 1989; Foley, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/8/02

Site name(s): Unnamed (Rainbow Ridge south of Rainbow Mountain)

Site type: Occurrence

ARDF no.: MH229

Latitude: 63.2798 **Quadrangle:** MH B-4

Longitude: 145.6230

Location description and accuracy:
This occurrence is at an elevation of 4,500 feet on the southwest part of Rainbow Ridge, about 2.1 miles south of the top of Rainbow Mountain. It is at the center of the SW1/4 section 10, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, p. 67), and it corresponds to locality S114 of table 2 in Nokelberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals:

Geologic description:
This occurrence consists of pyrite and chalcopyrite disseminated in dacite tuff (Hanson, 1963, p. 67). The dacite tuff is part of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others 1991). This occurrence is one of the four prominent areas of pyrite and chalcopyrite disseminated in dacitic tuff noted by Hanson (1963, p. 67, figure 5).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

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

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

Production Status: No

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (Rainbow Ridge south-southeast of Rainbow Mountain)

Site type: Occurrence

ARDF no.: MH230

Latitude: 63.2878 **Quadrangle:** MH B-4

Longitude: 145.6180

Location description and accuracy:
This occurrence at an elevation of 6,200 feet is near the crest of Rainbow Ridge 1.5 miles south-southeast of the top of Rainbow Ridge. It is in the NE1/4NW1/4 section 10, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, locality 7). It corresponds to locality 22 in Cobb (1979 [OFR 79-238]) and locality S112 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Cu, Pb

Other: Ag, Au

Ore minerals: Chalcopyrite, galena, pyrite

Gangue minerals: Quartz

Geologic description:
This occurrence consists of chalcopyrite, galena, and pyrite in vertical quartz veins as much as 8 feet wide that strike north-south and cut a Permian dacite intrusive (Hanson, 1963; Nokleberg and others, 1991). The dacite intrudes the Tetelna Volcanics of Permian age. A sample of mineralized vein contained 4,000 parts per million (ppm) copper, 6,000 ppm lead, and a trace each of silver and gold (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Permian or younger.

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

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

Production Status: No

Site Status: Inactive

Workings/exploration:
A sample of mineralized vein contained 4,000 parts per million (ppm) copper, 6,000 ppm lead, and a trace each of silver and gold (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (south-southeast of Rainbow Mountain)

Site type: Occurrence

ARDF no.: MH231

Latitude: 63.2855 **Quadrangle:** MH B-4

Longitude: 145.6091

Location description and accuracy:
This occurrence is at an elevation of 5,800 feet on the crest of Rainbow Ridge, 1.8 miles south-southeast of Rainbow Mountain. It is at the center of section 10, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, locality 8), and it corresponds to locality 23 in Cobb (1979 [OFR 79-238]) and locality S113 in table 2 of Nokelberg and others (1991). It is a quarter-mile southeast of MH230.

Commodities:

Main: Cu, Pb

Other: Ag, Au

Ore minerals: Chalcopyrite, galena, pyrite

Gangue minerals: Quartz

Geologic description:
This occurrence consists of two quartz veins as much as 2 feet thick and several smaller veins that contain chalcopyrite, galena, pyrite, and traces of gold and silver (Hanson, 1963). The veins strike N5W, dip 83W, cut andesite to dacite flow breccia, and are truncated on the north by a thrust fault. The flow breccias are part of the Tetelna Volcanics of Pennsylvanian age (Nokleberg and others, 1991). Samples of the mineralized veins assayed 0.3 to 0.4 percent copper, 0.5 to 0.6 percent lead, and a trace each of gold and silver (Hanson, 1963).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Samples of the mineralized veins assayed 0.3 to 0.4 percent copper, 0.5 to 0.6 percent lead, and a trace each of gold and silver (Hanson, 1963).

Production notes:

Reserves:

Additional comments:

References:
Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (west face of Rainbow Ridge south of Rainbow Mountain)

Site type: Occurrence

ARDF no.: MH232

Latitude: 63.2767 **Quadrangle:** MH B-4

Longitude: 145.6216

Location description and accuracy:
This occurrence is at an elevation of 4,500 feet about 2.3 miles south of the top of Rainbow Mountain. It is in the SE1/4SW1/4 section 10, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, locality 9), and it corresponds to locality 24 in Cobb (1979 [OFR 79-238]) and locality S115 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:
This occurrence consist of chalcopyrite and pyrite in quartz veins as much as a half-meter wide that strike N 34 W and dip 70S to vertical (Hanson, 1963). The veins cut dacite tuff of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

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:

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (southeast end of Rainbow Ridge)

Site type: Occurrence

ARDF no.: MH233

Latitude: 63.2713 **Quadrangle:** MH B-4

Longitude: 145.5878

Location description and accuracy:
This occurrence is at an elevation of 5,000 feet near the southeast end of Rainbow Ridge. It is on the southwest valley wall of upper McCallum Creek in the SE1/4NW1/4 section 14, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, locality 10), and it corresponds to locality 25 in Cobb (1979 [OFR 79-238]) and locality S120 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Ag, Cu, Pb

Other: Au

Ore minerals: Chalcopyrite, galena

Gangue minerals: Quartz

Geologic description:
This occurrence consists of chalcopyrite and galena in several small irregular quartz veins that strike N20E and dip vertically (Hanson, 1963). The veins occur along a fault in limestone of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). Samples of the mineralized veins assayed 0.3 to 0.4 percent copper, 2.5 to 2.6 percent lead, a trace of gold, and as much as 1.4 ounces of silver per ton (Hanson, 1963).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Samples of the mineralized veins assayed 0.3 to 0.4 percent copper, 2.5 to 2.6 percent lead, a trace of gold, and as much as 1.4 ounces of silver per ton (Hanson, 1963).

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (upper McCallum Creek)

Site type: Occurrence

ARDF no.: MH234

Latitude: 63.2618 **Quadrangle:** MH B-4

Longitude: 145.5667

Location description and accuracy:
This occurrence is on McCallum Creek at an elevation of 3,900 feet. It is in the southwest corner of section 13, T. 19 S., R. 11 E., Fairbanks Meridian. This locality is location 11 of Hanson (1963, plate 5). It corresponds to locality 25a in Cobb (1979 [OFR 79-238]) and locality S121 of table 2 in Nokelberg and others (1991).

Commodities:

Main: Cu, Pb

Other:

Ore minerals: Chalcopyrite, galena, pyrite

Gangue minerals: Quartz

Geologic description:
This occurrence consists of chalcopyrite, galena, and pyrite in quartz veins as much as 1 foot thick (Hanson, 1963). The veins occur along a thrust fault in metadacite tuff of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

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:

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (east-southeast of the toe of McCallum Glacier)

Site type: Occurrence

ARDF no.: MH235

Latitude: 63.2801 **Quadrangle:** MH B-4

Longitude: 145.5665

Location description and accuracy:
This occurrence is at an elevation of 5,200 feet approximately 1 mile east-southeast of the toe of McCallum Glacier. It is in the NW1/4SW1/4 section 12, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, locality 12), and it corresponds to locality 26 in Cobb (1979 [OFR 79-238]) and locality S119 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Cu, Pb

Other: Au

Ore minerals: Chalcopyrite, galena

Gangue minerals: Quartz

Geologic description:
This occurrence consists of chalcopyrite and galena in scattered areas of small quartz veins in metadacite tuff of the Slana Spur Formation of Pennsylvanian age (Hanson, 1963; Nokleberg and others, 1991). Samples of the mineralized quartz veins assayed 0.4 to 0.5 percent copper, 0.4 to 0.5 percent lead, and a trace of gold (Hanson, 1963).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Samples of the mineralized quartz veins assayed 0.4 to 0.5 percent copper, 0.4 to 0.5 percent lead, and a trace of gold (Hanson, 1963).

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (east of the toe of McCallum Glacier)

Site type: Occurrence

ARDF no.: MH236

Latitude: 63.2845 **Quadrangle:** MH B-4

Longitude: 145.5660

Location description and accuracy:
This occurrence is at an elevation of 6,200 feet approximately 1 mile east of the toe of McCallum Glacier. It is in the SW1/4NW1/4 section 12, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, locality 13), and it corresponds to locality 27 in Cobb (1979 [OFR 79-238]) and locality S118 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Chalcopyrite, galena

Gangue minerals: Quartz

Geologic description:
This occurrence consists of chalcopyrite and galena in quartz veins as much as 6 inches thick that strike N60E and dip 40S (Hanson, 1963). The veins cut altered meta-andesite intruded by quartz diorite. A grab sample of iron-stained meta-andesite contained 3 parts per million silver (Nokleberg and others, 1991). The host rocks are part of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991). This occurrence is one of the four prominent areas of pyrite and chalcopyrite disseminated in dacitic tuff noted by Hanson (1963, p. 67, figure 5).

Alteration:
The meta-andesite is highly altered adjacent to the quartz diorite intrusion (Hanson, 1963).

Age of mineralization:
Pennsylvanian or younger.

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:
A grab sample of iron-stained meta-andesite contained 3 parts per million silver (Nokleberg and others, 1991).

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (east-northeast of the toe of McCallum Glacier)

Site type: Occurrence

ARDF no.: MH237

Latitude: 63.2904 **Quadrangle:** MH B-4

Longitude: 145.5624

Location description and accuracy:
This occurrence at an elevation of 6,200 feet approximately 1 mile east-northeast of the toe of McCallum Glacier. It is near the southwest corner of section 1, T. 19 S., R. 11 E., Fairbanks Meridian. The occurrence is described by Hanson (1963, p. 73), and it corresponds to locality 28 in Cobb (1979 [OFR 79-238]) and to locality S117 in table 2 of Nokelberg and others (1991).

Commodities:

Main: Cu, Pb

Other:

Ore minerals: Chalcopyrite, galena, pyrite

Gangue minerals: Quartz

Geologic description:
This occurrence consists of chalcopyrite, galena, and pyrite disseminated in silicified granodiorite (Hanson, 1963). The mineralization probably is associated with the granodiorite that intrudes the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:
The granodiorite is silicified.

Age of mineralization:
Pennsylvanian or younger.

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

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

Production Status: No

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Hanson, 1963; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Hanson, 1963

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/09/02

Site name(s): Unnamed (northeast of Snow White Peak)

Site type: Occurrence

ARDF no.: MH238

Latitude: 63.3652 **Quadrangle:** MH B-3

Longitude: 145.3102

Location description and accuracy:
This occurrence is at an elevation of about 6,200 feet on the Johnson Glacier 2 miles east-northeast of Snow White Peak. It is in the SW1/4 section 8, T. 18 S., R. 13 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Pb, Sb, Zn

Other: Au

Ore minerals: Galena, sphalerite, stibnite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
This occurrence is generally described as lead-zinc-antimony veins in quartz sericite schist occurring along a 1,500-foot-long, northwest-trending, rubble train. Samples show erratic values: as much as 9.4 percent antimony, 1.25 percent arsenic, 0.3 percent zinc, 0.06 percent lead, and 0.035 ounce of gold per ton (R. A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

This unnamed occurrence is within the Jarvis Creek subterrane, which is Devonian and older. This terrane is chiefly composed of fine-grained, mylonitic metasedimentary rocks. The unit is about 65 percent quartz-mica schist, 15 percent quartzite, and 5 percent each of chlorite-white-mica schist, quartz-biotite schist, calcareous schist, and marble. Protoliths are mainly pelite, quartz sandstone, graywacke, marl, and limestone. Intense deformation and recrystallization have obliterated most relict minerals and textures. The unit is probably is a few thousand meters thick (Nokleberg and others, 1992).

Alteration:

Age of mineralization:
Devonian or younger, on the basis of the age of the host rock, which is in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
This occurrence was visited in 1976 by Resource Associates of Alaska, Inc. but there is no more recent

report of work (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Phelan Creek

Site type: Occurrence

ARDF no.: MH239

Latitude: 63.2304 **Quadrangle:** MH A-3

Longitude: 145.4792

Location description and accuracy:
This placer occurrence is at an elevation of approximately 3,600 feet at the confluence of College Creek and the creek draining southwest from Gulkana Glacier (mapped as Phelan Creek on the A-4 quadrangle but labeled Gulkana River on the A-3 quadrangle). It is in the NE1/4NE1/4 section 32, T. 19 S., R. 12 E., Fairbanks Meridian.

Commodities:

Main: Au, Pt

Other:

Ore minerals:

Gangue minerals:

Geologic description:
Pan concentrates of placer material collected by the U.S. Bureau of Mines from Phelan Creek contain gold and as much as 760 parts per billion platinum (Foley and others, 1989).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
There were active State claims on lower Phelan Creek during the mid-1990's.

Production notes:

Reserves:

Additional comments:

References:

Foley and others, 1989.

Primary reference: Foley and others, 1989

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Gunn Creek

Site type: Occurrence

ARDF no.: MH240

Latitude: 63.1629 **Quadrangle:** MH A-3

Longitude: 145.4904

Location description and accuracy:
This placer occurrence is on Gunn Creek, about 1.2 miles north-northeast of Oxbow Lake. It is at an elevation of approximately 3,200 feet in the SE1/4SW1/4 of section 20, T. 20 S., R. 12 E., Fairbanks Meridian.

Commodities:

Main: W

Other: Au, Cr, Zn

Ore minerals: Chromite, gold, ilmenite, magnetite, scheelite, sphalerite

Gangue minerals: Olivine, zircon

Geologic description:
A pan-concentrate sample of stream gravels at this site contained chromite, gold, ilmenite, magnetite, olivine, scheelite, sphalerite, and zircon (Rose and Saunders, 1965, p. 15). The source of some of these minerals may be glacial till and possibly granite that has been reported in this vicinity (Rose and Saunders, 1965).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Rose and Saunders, 1965; Cobb, 1975 (MR-66).

Primary reference: Rose and Saunders, 1965

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Unnamed (east of mile 195 on Richardson Highway)

Site type: Occurrence

ARDF no.: MH241

Latitude: 63.1313 **Quadrangle:** MH A-3

Longitude: 145.4714

Location description and accuracy:
This occurrence is at an elevation of 3,600 feet, 0.75 mile due east of mile 195 on the Richardson Highway. It is at the northeast corner of section 5, T. 20 S., R. 12 E., Fairbanks Meridian.

Commodities:

Main: Cu, Ni, Pd, Pt

Other:

Ore minerals: Chalcopyrite, magnetite, pentlandite, pyrrhotite

Gangue minerals: Amphibole, clinopyroxene

Geologic description:
The rock exposed at this site is mainly Upper Triassic coarse-grained to pegmatitic olivine melagabbro containing 20 percent olivine, 70 percent clinopyroxene, and 10 percent intercumulus plagioclase. Mineralization consists of chalcopyrite, pentlandite, and pyrrhotite in iron-stained, magnetite-bearing skarn of intergrown clinopyroxene and amphibole. The olivine in the melagabbro is partly serpentinized, and the pyroxene is mostly altered to amphibole. A sample of the mineralized rock contained 1.07 percent copper, 1.58 percent nickel, 484 parts per billion (ppb) palladium, 300 ppb platinum, and 110 ppb gold. (The source of all this information is W.T. Ellis, oral communication, 1998.)

Alteration:
The olivine is partly serpentinized, and the pyroxene is mostly altered to amphibole. There is also local iron staining.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status:

Site Status: Inactive

Workings/exploration:
A sample of the mineralized rock contained 1.07 percent copper, 1.58 percent nickel, 484 parts per billion (ppb) palladium, 300 ppb platinum, and 110 ppb gold (W.T. Ellis, oral communication, 1998). The prospect had been staked, but the area is closed to mineral entry because it is in the Alyeska pipeline corridor.

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Unnamed (north of the glacier at the head of the West Fork Robertson River)

Site type: Occurrence

ARDF no.: MH242

Latitude: 63.3097 **Quadrangle:** MH B-2

Longitude: 144.9196

Location description and accuracy:
This unnamed occurrence is in the rugged mountains between the Johnson Glacier and the unnamed glacier at the head of the West Fork Robertson River. It is at an elevation of about 6,400 feet and 8.1 miles east-southeast of Mount Gakona, in the NW1/4SW1/4 section 32, T. 18 S., R. 15 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other:

Ore minerals: Galena, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
During reconnaissance work in 1978, Resource Associates of Alaska, Inc. discovered mineralized dolomite-quartz breccia with disseminated sphalerite and galena in talus (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). There is no record of any additional exploration work at this site. The rock assayed 2 to 5 percent zinc, 1.5 percent lead, and 2 to 3 ounces of silver per ton.
This occurrence is in metavolcanic and subordinate metasedimentary rocks that are included in the Hayes Glacier subterrane, which is Devonian and older (Nokleberg and others, 1992).

Alteration:

Age of mineralization:
Devonian and older, on the basis of the age of the host rock, which is in the Hayes Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
During reconnaissance work in 1978, Resource Associates of Alaska, Inc. discovered mineralized dolomite-quartz breccia with disseminated sphalerite and galena in talus (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). There is no record of any further work at this

site.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (north of the glacier at the head of the West Fork Robertson River)

Site type: Occurrence

ARDF no.: MH243

Latitude: 63.3019 **Quadrangle:** MH B-2

Longitude: 144.9005

Location description and accuracy:
This unnamed occurrence lies northwest of Mount Kimball between the Johnson Glacier and an unnamed glacier at the head of the West Fork Robertson River. It is at an elevation of about 5,000 feet elevation and 8.8 miles east-southeast of Mount Gakona, in the NE1/4NE1/4 section 5, T. 19 S., R. 15 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Fe

Other: Cu, Zn

Ore minerals: Chalcopyrite, pyrite, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
During reconnaissance work in 1978, Resource Associates of Alaska, Inc. discovered massive sulfide mineralization with pyrite, chalcopyrite, and sphalerite in talus (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). There is no indication of any further work. Samples contained less than 0.1 percent copper, lead, and zinc.
This occurrence is in metavolcanic and subordinate metasedimentary rocks that are included in the Hayes Glacier subterrane, which is Devonian and older (Nokleberg and others, 1992).

Alteration:

Age of mineralization:
Devonian and older, on the basis of the age of the host rock, which is in the Hayes Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
During reconnaissance work in 1978, Resource Associates of Alaska, Inc. discovered mineralized dolomite-quartz breccia with disseminated sphalerite and galena in talus (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). There is no record of any further work at this

site.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (south side of the West Fork Robertson River valley)

Site type: Occurrence

ARDF no.: MH244

Latitude: 63.3092 **Quadrangle:** MH B-2

Longitude: 144.7424

Location description and accuracy:

This unnamed occurrence is about 1.8 miles southwest of the mouth of Rock Candy Creek. It is at an elevation of about 4,000 feet in the SE1/4 section 31, T. 18 S., R. 16 E., Fairbanks Meridian. The occurrence is on the moraine of the glacier at the head of the West Fork Robertson River near the junction with a smaller tributary glacier. The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other:

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

Gangue minerals: Calcite, quartz

Geologic description:

Two types of massive sulfide mineralization were found on glacial moraine here during geological reconnaissance in 1975. These occurrences contain sparse base metal concentrations. Banded pyrrhotite with approximately 1 percent combined copper, lead, and zinc is in carbonate breccia with siliceous fragments. Pyrrhotite and calcite occur in bands that wrap around the breccia fragments. Farther up the glacier, banded pyrite and quartz-sericite schist with disseminated pyrite are abundant on the moraine on the ice. The rocks contains blueish-white quartz crystals and porphyroblasts as much as one-quarter inch in diameter; the protolith is probably a rhyolitic lapilli tuff. Along the southern side of the glacier, meta-andesite (?) with black chlorite and white tourmaline crystals developed in open spaces (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

This occurrence is in the Jarvis Creek Glacier subterrane of Devonian age (Nokleberg and others, 1992). This subterrane consists of a complex sequence of volcaniclastic metasedimentary rocks, predominantly of intermediate composition. The unit includes felsic and mafic metavolcanic units and metasedimentary rocks, including calcareous schist, dolomite, limestone, siltstone, quartzite, and black carbonaceous schist. The rock units are typically thin bedded, strike northwest, and dip moderately southwest. The schistosity and folds are generally parallel to the regional strike but with local exceptions (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976). The metamorphosed volcanic and sedimentary rocks have been intruded by several gabbro and mafic sills and dikes and plutons of felsic to intermediate composition(R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

Alteration:

Age of mineralization:

Devonian or younger, on the basis of the age of the host rock, which is in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
This occurrence has only had limited surface sampling.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (near the mouth of Rock Candy Creek)

Site type: Occurrence

ARDF no.: MH245

Latitude: 63.3233 **Quadrangle:** MH B-2

Longitude: 144.6956

Location description and accuracy:
This occurrence is located on the moraine of the glacier at the head of the West Fork Robertson River and is about one-third mile northwest of the mouth of Rock Candy Creek. It is at an elevation of about 3,500 feet in the SW1/4 section 28, T. 18 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other: Ag

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
Float of massive and banded-sulfide boulders was found on the moraine of the glacier at the head of the West Fork Robertson River northeast of the mouth of Rock Candy Creek. No details are given other than that a similarity is noted to mineralization at a nearby unnamed occurrence (MH244) (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

This occurrence is in the Jarvis Creek Glacier subterrane of Devonian age (Nokleberg and others, 1992). This subterrane consists of a complex sequence of volcaniclastic metasedimentary rocks, predominantly of intermediate composition. The unit includes felsic and mafic metavolcanic units and metasedimentary rocks, including calcareous schist, dolomite, limestone, siltstone, quartzite, and black carbonaceous schist. The rock units are typically thin bedded, strike northwest, and dip moderately southwest. The schistosity and folds are generally parallel to the regional strike but with local exceptions (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976). The metamorphosed volcanic and sedimentary rocks have been intruded by several gabbro and mafic sills and dikes and plutons of felsic to intermediate composition(R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

Alteration:

Age of mineralization:
Devonian or younger, on the basis of the age of the host rock, which is in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:

This occurrence has only had limited surface sampling. Follow-up work focused on discoveries of additional mineralization (MH244 and MH249) (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Lo Goat

Site type: Occurrence

ARDF no.: MH246

Latitude: 63.2635 **Quadrangle:** MH B-2

Longitude: 144.7382

Location description and accuracy:
The Lo Goat occurrence is at an elevation of about 7,300 feet, 3.5 miles northwest of Mount Kimball and 0.3 mile southwest of the Zygoat occurrence (MH247). It is in the SW1/4SW1/4 section 17, T. 19 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Fe

Other:

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
The occurrence is part of a trend of distinctive, generally barren, massive and semimassive pyrite-rich mineralization in the upper portion of the Hayes Glacier belt of rocks. This mineralized trend was traced discontinuously from south of the Tok Glacier to the head of the Gakona Glacier. The massive sulfides occur in pyrite-rich felsic metavolcanic rocks or at the contact of the metavolcanic rocks with graphitic schist or limestone (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978; E. Hunter, unpublished data, 1998).

The Lo Goat occurrence is in rocks that consist mainly of metamorphosed quartz keratophyre and metaandesite and sparse metadacite and metabasalt. These metavolcanic and subordinate metasedimentary rocks are included in the Hayes Glacier subterrane, which is Devonian and older (Nokleberg and others, 1992).

Alteration:

Age of mineralization:
Devonian and older, on the basis of the age of the host rock, which is in the Hayes Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Probably inactive

Workings/exploration:
The Lo Goat occurrence has only had limited surface examination.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Zygoat

Site type: Occurrence

ARDF no.: MH247

Latitude: 63.2684 **Quadrangle:** MH B-2

Longitude: 144.7218

Location description and accuracy:
The Zygoat occurrence is at an elevation of about 8,100 feet, 3.2 miles northwest of Mount Kimball and 0.6 mile west of the Goat occurrence (MH251). It is south of a glacier at the head of the West Fork Robertson River near the center of section 17, T. 19 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Fe

Other:

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
The Zygoat occurrence is part of a series of distinctive, generally barren massive and semimassive pyrite-rich layers in the upper portion of the Hayes Glacier belt of rocks. This mineralized trend can be traced discontinuously from south of the Tok Glacier to the head of the Gakona Glacier. The massive sulfides occur in pyritic felsic metavolcanic rocks or at the contact of the metavolcanic rocks with graphitic schist or limestone (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978; E. Hunter, unpublished data, 1998).

The Zygoat occurrence is in rocks that consist mainly of metamorphosed quartz keratophyre and metaandesite and sparse metadacite and metabasalt These metavolcanic and subordinate metasedimentary rocks are included in the Hayes Glacier subterrane, the age of which is Devonian and older (Nokleberg and others, 1992).

Alteration:

Age of mineralization:
Devonian and older, on the basis of the age of the host rock, which is in the Hayes Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
The Zygoat occurrence is part of a belt of distinctive, generally barren massive and semimassive pyritic

mineralization discovered in the upper portion of the Hayes Glacier belt of rocks. This mineralized trend was traced discontinuously from south of the Tok Glacier to the head of the Gakona Glacier.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (southwest of the head of Snowslide Creek)

Site type: Occurrence

ARDF no.: MH248

Latitude: 63.3154 **Quadrangle:** MH B-2

Longitude: 144.6449

Location description and accuracy:
This unnamed occurrence is about one-half mile west of the head of Snowslide Creek at an elevation of about 5,900 feet. It is about one-half mile northeast of the center of section 34, T. 18 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Ag, Pb, Sb (?), Zn

Other: As, Au

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

Gangue minerals: Adularia (?), calcite, quartz

Geologic description:
This occurrence is part of a northwest-trending set of structurally controlled sulfide veins and veinlets that are intermittently exposed for about 9 miles between the Robertson Glacier and the glacier at the head of the West Fork Robertson River. Coarse-grained pyrite, arsenopyrite, galena, sphalerite, and stibnite occur in a gangue of quartz and carbonate with patches of adularia (?). The veins crosscut both bedding and schistosity but are locally parallel to them. The rocks in this area are siliceous metasedimentary rocks that include quartzite, quartz arenite, and siliceous siltstones (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978).

Samples of the veins show significant amounts of lead, silver, and zinc in most veins and varying amounts of arsenic, antimony, copper, and traces of gold (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976). Geologic mapping and geochemical sampling was done from 1976 to 1979. However, most of the work in this area was concentrated on similar veins nearby, such as the RC East prospect (MH255), and there has been no further work in the area.

Alteration:

Age of mineralization:
Devonian or younger, on the basis of the age of the host rock, which are in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:

Geologic mapping and geochemical sampling was done from 1976 to 1979. However, most of the work in this area was concentrated on similar deposits nearby.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (on Rock Candy Creek)

Site type: Occurrence

ARDF no.: MH249

Latitude: 63.3005 **Quadrangle:** MH B-2

Longitude: 144.6738

Location description and accuracy:

This occurrence is at an elevation of about 4,400 feet on the south side of Rock Candy Creek, about 1.5 miles above its mouth. It is in the NW1/4 section 3, T. 19 S., R. 16 E., Fairbanks Meridian. The location accurate.

Commodities:

Main: Ag, Cu, Pb, Zn

Other:

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Quartz, sericite

Geologic description:

Massive sulfide boulders are sparsely distributed in the drainage of Rock Candy Creek. Follow-up work to locate their source led to the discovery of 4- to 6-inch-thick massive and disseminated, volcanogenic sulfide lenses as well as multiple, but thin, hydrothermal veins with appreciable amounts of base and precious metals. Samples contain as much as 4 percent zinc, 1.5 percent lead, 0.1 percent copper, and 1 to 2 ounces per ton silver. Lenses of massive pyrrhotite 4 to 8 inches thick were found on the north side of Rock Candy Creek in quartz-sericite schist exposed on a dip slope. The pyrrhotite contains trace sphalerite, chalcopyrite, and galena (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

This occurrence is in the Jarvis Creek Glacier subterrane of Devonian age (Nokleberg and others, 1992). This subterrane consists of a complex sequence of volcaniclastic metasedimentary rocks, predominantly of intermediate composition. The unit includes felsic and mafic metavolcanic units and metasedimentary rocks, including calcareous schist, dolomite, limestone, siltstone, quartzite, and black carbonaceous schist. The rock units are typically thin bedded, strike northwest, and dip moderately southwest. The schistosity and folds are generally parallel to the regional strike but with local exceptions (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976). The metamorphosed volcanic and sedimentary rocks have been intruded by several gabbro and mafic sills and dikes and plutons of felsic to intermediate composition(R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

Alteration:

Age of mineralization:

Devonian or younger, on the basis of the age of the host rocks, which are in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

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

28a

Production Status: None

Site Status: Inactive

Workings/exploration:
This occurrence has only had limited surface sampling.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): RC West

Site type: Occurrence

ARDF no.: MH250

Latitude: 63.2953 **Quadrangle:** MH B-2

Longitude: 144.6920

Location description and accuracy:
The RC West occurrence is one-half mile long, exposed on the north side of the ridge 3.8 miles north-northwest of Mount Kimball. The occurrence is at the point on the ridge where the mineralized rock crosses it. The occurrence is about 0.2 mile south of the center of section 4, T. 19 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Cu

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
The RC West occurrence consists of multiple bands and lenses of pyrite-rich sulfides in a sequence of quartz-chlorite-sericite schist, quartz-sericite schist, dolomite, calcareous schist, limestone, and black carbonaceous schist. For about 100 feet, pyrite, galena, sphalerite, and minor chalcopyrite occur as multiple bands and disseminations as much as 6 inches thick over a total thickness of 8 to 10 feet. Three grab samples contained 0.08 to 0.71 percent copper, 0.81 to 5.8 percent lead, 1.4 to 10.6 percent zinc, 2.04 to 21.2 ounces of silver per ton, and less than 0.003 ounce of gold per ton (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

This occurrence is in the Jarvis Creek Glacier subterrane of Devonian age (Nokleberg and others, 1992). It consists of a complex sequence of volcaniclastic sedimentary rocks, predominantly of intermediate composition. The unit includes felsic and mafic metavolcanic and metasedimentary rocks, including calcareous schist, dolomite, limestone, siltstone, quartzite, and black carbonaceous schist. The rocks are typically thin bedded, strike northwest, and dip moderately southwest. The schistosity and folds in the area are generally parallel to the regional strike, but there are local exceptions (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

Alteration:

Age of mineralization:
Devonian, on the basis of the age of the host rock, which is in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Probably inactive

Workings/exploration:
The only exploration work has been surface sampling and prospecting.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Goat

Site type: Occurrence

ARDF no.: MH251

Latitude: 63.2682 **Quadrangle:** MH B-2

Longitude: 144.7110

Location description and accuracy:
The Goat occurrence is at an elevation of about 8,600 feet, 3.25 miles northwest of Mount Kimball in the rugged mountains south of a glacier at the head of the West Fork Robertson River. It is in the SE1/4NE1/4 section 17, T. 19 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Fe

Other:

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
The Goat occurrence is part of a trend of distinctive, generally barren, massive and semimassive pyrite-rich mineralization in the upper portion of the Hayes Glacier belt of rocks. This mineralized trend was traced discontinuously from south of the Tok Glacier to the head of the Gakona Glacier. The massive sulfides occur in pyrite-rich felsic metavolcanic rocks or at the contact of the metavolcanic rocks with graphitic schist or limestone (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978; E. Hunter, unpublished data, 1998).

The Goat occurrence is in rocks that consist mainly of metamorphosed quartz keratophyre and meta-andesite and sparse metadacite and metabasalt. These metavolcanic and subordinate metasedimentary rocks are included in the Hayes Glacier subterrane (Nokleberg and others, 1992), which is Devonian and older.

Alteration:

Age of mineralization:
Devonian and older, on the basis of the age of the host rock, which is in the Hayes Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
The Goat occurrence has only had limited surface examination.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): EEK (southwest of the Kimball Glacier)

Site type: Occurrence

ARDF no.: MH252

Latitude: 63.2550 **Quadrangle:** MH B-2

Longitude: 144.6982

Location description and accuracy:
The EEK occurrence is at an elevation of about 8,700 feet, 2.1 miles northwest of Mount Kimball and west of the Kimball Glacier. The occurrence is in rugged mountains south of a glacier at the head of the West Fork Robertson River. It is in the SE1/4NW1/4 section 21, T. 19 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Fe

Other:

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
The EEK occurrence is part of a trend of distinctive, generally barren, massive and semimassive pyrite-rich mineralization in the upper portion of the Hayes Glacier belt of rocks. This mineralized trend was traced discontinuously from south of the Tok Glacier to the head of the Gakona Glacier. The massive sulfides occur in pyrite-rich felsic metavolcanic rocks or at the contact of the metavolcanic rocks with graphitic schist or limestone (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978; E. Hunter, unpublished data, 1998).

The EEK occurrence is in rocks that consist mainly of metamorphosed quartz keratophyre and meta-andesite and sparse metadacite and metabasalt. These metavolcanic and subordinate metasedimentary rocks are included in the Hayes Glacier subterrane, which is Devonian and older (Nokleberg and others, 1992).

Alteration:

Age of mineralization:
Devonian and older, on the basis of the age of the host rock, which is in the Hayes Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Probably inactive

Workings/exploration:
The EEK occurrence has only had limited surface examination.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Nokleberg and others, 1992; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (near peak 7360)

Site type: Occurrence

ARDF no.: MH253

Latitude: 63.3007 **Quadrangle:** MH B-2

Longitude: 144.6135

Location description and accuracy:
This occurrence is at an elevation of about 7,100 feet, on the wall of the cirque at the head of Rock Candy Creek. It is about one-half mile northeast of the center of section 2, T. 19 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Ag, Pb, Sb (?), Zn

Other: As, Au

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

Gangue minerals: Adularia (?), calcite, quartz

Geologic description:
This occurrence is part of a northwest-trending set of structurally controlled sulfide veins and veinlets that are intermittently exposed for about 9 miles between the Robertson Glacier and the glacier at the head of the West Fork Robertson River. Coarse-grained pyrite, arsenopyrite, galena, sphalerite, and stibnite occur in a gangue of quartz and carbonate with patches of adularia (?). The veins crosscut both bedding and schistosity but are locally parallel to them. The host rocks in this area are siliceous metasedimentary rocks that include quartzite, quartz arenite, and siliceous siltstones (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978).

Samples contain as much as 25 percent lead, 17 percent zinc, 0.1 percent copper, 2 to 3 ounces of silver per ton, and 1.5 parts per million gold (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976). Geologic mapping and geochemical sampling was done from 1976 to 1979; however, most of the work in this area was concentrated on similar veins nearby, such as the RC East prospect (MH255).

Alteration:

Age of mineralization:
Devonian or younger, on the basis of the age of the host rock, which is in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:

Geologic mapping and geochemical sampling was done from 1976 to 1979; however, most of the work in this area was concentrated on similar deposits nearby.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): RC

Site type: Occurrence

ARDF no.: MH254

Latitude: 63.2865 **Quadrangle:** MH B-2

Longitude: 144.6538

Location description and accuracy:
The RC occurrence is at an elevation of about 7,000 feet, 3.4 miles north-northwest of Mount Kimball and south of the head of Rock Candy Creek. The occurrence is in the NW1/4NE1/4 section 10, T. 19 S., R. 16 E., Fairbanks Meridian.

Commodities:

Main: Ag, Cu, Pb, Zn

Other:

Ore minerals: Arsenopyrite, chalcopyrite, galena, pyrite, sphalerite, stibnite

Gangue minerals: Adularia (?), carbonate, quartz

Geologic description:
The RC massive sulfide occurrence consists of pyrite bands with distinctive sphalerite-galena banding and chalcopyrite along fractures. The massive sulfide exposures vary from several inches to 5 feet in thickness. Outcrops are limited; extensive boulder trains of massive sulfides extend downslope and along the trend of the outcrop. Hydrothermal quartz-pyrite-arsenopyrite-stibnite veins locally cut blocks of massive sulfide float. Three veins crop out, each as much as 5 inches in thickness. They contain pyrite, arsenopyrite, galena, sphalerite, and stibnite. The gangue is quartz and carbonate with patches of adularia (?) in selvages as much as 2 inches thick. The veins generally crosscut both bedding and schistosity but are locally parallel to them. The average grade of the massive sulfide mineralization is 0.42 percent copper, 3.97 percent lead, 5.51 percent zinc, 57.2 parts per million silver, and traces of gold (Lange and others, 1993). Exploration of the massive sulfide mineralization soon focused on the higher grade polymetallic veins (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977).

The rocks in the area consist of a complex sequence of volcaniclastic sedimentary rocks, predominantly of intermediate composition. Felsic and mafic metavolcanic and metasedimentary rocks also occur; they include calcareous schist, dolomite, limestone, siltstone, quartzite, and black carbonaceous schist. The rock units are typically thin bedded, strike northwest, and dip moderately southwest. The schistosity and folds are generally parallel to the regional strike, with local exceptions (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

Alteration:

Age of mineralization:
Devonian, on the basis of the age of the host rock, which is in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Polymetallic veins and Kuroko massive sulfide (Cox and Singer, 1986; model 22c, model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c, 28a

Production Status: None

Site Status: Inactive

Workings/exploration:

Four core holes totaling 1,116 feet were drilled in 1977, 1978, and 1980 on the RC occurrence (S.S. Dashevsky, written communication, 2003). Exploration of the massive sulfide mineralization soon focused on the higher grade polymetallic veins (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977).

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; Lange and others, 1993; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg (USGS)

Last report date: 03/20/03

Site name(s): RC East

Site type: Prospect

ARDF no.: MH255

Latitude: 63.2826 **Quadrangle:** MH B-2

Longitude: 144.6245

Location description and accuracy:
The RC East prospect is at an elevation of about 6,000 feet and north of the Kimball Glacier near the center of section 11, T. 19 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, As, Au, Cu, Sb

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

Gangue minerals: Adularia (?), carbonate, quartz

Geologic description:
The RC East prospect is the eastern extension of the Rock Candy massive sulfide layer or unit. The prospect consists of massive and semimassive pyrite bands with distinctive sphalerite-galena banding and chalcopyrite along fractures. Hydrothermal quartz-pyrite-arsenopyrite-stibnite veins and veinlets are widely distributed throughout the area (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1979). The average grade of RC East massive sulfide is 0.3 percent copper, 0.9 percent lead, 1.6 percent zinc, 34.2 parts per million silver, and no gold (Lange and others, 1993). The average of 14 surface samples of the veins was 8.48 percent lead, 5.03 percent zinc, 25.43 ounces of silver per ton, 0.62 ounce of gold per ton, 15.75 percent arsenic, and 1.57 percent antimony (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978).

This occurrence is in the Devonian Jarvis Creek Glacier subterrane (Nokleberg and others, 1992). Rocks at the prospect consist of a complex sequence of volcaniclastic sedimentary rocks, predominantly of intermediate composition. The unit includes felsic and mafic metavolcanic and metasedimentary rocks including calcareous schist, dolomite, limestone, siltstone, quartzite, and black carbonaceous schist. The rocks are typically thin bedded, strike northwest, and dip moderately southwest. The schistosity and folds in the area are generally parallel to the regional strike, but there are local exceptions (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976).

Alteration:

Age of mineralization:
Devonian, on the basis of the age of the host rocks, which are in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Polymetallic veins and Kuroko massive sulfide (Cox and Singer, 1986; model 22c, model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c, 28a

Production Status: None

Site Status: Inactive

Workings/exploration:
Two holes were drilled in 1978 on the RC East prospect; they suggest little potential for significant tonnage.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Nokleberg and others, 1992; Lange and others, 1993; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg (USGS)

Last report date: 03/20/03

Site name(s): Unnamed (north of Kimball Glacier)

Site type: Occurrence

ARDF no.: MH256

Latitude: 63.2837 **Quadrangle:** MH B-2

Longitude: 144.6023

Location description and accuracy:
This occurrence is at an elevation of about 6,000 feet and one-half mile north of the Kimball Glacier and approximately 5 miles south of the terminus of the glacier at the head of the West Fork Robertson River. It is about 0.2 mile west-northwest of the center of section 12, T. 19 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other: Ag

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

Gangue minerals: Quartz

Geologic description:
This occurrence is in an area of a hydrothermal massive sulfide veins. The rocks are quartz-sericite schist with massive pyrite bands as much as 12 inches thick (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978). Samples contain as much as 0.5 percent copper and lead, 1.8 percent zinc, and less than 1 ounce of silver per ton. No significant gold is reported, but it is not clear how many samples were analyzed for gold.

Alteration:

Age of mineralization:
Devonian or younger, on the basis of the age of the host rock, which is in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Polymetallic veins and Kuroko massive sulfide (Cox and Singer, 1986; model 22c, model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
22c, 28a

Production Status: None

Site Status: Inactive

Workings/exploration:
This occurrence has only had limited surface sampling.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (northeast of peak 7360)

Site type: Occurrence

ARDF no.: MH257

Latitude: 63.3046 **Quadrangle:** MH B-2

Longitude: 144.6034

Location description and accuracy:
This occurrence is near the peak at the head of Snowslide Creek and at an elevation of about 7,400 feet. It is about 0.6 mile south-southeast of the center of section 36, T. 18 S., R. 16 E., Fairbanks Meridian. The location is accurate.

Commodities:

Main: Ag, Pb, Sb (?), Zn

Other: As, Au

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

Gangue minerals: Adularia (?), calcite, quartz

Geologic description:
This occurrence is part of a northwest-trending set of structurally controlled sulfide veins and veinlets that are intermittently exposed for about 9 miles between the Robertson Glacier and the glacier at the head of the West Fork Robertson River. Coarse-grained pyrite, arsenopyrite, galena, sphalerite, and stibnite occur in a gangue of quartz and carbonate with patches of adularia (?). The veins crosscut both bedding and schistosity but are locally parallel to them. The rocks in this area are siliceous metasedimentary rocks that include quartzite, quartz arenite, and siliceous siltstones (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978).

Samples contain as much as 1.5 percent lead, 9 percent zinc, 5 to 9 ounces of silver per ton, 0.9 part per million gold, and no copper (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976). Geologic mapping and geochemical sampling was done from 1976 to 1979; however, most of the work in this area was concentrated on similar veins nearby, such as the RC East prospect (MH255).

Alteration:

Age of mineralization:
Devonian or younger, on the basis of the age of the host rock, which is in the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992).

Deposit model:
Polymetallic veins (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:

Geologic mapping and geochemical sampling was done from 1976 to 1979; however, most of the work in this area was concentrated on similar deposits nearby.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Nokleberg and others, 1992; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): PG West

Site type: Occurrence

ARDF no.: MH258

Latitude: 63.3424 **Quadrangle:** MH B-1

Longitude: 144.4722

Location description and accuracy:
The PG West occurrence is 0.2 mile southwest of peak 7630 and in the NW1/4 section 16, T. 18 N., R. 5 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

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

Gangue minerals: Ankerite, carbonate, chlorite, quartz

Geologic description:
The PG West occurrence is a massive sulfide deposit with chalcopyrite, galena, pyrite, and sphalerite in a quartz-ankerite gangue. The deposit is in altered and brecciated quartz sericite schist and carbonaceous schist. Fine to very coarse grained quartz arenite and quartzite units underlie the occurrence, which is above a mafic intrusive body below the PG West occurrence. A gray siltstone composed of quartz, sericite, and graphite forms the hanging wall of the deposit; the overlying rocks consist of chloritic phyllites and intermediate to felsic schists thought to have originally been volcanic sediments and rhyolite tuffs (J. K. Muntzert and others, unpublished Resource Associates of Alaska Inc. report, 1977).

The occurrence was originally described as a volcanogenic massive sulfide deposit. Subsequent examination by American Copper and Nickel in 1994 indicated that the sulfides may be related to skarn developed beside a mafic intrusive (W. Shalosky, written communication, 1994).

Resource Associates of Alaska Inc. drilled one core hole in 1977 after finding pyritic massive sulfides in talus. Some pyrite was was intersected in a 1-foot interval in the core; it contained 0.1 percent copper, 0.8 percent lead, 1.5 percent zinc, 27.8 parts per million (ppm) silver, and 0.1 ppm gold (E. Hunter, unpublished data, 1998).

Alteration:
Strong enveloping pyrite; ankerite; regional carbonate alteration (Lange and others, 1993).

Age of mineralization:
The enclosing Drum unit has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359+/- 6 Ma determined at the DD South deposit (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
Surface sampling and mapping that found the massive sulfide float led to Resource Associates of Alaska Inc. drilling one core hole in 1977.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W. T. Ellis (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and Nokleberg, W.J., (USGS)

Last report date: 03/20/03

Site name(s): PG

Site type: Occurrence

ARDF no.: MH259

Latitude: 63.3357 **Quadrangle:** MH B-1

Longitude: 144.4437

Location description and accuracy:
The PG occurrence is in moraine debris at the toe of the glacier and about 1.6 miles west of peak 7886 in the SW1/4 section 15, T. 18 N., R. 5 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Ag, Au, Cu, Pb, Zn

Other:

Ore minerals: Chalcopyrite, galena, gold, sphalerite

Gangue minerals:

Geologic description:
The PG prospect is a widespread occurrence of massive sulfide float in moraine of an unnamed glacier. The probable source of the float is the Drum unit of felsic metavolcanic rocks that are exposed along the southern edge of the glacier. The unit dips approximately 20 degrees to the southeast; it is overlain by the Tok River unit and underlain by the Tiger unit. The glacier has receded significantly in recent years and has uncovered more massive sulfide float. A 5,000-foot-long train of massive sulfide float has been traced on the ice along the south edge of the glacier. Float samples average 0.8 percent copper, 1.1 percent lead, 2.0 percent zinc, 1.5 ounces of silver per ton, and 1,750 parts per billion (ppb) gold. A sample taken at the head of the float train assayed 0.1 percent copper, 6.6 percent lead, 8.4 percent zinc, 1.5 ounces of silver per ton, and 170 ppb gold (E. Hunter, unpublished data, 1998). About 1.5 miles to the southeast, the Drum mineralized layer is exposed at the PGX prospect (MH260) (E. Hunter, unpublished data, 1998).

Alteration:

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
A 5,000-foot-long train of massive sulfide float has been traced on the ice along the south edge of the gla-

cier, but only limited surface sampling has been completed.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grade Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): PGX

Site type: Prospect

ARDF no.: MH260

Latitude: 63.3252 **Quadrangle:** MH B-1

Longitude: 144.4047

Location description and accuracy:
The PGX prospect is located about 0.2 mile east of a small glacier in section 23, T. 18 N., R. 5 E., Copper River Meridian. The prospect is 0.8 mile southeast of peak 7886 and in the SW1/4 section 23, T. 18 N., R. 5 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Ag, Pb, Zn

Other: Au, Cu

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Calcite, chlorite, gypsum, quartz, sericite

Geologic description:
The PGX prospect is 1.5 miles southeast of the PG occurrence (MH259) and consists of two poorly exposed semimassive bands of sulfide within highly altered felsic metavolcanic rocks of the Drum unit. The bands are discontinuous, about 10 feet apart, and less than 1 foot thick. The upper band assayed 0.11 percent copper, 0.24 percent lead, 0.14 percent zinc, 15 parts per million (ppm) silver, and 300 parts per billion (ppb) gold. The lower band assayed 0.64 percent copper, 0.25 percent lead, 0.60 percent zinc, 23 ppm silver, and 840 ppb gold. In 1997, massive sulfide float was found in the valley southeast of the PGX prospect; it probably came from a layer in the Drum unit. This float contained higher values than found in outcrop at the PGX prospect, and higher grade massive sulfides may be present beneath the talus-covered slopes. A 2-foot boulder assayed 0.02 percent copper, 4.6 percent lead, 3.34 percent zinc, 4 ounces of silver per ton, and 800 ppb gold. A float sample 1,000 feet away assayed 0.24 percent copper, 5.1 percent lead, 5.7 percent zinc, 10 ounces of silver per ton, and 1,805 ppb gold (E. Hunter, unpublished data, 1998).

The Drum unit that hosts the PGX prospect consists of white to pale-gray green, rusty weathering, quartz-sericite(-chlorite-pyrite) schist with minor gray to black carbonaceous phyllite and rare interbeds of chloritic phyllite. The schist commonly contains 1 to 5 percent quartz eyes but may contain more. The protoliths of the schist are about two-thirds of volcanic origin and one-third of sedimentary origin. The schist has a phyllitic parting in many places.

Alteration:

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325), approximately 6 miles to the southeast (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

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

28a

Production Status: None

Site Status: Active

Workings/exploration:

Reconnaissance work began on the PGX prospect in 1976 with the collection of rock and stream-sediment samples (Rodney A. Blakestad and others, Resource Associates of Alaska, Inc., unpublished report, 1976). One hole drilled in 1977 intersected disseminated pyrite. Geophysical grids were established by Resource Associates of Alaska, though a systematic survey was not possible due to extremely rugged terrain.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): PG Northeast

Site type: Occurrence

ARDF no.: MH261

Latitude: 63.3492 **Quadrangle:** MH B-1

Longitude: 144.4023

Location description and accuracy:
The PG Northeast occurrence is a mile north-northwest of peak 7886 at an elevation of about 4,900 feet. It is about one-half mile south of the center of section 11, T. 18 N., R. 5 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Zn

Other: Ag, Cu, Pb

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

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
The PG Northeast occurrence was found in 1995 during follow-up of airborne electromagnetic anomalies that coincided with a graphitic black schist horizon 600 feet to the west. It is a 1-foot-thick massive sulfide layer or unit that occurs in the lower Lagoon unit. Outcrop samples contained 0.28 percent copper, 0.28 percent lead, 5.5 percent zinc, 14 parts per million (ppm) silver, and 10 parts per billion (ppb) gold. A piece of float assayed 0.12 percent copper, 3.44 percent lead, 6.45 percent zinc, 38 ppm silver, and 90 ppb gold. Additional prospecting in this area failed to find other mineralization (E. Hunter, unpublished data, 1998).

The rocks surrounding this occurrence are part of the Tushtena Pass unit; however, the massive sulfide mineralization is in the Lagoon unit. The Lagoon unit consists of a basal section of banded, medium- to coarse-grained, quartz-sericite(-chlorite) schist and carbonaceous schist; the upper part of the section consists of finer grained schist and phyllite. The protoliths of the basal section are immature sediments or wackes, mudstone, quartz arenite, and lesser calcareous arenite and carbonate units. Thin, gray to white and pale-green interbedded metavolcanic members of the lower Lagoon unit are typically rhyolite and rhyodacite, but there is rare andesite and basalt (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:

Work is limited to preliminary surface sampling and mapping in conjunction with its initial discovery. The PG Northeast occurrence was found in 1995 during follow-up of airborne electromagnetic anomalies that coincide with a graphitic black schist unit exposed 600 feet to the west.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): PG East

Site type: Occurrence

ARDF no.: MH262

Latitude: 63.3401 **Quadrangle:** MH B-1

Longitude: 144.3460

Location description and accuracy:
The PG East occurrence is approximately 0.4 mile west of peak 7523 at an elevation of about 6,400 feet. It is about one-third mile west of the center of section 18, T. 18 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Fe

Other: Cu

Ore minerals: Chalcopyrite, pyrite, pyrrhotite

Gangue minerals: Calcite, chlorite, quartz, sericite

Geologic description:
The PG East massive sulfide occurrence is a low-grade sulfide layer or unit within the Tushtena Pass unit. With the PG Southeast prospect (MH263), PG East is part of a 2-mile-long zone of intermittently exposed semimassive and massive sulfides. The sulfides are predominantly pyrite and pyrrhotite with minor chalcopyrite. Massive sulfides reach 2 feet in thickness, and semimassive sulfides are as much as 25 feet thick. Base metal grades are very low. Copper is generally below 0.1 percent, lead, zinc, and silver values do not exceed background, and gold values are about 30 parts per billion (E. Hunter, unpublished data, 1998).

The Tushtena Pass unit that hosts the PG East occurrence consists of medium- to coarse-grained, calcareous, quartz-sericite-chlorite-schist with local carbonate interbeds. The unit is is typically green to gray, foliated, schistose to blocky, laminated to medium-bedded, quartz-eye bearing, quartz-rich rocks with subordinate muscovite, sericite, and chlorite. In many places, sheared zones are the loci of pervasive iron-carbonate alteration that weathers to a distinct reddish hue. Discontinuous bands of siliceous limestone, dolomite, marble, and black, weakly pyritic metasiltstones are common (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:

Only preliminary surface examination of this sulfide occurrence; there are no significantly elevated base or precious metals reported with the iron sulfides (E. Hunter, unpublished data, 1998).

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): PG Southeast

Site type: Occurrence

ARDF no.: MH263

Latitude: 63.3310 **Quadrangle:** MH B-1

Longitude: 144.3303

Location description and accuracy:
The PG Southeast occurrence is 0.7 mile south-southeast of peak 7523 at an elevation of about 6,000 feet. The occurrence is in the NW1/4NE1/4 section 19, T. 18 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Fe

Other: Cu

Ore minerals: Chalcopyrite, pyrite, pyrrhotite

Gangue minerals: Calcite, chlorite, quartz, sericite

Geologic description:
The PG Southeast occurrence is a low-grade sulfide horizon within the Tushtena Pass unit and is part of a 2-mile-long zone of intermittently exposed semimassive and massive sulfides that include the PG East prospect (MH262). The sulfides are predominantly pyrite and pyrrhotite with minor chalcopyrite. The massive sulfides are as much as 2 feet thick and the semimassive sulfides are as much as 25 feet thick. Base metal grades are very low. Copper is typically below 0.1 percent; lead, zinc, and silver values do not exceed background; and gold values are about 30 parts per billion (E. Hunter, unpublished data, 1998).

The Tushtena Pass unit that hosts the PG East occurrence consists of medium- to coarse-grained, calcareous, quartz-sericite-chlorite-schist with local carbonate interbeds. The unit is is typically green to gray, foliated, schistose to blocky, laminated to medium-bedded, quartz-eye bearing, quartz-rich rocks with subordinate muscovite, sericite, and chlorite. In many places, sheared zones are the loci of pervasive iron-carbonate alteration that weathers to a distinct reddish hue. Discontinuous bands of siliceous limestone, dolomite, marble, and black, weakly pyritic metasiltstones are common (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:

Only preliminary surface examination of this sulfide occurrence; there are no significantly elevated base or precious metals reported with the iron sulfides (E. Hunter, unpublished data, 1998).

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (southeast of peak 7057)

Site type: Occurrence

ARDF no.: MH264

Latitude: 63.3066 **Quadrangle:** MH B-1

Longitude: 144.3415

Location description and accuracy:
This occurrence is on the north side of the Robertson River 6.6 miles due west of the confluence of Rumble Creek and the Robertson River at an elevation of about 3,700 feet. The prospect is 1.4 miles southeast of peak 7057 and in the SW1/4 section 30, T. 18 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other: Ag, Au

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, dolomite, graphite, quartz, sericite

Geologic description:
This occurrence is a zone of highly altered felsic metavolcanic rocks in the upper Lagoon unit; it is in a layer or unit similar to the large DW-LP sulfide system (MH334, MH338-341, MH346). Disseminated pyrite is common within the altered volcanic rocks, and zones of semimassive sulfides as much as one foot thick were found. The semimassive sulfides averaged 0.08 percent copper, 0.5 percent lead, 1.0 percent zinc, 15 parts per million silver, and 250 parts per billion gold (E. Hunter, unpublished data, 1998). The protoliths of the Lagoon unit are rhyodacite and dacite, but the unit contains rare rhyolite and minor andesite and basalt. (Dashevsky and others, 2003).

Alteration:
Massive sulfides occur within an intense altered horizon marked by chlorite; there is peripheral sericite-quartz-pyrite -/+ chalcopyrite alteration.

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
American Copper and Nickel Company explored this area; they found that disseminated pyrite is common

in the altered volcanic rocks and there are local zones of semimassive sulfides as much as one foot thick. This area was evaluated by soil sampling and UTEM geophysical surveys following up the strong alteration and favorable stratigraphy. The soil sampling confirmed the presence of an anomalous base metal unit or layer, but the UTEM survey failed to identify a significant electromagnetic conductor (E. Hunter, unpublished data, 1998).

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): DG

Site type: Prospect

ARDF no.: MH265

Latitude: 63.3474 **Quadrangle:** MH B-1

Longitude: 144.0706

Location description and accuracy:
The DG prospect crops out at an elevation of about 4,800 feet on the northeast side of the ridge 0.9 mile southeast of peak 6171. The prospect is about 0.6 mile north-northeast of the center of section 16, T. 18 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Zn

Other: Cu

Ore minerals: Chalcopyrite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
The DG prospect is in the Tushtena Pass unit, largely metavolcanic rocks of Devonian age. Massive and semimassive sulfides occur in quartz-chlorite-sericite-feldspar schist. A single drill hole by Resource Associates of Alaska in 1977 intersected 7.8 feet of massive sulfides; the thickest layer was 1.5 feet thick. The mineralized layer appears to be eroded to the east, west, and north of the showing on the ridge; consequently, there is little tonnage potential (E. Hunter, unpublished data, 1998).

The DG massive sulfide is exposed at surface in a pyritic, quartz-sericite schist; it consists of highly contorted massive layers of pyrite, pyrrhotite, sphalerite, and chalcopyrite as much as a foot thick that are bordered by banded pyrite and banded coarse-grained pyrite and sphalerite. The mineralized zone is approximately 3 feet thick at surface (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977).

A single drill hole tested a magnetic anomaly down-dip from the outcrop. Minor amounts of disseminated sphalerite were intersected over broad zones; mineralized intervals contained as much as 4.0 percent zinc and 0.13 percent copper over a thickness as much as 7.8 feet and no lead or precious metals (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977).

The Tushtena Pass unit, which hosts the DG occurrence, is characterized by medium- to coarse-grained, calcareous, quartz-sericite-chlorite-schist, with local carbonate interbeds. In many places, sheared zones are the loci of pervasive iron-carbonate alteration, and they weather to a distinct reddish hue. Discontinuous bands of siliceous limestone and dolomite marble and black, weakly pyritic metasiltstones are common. The sequence is intruded by gabbroic sills and dikes; hornfels is locally developed in adjacent rocks (Dashevsky and others, 2003).

Alteration:
Chlorite alteration in footwall.

Age of mineralization:
Devonian, on the basis of the age of the host rocks.

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
This prospect was discovered in 1976. In 1977, Resource Associates of Alaska drilled one hole into the mineralized horizon. They penetrated 7.8 feet of 0.13 percent copper, 0.03 percent lead, and 4.0 percent zinc (E. Hunter, unpublished data, 1998).

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Robertson River

Site type: Prospect

ARDF no.: MH266

Latitude: 63.3697 **Quadrangle:** MH B-1

Longitude: 144.0495

Location description and accuracy:
The Robertson River begins at the terminus of the Robertson Glacier and flows northeast 33 miles to the Tanana River, 16 miles northwest of Tanacross. Because an exact location for the prospect is not known, the location is placed at about the middle of the river (north part of T. 18 N., R. 7. E.) and could be several if not many miles away from the location given here.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
A little placer gold was mined in 1954, but not enough to pay for mining (Moffit, 1954).

Alteration:

Age of mineralization:
Quaternary.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
A little placer gold was mined in 1954, but not enough to pay for mining (Moffit, 1954).

Production notes:

Reserves:

Additional comments:

References:
Moffit, 1954.

Primary reference: Moffit, 1954

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

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

Site type: Occurrence

ARDF no.: MH267

Latitude: 63.2317 **Quadrangle:** MH A-3

Longitude: 145.0947

Location description and accuracy:
This occurrence is at an elevation 6,400 feet approximately 3 miles east of Gakona Glacier. It is in the NE1/4NE1/4 section 32, T. 19 S., R. 14 E., Fairbanks Meridian. The site corresponds to locality 1 in Rose (1967) and locality S124 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other:

Ore minerals: Magnetite, pyrite, pyrrhotite

Gangue minerals:

Geologic description:
At this site iron-stained Late Paleozoic or younger amphibolite, hornblendite, and hornblende-augite-plagioclase rock contains 5 to 10 percent disseminated pyrite, pyrrhotite, and magnetite and a trace of chalcopyrite (Rose, 1967). The iron-stained zone exposed on the ridge is 50 feet wide and 100 (or more) feet long (Rose, 1967). A large part of the zone is steep and inaccessible. A sample containing abundant sulfides, including visible chalcopyrite, assayed less than 0.05 percent copper.

Alteration:

Age of mineralization:
Late Paleozoic or younger.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill; possibly Porphyry Cu (Cox and Singer, 1986; model 17).

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

Production Status: No

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Unnamed (east of lower Gakona Glacier)

Site type: Occurrence

ARDF no.: MH268

Latitude: 63.2199 **Quadrangle:** MH A-3

Longitude: 145.1148

Location description and accuracy:
This occurrence is at an elevation 5,300 feet approximately 2 miles east of lower Gakona Glacier. It is in the SW1/4SW1/4 section 32, T. 19 S., R. 14 E., Fairbanks Meridian.

Commodities:

Main: Cu

Other: Co

Ore minerals: Chalcopyrite, pyrite, pyrrhotite

Gangue minerals:

Geologic description:
The north-northeast-trending deposit at this site consists of steeply dipping east-west-trending Upper Triassic layered gabbro, peridotite, and pyroxenite (W.T. Ellis, oral communication, 1994). Some of the gabbro and pyroxenite are very coarse grained. A 3-foot-thick iron-stained zone that strikes north and dips 45E is serpentinized and contains disseminated to semimassive segregations of pyrite, pyrrhotite, and chalcopyrite. A grab sample of a sulfide-rich boulder contained 1,056 parts per million (ppm) copper and 102 ppm cobalt.

Alteration:
Conspicuous iron-staining and moderate to strong serpentinization.

Age of mineralization:
Late Triassic.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The prospect was discovered in 1994 by American Copper and Nickel Company (W.T. Ellis, oral communication, 1994).

Production notes:

Reserves:

Additional comments:

References:
This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Unnamed (east of toe of Gakona Glacier)

Site type: Occurrence

ARDF no.: MH269

Latitude: 63.2005 **Quadrangle:** MH A-3

Longitude: 145.0938

Location description and accuracy:
This occurrence is an elevation 5,250 feet approximately 2 miles east of the toe of the Gakona Glacier. It is in the NE1/4NE1/4 section 8, T. 20 S., R. 14 E., Fairbanks Meridian. The site corresponds to locality 5 of Rose (1967).

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Amphibole

Geologic description:
Pyrite and traces of chalcopyrite occur in an amphibolite-bearing marble skarn along a contact with diorite (Rose, 1967). The marble is part of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:
Development of amphibole-bearing marble skarn at the contact with diorite.

Age of mineralization:
Probably Mesozoic.

Deposit model:
Cu skarn deposit (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:

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Unnamed (northwest of toe of West Fork glacier)

Site type: Occurrence

ARDF no.: MH270

Latitude: 63.1994 **Quadrangle:** MH A-3

Longitude: 145.0193

Location description and accuracy:
This occurrence is at an elevation of 5,100 feet approximately 1 mile northwest of the toe of the glacier at the head of West Fork Chistochina River, in the NE1/4 section 11, T. 20 S., R. 14 E., Fairbanks Meridian. The site corresponds to locality 6 of Rose (1967).

Commodities:

Main: Ag, Pb

Other:

Ore minerals: Galena

Gangue minerals: Calcite, quartz

Geologic description:
This occurrence consists of a silver-bearing galena-quartz-carbonate vein (Rose, 1967). The vein cuts agglomerate that is part of the Slana Spur Formation of Pennsylvanian age (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Pennsylvanian or younger.

Deposit model:
Polymetallic vein (Cox and Singer, 1989; model 22c).

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

Production Status: No

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Science), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 08/14/02

Site name(s): Unnamed (near the glacier at the head of the West Fork Chistochina River)

Site type: Occurrence

ARDF no.: MH271

Latitude: 63.1845 **Quadrangle:** MH A-2

Longitude: 144.9730

Location description and accuracy:
This occurrence is southeast of the terminus of the glacier at the the head of West Fork Chistochina River and at an elevation of about 4,100 feet. It is in the W1/2NE1/4 section 13, T. 20 S., R. 14 E., Fairbanks Meridian. The occurrence corresponds to locality 9 on figure 1 of Rose (1967) and locality 2 on figure 6 of Cobb (1979 [OFR 79-238]). The location is probably accurate within 1,000 feet.

Commodities:

Main: Cu

Other: Fe, Mn

Ore minerals: Chalcopyrite, magnetite, rhodochrosite, rhodonite, pyrite

Gangue minerals: Carbonate mineral, chlorite, epidote, quartz

Geologic description:
The rocks near this site are andesite of the Slana Spur Formation of Pennsylvanian to Permian age (Richter and Dutro, 1975). The andesite is intruded by Mesozoic (?) quartz monzonite and is partly replaced by pods as much as 5 feet wide that have abundant chalcopyrite, pyrite, and magnetite in a gangue of quartz, epidote, chlorite, and an unspecified carbonate mineral (Rose, 1967). Rose found a boulder near the site that contained rhodonite, rhodochrosite, and quartz but could not determine if it was locally derived or transported.

Alteration:
Replacement of andesite by masses of skarn-like pyrite-chalcopyrite-magnetite accompanied by chlorite, epidote, quartz, and a carbonate mineral.

Age of mineralization:
Possibly Mesozoic, on the basis of the association with a quartz monzonite pluton of that age.

Deposit model:
Cu skarn (Cox and Singer, 1986; model 18b).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
The natural exposure of mineralized andesite is in an abandoned stream channel; the occurrence was not found during the investigations of I.M. Lange and W.J. Nokleberg in 1979 and 1980.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Richter and Dutro, 1975; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 6/27/03

Site name(s): Unnamed (Chistochina River)

Site type: Occurrence

ARDF no.: MH272

Latitude: 63.1866 **Quadrangle:** MH A-3

Longitude: 145.0061

Location description and accuracy:
This occurrence is at an elevation of about 3,750 feet and south of the toe of the glacier at the head of West Fork Chistochina River, in the NE1/4 section 14, T. 20 S., R. 14 E., Fairbanks Meridian. It corresponds to locality 4 in figure 6 of Cobb (1979 [OFR 79-238]), which is the location of panned concentrate sample 41 of Rose (1967).

Commodities:

Main: W

Other: Fe

Ore minerals: Pyrite, scheelite

Gangue minerals: Magnetite

Geologic description:
The occurrence is for floodplain gravels of the Chistochina River. A panned concentrate contained about 30 percent magnetite, 10 percent pyrite (which may include pyrrhotite and chalcopyrite), and 6 grains of scheelite (Rose, 1967). Two grains of scheelite were found in panned concentrates from two nearby sites.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Black-sand placer; scheelite occurs in magnetite-rich placer concentrate.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 6/27/03

Site name(s): Unnamed (near terminus of glacier at head of West Fork Chistochina River)

Site type: Prospect

ARDF no.: MH273

Latitude: 63.1733 **Quadrangle:** MH A-2

Longitude: 144.9974

Location description and accuracy:
The prospect is southeast of the terminal moraine of the glacier at the head of the West Fork Chistochina River and at an elevation of about 3,950 feet. It is in the NE1/4NE1/4 section 23, T. 20 S., R. 14 E., Fairbanks Meridian. The prospect corresponds to locality 8 on figure 1 of Rose (1967) and locality 1 on figure 6 of Cobb (1979 [OFR 79-238]).

Commodities:

Main: Cu

Other: Ag, Au, Pb

Ore minerals: Chalcopyrite, malachite, pyrite

Gangue minerals: Quartz

Geologic description:
At this prospect upper Paleozoic volcanic rocks of the Slana Spur Formation are pyritized over a radius of about 600 feet (Rose, 1967). The volcanic strata are cut by a 1-foot-wide quartz-pyrite-chalcopyrite vein and locally stained with malachite. A selected sample of a sulfide-rich part of the vein assayed 0.02 ounce of gold per ton, 0.46 ounce of silver per ton, and 2.2 percent copper. Lead is present but probably at less than 500 parts per million (Rose, 1967).

Alteration:

Age of mineralization:
Late Paleozoic or younger, on the basis of the age of the host rocks.

Deposit model:
Polymetallic vein (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
A quartz-pyrite-chalcopyrite vein is exposed in a small pit.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 6/27/03

Site name(s): Daisy

Site type: Occurrence

ARDF no.: MH274

Latitude: 63.1395 **Quadrangle:** MH A-2

Longitude: 144.9840

Location description and accuracy:
This occurrence on the Daisy claims is along the West Fork Chistochina River about 1.2 mile above the confluence of West Fork Chistochina River and the main channel of the Chistochina River. It is in the SE1/4NW1/4 section 36, T. 20 S., R. 14 E., Fairbanks Meridian. The site corresponds to location 30 of Rose (1967) and is accurate. It is also near a location at which scheelite was panned from gravel of the West Fork Chistochina (Rose, 1967).

Commodities:

Main: Cu (?)

Other: W (?)

Ore minerals: Pyrite, scheelite

Gangue minerals:

Geologic description:
A stock of granodiorite or quartz monzonite is exposed in outcrops on the north and south sides of the West Fork Chistochina River near this site (Rose, 1967). To the northwest, the intrusion is in contact with volcanic rocks that are locally pyritized and iron-stained. The gravel nearby in the West Fork Chistochina River probably contains some placer scheelite (Rose, 1967; W.J. Nokleberg, written communication, 1996).
The pyritized volcanic rocks and adjacent intrusion were covered by eight Daisy claims in 1966. The Daisy claims were part of an 85-claim group staked in 1985 by Norman Moore, possibly on a porphyry copper prospect (Rose, 1967).

Alteration:
Pyritic alteration of granitic and volcanic rocks.

Age of mineralization:
Holocene placer and Mesozoic pyritization.

Deposit model:
Porphyry Cu (?) (Cox and Singer, 1986; model 20c); placer W.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Claims were staked in 1966; only limited surface sampling has been done.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/13/03

Site name(s): Unnamed (on divide between Chistochina Glacier and West Fork Chistochina glacier)

Site type: Occurrence

ARDF no.: MH275

Latitude: 63.2157 **Quadrangle:** MH A-2

Longitude: 144.8918

Location description and accuracy:
The occurrence is on a steep ridge west-northwest of peak 5990. It is in the NW1/4NW1/4 of section 4, T. 20 S., R. 15 E., Fairbanks Meridian. The occurrence corresponds to locality 15 on figure 1 of Rose (1967) and locality 6 on figure 6 of Cobb (1979 [OFR 79-238]). The location is probably accurate within 1,000 feet.

Commodities:

Main: Au

Other: Ag, Cu

Ore minerals: Chalcopyrite (?), pyrite

Gangue minerals: Quartz

Geologic description:
The rocks in the vicinity of this occurrence consist of metabasalts of the Nikolai Greenstone of Late Triassic age (Nokleberg and others, 1991); earlier the rocks were mapped as Mankomen Formation (Rose, 1967). A pyritic unit of the Nikolai Greenstone extends for more than a mile along strike; it is cut by intermediate and mafic dike rocks. The pyritized rock possibly contains a trace of chalcopyrite. Grab sample 6E534 contained 0.02 ounce of gold per ton, 0.18 ounce of silver per ton, and a trace of copper (Rose, 1967, table 5).

Alteration:
Sulfidization of metabasalt.

Age of mineralization:
Post-Late Triassic, on the basis of the age of host rocks.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: No

Site Status: Inactive

Workings/exploration:
Geologic mapping; limited surface sampling.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967; Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/1/03

Site name(s): Unnamed (east of glacier at the head of West Fork Chistochina River)

Site type: Occurrence

ARDF no.: MH276

Latitude: 63.2086 **Quadrangle:** MH A-2

Longitude: 144.9181

Location description and accuracy:
This occurrence is about 2 miles east of the terminus of the Chistochina Glacier at an elevation of about 5,000 feet. It is in the NE1/4SW1/4 section 5, T. 20 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 14 on figure 1 of Rose (1967), locality 5 on figure 6 of Cobb (1979 [OFR 78-238]), and locality 130 in table 2 of Nokleberg and others (1991). The location is probably accurate within 0.2 mile.

Commodities:

Main: Au

Other: Cu, W

Ore minerals: Chalcopyrite, pyrite

Gangue minerals: Quartz

Geologic description:
Argillite of the Slana Spur Formation is pyritized adjacent to a granodiorite intrusion of probable Mesozoic age (Rose, 1967). The pyritic zone is about 750 by 1,500 feet in extent. A sample of intensely iron stained argillite with a trace of chalcopyrite contained 0.04 ounce of gold per ton and a trace of silver (Rose, 1967). A sample collected during a U.S. Geological Survey investigation contained 1.2 ppm of gold, a trace of silver, and 100 ppm tungsten (Nokleberg and others, 1991).

Alteration:
Pyritization of argillite adjacent to a Mesozoic granodiorite.

Age of mineralization:
Probably related to a nearby Mesozoic intrusion.

Deposit model:
Polymetallic vein(s) (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:
Geologic mapping and limited surface sampling.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967; Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 06/28/03

Site name(s): Unnamed (north of peak 6168)

Site type: Occurrence

ARDF no.: MH277

Latitude: 63.1952 **Quadrangle:** MH A-2

Longitude: 144.9141

Location description and accuracy:
This occurrence is just north of peak 6168 on a steep ridge. It is about 0.1 mile south of the center of section 8, T. 20 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 129 in table 2 of Nokleberg and others (1991). The location is approximate.

Commodities:

Main: Cu

Other:

Ore minerals: Azurite

Gangue minerals:

Geologic description:
The rock in this area is Mesozoic (?) quartz monzonite that is cut by pegmatite dikes (Rose, 1967; Nokleberg and others, 1991). A pegmatite dike weakly stained with azurite assayed 0.22 percent copper.

Alteration:

Age of mineralization:
Probably Mesozoic, the age of host pluton.

Deposit model:
Polymetallic vein? (Cox and Singer, 1986; model 22c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Geologic mapping and limited surface sampling.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 6/24/03

Site name(s): Unnamed (near the east side of terminus of glacier at head of the West Fork Chistochina River)

Site type: Occurrence

ARDF no.: MH278

Latitude: 63.1870 **Quadrangle:** A-2 A-2

Longitude: 144.9608

Location description and accuracy:
This occurrence is about one-third mile southeast of the 1966 terminus of the glacier at the head of the West Fork Chistochina River (see figure 2 of Rose, 1967). It is about 0.6 mile northeast of the center of section 13, T. 20 S., R. 14 E., Fairbanks Meridian, and the location is accurate for the approximate center of a mineralized area.

Commodities:

Main: Zn (?)

Other: Pb (?)

Ore minerals: Galena (?), pyrite, sphalerite (?)

Gangue minerals:

Geologic description:
The rocks in the vicinity of this occurrence are mainly andesite, notably pyritized (Rose, 1967). Rose mapped these rocks as Chisna Formation of Pennsylvanian to Permian age, but more recently they have been considered to be Tetelna Volcanics or Slana Spur Formation (Richter and Dutro, 1975).
The area is not mapped in detail, but Rose (1967) showed two masses of pyritized rock north of a large stock of quartz monzonite and granodiorite. Two stream-sediment samples collected below the pyritized volcanic rocks are markedly anomalous in zinc (620 and 630 parts per million [ppm]), and moderately anomalous in lead (70 and 105 ppm) and have at least background amounts of copper (Rose, 1967).

Alteration:
Pyritic.

Age of mineralization:
Possibly related to the Pennsylvanian to Permian volcanic rocks or to emplacement of a nearby Mesozoic quartz monzonite pluton.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no reported workings.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Richter and Dutro, 1975.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 6/27/03

Site name(s): Unnamed (on ridge between Chistochina Glacier and glacier near the head of West Fork Chistochina River)

Site type: Occurrence

ARDF no.: MH279

Latitude: 63.1803 **Quadrangle:** MH A-2

Longitude: 144.9487

Location description and accuracy:
The occurrence is on the ridge between the Chistochina River and the glacier at the head of the West Fork Chistochina River, about 3 miles north of their confluence; it is at an elevation of about 5,400 feet. The occurrence is about 0.1 mile southwest of the center of section 18, T. 20 S., R. 15 E., Fairbanks Meridian. The occurrence corresponds to locality 10 on figure 2 of Rose (1967) and locality 130 in table 2 of Nokleberg and others (1991); the location is probably accurate within 1,000 feet.

Commodities:

Main: Cu

Other: Ag

Ore minerals: Azurite, malachite

Gangue minerals:

Geologic description:
The rocks in vicinity of this occurrence are dacite and andesite of the Chisna Formation (Rose, 1967). The rocks possibly belong to the Tetelna Volcanics or Slana Spur Formation of Richter and Dutro (1975). A north-trending dike of quartz monzonite that can be traced for about 2 miles cuts the volcanic rocks.
Float fragments of dacite and andesite are stained with azurite and malachite (Rose, 1967; Nokleberg and others, 1991). A grab sample from the locality contained 5 parts per million silver. Two nearby occurrences, MH280 and MH281, are also in volcanic wall rocks near the quartz monzonite dike.

Alteration:

Age of mineralization:
Possibly related to the Pennsylvanian to Permian volcanic rocks or related to the Mesozoic quartz monzonite.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Only limited surface sampling and geologic mapping.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Richter and Dutro, 1975; Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 6/29/03

Site name(s): Unnamed (on ridge between Chistochina Glacier and the glacier near the head of West Fork Chistochina River)

Site type: Occurrence

ARDF no.: MH280

Latitude: 63.1733 **Quadrangle:** MH A-2

Longitude: 144.9534

Location description and accuracy:
The occurrence is about 2.5 miles north of the confluence of the Chistochina River and the West Fork Chistochina Rivers at an elevation of about 5,600 feet. It is in the NW1/4 section 19, T. 20 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 11 on figure 2 of Rose (1967) and locality 3 on figure 6 of Cobb (1979 [OFR 79-238]). The location is probably accurate to within 0.1 mile.

Commodities:

Main: Fe

Other:

Ore minerals: Hematite, magnetite

Gangue minerals: Quartz

Geologic description:
The rocks at the site consist of andesite to dacite agglomerate, flows, and tuff of the Chisna Formation of Pennsylvanian to Permian (?) age (Rose, 1967). The volcanic rocks probably correlate with Tetelna Volcanics of Pennsylvanian age or Slana Spur Formation of Pennsylvanian to Permian age (Richter and Dutro, 1975).
Specular hematite and hematite with quartz and some magnetite occur in float and in a banded-hematite outcrop exposed for about 15 feet. The float occurrences are scattered along a north-trending zone about 300 feet long. The deposit appears to be a replacement of the volcanic rocks (Rose, 1967). It is on the west flank of the same Mesozoic quartz monzonite dike as occurrences MH279 and MH281.

Alteration:
Replacement of intermediate volcanic rocks by quartz, hematite, and magnetite.

Age of mineralization:
Possibly related to Pennsylvanian to Permian volcanic rocks or the Mesozoic quartz monzonite.

Deposit model:
Possibly Fe skarn (Cox and Singer, 1986; model 18d).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
Geologic mapping.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Richter and Dutro, 1975; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 6/29/03

Site name(s): Unnamed (north of mouth of the West Fork Chistochina River)

Site type: Occurrence

ARDF no.: MH281

Latitude: 63.1679 **Quadrangle:** MH A-2

Longitude: 144.9581

Location description and accuracy:
The occurrence is about 2 miles north of the confluence of the Chistochina River and the West Fork Chistochina River at an elevation of about 5,450 feet. The occurrence is in the SW1/4NW1/4 section 19, T. 20 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 12 on figure 2 of Rose (1967).

Commodities:

Main: Fe

Other:

Ore minerals: Magnetite

Gangue minerals: Quartz

Geologic description:
The rocks at the site consist of andesite to dacite agglomerate, flows, and tuff of the Chisna Formation (Rose, 1967). The volcanic rocks probably correlate with Tetelna Volcanics of Pennsylvanian age or Slana Spur Formation of Pennsylvanian to Permian age (Richter and Dutro, 1975).

Rose (1967) found several boulders of quartz-magnetite rock at this location; the underlying deposit is probably similar to the replacement deposit of quartz-hematite-magnetite at MH280. Both sites are about one-quarter mile west of a prominent quartz monzonite dike.

Alteration:
Probable replacement of intermediate volcanic rocks by quartz and magnetite.

Age of mineralization:
Possibly related to Pennsylvanian to Permian volcanic rocks or to Mesozoic quartz monzonite.

Deposit model:
Possibly Fe skarn (Cox and Singer, 1986; model 18d).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Geologic mapping only.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Richter and Dutro, 1975.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 6/24/03

Site name(s): Unnamed (south of Slate Creek)

Site type: Occurrence

ARDF no.: MH282

Latitude: 63.1646 **Quadrangle:** MH A-2

Longitude: 144.8465

Location description and accuracy:
This occurrence is about a mile southeast of the mouth of Slate Creek and at an elevation of about 4,400 feet. The occurrence is in the NW1/4SE1/4 section 22, T. 20 S., R. 15 E., Fairbanks Meridian. The occurrence corresponds to locality 25 of Rose (1967) and locality 18 on figure 6 of Cobb (1979 [OFR 79-238]. The location is accurate within 0.1 mile.

Commodities:

Main: Au

Other:

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
The rocks at this occurrence are an extensive body of pyritized andesite of Pennsylvanian age (Rose, 1967). The volcanic rocks are cut by quartz veinlets, and a sample assayed 0.04 ounce of gold per ton (Rose, 1967).

Alteration:
The andesite is pyritized and has been silicified (Rose, 1967).

Age of mineralization:
Uncertain; epigenetic introduction of quartz and pyrite.

Deposit model:
Possibly 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:

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/9/03

Site name(s): Unnamed (northwest of the terminus of Chistochina Glacier)

Site type: Occurrence

ARDF no.: MH283

Latitude: 63.2158 **Quadrangle:** MH A-2

Longitude: 144.8813

Location description and accuracy:
The occurrence is about 2 miles northwest of the terminus of the Chistochina Glacier. It is about 0.2 mile east-northeast of peak 5990 in the NW1/4NE1/4 section 4, T. 20 S., R. 15 E., Fairbanks Meridian. The occurrence corresponds to locality 16 on figure 1 of Rose (1967), locality 7 on figure 6 of Cobb (1979 [OFR 79-238]), and locality 131 in table 2 of Nokleberg and others (1991). The location is probably accurate within 0.2 mile.

Commodities:

Main: Ag, Au

Other: Cu, Mo, Ni

Ore minerals: Chalcopyrite, pentlandite (?), pyrite, pyrrhotite

Gangue minerals: Quartz

Geologic description:
The metavolcanic rocks in the vicinity of the occurrence are chiefly amphibolite and derived from the Nikolai Greenstone of Late Triassic age; the rocks were earlier mapped as Mankomen Formation of Permian age (Nokleberg and others, 1991; Rose, 1967). The metavolcanic rocks are cut by quartz veins that contain pyrite, pyrrhotite, possibly pentlandite, and a trace of chalcopyrite. Sample 6E537 collected by Rose (1967, table 5) contained 0.02 ounce of gold per ton, 0.14 ounce of silver per ton, and detectable trace amounts of copper and nickel. Sample 79IL067C collected at the site by Nokleberg and others (1991) contained 10 parts per million molybdenum. Stream-sediment samples collected below the site were anomalous in zinc and molybdenum (Rose, 1967).

Alteration:
Sulfidization of amphibolite.

Age of mineralization:
Post-Late Triassic, on the basis of the age of the host rock.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: No

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/1/03

Site name(s): Unnamed (northwest of the terminus of Chistochina Glacier)

Site type: Occurrence

ARDF no.: MH284

Latitude: 63.2066 **Quadrangle:** MH A-2

Longitude: 144.8715

Location description and accuracy:
This occurrence is northwest of the 1966 terminus of the Chistochina Glacier at an elevation of about 5,200 feet. The occurrence is in the SE1/4SE1/4 section 4, T. 20 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 17 on figure 1 of Rose (1967)and locality 8 on figure 6 of Cobb (1979 [OFR 79-238]) and is approximately the same as locality 133 in table 2 of Nokleberg and others (1991). The location is accurate within 0.2 mile.

Commodities:

Main: Au

Other: Ag, Zn (?)

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
The rocks in this area are part of the Eagle Creek Formation of Early Permian age and consist of interlayered argillite and limestone (Nokleberg and others, 1991). The unit was mapped as Mankomen Formation by Rose (1967). Subsequently, the units were remapped as part of the Eagle Creek Formation, a member of the Mankomen Group (Richter and Dutro, 1975).

The Eagle Creek argillite is extensively pyritized at the site. The pyritized argillite lies north of a body of Upper Triassic (?) ultramafic rock that is intruded by quartz monzonite of Mesozoic age (Rose, 1967).

A grab sample of pyritic argillite contained 0.02 ounce of gold per ton and trace amounts of silver and zinc (Rose, 1967).

Alteration:
Pyritization of Lower Permian argillite.

Age of mineralization:
Post-Early Permian and probably Mesozoic, related to a nearby granodiorite intrusion.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Geologic mapping and limited surface sampling.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Richter and Dutro, 1975; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/1/03

Site name(s): Unnamed (northwest of Chistochina Glacier)

Site type: Occurrence

ARDF no.: MH285

Latitude: 63.2037 **Quadrangle:** MH A-2

Longitude: 144.8708

Location description and accuracy:
This occurrence is float on a moraine on the mountain northwest of the 1966 terminus of the glacier at the head of the Chistochina River. It is in the southern part of the SE1/4SE1/4 section 4, T. 20 S., R. 15 E., Fairbanks Meridian. The occurrence corresponds to locality 18 on figure 1 of Rose (1967) and locality 9 on figure 6 of Cobb (1979 [OFR 79-238]) and is included with nearby site MH284 in locality 133 on table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag, Au, Ni, Pt

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

Gangue minerals:

Geologic description:
A dunite boulder was collected on glacial moraine near the projected contact of an ultramafic body consisting of dunite, peridotite, and pyroxenite with argillite of the Eagle Creek Formation (Rose, 1967). The ultramafic body is about 1,500 feet across and extends for about one mile, sandwiched between quartz monzonite to the south and argillite of the Eagle Creek Formation to the north. The boulder contained abundant pyrite and probably chalcopyrite and pyrrhotite; it assayed 0.75 percent copper, a trace of gold and platinum, 0.12 ounce of silver per ton, and 0.2 percent nickel (Rose, 1967). The boulder was probably derived locally.

Alteration:

Age of mineralization:
Probably related to ultramafic rocks of Late Triassic age.

Deposit model:
Ni-Cu-PGE in differentiated mafic-ultramafic sill.

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

Production Status: None

Site Status: Inactive

Workings/exploration:
No workings are reported. The sulfide-bearing boulder was found during mapping by Rose (1967).

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/1/03

Site name(s): Unnamed (northwest of the terminus of Chistochina Glacier)

Site type: Occurrence

ARDF no.: MH286

Latitude: 63.1999 **Quadrangle:** MH A-2

Longitude: 144.8764

Location description and accuracy:
This occurrence is on a ridge on the northwest side of the terminus of the Chistochina Glacier at an elevation of about 5,700 feet. It is near the center of the W1/2NE1/4 section 9, T. 20 S., R. 15 E., Fairbanks Meridian. This corresponds to locality 19 on figure 1 of Rose (1967) and locality 10 on figure 6 of Cobb (1979 [OFR 79-238]). It is accurate to about 0.1 mile.

Commodities:

Main: Chrysotile

Other: Fe

Ore minerals: Chrysotile, magnetite

Gangue minerals:

Geologic description:
The host rock at this occurrence is dunite in a composite ultramafic body that also contains peridotite, pyroxenite, and hornblendite (Rose, 1967). Thin veinlets of cross-fiber chrysotile cut the dunite. Boulders of hornblendite near the site contain as much as about 10 percent magnetite. No analyses are reported from the area.

Alteration:
Alteration of the dunite has produced veinlets of cross-fiber chrysotile.

Age of mineralization:
Probably Late Triassic, related to the sillform body that hosts the occurrence.

Deposit model:
Low-grade deposit of cross-fiber asbestos (chrysotile) and disseminated magnetite in layered mafic-ultramafic complex.

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

Production Status: No

Site Status: Inactive

Workings/exploration:
The site was found during geologic mapping (Rose, 1967).

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/1/03

Site name(s): Unnamed (west of the terminus of Chistochina Glacier)

Site type: Occurrence

ARDF no.: MH287

Latitude: 63.1934 **Quadrangle:** MH A-2

Longitude: 144.8786

Location description and accuracy:

This occurrence is west of the terminus of the Chistochina Glacier about 4.7 miles northeast of the junction of the Chistochina River and the West Fork Chistochina River. The elevation is about 4,800 feet. The occurrence is in the NW1/4SE1/4 section T. 20 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 11 on figure 6 of Cobb (1979 [OFR 79-238]) and locality 134 in table 2 of Nokleberg and others (1991). The location of the occurrence seems to be that of locality 20 of Rose (1967), but the geology does not appear to fit (see Geologic Description). Thus the location is uncertain. Cobb (1979 [OFR 79-238]) and Nokleberg and others (1991) carry this uncertainty forward.

Commodities:

Main: Cu

Other: Ag, Au, Ni

Ore minerals: Chalcopyrite (?), pyrite

Gangue minerals: Quartz

Geologic description:

Locality 20 of Rose (1967) is in a mile-long northeast-trending body of gabbro and mafic gabbro south of quartz monzonite of probable Mesozoic age. The mafic gabbro of the region contains 10 to 20 percent plagioclase, major amounts of hornblende and pyroxene, and accessory biotite, magnetite, and apatite (Rose, 1967). Rose's description of the area noted a 50-foot-wide zone of pyritized rocks at the contact between peridotite and monzonite. The occurrence could be at a local peridotite-monzonite contact within the gabbro body. The nearest such contact on the map is, however, about one-half mile north, near MH286.

A grab sample collected at locality 20 contained 0.02 ounce of gold per ton, 0.18 ounce of silver per ton, 0.2 percent copper, and a trace of nickel (Rose, 1967). The copper is probably from chalcopyrite or a secondary copper mineral after chalcopyrite.

Alteration:

Pyritization.

Age of mineralization:

Mesozoic (?).

Deposit model:

Uncertain; Porphyry Cu (?) (Cox and Singer, 1986; model 20c) or related to a differentiated mafic-ultramafic sill.

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

20c (?)

Production Status: No

Site Status: Inactive

Workings/exploration:

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/1/03

Site name(s): Chistochina Glacier

Site type: Mine

ARDF no.: MH288

Latitude: 63.1778 **Quadrangle:** MH A-2

Longitude: 144.8641

Location description and accuracy:
The placer mine is in the main flood plain of the Chistochina River about 0.6 mile north of the mouth of Slate Creek. It is in the NW1/4SW1/4 section 15, T. 20 S., R. 15 E., Fairbanks Meridian. The location of the mine is shown by Rose (1967); it corresponds to locality 12 on figure 6 of Cobb (1979 [OFR 79-238]). The location is accurate within about 0.1 mile.

Commodities:

Main: Au

Other: Platinum group elements (PGE), W

Ore minerals: Gold, PGE, scheelite

Gangue minerals: Magnetite (?)

Geologic description:
Placer gold and some platinum-group elements (PGE) and scheelite occur in Holocene outwash gravels of the Chistochina River in a part of the river's course that was covered by ice in 1900 (Rose, 1967; Cobb, 1979 [OFR 79-238]). The gold, PGE, scheelite, and possible magnetite probably occur in outwash or river-bar-type deposits.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined

Site Status: Inactive

Workings/exploration:
Twelve claims were reported in the area by Rose (1967). There are no extensive workings.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/1/03

Site name(s): Unnamed (near the mouth of Slate Creek)

Site type: Occurrence

ARDF no.: MH289

Latitude: 63.1704 **Quadrangle:** MH A-2

Longitude: 144.8632

Location description and accuracy:
This occurrence is near the mouth of Slate Creek, near the center of the W1/2NW1/4 section 22, T. 20 S., R. 15 E., Fairbanks Meridian. The occurrence corresponds to locality 24 of Rose (1967), locality 17 on figure 6 of Cobb (1979 [OFR 79-238]), locality 48 of MacKevett and Holloway (1977), and locality 136 in table 2 of Nokleberg and others (1991). The location is accurate within 0.1 mile.

Commodities:

Main: Cu

Other: Ag, Au

Ore minerals: Chalcopyrite, pyrite

Gangue minerals:

Geologic description:
Rocks in the vicinity of the occurrence consist mainly of andesite and dacite of Pennsylvanian age northwest of a dikelike body of quartz monzonite of Mesozoic age (Rose, 1967). The volcanic rocks are highly pyritized and contain weakly disseminated chalcopyrite (MacKevett and Holloway, 1977). A sample of pyritized volcanic rocks contained a trace of gold, 0.12 ounce of silver per ton, and 0.15 percent copper (Rose, 1967).

Alteration:
Pyritization of volcanic rocks.

Age of mineralization:
The mineralization is either syngenetic and related to the Pennsylvanian volcanic rocks or epigenetic, related to the Mesozoic quartz monzonite body.

Deposit model:
Porphyry Cu (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:

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/9/03

Site name(s): Unnamed (southwest of Slate Creek)

Site type: Occurrences

ARDF no.: MH290

Latitude: 63.1591 **Quadrangle:** MH A-2

Longitude: 144.8768

Location description and accuracy:
These occurrences are at the approximate center of localities 28 and 29 on figure 1 of Rose (1967). The location is at an elevation of about 4,400 feet in the NW1/4NE1/4 section 28, T. 20 S., R. 15 E., Fairbanks Meridian. Rose's locality 29 is a few hundred feet west-northwest of the location; his locality 28 is a few hundred feet east-southeast of it.

Commodities:

Main: Fe

Other:

Ore minerals: Hematite, pyrite

Gangue minerals:

Geologic description:
Rocks in the vicinity of these occurrences consist of andesite and dacite agglomerate, tuff, and flows of Pennsylvanian to Permian (?) age (Rose, 1967). Boulders of hematite and hematite-pyrite were found at two main sites on a steep side hill, and the source of the boulders is probably subjacent to or just above the talus.

Andesite and dacite near the site have been extensively pyritized, possibly by nearby intrusions of Mesozoic age. The boulders are possibly from a contact-metamorphic type of iron deposit. Iron-rich deposits nearby locally contain copper (about one half mile to the southeast).

Alteration:
Replacement of intermediate volcanic rocks by iron minerals.

Age of mineralization:
Mesozoic (?), inferred from nearby plutons of that age.

Deposit model:
Possibly Fe skarn (Cox and Singer, 1986; model 18d).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Only geologic mapping and surface prospecting.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 6/24/03

Site name(s): Unnamed (east of Chistochina River)

Site type: Occurrence

ARDF no.: MH291

Latitude: 63.1239 **Quadrangle:** MH A-2

Longitude: 144.9047

Location description and accuracy:
This occurrence is about 1.5 miles east-southeast of the junction of the Chistochina River and the West Fork Chistochina Rivers. The occurrence is about one-third mile east of the center of section 5, T. 21 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 138 in table 2 of Nokleberg and others (1991), and the location is probably accurate to 0.2 mile.

Commodities:

Main: Ag, Cu

Other:

Ore minerals: Azurite, chalcopyrite, malachite, pyrite

Gangue minerals: Actinolite, albite, chlorite, epidote, potassium feldspar, quartz, sericite

Geologic description:
This occurrence is in dacite porphyry of Early Permian age. The dacite intrudes the lower part of the Slana Spur Formation of Pennsylvanian to Early Permian age; the Slana Spur Formation is mainly composed of dacite agglomerate. Locally, the dacite porphyry is intensely altered to a rock composed of actinolite, albite, chlorite, epidote, potassium feldspar, and sericite.

This occurrence is a dacite porphyry that contains disseminated pyrite and chalcopyrite and is locally stained with azurite and malachite. A grab sample assayed 1.14 percent copper and 50 parts per million silver (Nokleberg and others, 1991).

The deposit is probably a porphyry copper related to the Early Permian dacite porphyry.

Alteration:
Locally intense alteration of dacite. Alteration minerals include actinolite, albite, chlorite, epidote, potassium feldspar, and sericite.

Age of mineralization:
Probably Early Permian.

Deposit model:
Probably Porphyry Cu (Cox and Singer, 1986; model 20c).

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

Production Status: None

Site Status: Undetermined

Workings/exploration:
Limited surface sampling; no workings reported from the site.

Production notes:

Reserves:

Additional comments:
More prospecting appears to be warranted.

References:
Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/9/03

Site name(s): Unnamed (on a south fork of Powell Creek)

Site type: Prospect

ARDF no.: MH292

Latitude: 63.1319 **Quadrangle:** MH A-2

Longitude: 144.8650

Location description and accuracy:
This prospect (or mine) is in an unnamed south fork of Powell Creek (Gulch). The prospect is shown with a mine symbol at the end of a trail on the 1975 Mount Hayes A-2 topographic map. It is in the southwest corner of section 34, T. 20 S., R. 15 E., Fairbanks Meridian.

Commodities:

Main: Ag (?), Au (?), Cu (?)

Other:

Ore minerals:

Gangue minerals:

Geologic description:
The rocks in the vicinity of this prospect or mine are a dacite intrusion of Permian age near its contact with volcanic agglomerate of the Slana Spur Formation of Pennsylvanian and early Permian age (Nokleberg and others, 1991). Judged from its topographic and geologic occurrence, the prospect could be either a placer location or a copper occurrence similar to MH291. There is, however, no information about this record other than the mine symbol on the Mount Hayes A-2 topographic map.

Alteration:

Age of mineralization:

Deposit model:

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

Production Status: Undetermined.

Site Status: Undetermined

Workings/exploration:
A mine is shown on the Mount Hayes A-2 topographic map at this location.

Production notes:

Reserves:

Additional comments:

References:
Nokleberg and others, 1991; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/11/03

Site name(s): Big Four Creek; Big Four Gulch

Site type: Mine

ARDF no.: MH293

Latitude: 63.1854 **Quadrangle:** MH A-2

Longitude: 144.8212

Location description and accuracy:

Big Four Creek or Gulch, an informal name (not on the 1975 revision of the A-2 quadrangle), is on the south side of the Chistochina River about 1.6 miles northeast of the mouth of Slate Creek, which flows northwesterly into the Chistochina. The Big Four Creek placer mine is mainly in the E1/2NW1/4 section 14, T. 20 S., R. 15 E., Fairbanks Meridian. The location is plotted near the main site of mining, which is south of the 1966 terminus of Chistochina Glacier (Rose, 1967). Most mining has taken place between elevations of 4,300 and 4,600 feet. The location is accurate; it is approximately the same as locality 14 on figure 6 of Cobb (1979 [OFR 79-238]), locality 66 of MacKevett and Holloway (1977), and locality 8 in table 3 of Nokleberg and others (1991).

Commodities:

Main: Au

Other: Ag, Cu, Cr, Hg, Pt

Ore minerals: Chromite, copper (native), gold, iron-platinum alloy, mercury

Gangue minerals:

Geologic description:

Big Four Creek is a short, steep creek cut into Upper Triassic cumulate gabbro, argillite of the Mankomen or Eagle Creek Formations, and, at its head, the Tertiary 'round wash' conglomerate (Rose, 1967). Rose also mapped irregular breccia bodies of uncertain origin in upper Big Four Creek. The pay gravel in the creek is mainly derived from the 'round wash' conglomerate. The 'round wash' consists of gravel and partly indurated cobble and boulder 'stone' locally containing well-rounded to subangular boulders as much as a foot across. Clasts are mainly schist, greenstone, granite, and argillite (Yeend, 1981 [C 823-B]).

Gold is shotty to well-worn and is somewhat finer grained than the gold from the Miller Gulch placer (MH296; Moffit, 1912), a deposit also derived from the reworking of 'round wash' conglomerate. Gold is accompanied by some native copper and native mercury. Placer concentrates are mainly (65 to 70 percent) magnetite and 30 percent ilmenite and contain lesser amounts of chromite, pyrite, epidote, garnet, and zircon (Yeend, 1981 [C 823-B]). Small amounts of platinum-group metals (PGE) occur; iron-platinum alloy from the concentrates contained 83 percent platinum and 17 percent iron as determined by electron-microprobe analysis (Foley, 1992).

The placer deposit was discovered in 1902, and mining commenced immediately (Mendenhall, 1903; Mendenhall and Schrader, 1903). Mining has continued intermittently to the present.

Alteration:

The 'round wash' conglomerate is extensively altered to clay (Chapin, 1919).

Age of mineralization:

Tertiary to Holocene.

Deposit model:

Placer Au-PGE (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:
Gold was discovered in Big Four Creek by 1902, and mining commenced immediately (Mendenhall, 1903; Mendenhall and Schrader, 1903). The placer deposit was worked on a small scale intermittently between 1903 and the present (Moffit, 1912, 1944; Yeend, 1981 [C 823-B]; Foley, 1992). The deposit itself is fairly small, and water has often been in short supply, minimizing production (Moffit, 1954). The creek has been mined by mechanized open-cut methods intermittently since the early 1950's (Foley, 1992).

Production notes:

Reserves:

Additional comments:

References:
Mendenhall, 1903; Mendenhall and Schrader, 1903; Moffit, 1912; Chapin, 1919; Moffit, 1944; Moffit, 1954; Rose, 1967; Cobb, 1979 (OFR 79-238); Yeend, 1981 (C 823-B); Foley and Summers, 1990; Nokleberg and others, 1991; Foley, 1992.

Primary reference: Moffit, 1954; Yeend, 1981 (C 823-B)

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/3/03

Site name(s): Unnamed (northeast of Slate Creek)

Site type: Occurrence

ARDF no.: MH294

Latitude: 63.1804 **Quadrangle:** MH A-2

Longitude: 144.8319

Location description and accuracy:
This occurrence is south of the terminus of the Chistochina Glacier at an elevation of about 4,600 feet. It is about 1.1 miles northeast of the mouth of Slate Creek and about one-half mile southwest of informally named Big Four Creek, in the NW1/4SW1/4 of sec. 14, T. 20 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 23 of Rose (1967), locality 13 on figure 6 of Cobb (1979 [OFR 79-238]), and locality 135 of Nokleberg and others (1991). The location is probably accurate within 0.2 mile.

Commodities:

Main: Cu

Other:

Ore minerals: Chalcopyrite, malachite (?), secondary copper minerals

Gangue minerals: Epidote

Geologic description:
This occurrence is in a body of gabbro and mafic gabbro that is about a mile wide and possibly elongated to the northeast (Rose, 1967). The gabbro is probably Late Triassic in age. The mafic intrusive is overlain unconformably by the 'round wash' conglomerate of Tertiary age. The same gabbro body forms the bedrock in the Big Four Creek placer deposit (MH293). Chalcopyrite and secondary copper minerals, probably including malachite, occur in a vein or in a vuggy epidote-filled segregation in gabbro.

Alteration:
Alteration consists of epidote-filled veining or segregations in gabbro.

Age of mineralization:
Late Triassic or younger, on the basis of the age of the host rock.

Deposit model:

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

Production Status: No

Site Status: Inactive

Workings/exploration:
No workings are reported.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/2/03

Site name(s): Lower Slate Creek

Site type: Mines

ARDF no.: MH295

Latitude: 63.1710 **Quadrangle:** MH A-2

Longitude: 144.8554

Location description and accuracy:

The placer mines in lower Slate Creek are mainly below Miller Gulch and above the broad flood plain of the Chistochina River. The approximate center of the mines is in the NE1/4NW1/4 section 22, T. 20 S., R. 15 E., Fairbanks Meridian. The mines correspond approximately to locality 16 on figure 6 of Cobb (1979 [OFR 79-238]) and locality 65 of MacKevett and Holloway (1977). The Slate Creek mine of Nokleberg and others (1991, locality 9, table 3) includes these mines and Miller Gulch (MH296).

Commodities:

Main: Au

Other: Ag, Hg, platinum group elements (PGE)

Ore minerals: Cinnabar, gold, PGE, pyrite

Gangue minerals: Garnet, magnetite

Geologic description:

Extensive mining occurred along this lower Slate Creek location in 1941 and several previous years (Moffit, 1944). Slate Creek is aligned along a graben filled with Gakona Formation of possible Eocene age. In the lower creek, the fault on the north side of the graben is largely buried by Holocene alluvium and glacial-fluvial benches of Pleistocene age; the general distribution of rock and alluvial units is shown by Rose (1967).

The placer deposits of lower Slate Creek are complex (Chapin, 1919; Yeend, 1981 [C 823-B, OFR 81-355]). The ultimate source of most of the placer gold appears to be the Tertiary 'round wash' conglomerate exposed in Miller Gulch, the main south-flowing tributary of Slate Creek. A lesser amount of gold came from veins in bedrock exposed in Miller Gulch and other upstream sources.

Gold was reconcentrated in high bench deposits during multiple stages of Pleistocene glaciation as Slate Creek was dammed by glaciers in the Chistochina River valley. Gold from 'round wash', glacial, and bedrock sources was also reconcentrated in rich shallow deposits of late Pleistocene and Holocene age in alluvial gravels of Slate Creek (Chapin, 1919). Rose proposed that a buried auriferous channel could lie below the high bench deposits along the north boundary fault of the Slate Creek graben.

The gold in Slate Creek is generally fine grained and fairly smooth. Its fineness is about 894 (Purington, 1905). The gold is generally finer grained than the gold mined in Miller Gulch. Placer concentrates are mainly magnetite and garnet; they contain some pyrite, cinnabar, and platinum group metals (PGE). The concentrate contains about 1 part of platinum group metal per 100 parts of gold.

In the early years of the district, shallow gravels along Slate Creek were mined by shovel-in methods; rich gravels were mined in Slate Creek just below Miller Gulch. In 1917, Slate Creek was mined by a fairly large scale hydraulic operation. Total production in that year was estimated at $100,000, mostly from large cuts on Slate Creek. Some of the pay was from virgin ground; the rest was from ground that had been mined earlier by hand (Chapin, 1919). In 1941 and several preceding years mining was mainly from benches 50 to 60 feet above the north side of the creek near its mouth. Most of the bench gold was recovered from loose, well-washed gravel contained in a tight brownish wash (Moffit, 1944). Extensive mining on lower Slate Creek ceased by about 1962 (Cobb, 1979 [OFR 79-238]).

Alteration:

Age of mineralization:
Tertiary to Holocene.

Deposit model:
Placer Au-PGE, glacio-fluvial (Cox and Singer, 1986; model 39a).

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

Production Status: Yes

Site Status: Inactive

Workings/exploration:
Placer gold was discovered in Slate Creek in 1900 by Coles, Jacobson, Kramer, and Levell (Mendenhall and Schrader, 1903). Only a few areas of the creek were rich enough to be mined by hand; they included the first one or two claims below Miller Gulch and a bench opposite Miller Gulch, where the paystreak probably was an ancient fan from Miller Gulch (Mendenhall and Schrader, 1903). Small-scale mining took place on the creek in 1908 (Moffit, 1909), 1909 (Brooks, 1910), probably 1910, and in 1911 (Brooks, 1912). Preparation for large-scale mining began in 1912 (Brooks, 1913) with mining reported for 1914 (Brooks, 1915), 1915, (Brooks, 1916), and 1916 (Smith, 1917). The preparations for large-scale hydraulic operations were completed by 1917 when about 4,800 ounces of fine gold were produced mainly from Slate Creek on its left limit (south side) (Chapin, 1919). Platinum constituted somewhat more than 1 percent of the volume of gold recovered in 1917.

Mining continued almost yearly into the 1930's, and some platinum was recovered in many years (Martin, 1920; Brooks and Martin, 1921; Brooks, 1921; Brooks, 1923; Brooks and Capps, 1924; Brooks, 1925; Moffit, 1927). Mining continued between 1926 and 1933 (Smith, 1929; Smith, 1930 [B 810-A, B 813-A]; Smith, 1932; Smith, 1933 [B 836-A]; Smith,1933 [B 844-A]; Smith, 1934 [B 857-A]; Smith, 1934 [B 864-A]. In 1934, probably reflecting the increased price of gold to $35 per ounce, extensive preparation was done for a large operation. The development work was destroyed by a flood in August 1934 (Smith, 1936); in 1935 most of the work was rehabilitation to repair flood damage (Moffit, 1937; Smith, 1937). Mining recommenced in 1936, and there was at least some mining through 1941 (Smith, 1938; Smith, 1939 [B 917-A]; Smith, 1942 [B 933-A]). According to Moffit (1944), much of the last production was from an elevated bench on the north side of Slate Creek near its mouth. Mining of uncertain extent took place after World War II but essentially ceased by 1962.

Production notes:
Lower Slate Creek was one of the two main sources of placer gold in the Chistochina district; the other was Miller Gulch. Lower Slate Creek probably has produced at least 50,000 ounces of gold.

Reserves:
A placer gold resource was postulated by Rose (1967); a channel, more or less along the north fault of the Slate Creek graben, may be buried by weakly auriferous bench deposits.

Additional comments:

References:
Mendenhall and Schrader, 1903; Purington, 1905; Moffit, 1909; Brooks, 1910; Brooks, 1912; Brooks, 1913; Brooks, 1915; Brooks, 1916; Smith, 1917; Chapin, 1919; Martin, 1920; Brooks, 1921; Brooks and Martin, 1921; Brooks, 1923; Brooks and Capps, 1924; Brooks, 1925; Smith, 1926; Moffit, 1927; Smith, 1929; Smith, 1930 (B 810-A); Smith, 1930 (B 813-A); Smith, 1932; Smith, 1933 (B 836-A); Smith, 1933 (B 844-A); Smith, 1934; Moffit, 1937; Smith, 1937; Smith, 1939 (B 910-A); Smith, 1939 (B 917-A); Smith, 1942 (B 933-A); Moffit, 1944; Moffit, 1954; Rose, 1967; Mackevett and Holloway, 1977; Cobb,

1979 (OFR 79-238); Yeend, 1981 (C 823-B); Yeend, 1981 (OFR 81-355); Nokleberg and others, 1991.

Primary reference: Chapin, 1919; Moffit, 1944; Yeend, 1981 (OFR 81-355)

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/9/03

Site name(s): Miller Gulch

Site type: Mine

ARDF no.: MH296

Latitude: 63.1748 **Quadrangle:** MH A-2

Longitude: 144.8266

Location description and accuracy:

The Miller Gulch mine is in a southwest-flowing, mile-long tributary of Slate Creek. The gulch begins in the S1/2 section 14, T. 20 S., R. 15 E., Fairbanks Meridian, where it trends generally westward. The gulch then turns south in the NW1/4 section 23, T. 20 S., R. 15 E., where it enters Slate Creek. Almost the entire gulch has been mined. The location is about the midpoint of the gulch and is accurate as the center of the placer deposit.

The Miller Gulch mine was approximately located by Cobb in several publications, including 1972 (MF-414), 1973 (B 1374), and 1979 as locality 15 in figure 6 (OFR 79-238). The approximate location of three placer mine operations in the gulch is shown by Rose (1967). The Miller Gulch mine is locality 65 of MacKevett and Holloway (1977) and appears to be included with Slate Gulch in locality 9 in table 3 of Nokleberg and others (1991).

Commodities:

Main: Au

Other: Ag, Cu, Hg, platinum group elements (PGE)

Ore minerals: Cinnabar, chalcopyrite, copper (native), gold, osmiridium

Gangue minerals: Garnet, magnetite

Geologic description:

The lower part of Miller Gulch is incised in argillite of the Eagle Creek Formation of Pennsylvanian age (Richter and Dutro, 1975). This unit was previously mapped as Mankomen Formation of Permian age by Rose (1967). The upper part of the gulch is cut into a Tertiary conglomerate locally termed 'round wash' that uncomformably overlies the Eagle Creek Formation. Gabbro of Triassic (?) age crops out on the west side of Miller Gulch, and fault-controlled (?) breccia, which trends northwest, crops out near the head of Miller Gulch (Rose, 1967). The 'round wash' possibly is correlative with the Gakona Formation of Eocene (?) age. It has been deformed and dips about 20 degrees north. The conglomerate is largely composed of diorite and gabbro clasts with lesser granodiorite, slate, graywacke, white quartz, and peridotite. Finer grained facies of the 'round wash' are predominantly schist and slate with some white quartz (Rose, 1967). The unit has been altered or weathered in place, and cobbles are covered with a rind of clay or hematite; some of the cobbles are slickensided (Chapin, 1919; C.C. Hawley, unpublished field mapping, 1967). The conglomerate resembles white channel gravels of the Klondike district, Yukon Territory, which have been extensively altered since their deposition.

Gold was discovered in Miller Gulch in about 1900, and mining commenced immediately. By 1903, the total production of the Chistochina district was about $365,000, of which about $175,000 came from Miller Gulch or nearby Slate Creek (Mendenhall and Schrader, 1903). Miller Gulch has been mined fairly continuously until the present.

The placer deposits in the creek vary from about 5 feet wide near the head of Miller Gulch to 200 to 300 feet wide near the mouth of the gulch. The thickness of the gravel ranges from 4 to 8 feet; most of it is derived from argillite of the Eagle Creek Formation. Some of the gravel is composed of granitic material derived from the 'round wash' (Mendenhall, 1903; Mendenhall and Schrader, 1903). Gold-bearing benches are present irregularly along the creek on both walls of the canyon of Miller Gulch to as high as about 200 feet

above the canyon floor.

The gold in Miller Gulch is mainly flat, stained with iron and manganese, and only rarely found with remnant quartz. In the early days of the district, nuggets weighing as much as 1 ounce were common; some were as heavy as 4 ounces. The fineness of the gold varies from about 870 to 895 (Mendenhall and Schrader, 1903; Purington, 1905).

Placer concentrates consist of cinnabar, native copper, and small nuggets of osmiridium with major magnetite and minor garnet. Cinnabar and native copper are probably derived locally because they occur in veinlets with chalcopyrite in the argillite bed rock (Walt Ashwill, oral communication, November 2001).

The bulk of the gold in the creek appears to have been reconcentrated from the 'round wash' (Chapin, 1919; Rose, 1967; Cobb, 1973 [B 1374]; Yeend, 1981 [C 823-B, OFR 81-355]). Other sources include auriferous glacial deposits and mineralized veinlets in bedrock. Moffit (1912) proposed that most of the gold was derived from the older bedrock. The ultimate source of the 'round wash' is speculative; Rose (1967) proposed that most was from derived from an area north of the Denali Fault.

Alteration:

The 'round wash' has been extensively weathered or altered in place; it was argillized and cobbles are coated with hematite or clay (Chapin, 1919).

Age of mineralization:

Eocene (?), Pleistocene, Holocene.

Deposit model:

Placer Au-PGE (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:

Miller Gulch was discovered in 1900. By 1903 about $175,000 (almost 8,500 fine ounces of gold) had been mined from Miller Gulch and nearby Slate Creek (Mendenhall and Schrader, 1903). The gravels along the gulch were mined extensively between 1903 and 1910 when mined slowed temporarily to allow exploitation of deposits in Slate Creek that could be covered by tailings from Miller Gulch (Moffit, 1909; Brooks, 1910; Moffit, 1912). In subsequent years production began on the higher level benches. Mining was reported in 1915 and 1916, although production in 1916 was limited by a shortage of water (Brooks, 1916). Mining activity increased in the 1930's; production was reported in 1932, 1938, and 1939 (Smith, 1934 [B 857-A], 1939 [B 917-A], 1941). The importance of the creek was recognized in summary papers by Moffit (1944, 1954). Mining on the creek was intermittently active in the 1960's (Rose, 1967). Activity increased again in the late 1970's to the mid-1980's as the price of gold rose.

Production notes:

Total production of Miller Gulch is uncertain but considerable. According to Koschmann and Bergendahl (1968), the Chistochina district produced about 141,000 ounces of gold between 1900 and 1959. This figure is minimal because the records are incomplete between 1931 and 1945, a period of active mining. Miller Gulch and Slate Creek produced most of the gold mined in the Chistochina district, although no definite amount is assignable to Miller Gulch. It seems likely, however, that Miller Gulch has produced at least about 50,000 ounces of gold. Approximately 1 ounce of platinum group metals was produced for every 100 ounces of gold.

Reserves:

No reserves have been published, but some gold still exists in bench deposits and unmined remnants of the creek gravels.

Additional comments:

References:

Mendenhall, 1903; Mendenhall and Schrader, 1903; Purington, 1905; Moffit, 1909; Brooks, 1910; Moffit, 1912; Chapin, 1919; Smith, 1934 (B 857-A); Smith, 1939 (B 917-A); Smith, 1941; Moffit, 1944; Moffit, 1954; Rose, 1967; Koschmann and Bergendahl, 1968; Cobb, 1972 (MF-414); Cobb, 1973 (B 1374); Richter and Dutro, 1975; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Yeend, 1981 (C 823-B); Yeend, 1981 (OFR-81-355); Nokleberg and others, 1991.

Primary reference: Rose, 1967; Mendenhall and Schrader, 1903

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/2/03

Site name(s): Treasure Gulch

Site type: Mine

ARDF no.: MH297

Latitude: 63.1713 **Quadrangle:** MH A-2

Longitude: 144.8431

Location description and accuracy:
The placer mine is on the north side of Slate Creek about one-half mile west of the mouth of Miller Gulch (see MH296) in the NE1/4 section 22, T. 20 S., R. 15 E., Fairbanks Meridian. The location for this record is based on an earlier compilation for the Mount Hayes quadrangle (W.J. Nokleberg, written communication, 1996). The accuracy of location is uncertain.

Commodities:

Main: Au

Other: Platinum group elements (PGE)

Ore minerals: Au, PGE

Gangue minerals:

Geologic description:
Platinum was produced during 1940 as a byproduct of gold prospecting in Treasure Gulch (Smith, 1942 [B 933-A]). At the mine site, minor gulches cut auriferous Pleistocene bench gravels formed when the mouth of Slate Creek was dammed by an ancestral Chistochina Glacier (Rose, 1967). The placer deposit on Treasure Gulch may be an alluvial reconcentration of gold and platinum contained in weakly metalliferous bench gravel. The deposit is probably of Holocene age.

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined

Site Status: Inactive

Workings/exploration:
Small-scale prospect workings.

Production notes:
Unknown amount of platinum recovered in 1940 (Smith, 1942 [B 933-A]).

Reserves:

Additional comments:

References:
Smith, 1942 (B 933-A); Rose, 1967.

Primary reference: Smith, 1942 (B 933-A)

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/9/03

Site name(s): Upper Slate Creek

Site type: Mines

ARDF no.: MH298

Latitude: 63.1657 **Quadrangle:** MH A-2

Longitude: 144.8009

Location description and accuracy:

The Upper Slate Creek mines are in the headwaters of the creek mainly in the W1/2 section 13 and the W1/2 section 24, T. 20 S., R. 15 E., Fairbanks Meridian, and in the Chisna Pass area southeast of Slate Creek. The location is for this record on Slate Creek on the section line that divides sections 23 and 24. The approximate location of mining on upper Slate Creek during 1979 was shown by Yeend (1981 [C 823-B and OFR 81-355]).

Commodities:

Main: Au

Other: Ag, Cu, Hg, platinum group elements (PGE)

Ore minerals: Cinnabar, copper (native), gold, PGE, pyrite

Gangue minerals: Amphibole, chlorite, epidote, garnet, ilmenite, magnetite, zircon

Geologic description:

Upper Slate Creek is mainly underlain by argillite of the Eagle Creek Formation of Pennsylvanian age. This unit was previously mapped as Mankomen Formation by Rose (1967). Rose also mapped breccia of unknown type and a small body of locally brecciated quartz monzonite in upper Slate Creek. A pyritic argillite unit at the head of upper Slate Creek contained a trace of gold and 0.12 ounce of silver per ton (Rose, 1967).

The 'round wash' conglomerate of Tertiary age probably unconformably overlies the Eagle Creek Formation but has been removed by erosion and glaciation. The conglomerate is locally preserved in downfaulted blocks (Yeend, 1981 [OFR 81-355]). A pebble count of placer gravel in Slate Creek shows that it consists mainly of greenstone, felsic plutonic rocks, and slate. Quartz constitutes about six percent of the material (Yeend, 1981 [OFR 81-355]).

Complex glacio-fluvial placers are present in upper Slate Creek. Extensive drilling in 1974 and 1975 delimited buried auriferous channels incised in Eagle Creek Formation that are buried by low-grade auriferous glacial outwash. A valley glacier formerly occupied the north-trending valley of upper Slate Creek. This glacier probably split, and one branch extended southeast toward Limestone Creek and a second branch extended toward Powell Gulch and Slate Creek. Drainage was modified during the last main glaciation by damming of Slate Creek by a glacier in the valley of the West Fork Chistochina River; there was a possible reversal of flow (Yeend, 1981 [OFR 81-355]). The rich gold-bearing channels formed before the last valley glaciation, which, however, brought in additional gold in the outwash gravel. In addition, in incised auriferous channels, gold was also found on bedrock surfaces sloping as much as 30 degrees (Douglas Colp, oral communication, November 2001).

Yeend (1981 [OFR 81-355]) proposed that the placer mine operating in 1979 mined an ancient colluvial-alluvial fan near the point where the flow of upper Slate Creek changed from southwest to northwest. The depth of auriferous bedrock increases to the south. The lowest pay was about 120 feet deep when mining ceased in 1982. The channel, however, continued as outlined by a few drill holes that found gold deeper than 120 feet.

Most of the gold in upper Slate Creek is flat and iron-stained; it is similar to gold found elsewhere in the district that was derived from the 'round wash' conglomerate of Tertiary age. A small amount of gold occurs

in small, bright, angular nuggets; this gold is inferred to have come from veinlets in the Pennsylvanian bedrock (Walter Ashwill, oral communication, 2001). Concentrates in upper Slate Creek contain cinnabar, native copper, and sparse silvery grains of platinum group metals. The concentrates also contain magnetite and garnet. Yeend (1981[OFR 81-355]) described the gold and concentrates that were being recovered in 1979. Gold was brassy yellow or copper colored; some had adhering quartz. Concentrate obtained from a gravel section above the mine consisted of about 30 percent magnetite, 10 percent each of ilmenite, pyrite, and chlorite, and less than 10 percent of epidote, zircon, garnet, and amphibole.

More than 20,000 ounces of placer gold were mined in upper Slate Creek between 1979 and 1982.

Alteration:

Age of mineralization:
Pleistocene.

Deposit model:
Placer Au-PGE, glacio-fluvial (Cox and Singer, 1986; model 39a).

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

Production Status: Yes; medium

Site Status: Inactive

Workings/exploration:
Gold was known in upper Slate Creek and was mined on a small scale before 1974. In 1974 and 1975 upper Slate Creek was drilled with churn and Becker-type drills and a clamshell rig by Ranchers Exploration and Development Co. of Albuquerque, New Mexico. Drilling found gold on steep hard bedrock surfaces and in channels incised in local bedrock. All the gravel, except for 4 or 5 feet of surface gravel, was processed. Most of the gold produced came from the deeper gravel.

The mining plant was mobilized in 1978 and in 1979 when production began. Total production from 1979 to 1982 was about 21,000 ounces of placer gold. The best year was 1980, when 8,000 ounces of gold were recovered. Ranchers discontinued mining in 1982. There has been some mining since then, but nothing to approach the scale of the Ranchers project, which repaid all exploration and development costs and returned a modest profit (Walter Ashwill and Douglas Colp, oral communications, November 2001).

Production notes:

Reserves:
A gold resource remains in deep ground and probably in benches along upper Slate Creek.

Additional comments:

References:
Chapin, 1919; Rose, 1967; Yeend, 1981 (C 823-B); Yeend, 1981 (OFR 81-355); this record.

Primary reference: Yeend, 1981(C 823-B); Yeend, 1981 (OFR-81-355); this record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/2/03

Site name(s): Unnamed (near peak 5850 south of Chisna Pass)

Site type: Occurrence

ARDF no.: MH299

Latitude: 63.1455 **Quadrangle:** MH A-2

Longitude: 144.8022

Location description and accuracy:

The occurrence is 0.3 mile southwest of peak 5850 one mile south of Chisna Pass. The occurrence is plotted at an outcrop of massive chalcopyrite and pyrite on the ridge crest within an area of mineralization; it is near the northeast corner of sec. 35, T. 20 S., R. 15 E., Fairbanks Meridian. The location is accurate within 0.1 mile. The site is near locality 140 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag, Au, Pb, Sn, Zn

Ore minerals: Azurite, bornite (?), chalcopyrite, galena, malachite, pyrite, sphalerite

Gangue minerals: Quartz

Geologic description:

Disseminated sulfides with local occurrences of massive to semimassive sulfides are found in a Permian (?) meta-andesite to metadacite porphyry (Lange and others, 1981; Nokleberg and others, 1987; Nokleberg and others, 1991). A prominent zone of sulfidized rock that strikes northwest crops out in a gully in the NE1/4NE1/4, sec 35, T. 20 S., R. 15 E., Fairbanks Meridian (Randy Moore and C. C. Hawley, written communication, 1996). One sample of semimassive pyrite, chalcopyrite, and possibly bornite assayed 0.488 ounce of gold per ton and more than 1 percent copper. Other samples from the mineralized area collected in the 1996 examination generally contain less than 500 parts per million (ppm) copper.

Altered rocks with disseminated galena and sphalerite occur in the vicinity; they contain as much as 28.4 ppm silver, 1,235 ppm arsenic, 2,690 ppm lead, and 1,560 ppm zinc (Moore and Hawley, as above). A sample, probably from the massive sulfide zone, collected by the U.S. Geological Survey assayed 2 ppm gold, 70 ppm silver, 2 percent copper, 1,500 ppm arsenic, 30 ppm tin, and 530 ppm zinc (Nokleberg and others, 1991). The occurrence may be a distal porphyry copper deposit of possible Permian age.

Alteration:

Age of mineralization:

The volcanic host rocks probably are early Permian, and the mineralization is related to a Permian(?) metadacite intrusive.

Deposit model:

Porphyry Cu, distal (Cox and Singer, 1986; model 20c).

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

20c

Production Status: None

Site Status: Inactive

Workings/exploration:
Only a few surface samples.

Production notes:

Reserves:

Additional comments:

References:
Lange and others, 1981; Nokleberg and others, 1987; Nokleberg and others, 1991; this record.

Primary reference: Nokleberg and others, 1987; this record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/12/03

Site name(s): Northland Mines

Site type: Prospect

ARDF no.: MH300

Latitude: 63.1371 **Quadrangle:** MH A-2

Longitude: 144.8118

Location description and accuracy:
This prospect is on the north side of Powell Gulch about 0.7 mile northeast of its mouth. It is in the NW1/4SE1/4 section 35, T. 20 S., R. 15 E., Fairbanks Meridian. The prospect is near locality 31 of Rose (1967), locality 20 on figure 6 of Cobb (1979 [OFR-238]), and locality 139 in table 2 of Nokleberg and others (1991). It is within a claim block, and the location is accurate.

Commodities:

Main: Cu

Other: Ag, Fe, W

Ore minerals: Chalcopyrite, hematite

Gangue minerals: Garnet

Geologic description:
The rocks in the area include limestone and volcanic rocks, both possibly part of the Slana Spur Formation of Pennsylvanian and Early Permian age (Richter and Dutro, 1975; Nokleberg and others, 1991).

Rose (1967) did not visit the site but was shown specimens of chalcopyrite replacing silicified limestone. The site was visited later by the U.S. Geological Survey (Nokleberg and others, 1991). A skarn-like deposit occurs beneath a topographic dip slope about 75 feet wide and 270 feet long. Veins as much as about 3 feet wide of chalcopyrite and massive hematite cut garnet skarn in limestone. A grab sample of chalcopyrite-bearing rock associated with massive hematite assayed 1.5 percent copper, 100 parts per million (ppm) tungsten, and 7 ppm silver (Nokleberg and others, 1991, table 2). The mineralization is epigenetic and of Early Permian or younger age.

Alteration:
Skarn; silicates formed in limy host rock.

Age of mineralization:
Early Permian or younger.

Deposit model:
Cu 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:
Shallow pits.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967; Richter and Dutro, 1975; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/12/03

Site name(s): Upper Chisna River

Site type: Prospects

ARDF no.: MH301

Latitude: 63.1194 **Quadrangle:** MH A-2

Longitude: 144.8018

Location description and accuracy:
This record is a general location for unpatented mining claims along about 6 miles of the Chisna River above Red Mountain Creek and below Ruby Gulch (Rose, 1967). The site is plotted about one-half mile below the mouth of Powell Gulch, about the center of the claims. It is accurate as a general location for claims that have been prospected since the early days of the district (Mendenhall and Schrader, 1903).

Commodities:

Main: Au

Other: Ag, platinum group elements (PGE) (?)

Ore minerals: Gold, PGE (?)

Gangue minerals: Garnet, magnetite, pyrite

Geologic description:
The Chisna River below Ruby Gulch and above Red Mountain Creek flows through a rather wide glacial valley. Except for recent alluvium along the river, the gravel consists mainly of glacial outwash and till. The river has been claimed and explored at intervals since gold was discovered in 1898. Fine gold is concentrated on clay layers within the glacial deposits but is not abundant enough to be mined (Mendenhall and Schrader, 1903). A shaft sunk in the valley about one-half mile above Powell Gulch penetrated about 20 feet of till before entering a wet sand alluvial deposit, where the shaft collapsed.

Partly on the basis of results of drilling in Upper Slate Creek (MH298), it is likely that the valley of the Chisna has deeply incised channels in bedrock that may be auriferous. At times when the mouth of Slate Creek was dammed by a glacier in the main Chistochina River valley, ice and outwash must have flowed down the Chisna River valley and introduced gold from upstream sources.

No deep gold resources have been identified, but they probably exist. Most gold in the district is accompanied by large amounts of magnetite and some garnet and pyrite. Platinum group elements (PGEs) were found in the Upper Slate Creek deposit (MH298) and could exist in the Chisna River gravels derived from Slate Creek.

Alteration:

Age of mineralization:
Pleistocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:

The upper Chisna River has been prospected since the discovery of gold near Chisna in 1898. No significant mining has occurred in the river above the Chisna mine site (MH356).

Production notes:

Reserves:

Additional comments:

References:

Mendenhall and Schrader, 1903; Rose, 1967.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/12/03

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

Site type: Occurrence

ARDF no.: MH302

Latitude: 63.1758 **Quadrangle:** MH A-2

Longitude: 144.7650

Location description and accuracy:
The occurrence is at an elevation of about 5,500 feet near the head of a north-flowing tributary glacier to Chistochina Glacier. The occurrence is in the SW1/4SW1/4 section 18, T. 20 S., R. 16 E., Fairbanks Meridian. The site corresponds to locality 22 of Rose (1967), locality 23 on figure 6 of Cobb (1979 [OFR 79-238]), and locality 141 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Ag, Au

Other:

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
The rocks in the vicinity of the occurrence are argillite, probably of the Eagle Creek Formation of Early Permian age (Richter and Dutro, 1975), a unit formerly assigned to the Mankomen Formation. The rock has been pyritized. An assay showed a trace of gold and 0.12 ounce of silver per ton (Rose, 1967).

Alteration:
Pyritization.

Age of mineralization:
Early Permian or younger.

Deposit model:

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

Production Status: No

Site Status: Inactive

Workings/exploration:
The mineral site is a natural outcrop; only limited surface sampling has been done.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967; Richter and Dutro, 1975; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/12 /03

Site name(s): Unnamed (north of the Chistochina Glacier)

Site type: Occurrence

ARDF no.: MH303

Latitude: 63.2026 **Quadrangle:** MH A-2

Longitude: 144.6957

Location description and accuracy:
The location given by Cobb (1979 [OFR 79-238]) for this occurrence is north of the Chistochina Glacier and southwest of Mount Kimball. The location is an arbitrary point in the NW1/4 section 9, T. 20 S., R. 16 E., Fairbanks Meridian. The accuracy is undetermined; the actual location may be several or more miles away.

Commodities:

Main: Ag, Au

Other:

Ore minerals: Pyrite

Gangue minerals:

Geologic description:
A grab sample of highly stained and pyritized argillite from this location contained 0.02 ounce of gold per ton and traces of silver (Rose, 1967). The grab sample was of argillite from the Mankomen Formation of Permian age (Cobb, 1979 [OFR 79-238]).

Alteration:

Age of mineralization:

Deposit model:

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

Production Status: None

Site Status: Probably inactive

Workings/exploration:
Only one grab sample of highly stained and pyritized argillite was taken from this location.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (north of the Chistochina Glacier)

Site type: Occurrence

ARDF no.: MH304

Latitude: 63.1988 **Quadrangle:** MH A-2

Longitude: 144.7006

Location description and accuracy:
The location given by Cobb (1979 [OFR 79-238]) for this occurrence is north of the Chistochina Glacier and southwest of Mount Kimball. The occurrence is shown at an arbitrary point in the NW1/4 section 9, T. 20 S., R. 16 E., Fairbanks Meridian. The accuracy is indeterminate; the occurrence may be within a radius of several miles or more.

Commodities:

Main: Ag, Cu, Ni

Other: Au, Pt

Ore minerals: Pyrite

Gangue minerals: Olivine

Geologic description:
A dunite boulder found on a glacial moraine contained abundant pyrite; a sample contained 0.75 percent copper, 0.2 percent nickel, 0.12 ounce of silver per ton, and traces of gold and platinum (Rose, 1967).

Alteration:

Age of mineralization:

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
A boulder of dunite found in glacial moraine was sampled.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238).

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date:

Site name(s): Ruby Gulch; Jackpot

Site type: Mine

ARDF no.: MH305

Latitude: 63.1590 **Quadrangle:** MH A-2

Longitude: 144.7681

Location description and accuracy:

This mine is at an elevation of about 4,250 feet in Ruby Gulch, a tributary of the Chisna River. The mine is in the NW1/4NW1/4 section 30, T. 20 S., R. 16 E., Fairbanks Meridian, probably near the Jackpot mine site shown by Mendenhall and Schrader (1903). Those geologists described two mining localities, one near the mouth of the creek and the second in the canyon of Ruby Gulch on the Jackpot claim. Ruby Gulch is locality 24 on figure 6 of Cobb (1979 [OFR 79-238]) and locality 10 in table 3 of Nokleberg and others (1991).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:

Ruby Gulch is mainly in argillite of the Slana Spur Formation of Pennsylvanian and Early Permian (?) age (Richter and Dutro, 1975; Nokleberg and others, 1991). Chapin (1919) previously assigned the argillite to the Mankomen Formation. Near the head of the creek, a section of 'round wash' conglomerate of Tertiary age has been downfaulted into the Slana Spur Formation (Chapin 1919).

On lower Ruby Creek the placer apparently is a reworked alluvial fan. Placer gold occurred in 3 to 4 feet of gravel on clay false bedrock in a channel cut in the alluvial fan. Upstream on the Jackpot claim 2 to 4 feet of rich gravel were mined from a narrow canyon (Mendenhall and Schrader, 1903) in a section of creek that also had a parallel lower grade channel incised in bedrock (Moffit, 1912). Pay gravel consists mainly of argillite derived from local bedrock but includes greenstone and granitic boulders from the 'round wash' conglomerate, the probable ultimate source of most of the gold.

Gold in Ruby Gulch is reported to be similar to that in Miller Gulch (MH296) and to occur in nuggets weighing as much as about 0.6 ounce. Fineness reported is about 870 to 900 (Mendenhall and Schrader (1903).

Alteration:

Age of mineralization:

Tertiary ('round wash'), Pleistocene (?) and Holocene.

Deposit model:

Placer Au (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:

In 1902, Ruby Gulch was being mined in two places, one near the mouth of the creek, the other upstream in the canyon of Ruby Gulch (Mendenhall and Schrader, 1903). In 1910, Ruby Creek was the third most important placer creek in the district after Miller Gulch (MH296) and Slate Creek (MH295, MH298) (Moffit, 1912), but it was mined out fairly quickly.

Production notes:

Reserves:

Additional comments:

References:

Mendenhall and Schrader, 1903; Moffit, 1912; Chapin, 1919; Moffit, 1944; Richter and Dutro, 1975; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Mendenhall and Schrader, 1903

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 12/05/01

Site name(s): Quartz Creek

Site type: Mine

ARDF no.: MH306

Latitude: 63.1515 **Quadrangle:** MH A-2

Longitude: 144.7522

Location description and accuracy:

This mine is in the lower part of Quartz Creek, a tributary of the east fork of the upper Chisna River. The mine is at an elevation of about 4,100 feet and is about 0.1 mile southeast of the center of section 30, T. 20 S., R. 16 E., Fairbanks Meridian. The approximate location of the mine was shown by Yeend (1981 [OFR 81-355]). This mine corresponds to locality 25 on figure 6 of Cobb (1979 [OFR 79-238] and locality 11 in table 3 of Nokleberg and others (1991).

Commodities:

Main: Au

Other: Ag

Ore minerals: Gold

Gangue minerals: Amphibole, chlorite, epidote, garnet, ilmenite, magnetite, pyrite, zircon

Geologic description:

This mine is on Quartz Creek on an alluvial fan at the mouth of the creek, similar to the lower placer deposit at Ruby Creek (Gulch) (MH305). Good 'pay' occurs on false bedrock within the fan and on bedrock at the base of the fan. The gravel is poorly sorted and consists mainly of sand-size angular chips of blue-gray slate and cobbles to 1-foot diameter composed of quartz and igneous and metamorphic rocks probably derived from the 'round wash' conglomerate of Tertiary age (Yeend, 1981 [OFR 81-355]).

Heavy minerals, abundant in the concentrates, consist predominantly of magnetite, but include amphibole, garnet, ilmenite, chlorite, epidote, pyrite, and zircon. Two varieties of gold are present: bright yellow, and orange brown. Some gold has adhering quartz; small nuggets are mostly flattened (Yeend, 1981 [OFR 81-355]).

The placer deposit exploited at the mine is Holocene in age, formed by reconcentration of gold contained in an older alluvial fan and from bedrock sources. 'Round wash' conglomerate of Tertiary age was probably the ultimate source of most of the gold.

Alteration:

Age of mineralization:

Holocene deposit formed by reworking of Tertiary and Pleistocene (?) deposits.

Deposit model:

Placer Au (Cox and Singer, 1986; model 39a).

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

39a

Production Status: Yes; small

Site Status: Probably inactive

Workings/exploration:

The property was being mined when visited by Yeend (1981 [OFR 81-355]) in 1979.

Production notes:

Reserves:

Yeend (1981 [OFR 81-355]) estimated that the gold-bearing alluvial fan contained about 600,000 cubic meters of gravel, only part of which would have been of ore grade.

Additional comments:

References:

Moffit, 1954; Rose, 1967; Cobb, 1979 (OFR 79-238); Yeend, 1981 (OFR 81-355); Yeend, 1981 (C 823-B); Nokleberg and others, 1991.

Primary reference: Yeend, 1981 (C 823-B); Yeend, 1981 (OFR 81-355); Moffit, 1954

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/12/03

Site name(s): Unnamed (north of the head of Limestone Creek)

Site type: Prospect

ARDF no.: MH307

Latitude: 63.1583 **Quadrangle:** MH A-2

Longitude: 144.6969

Location description and accuracy:
This prospect (or small mine) is north of the divide at the head of Limestone Creek. It is on an unnamed creek that flows northeast into the east lobe of the Chistochina Glacier. The prospect is in the N1/2NW1/4 section 28, T. 20 S., R. 16 E., Fairbanks Meridian. The placer corresponds to locality 26 on figure 6 of Cobb (1979 [OFR 79-238]), locality 77 of MacKevett and Holloway (1977), and locality 12 in table 3 of Nokleberg and others (1991). The location of the prospect or small mine described by Nokleberg and others (1991) as their locality 12 does not match the location shown by Cobb, and there is insufficient information to resolve the location issue.

Commodities:

Main: Au

Other: Ag

Ore minerals: Gold

Gangue minerals:

Geologic description:
Rocks north of the Limestone Creek divide probably include limestone of Late Triassic age and the Nikolai Greenstone, also of Late Triassic age.
According to Nokleberg and others (1991), the area of this placer prospect or small mine resulted from drainage of a Tertiary conglomerate probably similar to the 'round wash' of Miller Gulch (MH296).

Alteration:

Age of mineralization:
Holocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
Some workings were reported by MacKevett and Holloway (1977).

Production notes:

Reserves:

Additional comments:

References:

MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Cobb, 1979 (OFR 79-238)

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/1/03

Site name(s): Unnamed (near the head of Willow Creek)

Site type: Occurrence

ARDF no.: MH308

Latitude: 63.1058 **Quadrangle:** MH A-2

Longitude: 144.7357

Location description and accuracy:
This occurrence is on the ridge at the headwaters of Willow Creek, a southwest-flowing tributary of the Chisna River. The occurrence is at an elevation of about 5,500 feet near peak 5770. The occurrence is near the center of the W1/2SW1/4 section 8, T. 21 S., R. 16 E., Fairbanks Meridian. It corresponds to locality 142 in table 2 of Nokleberg and others (1991); the location is probably accurate within 0.2 mile.

Commodities:

Main: Cu

Other: Ag, Au

Ore minerals: Malachite

Gangue minerals: Quartz

Geologic description:
The rocks in the vicinity consist of meta-andesite porphyry of the Tetelna Volcanics of Pennsylvanian age (Nokleberg and others, 1991). The meta-andesite is locally stained with malachite; a grab sample assayed 0.64 percent copper, 15 parts per million (ppm) silver, and 0.20 ppm gold (Nokleberg and others, 1991).

Alteration:

Age of mineralization:
Pennsylvanian or younger, on the basis of the age of host rocks.

Deposit model:
Uncertain; polymetallic vein(s) (?) (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 limited surface sampling.

Production notes:

Reserves:

Additional comments:

References:

Nokleberg and others, 1991.

Primary reference: Nokleberg and others, 1991

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/12/03

Site name(s): Limestone Creek; Lake Creek; Lime Creek

Site type: Mine

ARDF no.: MH309

Latitude: 63.1323 **Quadrangle:** MH A-2

Longitude: 144.6428

Location description and accuracy:

Limestone Creek, formerly named Lake Creek and also called Lime Creek, is a tributary of the Middle Fork Chistochina River. The Limestone Creek placer mine is about 0.1 mile northeast of the present course of Limestone Creek. The deposit was mined over a distance of about 0.8 mile. The mine is near the southeast corner of section 34, T. 20 S., R. 16 E., Fairbanks Meridian. Limestone Creek is locality 28 on figure 6 of Cobb (1979 [OFR 79-238]) and is included with nearby deposits as locality 68 of MacKevett and Holloway (1977). The mine corresponds generally to locality 13 in table 3 of Nokleberg and others (1991).

Commodities:

Main: Au

Other: Ag, Cr, Cu, Pb, platinum group elements (PGE), W

Ore minerals: Copper (native), chromite, galena, gold, PGE, pyrite, scheelite, silver (native)

Gangue minerals: Garnet, olivine, magnetite

Geologic description:

Limestone Creek is the main placer deposit in the drainage of the Middle Fork Chistochina River; minor gold-bearing creeks such as Bedrock Creek (MH310) and Kramer or Kraemer Creek (MH311), also tributaries of the Middle Fork, are sometimes lumped with the Limestone Creek deposit.

Mining on Limestone Creek mainly took place on a bench on the north side of and subparallel to modern Limestone Creek. The gravels generally consist of about 35 to 45 feet of boulder-gravel wash underlain by a blue-gray glacial clay. The best 'pay' is in an iron-stained gravel zone on clay false bedrock (Moffit, 1912). Locally the gravel section is as much as 70 feet thick (Moffit, 1944).

This placer deposit is not an alluvial deposit of Limestone Creek but is a bench deposit on the west side of the Middle Fork Chistochina River.

The deposit is in post-glacial and outwash gravels deposited on a slightly irregular bedrock floor that was scoured by ice moving from the north and west. Gravel, cobble, and boulder deposits contain transported granite and schist that are intermixed with bedrock materials of local origin. A source of some exotic materials and possibly gold was recognized in a gravel exposed about a mile north of the Limestone Creek mine site. As described by Moffit (1944), the gravel resembles the 'round wash' conglomerate of Tertiary age.

Drilling disclosed that the gold was scattered through the bench gravels but was enriched near bedrock; gold-bearing gravel was fairly well stratified and, at one place, formed two gold-bearing gravel layers separated by a compacted gravel false bedrock (Moffit, 1944).

The placer gold is fairly fine grained. Placer concentrates also contain shot size and large (2 to 3 pounds) fragments of native copper and galena and lesser amounts of chromite, platinum group elements (PGE), pyrite, scheelite, and some native silver. The occurrence of platinum metals was also noted by Chapin (1919) and Rose (1967). Olivine and magnetite occur in the concentrates (Moffit, 1944). Moffit (1912) proposed a local bedrock source for copper but a distal source for gold.

Alteration:

Age of mineralization:
Pleistocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Yes; unknown

Site Status: Inactive

Workings/exploration:
Mining began on Limestone Creek in 1908 (Moffit, 1909). The mine was active intermittently until 1942, but during many years the main activity was prospecting and drilling. A ten-man operation was reported in 1922 (Brooks and Capps, 1924). A major exploration program began in about 1934 (Moffit, 1937). Holes were drilled on 100-foot centers on five northwest-trending lines spaced 450 feet apart (Moffit, 1944); the deposit was also explored with pits and shafts. The deposit was prepared for mining in the late 1930's and 1940; the work included 5,900 feet of new ditches and an 800-foot-long dead cut to allow placement of sluice boxes for the hydraulic operation. An extensive operation began in 1941 to mine the demonstrated resource. Some gold was recovered, but the operation was terminated by World War II (Moffit, 1954). Some of the resource may have been mined in the late 1970's and early 1980's during a period of high gold price.

Production notes:
Limestone Creek produced at least 580 ounces of placer gold in and before 1934 (Moffit, 1944). It probably has a total production of more than 1,000 ounces.

Reserves:
There probably is a low-grade but possibly large gold resource in bench gravel on the west side of the Middle Fork Chistochina River.

Additional comments:

References:
Moffit, 1909; Moffit, 1912; Chapin, 1919; Brooks and Capps, 1924; Moffit, 1937; Moffit, 1944; Moffit, 1954; Rose, 1967; Cobb, 1979 (OFR 79-238); MacKevett and Holloway, 1977; Nokleberg and others, 1991.

Primary reference: Moffit, 1944

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 12/28/01

Site name(s): Bedrock Creek

Site type: Mine

ARDF no.: MH310

Latitude: 63.1379 **Quadrangle:** MH A-2

Longitude: 144.6359

Location description and accuracy:
This mine is on the south side of Bedrock Creek about one-third mile west of the center of section 35, T. 20 S., R. 16 E., Fairbanks Meridian. The location of the main cut on Bedrock Creek is shown in Moffit (1944). The mine is near locality 27 of Cobb (1979 [OFR 79-238]). Bedrock Creek is lumped with other nearby mines and prospects as locality 68 by MacKevett and Holloway (1977) and is locality 15 in table 3 of Nokleberg and others (1991). The location is accurate.

Commodities:

Main: Au

Other: Ag, Pb

Ore minerals: Galena, gold, pyrite

Gangue minerals: Chromite, garnet, magnetite, olivine (?)

Geologic description:
Bedrock Creek cuts through a section of bench gravel as much as 75 feet thick into hard bedrock of unknown lithology. During the Pleistocene the creek was a discharge channel for the glacier that fed the major glacier in the valley of the Middle Fork Chistochina River (Moffit, 1944).

Placer gold occurs in the bench gravels and is locally concentrated on layers of clay-rich or cemented gravel false bedrock. The cut on Bedrock Creek yielded a nugget that weighed about 0.15 ounce, the largest gold nugget found in the Middle Fork prospect area (Moffit, 1944). The principle heavy minerals found in the placer deposits are, in decreasing order of abundance, magnetite, pyrite, chromite, garnet, galena, and olivine (?).

Alteration:

Age of mineralization:
Pleistocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
Bedrock Creek was prospected in the early days of the district and was included with Limestone (MH309), Kraemer (MH311), and other nearby creeks in a consolidated claim group owned by the Middle

Fork Mining Company of Seattle (Moffit, 1944). The properties were explored and developed for production by 1941. Due at least in part to World War II, there was, however, no extensive mining.

Production notes:

Reserves:

There is a possible low-grade but large gold placer deposit in bench deposits on the west side of the Middle Fork Chistochina River (Moffit, 1944).

Additional comments:

References:

Rose, 1967; Moffit, 1944; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Moffit, 1944

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/12/03

Site name(s): Kraemer Creek; Kramer Creek

Site type: Mine

ARDF no.: MH311

Latitude: 63.1310 **Quadrangle:** MH A-2

Longitude: 144.6491

Location description and accuracy:
This mine is on Kraemer Creek (sometimes spelled Kramer), a tributary to Limestone Creek. The main cut of the mine is near the northeast corner of section 3, T. 21 S., R. 16 E., Fairbanks Meridian, and is about 0.2 mile west of Trout Lake (Moffit, 1944). Kraemer Creek is combined with Limestone Creek (MH309) and Bedrock Creek (MH310) as locality 29 on figure 6 of Cobb (1979 [OFR 79-238]) and as locality 68 of MacKevett and Holloway (1977).

Commodities:

Main: Au

Other: Ag, Cu, platinum group elements (PGE)

Ore minerals: Copper (native), gold, PGE, silver (native)

Gangue minerals: Chromite, garnet, magnetite, olivine (?)

Geologic description:
Kraemer Creek is a half-mile long creek that flows on a broad bench on the west side of the Middle Fork Chistochina River. It is subparallel to and about one-quarter mile south of Limestone Creek. The Kraemer Creek mine developed auriferous gravels on a mile-wide bench on the west side of the Middle Fork Chistochina. Placer gold in the area is in small, flattened but dense nuggets. Gold on Kraemer Creek reportedly was somewhat coarser than on Limestone Creek (MH309). Some of the gold on Kraemer Creek occurred in grains that weighed about 0.02 ounce (Moffit, 1944). According to mine operator Martin Jasper (in 1941), heavy minerals in decreasing order of abundance were magnetite, pyrite, chromite, galena, and olivine (?). Platinum, native copper, and sparse native silver also occurred in the concentrates (Moffit, 1944).

Alteration:

Age of mineralization:
Pleistocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
Placer gold was found in Kraemer Creek at least by 1907 (Moffit, 1912, 1944). The Kraemer Creek mine was first included in the Cleveland group of claims, which later were incorporated in a group of 75 claims

owned by the Middle Fork Mining Company of Seattle. The company conducted an extensive exploration program between 1934 and 1941 (Moffit, 1937, 1944). A large-scale mining operation begun in 1941 was terminated by World War II (Moffit, 1954).

Production notes:

Reserves:

Additional comments:

A possible low-grade gold resource exists on benches cut by Kraemer and nearby creeks (Moffit, 1944).

References:

Moffit, 1912; Moffit, 1937; Moffit, 1944; Moffit, 1954; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238).

Primary reference: Moffit, 1944

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/12/03

Site name(s): Ptarmigan Creek

Site type: Prospect

ARDF no.: MH312

Latitude: 63.1157 **Quadrangle:** MH A-2

Longitude: 144.6781

Location description and accuracy:
Ptarmigan Creek flows east into lower Limestone Creek, which is a main tributary of the Middle Fork Chistochina River. The prospect is on Ptarmigan Creek at an elevation of about 4,000 feet, in the NE1/4NE1/4 section 9, T. 21 S., R. 16 E., Fairbanks Meridian. The location of the prospect is approximate; it is assumed to be where a prospect trail (ditch?) from upper Limestone Creek crosses Ptarmigan Creek (see the Mount Hayes A-2 quadrangle topographic map). (MH003 in the D-6 quadrangle is also named Ptarmigan Creek.)

Commodities:

Main: Au

Other:

Ore minerals: Gold, platinum group element (PGE) minerals

Gangue minerals:

Geologic description:
Ptarmigan Creek was one of the properties of Middle Fork Mining Company of Seattle (Moffit, 1944) and was staked in a group of about 75 mining claims that covered parts of an auriferous bench at least 3 miles long.

Ptarmigan Creek is about 3 miles long. The upper 2 miles of the creek are in a canyon incised in bedrock; the lower mile flows on a gravel bench on the west side of the Middle Fork Chistochina River. The bench is auriferous, and where prospected on Limestone (MH309), Bedrock (MH310), and Kraemer (MH311) Creeks, gravels were generally less than 40 feet thick (Moffit, 1944; Cobb, 1979 [OFR 79-238]). Results of prospecting on Ptarmigan Creek are unknown. Claims were staked in 1907 on Ptarmigan Creek for gold and platinum (Heiner and Porter, 1972).

Alteration:

Age of mineralization:
Pleistocene to Holocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:

More than 70 claims were staked on the Ptarmigan Creek bench for gold and platinum in 1907 (Heiner and Porter, 1972, Kardex site number KX68-26). Workings are unknown, but the bench dissected by Ptarmigan Creek was probably prospected with reconnaissance pits or drill holes. Claims on Ptarmigan Creek were part of the property of the Middle Fork Mining Company of Seattle in 1941 (Moffit, 1944).

Production notes:

Reserves:

A low-grade gold resource is present on the bench of the Middle Fork Chistochina River bisected by Ptarmigan Creek (Moffit, 1944).

Additional comments:

References:

Moffit, 1944; Rose, 1967; Heiner and Porter, 1972; Cobb, 1979 (OFR 79-238).

Primary reference: Moffit, 1944

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/13/03

Site name(s): Russian John Creek

Site type: Prospect

ARDF no.: MH313

Latitude: 63.1072 **Quadrangle:** MH A-2

Longitude: 144.6808

Location description and accuracy:
This prospect is on Russian John Creek in the SE1/4 section 9, T. 21 S., R. 16 E., Fairbanks Meridian. The prospect probably continues east on section 10. The prospect is at the point where a trail meets the creek (see Mount Hayes A-2 quadrangle).

Commodities:

Main: Au

Other: Ag, platinum group elements (PGE) (?)

Ore minerals: Gold, PGE (?)

Gangue minerals:

Geologic description:
A bench placer on the west side of the Middle Fork Chistochina River is at least 3 miles long. It extends southerly from Bedrock Creek (MH310), through Limestone (MH309), Kraemer (MH311), and Ptarmigan Creeks (MH312) to Russian John Creek. Russian John Creek is about 2 miles long. The upper creek is in a canyon. The lower 1.25 miles flows easterly on the Middle Fork bench into Limestone Creek, which flows south west of the broad braided channel of the Middle Fork.

There is no specific prospect information on Russian John Creek. It is assumed that the bench placer deposit at Russian John Creek contains some platinum group element (or PGE) minerals and gold, as do the upstream occurrences. Upstream, the bench gravels were as much as 70 feet thick but generally less than 40 feet (Moffit, 1944).

Alteration:

Age of mineralization:
Pleistocene to Holocene.

Deposit model:
Placer Au-PGE (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
Claims that included Russian John Creek were part of the group owned by Middle Fork Mining Company of Seattle. The claims were explored during the late 1930's, and a hydraulic mining operation started in 1941 (Moffit, 1944). The operation was effectively terminated by World War II (Moffit, 1954).

Production notes:

Reserves:
Possible part of a low-grade gold resource on a mile-wide bench on the west side of the Middle Fork Chistochina River.

Additional comments:

References:
Moffit, 1944; Moffit, 1954; Rose, 1967.

Primary reference: Moffit, 1944

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/13/03

Site name(s): Unnamed (west of Powell Gulch)

Site type: Occurrence

ARDF no.: MH314

Latitude: 63.1548 **Quadrangle:** MH A-2

Longitude: 144.8500

Location description and accuracy:
The occurrence is on the east-facing slope above upper Powell Gulch at an elevation of about 5,250 feet. It is about 0.2 mile north of the center of section 27, T. 20 S., R. 15 E., Fairbanks Meridian. The occurrence corresponds to locality 26 of Rose (1967). The location is probably accurate within 0.2 mile.

Commodities:

Main:

Other: Fe

Ore minerals: Hematite, magnetite, pyrite

Gangue minerals: Chlorite

Geologic description:
The rocks that crop out just above this occurrence are pyritized and are mainly andesite of probable Pennsylvanian age. Boulders below the outcrop are mainly composed of hematite, magnetite, pyrite, and chlorite; they are probably nearly in place, but no source was found (Rose, 1967). No sample was analyzed.

Alteration:
Pyritization; introduction of magnetite, hematite, and chlorite.

Age of mineralization:
Uncertain; epigenetic mineralization of Pennsylvanian volcanic rocks.

Deposit model:
Possibly Fe skarn (Cox and Singer, 1986; model 18d).

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

Production Status: No

Site Status: Inactive

Workings/exploration:
There are no workings at this site.

Production notes:

Reserves:

Additional comments:

References:

Rose, 1967.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/9/03

Site name(s): Unnamed (west of Powell Gulch northeast of peak 5950)

Site type: Occurrence

ARDF no.: MH315

Latitude: 63.1549 **Quadrangle:** MH A-2

Longitude: 144.8574

Location description and accuracy:
The occurrence is near the top of the ridge south of Slate Creek and west of Powell Gulch. It is a few hundred feet northeast of peak 5950. The occurrence is in the SW1/4NW1/4 section 27, T. 20 S., R. 15 E., Fairbanks Meridian. It corresponds to locality 27 of Rose (1967), locality 19 on figure 6 of Cobb (1979 [OFR 79-239]), and locality 137 in table 2 of Nokleberg and others (1991). The location is accurate within 0.1 mile.

Commodities:

Main: Cu

Other: Ag, Au

Ore minerals: Chalcopyrite, hematite, pyrite

Gangue minerals: Chlorite, epidote, quartz

Geologic description:
The rocks near peak 5950 are mainly Tetelna Volcanics of Pennsylvanian age (Richter and Dutro, 1975), previously mapped as Chisna Formation of Pennsylvanian and Permian (?) age (Rose, 1967). Intrusions of quartz monzonite and the Gakona diorite of Mesozoic age occur in the vicinity. Locally, the volcanic rocks contain secondary epidote and have been chloritized and pyritized and contain disseminated chalcopyrite.

Nokleberg and others (1991, table 2) collected a grab sample from a zone about 10 feet wide and 30 feet long that assayed 1.4 percent copper and 15 parts per million silver. A select sample from a chalcopyrite-bearing boulder assayed a trace of gold, 0.52 ounce of silver per ton and 1.14 percent copper (Rose, 1967).

Alteration:
Sulfidization of Pennsylvanian volcanic rocks; introduction of chlorite and epidote.

Age of mineralization:
Probably Mesozoic, related to nearby intrusions of quartz monzonite and Gakona diorite (Rose, 1967).

Deposit model:
Cu skarn or Porphyry Cu, distal (Cox and Singer, 1986; model 18B, model 20c).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
18b or 20c

Production Status: No

Site Status: Inactive

Workings/exploration:
Limited surface sampling.

Production notes:

Reserves:

Additional comments:

References:
Rose, 1967; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Rose, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/9/03

Site name(s): SM

Site type: Occurrence

ARDF no.: MH316

Latitude: 63.1823 **Quadrangle:** MH A-1

Longitude: 144.4684

Location description and accuracy:

The SM occurrence is on a nunatak and is accessible only by helicopter (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). The occurrence is at an elevation of about 6,600 feet; it is one-half mile east of peak 7140 in the NE1/4 section 9, T. 16 N., R. 5 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Zn

Other: Ag, Au, Cu, Pb

Ore minerals: Chalcopyrite, galena, sphalerite

Gangue minerals: Graphite, pyrite, pyrrhotite

Geologic description:

The SM occurrence is in the Hayes Glacier unit of Devonian to Mississippian age (Nokleberg and others, 1992) and consists of a folded exposure of 7 feet of massive sulfides exposed on a nunatak. At least four distinct types of massive sulfide mineralization are found in glacial debris below the nunatak. These include: (1) banded pyrite-sphalerite-galena(-chalcopyrite), (2) massive pyrite, (3) massive pyrrhotite with minor chalcopyrite and pyrite, and (4) banded pyrite and sphalerite in a matrix of black graphitic siltstone. The abundance of each of these types of mineralization suggests that a substantial deposit may be present under the glacial ice. Isoclinal folding is prominent in outcrop. The massive sulfides occur at the contact between a pyritic and sericitic, felsic metavolcanic layer and a black graphitic siltstone. This contact appears to be repeated in several locations on the nunatak (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). Average metal values of the massive sulfide were 0.26 percent copper, 0.27 percent lead, 2.97 percent zinc, 0.62 ounce of silver per ton, and 0.05 ounce of gold per ton (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978).

The Hayes Glacier rocks that host the SM occurrence consists of fine-grained phyllitic schists and mylonite derived from sedimentary and volcanic protoliths. The rocks locally display intense structural deformation due to their proximity to the Denali Fault. The rocks are metamorphosed to lower greenschist facies and are less metamporphosed than Jarvis Belt rocks to the northeast (Nokleberg and others, 1992). The basal part of the unit consists of mafic to intermediate composition metavolcanic rocks overlain by interbedded felsic metavolcanic units and extensive pelitic and graphitic metasedimentary rocks (Dashevsky and others, 2003).

Alteration:

Age of mineralization:

Devonian to Mississippian, on the basis of the age of the host rocks.

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
This prospect was staked in 1976 by Resource Associates of Alaska, and limited exploration followed. Some sampling and a few lines of magnetic and VLF geophysical surveys were run. Strong anomalies from both techniques were found to correlate with known mineralization. A hand-held drill was used to sample banded, pyritic massive sulfide outcrops at the northeastern corner of the SM nunatak to a maximum depth of 4 feet.

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Nokleberg and others, 1992; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Unnamed (headwaters of the Chistochina River)

Site type: Occurrence

ARDF no.: MH317

Latitude: 63.1455 **Quadrangle:** MH A-1

Longitude: 144.4901

Location description and accuracy:
This occurrence is at an elevation of about 4,400 feet, 8 miles southeast of Mount Kimball. It is on moraine at the foot of an unnamed glacier at the head of the Chistochina River at the northeast corner of section 29 T. 16 N., R. 5 E., Copper River Meridian. This location is accurate.

Commodities:

Main: Cu, Zn

Other: Pb

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals:

Geologic description:
During reconnaissance work in 1978, Resource Associates of Alaska, Inc. discovered pyrite-rich float on a glacial moraine (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). There is no indication of any follow-up work at this site. The occurrence is 2.5 miles down the glacier from the SM massive sulfide occurrence (MH316).

The rocks of the Hayes Glacier unit that hosts this occurrence consist of fine-grained phyllitic schist and mylonite derived from sedimentary and volcanic protoliths. The rocks locally display intense structural deformation due to their proximity to Denali Fault. The basal part of the unit consists of mafic- to intermediate-composition metavolcanic rocks; they are overlain by interbedded felsic metavolcanic rocks and extensive pelitic and graphitic metasedimentary rocks (Dashevsky and others, 2003).

Alteration:

Age of mineralization:

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
During reconnaissance work in 1978, Resource Associates of Alaska, Inc. discovered pyrite-rich float on a glacial moraine (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). There is no indication of any follow-up work at this site.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Epidote Glacier

Site type: Occurrence

ARDF no.: MH318

Latitude: 63.2208 **Quadrangle:** MH A-1

Longitude: 144.4410

Location description and accuracy:
The Epidote Glacier occurrence is in the middle of the moraine-littered glacier surface of the informally named Epidote Glacier. It is at an elevation of about 4,800 feet in the SW1/4 section 27, T. 17 N., R. 5 E., Copper River Meridian. The location is accurate.

Commodities:

Main:

Other:

Ore minerals:

Gangue minerals: Epidote

Geologic description:
This occurrence consists of extensive float of altered calc-silicate rocks that litters the moraine and surface of the informally named Epidote Glacier (Dashevsky and others, 2003). The epidote-rich rocks are scattered over an area of more than 2 square miles (S.S. Dashevsky, written communication, 2002). The Hayes Glacier unit that hosts this occurrence consists of fine-grained phyllitic schists and mylonite derived from sedimentary and volcanic protoliths. The rocks locally display intense structural deformation due to their proximity to the Denali Fault. The rocks are metamorphosed to lower greenschist facies and are less metamporphosed than Jarvis Belt rocks to the northeast. The basal part of the unit consists of mafic to intermediate composition metavolcanic rocks overlain by interbedded felsic metavolcanic units and extensive pelitic and graphitic metasedimentary rocks (Dashevsky and others, 2003).

Alteration:
Extensive epidote alteration of schist scattered over an area of more than 2 square miles of glacial moraine (S.S. Dashevsky, written communication, 2002).

Age of mineralization:
Devonian to Mississippian, on the basis of the age of the host rocks.

Deposit model:

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Only limited surface sampling has been done at this prospect.

Production notes:

Reserves:

Additional comments:
Large calc-silicate alteration assemblage indicative of possible skarn or massive sulfide hydrothermal systems.

References:
Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): DD North

Site type: Prospect

ARDF no.: MH319

Latitude: 63.2686 **Quadrangle:** MH B-1

Longitude: 144.2650

Location description and accuracy:

The DD North prospect is located at an elevation of about 6,300 feet in the headwall basin of a small remnant glacier one-half mile northeast of peak 7440. The prospect in the east-central part of section 9, T. 17 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Au, Cu, Zn

Other: Ag, Pb

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Calcite, chlorite, gypsum, quartz, sericite

Geologic description:

The DD North prospect is a lens-shaped massive sulfide body in the uppermost part of the Drum metarhyolite unit of Devonian to Mississippian age. Mineralization subcrops beneath ice and moraine and is expressed at the surface by a train of massive sulfide boulders in glacial moraine leading up to the prospect site on the remnant glacier. The massive sulfide is pyrrhotite-rich with lesser pyrite and scattered sphalerite, galena, arsenopyrite, and chalcopyrite. Native gold was observed in core from quartz veins at the hanging-wall contact of the massive sulfide. Numerous lithic fragments of metasedimentary and metavolcanic protolith occur in the sulfide body (Dashevsky and others, 2003).

Twelve core holes totaling 7,055 feet have been drilled in the DD North deposit. The deposit appears to have an elongated lensoidal shape and is open down-dip to the southwest. Drilling has identified a 35-foot-thick central zone that contains 1.2 million tons averaging 1.6 percent copper, 2.4 percent lead, 3.2 percent zinc, 102 parts per million (ppm) silver, and 3.1 ppm gold.

The Drum unit that hosts the DD North prospect consists of white to pale gray-green, rusty weathering, quartz-sericite(-chlorite-pyrite) schist with minor gray to black carbonaceous phyllite and rare interbeds of chloritic phyllite. The schist commonly contains 1 to 5 percent quartz eyes but may contain more. The protoliths of the schist are about two-thirds of volcanic origin and one-third of sedimentary origin. The schist has a phyllitic parting. in many places. Metasedimentary rocks of the Tok River unit immediately overlie the DD North massive sulfide layer or unit (Dashevsky and others, 2003).

Alteration:

Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:

The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
The massive sulfide float boulders were discovered in 1976 at the DD North prospect during stream-sediment reconnaissance (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976). Extensive geological, geochemical, and geophysical surveys were conducted in 1976 through 1981 by Resource Associates of Alaska, in 1990 by Phelps Dodge, and from 1994 to 1997 by American Copper and Nickel Company (S.S. Dashevsky, oral communication, 2002). Twelve core holes totaling 7,055 feet have been drilled in the DD North prospect.

Production notes:

Reserves:
The DD North deposit has an inferred resource of 1.2 million tons with 1.6 percent copper, 2.4 percent lead, 3.2 percent zinc, 102 parts per million (ppm) silver, and 3.1 ppm gold. The resource calculation includes only those contiguous bodies with a true thickness greater than 8 feet and a gross metal value of greater than $80.00 per ton at 1998 prices (Dashevsky and others, 2003).

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): DDY

Site type: Occurrence

ARDF no.: MH320

Latitude: 63.2645 **Quadrangle:** MH B-1

Longitude: 144.2574

Location description and accuracy:
The DDY occurrence is at an elevation of about 6,300 feet, 0.6 mile east of peak 7440. It is about one-half mile southeast of the center of section 9, T. 17 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Cu, Zn

Other: Ag, Au, Pb

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

Gangue minerals: Calcite, chlorite, quartz, sericite

Geologic description:
The DDY occurrence consists of a thinly laminated discontinuous massive sulfide layer less than one-third meter thick; it is in a cherty exhalite at the contact of felsic metavolcanic rocks in the footwall and carbonaceous phyllite in the hanging wall. Samples average 0.6 percent copper, 0.04 percent lead, 0.4 percent zinc, 21 parts per million (ppm) silver, and 0.4 ppm gold (S.S. Dashevsky unpublished data, 2002).

The DDY occurrence is in the same mineralized horizon as the DD North prospect (MH319), at the contact of the Drum felsic metavolcanic unit with the overlying Tok River metasedimentary sequence. The Tok River unit is a thick, mainly metasedimentary assemblage of chloritic phyllite, quartz-sericite(-chlorite) schist, variably phyllitic quartz-eye metagrits, carbonaceous phyllite, and minor marble. Some of the metagrits contain feldspathic detritus and are locally calcareous. The protolith of the Tok River unit is about three-quarters sedimentary and one-quarter volcanic. It has minor interbeds of felsic volcanic rocks similar to the rhyolite and rhyodacite of the Drum unit (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
The associated Drum stratigraphic unit has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359+/- 6 Ma determined at the DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Probably inactive

Workings/exploration:

The DDY occurrence has been explored by surface mapping, sampling, and airborne and ground geophysics as part of the broader exploration of the DD North (MH319) and DD South (MH325) prospects. One core hole drilled in 1990 by Phelps Dodge near the DDY prospect did not intersect significant mineralization (S.S. Dashevsky, oral communication, 2002).

Production notes:

Reserves:

Additional comments:

References:

Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): DDX

Site type: Occurrence

ARDF no.: MH321

Latitude: 63.2587 **Quadrangle:** MH B-1

Longitude: 144.2487

Location description and accuracy:
The DDX prospect is at an elevation of about 5,200 feet and is a mile southeast of peak 7440. It is in the NW1/4 section 15, T. 17 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Ag, Pb, Zn

Other: Cu

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

Gangue minerals: Calcite, chlorite, quartz, sericite

Geologic description:
The DDX zone of massive sulfides crops out in a creek; one layer of mineralization 10 to 20 inches thick is exposed, as are several thinner bands 1 to 2 inches thick. The thicker layer is a banded massive sulfide dominated by pyrite; it has more chalcopyrite at its base and more sphalerite and galena at its top. The mineralization occurs within a 15-foot-thick black carbonaceous phyllite enclosed by felsic metavolcanic schist. The massive sulfide is exposed for about 30 feet before it lenses out or is covered by talus (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978). Samples from the DDX exposure average 0.5 percent copper, 3.3 percent lead, 5.5 percent zinc, 54 parts per million (ppm) silver, and 0.1 ppm gold (Dashevsky and others, 2003).

The DDX occurrence occupies the same mineralized unit or layer as the DD North prospect (MH319); it is along the upper contact of the Drum felsic unit and beneath the Tok River sequence. The Tok River unit is a thick assemblage of metasedimentary rocks that consist of chloritic phyllites, quartz-sericite (-chlorite) schist, phyllitic quartz-eye metagrits, carbonaceous phyllite, and minor marble. Some of the metagrits contain feldspathic detritus and are locally calcareous. The protolith of the Tok River unit is about three-quarters sedimentary and one-quarter volcanic. It has minor interbeds of felsic volcanic rocks similar to the rhyolite and rhyodacite of the Drum unit (Dashevsky and others, 2003).

Alteration:
Weak disseminated pyrite +/- quartz.

Age of mineralization:
The associated Drum stratigraphic unit has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359+/- 6 Ma determined at the DD South deposit (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Probably inactive

Workings/exploration:
The DDX occurrence has been explored by surface mapping, sampling, and airborne and ground geophysics as part of the broader exploration of the DD North (MH319) and DD South (MH325) prospects.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): ED

Site type: Occurrence

ARDF no.: MH322

Latitude: 63.1722 **Quadrangle:** MH A-1

Longitude: 144.2923

Location description and accuracy:
The ED occurrence is on the east side of the glacier at the head of Rumble Creek and at an elevation of about 4,700 feet. The occurrence is 1.2 miles east-southeast of peak 6705 and in the NW1/4 section 16, T. 16 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Cu, Zn

Other: Pb

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

Gangue minerals: Quartz

Geologic description:
The ED occurrence consists of semimassive to massive pyrite, pyrrhotite, and chalcopyrite that occur as pods and lenses as much as 1 foot thick along the contact of felsic metavolcanic schists and marble. The felsic volcanic unit or layer can be traced for 3 miles before it is covered by talus and ice both to the east and west. At the west end the mineralized layer is less than 10 feet thick (E. Hunter, unpublished data, 1998).

The ED prospect was sampled by American Copper and Nickel Company in 1994. The highest grade sample contains 3,631 parts per million (ppm) copper, 180 ppm lead, 292 ppm zinc, 2.4 ppm silver, and 5 parts per billion (ppb) gold (E. Hunter, unpublished data, 1998). Other samples collected from talus float contain as much as 1.2 percent copper, 1.8 percent lead, 2.7 percent zinc, 28 ppm silver, and 85 ppb gold (S.S. Dashevsky, written communication, 2003). The ED occurrence is in the upper Tok River unit near the facies transition to the Hayes Glacier unit (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
Devonian to Mississippian, on the basis of the age of the host rocks.

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
The ED prospect has only had limited surface sampling by American Copper and Nickel Company in 1994 (E. Hunter, unpublished data, 1998).

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Tiger Paw

Site type: Occurrence

ARDF no.: MH323

Latitude: 63.2891 **Quadrangle:** MH B-1

Longitude: 144.2332

Location description and accuracy:
The Tiger Paw occurrence is at an elevation of about 4,700 feet and about 0.8 mile north-northeast of peak 7835 (locally called Tiger Tooth Mountain). It is about one-half mile north-northeast of the center of section 3, T. 17 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other: Ag, Au

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, quartz, sericite

Geologic description:
The Tiger Paw occurrence is a laterally discontinuous massive sulfide-bearing pyritic layer or unit in siliceous felsic metavolcanic schist of the upper Lagoon unit. Samples collected by Resource Associates of Alaska Inc. in the late 1970's and early 1980's contain as much as 4.9 percent copper, 3.9 percent zinc, 2.9 percent zinc, 225 parts per million (ppm) silver, and 1 ppm gold. Follow-up sampling by American Copper and Nickel Company in the mid-1990's failed to find similar high metals values (S.S. Dashevsky, unpublished data, 2002).

The Lagoon unit is a succession of dark-gray, rusty, phyllitic metamorphosed mudstones interbedded with light-gray to white to pale-green siliceous quartz-sericite(-chlorite) schist. Locally the rocks contain coarse-grained blue quartz-eyes and rare fragmental volcanic textures preserved as chloritized lithic fragments. The upper part is dominated by white to pale-green, massive to laminated quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist; finely laminated schist with minor metamorphosed black mudstone; and thin intercalations of quartzite and fine-grained metamorphosed grit. The protoliths of the volcanic rocks of the upper Lagoon unit are mainly rhyodacite and dacite, but they also include rare rhyolite and minor andesite and basalt (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Probably inactive

Workings/exploration:
Only surface sampling and mapping have been done on this occurrence.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): TA

Site type: Occurrence

ARDF no.: MH324

Latitude: 63.2793 **Quadrangle:** MH B-1

Longitude: 144.1969

Location description and accuracy:

The TA occurrence is at an elevation of about 5,400 feet on the east flank of peak 7835, locally called Tiger Tooth Mountain. It is southwest of the confluence of the Robertson River and Rumble Creek and in the SE1/4 section 2, T. 17 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Zn

Other: Ag, Cu, Pb

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, quartz, sericite

Geologic description:

The TA occurrence has disseminated to semimassive pyrite, sphalerite, chalcopyrite, and galena in a sequence of fine- to coarse-grained quartz arenite, quartzite, quartz siltstone, lesser chloritic and sericitic metavolcanic schist, and limestone. The sulfides occur in poorly developed bands and concentrations along foliation and fracture planes; the mineralized rocks can be traced for at least 1,500 feet along strike. At least two mineralized horizons as much as 5 feet thick have been recognized. They contain both discontinuous cherty layers (exhalite?) and coarse-grained quartz arenite (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978).

Early workers considered the sulfide horizon at this prospect to possibly be a time-stratigraphic equivalent of the mineralized horizon at the DD North prospect (MH319) (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978). Subsequent examination by American Copper and Nickel Company in 1995 failed to find any massive mineralization, and the geologists concluded that the disseminated sulfides that were seen were probably a secondary remobilization into the porous metasedimentary rocks.

The TA occurrence is in the Lagoon unit, which is considerably older than the Drum unit that hosts the DD North deposit. Average grades of the TA sulfide occurrence are 0.2 percent copper, 2.2 percent zinc, and 20 parts per million silver (S.S. Dashevsky, unpublished data, 2002).

Alteration:

Age of mineralization:

The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

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

28a

Production Status: None

Site Status: Inactive

Workings/exploration:
The TA occurrence was discovered during the course of geologic mapping in 1978. Only surface sampling and mapping have been done.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): DD South

Site type: Prospect

ARDF no.: MH325

Latitude: 63.2645 **Quadrangle:** MH B-1

Longitude: 144.2323

Location description and accuracy:
The DD South prospect is located at an elevation of about 5,900 feet 1.4 miles east of peak 7440. It is about in the middle of the SE1/4 section 10, T. 17 N., R. 6 E., Copper River Meridian. This location is accurate.

Commodities:

Main: Ag, Au, Cu, Pb, Zn

Other:

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

Gangue minerals: Calcite, chlorite, gypsum, magnetite, quartz, sericite

Geologic description:
Boulders of massive sulfide in talus at DD South Float occurrence are derived from erosion of rocks at the southeastern edge of the DD South prospect. The DD South deposit is trough shaped and can be traced along strike 1,400 feet, and the main deposit is 400 to 500 feet wide (www.grayd.com). The central axis is 20 to 50 feet thick and tapers to a thickness of less than 10 feet (Dashevsky and others, 2003).

The deposit has a drill-inferred resource of 2.3 million tons with an average grade of 1.1 percent copper, 2.6 percent lead, 6.5 percent zinc, 102 parts per million (ppm) silver, and 2.4 ppm gold. Beyond this resource the deposit tapers to 1 foot and less over the next 150 feet. The deposit is pyrrhotite-rich with lesser pyrite and scattered sphalerite, galena, arsenopyrite, and chalcopyrite. Lithic fragments of metasedimentary and metavolcanic protolith are common in portions of the sulfide body (Dashevsky and others, 2003). Twenty-four core holes totaling 14,828 feet have been drilled in the DD South deposit (S.S. Dashevsky, unpublished data, 2002).

The DD South massive sulfide body is in the basal 120 feet of the Drum felsic metavolcanic unit, the age of which is that of the Mississippian-Devonian boundary. The Drum unit that hosts this prospect consists of white to pale gray-green, rusty weathering, quartz-sericite(-chlorite-pyrite) schist with minor gray to black carbonaceous phyllite and rare interbeds of chloritic phyllite. The schist commonly contains 1 to 5 percent quartz eyes but may contain more. The protoliths of the schist are about two-thirds of volcanic origin and one-third of sedimentary origin. The schist has a phyllitic parting in many places. The DD South mineralized horizon is underlain by the barren Tiger metavolcanic unit (Dashevsky and others, 2003).

Alteration:
Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at this prospect.

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
The DD South prospect was discovered in 1976 after finding massive sulfide blocks in talus at the DD South Float prospect. Extensive geological, geochemical, geophysical surveys and drilling were conducted by Resource Associates of Alaska from 1976 to 1981, by Phelps Dodge in 1990, and by American Copper and Nickel Company from 1994 to 1997. Twenty-four core holes totaling 14,828 feet have been drilled in the DD South deposit (S.S. Dashevsky, unpublished data, 2002).

Production notes:

Reserves:
The DD South deposit has an inferred resource of 2.3 million tons that averages 1.1 percent copper, 2.6 percent lead, 6.5 percent zinc, 102 parts per million (ppm) silver, and 2.4 ppm gold. The resource calculation includes only those contiguous bodies with a true thickness greater than 8 feet and a gross metal value of greater than $80.00 per ton at 1998 prices (Dashevsky and others, 2003).

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/26/03

Site name(s): Big Mac

Site type: Occurrence

ARDF no.: MH326

Latitude: 63.1673 **Quadrangle:** MH A-1

Longitude: 144.2298

Location description and accuracy:
The Big Mac occurrence is located at an elevation of about 5,700 feet between the head of Rumble Creek and the Tok River. It is approximately 0.4 mile northeast of peak 7725 in the west-central portion of section 14, T. 16 N., R. 6 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Fe

Other:

Ore minerals: Pyrite

Gangue minerals: Quartz

Geologic description:
The Big Mac occurrence consists of massive pyrite lenses as much as 1 foot thick and semimassive pyrite lenses as much as 10 feet thick; the lenses are in interbedded felsic metavolcanic rocks, pyritic exhalite (?), and minor limestone and graphitic black schist. The mineralized layer or unit can be traced for 1.5 miles along a cliff face; it is covered on the east and west by glacial till and ice. Base and precious metals values are at or below background levels in all samples collected (E. Hunter, unpublished data, 1998). The host rock is probably in the upper Tok River stratigraphic unit, but it is near a facies transition to the Hayes Glacier unit (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
Devonian to Mississippian, on the basis of the age of the host rocks.

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
The Big Mac occurrence was visited by American Copper and Nickel Company in 1994. Only background values for base and precious metal were found in the sulfides (E. Hunter, unpublished data, 1998).

Production notes:

Reserves:

Additional comments:

The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): LZ

Site type: Prospect

ARDF no.: MH327

Latitude: 63.1819 **Quadrangle:** MH A-1

Longitude: 144.1594

Location description and accuracy:
The LZ prospect is on a ridge between Rumble Creek to the northwest and the Tok River to the southeast at an elevation of about 6,400 feet, near the center of section 7, T. 16 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other: Ag, Au

Ore minerals: Arsenopyrite, chalcopyrite, galena, marcasite, pyrite, pyrrhotite, sphalerite, tennantite

Gangue minerals: Calcite, chlorite, dolomite, graphite, quartz, sericite

Geologic description:
The rocks in the vicinity of the LZ prospect are mainly interbedded and interfolded metasedimentary rocks (black phyllite, micaceous quartzite, calc-schist, marble) and minor metavolcanic rocks that consist of thinly banded white quartz-sericite schist and green quartz-chlorite-sericite schist. The rocks are part of the the lower Lagoon unit. The pervasive schistosity in the area generally strikes northwest and dips southwest at 30 to 50 degrees. Two small rhyolite porphyry dikes intrude the metasedimentary rocks (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976).

The LZ prospect has several layers of massive sulfides 0.5 to 4 feet thick in a stratigraphic section of 60 feet (J.K. Muntzert and others, unpublished Resource Associates of Alaska Inc. report, 1977; E. Hunter, written communication, 1998; Dashevsky and others, 2003). A typical sulfide specimen contains 1.2 percent copper, 5.62 percent lead, 11.1 percent zinc, 3.28 ounces of silver per ton, and traces of gold. The mineralized zones occur in or are intimately associated with quartz-sericite schist or quartz-sericite-chlorite schist (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976).

During the 1977 field season, massive sulfide mineralization was traced almost continuously over a strike length of 2,500 feet along a steep mountain slope. The mineralization is lost at the north end of this steep slope where it projects onto a broad dip slope with poor exposure; it is lost at the south end where it projects into a debris-filled cirque (J.K. Muntzert and others, unpublished Resource Associates of Alaska Inc. report, 1977). In the late 1990's American Copper and Nickel Company geologists confirmed at least three high-grade bands of massive sulfide 0.5 to 4 feet thick that shed blocks of mineralized rock to the talus field. Representative samples of these bands contain 1.0 percent copper, 7.0 percent lead, 10.0 percent zinc, 206 parts per million (ppm) silver, and 1.2 ppm gold (E. Hunter, written communication, 1998; Dashevsky and others, 2003).

Alteration:

Age of mineralization:
The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the nearby LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
Surface sampling, mapping, and limited drilling has been carried out on the LZ prospect. Culp (1982) prepared a masters thesis at the University of Alaska on the geology and mineralization of the PP-LZ trend. A single 130-foot core hole was drilled on the LZ prospect in 1977 but suffered severe core loss and did not hit the down-dip projection of the mineralized layer or unit (S.S. Dashevsky, written communication, 2003).

During the 1977 field season, massive sulfide mineralization was traced in outcrop almost continuously over a strike length of 2,500 feet along a steep mountain exposure. The mineralization is lost at the north end of this steep slope where it projects out onto a broad dip slope with poor exposure; it is lost at the south end where it projects into a debris-filled cirque.

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg (USGS)

Last report date: 03/20/03

Site name(s): LZ East

Site type: Prospect

ARDF no.: MH328

Latitude: 63.1791 **Quadrangle:** MH A-1

Longitude: 144.1465

Location description and accuracy:
The LZ East prospect is along strike 2,000 feet southeast of the LZ prospect (MH327). It is between Rumble Creek and the Tok River at an elevation of about 6,900 feet. It is about one-half mile east-southeast of the center of section 7, T. 16 N, R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other: Ag, Au

Ore minerals: Arsenopyrite, chalcopyrite, galena, marcasite, pyrite, pyrrhotite, sphalerite, tennantite

Gangue minerals: Calcite, chlorite, dolomite, graphite, quartz, sericite

Geologic description:
The LZ East prospect is one in a series of massive sulfide occurrences (MH327-MH328, MH350-MH353) that are intermittently exposed for 7 miles along strike in a thrust-repeated section of the lower Lagoon unit (Dashevsky and others, 2003). The LZ East deposit occurs as multiple thin massive sulfide sheets associated with felsic metavolcanic rocks in a sequence of graphitic siltstone, graphitic dolomite, and minor quartz-sericite-schist and marble. The average grade is 0.25 percent copper, 2.78 percent lead, 2.82 percent zinc, 80.2 grams of silver per ton, and 0.16 grams of gold per ton (Lange and others, 1993). American Copper and Nickel Company drilled two core holes in 1997 and intersected at least three massive sulfide bands 1.0 to 5.6 feet thick with grades of 0.4 to 1.0 percent copper, 3.4 to 8.9 percent lead, 5 to 11 percent zinc, 3.5 to 6.0 ounces of silver per ton, and 0.02 to 0.08 ounce of gold per ton (E. Hunter, unpublished data, 1998).

Alteration:

Age of mineralization:
The lower Lagoon metamorphic sequence that hosts the this prospect has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
Extensive field work has been done to define the PP-LZ mineralized zone, including geologic mapping,

soil sampling, stream-sediment sampling, and geophysical analysis (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976).

Production notes:

Reserves:

Additional comments:

The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg (USGS)

Last report date: 03/20/03

Site name(s): SB

Site type: Occurrence

ARDF no.: MH329

Latitude: 63.2909 **Quadrangle:** MH B-1

Longitude: 144.0868

Location description and accuracy:

The SB occurrence is approximately a mile upstream from the mouth of a small north-flowing tributary of the Robertson River in the SW1/4 section 33, T. 18 N., R. 7 E., Copper River Meridian. The occurrence is approximately located at an elevation of about 3,000 feet where massive sulfide boulders are exposed in landslides, mostly on the east side of the creek.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

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

Gangue minerals: Quartz, sericite

Geologic description:

The SB massive sulfide occurrence is a somewhat enigmatic occurrence that consists of numerous banded, pyrite-rich massive sulfide boulders as much as 15 feet in diameter. This occurrence is about 2.5 miles downstream from the DW-LP massive sulfide zone in an area of thick overburden. The boulders are concentrated in an area approximately 1,400 feet north-south by 500 to 800 feet east-west (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977).

The SB boulders were systematically sampled in 1977. The average of 10 samples is 0.26 percent copper, 1.03 percent lead, 4.4 percent zinc, and 1.39 ounces of silver per ton; the samples were not analyzed for gold (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977). Sampling by American Copper and Nickel Company in 1994 gave similar values of base metals and silver, but the modern assay techniques indicated the presence of gold. Samples averaged 0.4 percent copper, 1.7 percent lead, 4.5 percent zinc, 63 parts per million (ppm) silver, and 1.7 ppm gold (Dashevsky and others, 2003).

Considerable geophysical, geochemical, and geological work was done in the 1970's to locate the source of the sulfide boulders. The current hypothesis is that these sulfide boulders are glacial erratics from the DW-LP massive sulfide horizon that were rafted down the creek valley on ice (E. Hunter, unpublished data, 1998).

The rocks around the SB occurrence are part of the Tushtena Pass unit; it consists of medium- to coarse-grained, calcareous, quartz-sericite-chlorite-schist, with local carbonate interbeds. Tushtena Pass rocks are typically green to gray, foliated, schistose to blocky, laminated to medium-bedded, quartz-eye bearing, quartz-rich lithologies with subordinate muscovite, sericite, and chlorite.

Alteration:

Age of mineralization:

Devonian, on the basis of the age of the host rocks.

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Probably inactive

Workings/exploration:
Surface samples of boulders were taken in i977 and 1994 (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977; Dashevsky and others, 2003). Considerable geophysical, geochemical, and geological work was done in the 1970's to locate the source of the sulfide boulders. The current hypothesis is that these sulfide boulders are glacial erratics from the DW-LP massive sulfide horizon that were rafted down the creek valley on ice (E. Hunter, unpublished data, 1998).

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): MB

Site type: Occurrence

ARDF no.: MH330

Latitude: 63.2803 **Quadrangle:** MH B-1

Longitude: 144.1323

Location description and accuracy:

The MB occurrence is 1.6 miles south of the confluence of Rumble Creek and the Robertson River and in the NE1/4SE1/4 section 6, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Cu

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, quartz, sericite

Geologic description:

The MB sulfide occurrence consists of disseminated pyrite, sphalerite, galena, and chalcopyrite in a medium- to coarse-grained quartzose calcareous arenite. The mineralized horizon crops out at the MB discovery area and again approximately 1,400 feet to the east. Four grab samples from the MB area contained an average of 0.25 percent copper, 2.78 percent lead, 2.82 percent zinc, 2.58 ounces of silver per ton, and traces of gold. The rocks above and below the mineralized layer or unit include interbedded discontinuous arenite, graphitic siltstone, and quartzite. Thin, interbedded felsic metavolcanic rocks occur sporadically through the section. Several gabbroic sills 12 to 15 feet thick are present in the more graphitic horizons above and below the mineralized zone. Northwest-trending faults locally cut the mineralized horizon (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978). Subsequent examinations by American Copper and Nickel Company concluded that mineralization is associated with and adjacent to these fault structures (E. Hunter, unpublished data, 1996).

The MB occurrence is in the lower Lagoon unit, which has a basal section of banded medium- to coarse-grained quartz-sericite(-chlorite) schist and carbonaceous schist; the upper section consists of fine-grained schist and phyllite. The protoliths of the basal section are immature sediments or wackes, mudstone, quartz arenite, and lesser calcareous arenite and carbonates. The lower Lagoon unit typically has interbeds of thin, gray to white and pale-green, interbedded felsic metavolcanic rocks. The metavolcanic rocks were originally mainly rhyolite and rhyodacite with rare andesite and basalt. A graphitic layer near the lower contact is a prominent stratigraphic marker horizon that can be traced in float and by electromagnetic surveys as a low-resistivity zone. A less prominent but distinctive chlorotoid-kyanite-bearing horizon that can be traced for 3 miles along strike coincides with several volcanogenic massive sulfide deposits. This distinctive mineral assemblage may have originally been an advanced-argillite alteration zone. Such zones have been associated with high-sulfidization volcanogenic massive sulfide belts elsewhere in the world (Dashevsky and others, 2003).

Alteration:

Intense carbonate and mariposite alteration is associated with mineralization; peripheral alteration is silicification and carbonization (Lange and others, 1993). A distinctive chlorotoid-kyanite assemblage is associated with mineralization in basal Lagoon unit.

Age of mineralization:

The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/-6 Ma at the LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
The MB sulfide zone was discovered in 1976 near the confluence of Rumble Creek and the Robertson River. Geologic mapping, geochemical and geophysical surveys began in 1977. During 1978, 1:6,000-scale geologic mapping was completed. Talus and vegetation severely limit outcrop correlation (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978).

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; This record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Super Cub Ridge

Site type: Occurrence

ARDF no.: MH331

Latitude: 63.2752 **Quadrangle:** MH B-1

Longitude: 144.0747

Location description and accuracy:
The Super Cub Ridge occurrence is about 2.5 miles southeast of the confluence of the Robertson River and Rumble Creek at an elevation of about 5,500 feet. It is about one-half mile north-northeast of the center of section 9, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Fe

Other: Zn

Ore minerals: Magnetite, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
Pods of pyrrhotite-magnetite skarn occur in the Tushtena Pass unit at the contact with a gabbroic sill (S.S. Dashevsky, written communication, 2002). The Tushtena Pass unit consists mainly of medium- to coarse-grained calcareous quartz-sericite-chlorite schist with carbonate interbeds. The schist is typically green to gray and laminated to layered and contains quartz eyes. Discontinuous bands of siliceous limestone, dolomitic marble, and black pyritic metasiltstone are common. A poorly exposed graphitic member in its upper part is a stratigraphic marker that can be traced by electromagnetic surveys. Quartz-carbonate veins and bands are characteristic of the Tushtena Pass unit. It is intruded and thickened by gabbroic sills and dikes, many of which are associated with local hornfelsing in nearby rocks.

Alteration:

Age of mineralization:
Mid-Triassic, on the basis of the U-Pb zircon age of gabbroic bodies that are related to this deposit (Dashevsky and others, 2003).

Deposit model:
Iron skarn (Cox and Singer, 1986; model 18d).

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

Production Status: None

Site Status: Active

Workings/exploration:

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): SC East; Super Cub East

Site type: Occurrence

ARDF no.: MH332

Latitude: 63.2704 **Quadrangle:** MH B-1

Longitude: 144.0596

Location description and accuracy:

The SC East occurrence is centered around a small vegetation kill zone at an elevation of about 4,600 feet on the west side of what is informally called Fourth of July Creek, a north-flowing tributary to the Robertson River. The occurrence is 3.1 miles southeast of the confluence of the Robertson River and Rumble Creek and in the NW1/4 section 10, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Au, Ag, Cu, Pb, Zn

Other: Hg, Sb

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Chlorite, quartz

Geologic description:

At the SC East occurrence, high-grade precious-metal-rich sulfide float is exposed in a vegetation kill zone developed on a kame terrace of Pleistocene or Holocene glacial sediments (J. Beget, written communication, 1997). The float is partly buried by more recent talus and rock glacier deposits derived from cliffs and slopes directly above the terrace. The high-grade boulders are interpreted to have been transported by a small alpine glacier and were probably eroded from bedrock above and to the west of the terrace in an area now covered by an active rock glacier (S.S. Dashevsky, written communication, 2003).

High-grade mineralized boulders consistently assayed more than 25 percent combined copper, lead, and zinc, more than 200 grams of silver per ton, and 11.3 grams of gold per ton. The origin of the boulders is not known; five holes have been drilled in the area in an attempt to locate their source (www.grayd.com). Various metamorphic and mafic intrusive rocks occur in the kame terrace with the high-grade boulders, including abundant float of siliceous pyritic mudstone, commonly oxidized to a sponge-like texture. This mudstone has been traced to a source in outcrop that has been intersected in drilling, but no high-grade sulfide mineralization has been found in place (S.S. Dashevsky, written communication, 2003).

The SC East prospect is in the lower Lagoon unit. The basal part of the unit consists of banded, medium- to coarse-grained quartz-sericite (-chlorite) schist and carbonaceous schist; the upper part of the unit is finer grained schist and phyllite. Protoliths for the basal section are immature sediments or wackes, mudstone, quartz arenite, and lesser calcareous arenite, and carbonate units. Thin, gray to white and pale-green interbedded metavolcanic rocks of the lower Lagoon unit typically are rhyolite and rhyodacite but include rare andesite and basalt.

A prominent graphitic member in the lower sequence hosts the SC East and Trio occurrences (MH333) and serves as a stratigraphic marker near the lower contact. It can be traced in float and by electromagnetic surveys as an extensive low-resistivity zone. A less prominent, but distinctive chloritoid-kyanite assemblage within the graphitic member forms a discontinuous but identifiable horizon that is spatially related to volcanogenic massive sulfide occurrences in lower Lagoon unit for 3 miles along strike. This mineral assemblage potentially delineates a metamorphosed advanced-argillic alteration zone that has been associated with volcanogenic massive-sulfide-deposit environments elsewhere (Dashevsky and others, 2003).

Alteration:

Age of mineralization:

The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

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

28a

Production Status: None

Site Status: Active

Workings/exploration:

In 1995, the geologic follow-up on a prominent conductor found by an airborne EM survey by American Copper and Nickel Company led to discovery of very high grade precious-metal-rich sulfide boulders that consistently assay more than 25 percent combined copper, lead, and zinc, more than 200 grams of silver per ton, and 11.3 grams of gold per ton (S.S. Dashevsky and others, 1996, unpublished report of American Copper and Nickel Company, Inc.). Extensive soil sampling, geologic mapping, and magnetic and electromagnetic surveys were completed in 1995 and 1996 and extended the area of mineralization beyond the initial discovery site.

Four holes were drilled above the boulders in 1996, but none of them intersected massive sulfide mineralization. Mapping of the Quaternary geology in 1997 determined that the mineralized boulders did not come directly downslope but are lying in a kame terrace and were transported to the location by a small alpine glacier. One additional core hole was drilled in 1998 on the basis of the projected origin of the mineralization and a geophysical conductor from a previous survey. The hole intersected quartz-sericite-pyrite altered rocks but did not locate the source of the high-grade massive sulfide boulders (See www.grayd.com.).

Production notes:

Reserves:

Additional comments:

The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Trio

Site type: Occurrence

ARDF no.: MH333

Latitude: 63.2616 **Quadrangle:** MH B-1

Longitude: 144.0395

Location description and accuracy:

The Trio occurrence is about 4 miles southeast of the confluence of the Robertson River and Rumble Creek. It is at an elevation of about 5,400 feet about 0.6 mile south-southeast of the center of section 10, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Ag, Au, Zn

Other: Cu, Pb

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Carbonate, chlorite, quartz

Geologic description:

Massive sulfide boulders and rubble crop that contain as much as 17 percent combined copper, lead, and zinc were located at the Trio occurrence in 1976 (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977). More typical values are 0.5 to 1.5 percent copper, 2 to 8 percent lead, 4 to 7 percent zinc, 30 to 125 grams of silver per ton, and 0.5 to 3 grams of gold per ton. Intensive programs of geological mapping, ground geophysical and geochemical surveys, and drilling were carried out from 1976 to 1984 by Resource Associates of Alaska and in 1990 by Phelps Dodge. Eight core holes were drilled at the occurrence by 1990, but the intersections of the massive sulfides did not correlate well with surface mapping or from hole to hole. Additional mapping and prospecting by American Copper and Nickel Company from 1994 to 1998 determined that the sulfide showings and the fairly shallow drill holes were all within an area of landslide debris. Three deeper, more widely spaced holes drilled in 1998 outside the landslide mass intersected an intensely altered quartz-sericite-pyrite layer but found no significant sulfide mineralization (S.S. Dashevsky, written communication, 2003).

The Trio prospect is in the lower Lagoon unit of Devonian age and is similar to the nearby high-grade SC East occurrence (MH332). The lower Lagoon unit has a basal section of banded, medium- to coarse-grained, quartz-sericite (-chlorite) schists and carbonaceous schists. The upper section is finer grained schist and phyllite. Protoliths for the basal section are immature sediments or wackes, mudstone, quartz arenite, and lesser calcareous arenite and carbonates. Thin, gray to white and pale-green interbedded metavolcanic members of the lower Lagoon unit typically are rhyolite and rhyodacite but include rare andesite and basalt. A prominent graphitic member in the lower section also hosts the nearby SC East prospect (MH 332). The graphitic member serves as a stratigraphic marker near the lower contact and can be traced in float and by electromagnetic surveys as an extensive low-resistivity zone. A less prominent, but distinctive chloritoid-kyanite assemblage within the graphitic member forms a discontinuous but identifiable horizon for 3 miles along strike that is spatially related to the volcanogenic massive sulfide occurrences in the lower Lagoon unit. This mineral assemblage has delineated a metamorphosed advanced-argillic alteration zone that has been associated with high-sulfidation volcanogenic massive sulfide deposit environments elsewhere (Dashevsky and others, 2003).

Alteration:

Strong to intense sericite-quartz -CO3 +/- chloritoid, kaolin, kyanite, andalusite alteration (Lange and oth-

ers, 1993; Dashevsky and others, 2003).

Age of mineralization:
The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
Massive sulfide boulders and rubble crop that contain as much as 17 percent combined copper, lead, and zinc were located at the Trio occurrence in 1976 (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977). More typical values are 0.5 to 1.5 percent copper, 2 to 8 percent lead, 4 to 7 percent zinc, 30 to 125 grams of silver per ton, and 0.5 to 3 grams of gold per ton. Intensive programs of geological mapping, ground geophysical and geochemical surveys, and drilling were carried out from 1976 to 1984 by Resource Associates of Alaska and in 1990 by Phelps Dodge. Eight core holes were drilled at the occurrence by 1990, but the intersections of the massive sulfides did not correlate well with surface mapping or from hole to hole. Additional mapping and prospecting by American Copper and Nickel Company from 1994 to 1998 determined that the sulfide showings and the fairly shallow drill holes were within an area of landslide debris. Three deeper, more widely spaced holes drilled in 1998 outside the landslide mass intersected an intensely altered quartz-sericite-pyrite horizon but found no significant sulfide mineralization (S.S. Dashevsky, written communication, 2003). A total of 6,385 feet of drilling in 12 drill holes has taken place in the Trio area that includes the Trio West (MH336) and Trio East (MH337) prospects (E. Hunter, unpublished American Copper and Nickel, Inc. report, 1998).

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Val

Site type: Prospect

ARDF no.: MH334

Latitude: 63.2574 **Quadrangle:** MH B-1

Longitude: 144.1074

Location description and accuracy:

The Val prospect is approximately 3.5 miles south-southeast of the confluence of Robertson River and Rumble Creek at an elevation of about 5,300 feet. It is a about a mile south-southeast of peak 6,220 in the NE1/4 section 17, T. 17 N., R. 7 E., Copper River Meridian. This prospect is concealed by glacial debris. The location is accurate.

Commodities:

Main: Zn

Other: Ag, Au, Cu, Pb

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Quartz, sericite

Geologic description:

The Val massive sulfide deposit is in felsic metavolcanic rocks of the upper Lagoon unit of Devonian age. The deposit is a sheet-like body as much as 17 feet thick. The prospect is one block in what was once part of a single continuous massive sulfide sheet that extended more than 2 miles along strike and is more than 40 feet thick. The massive sulfide bodies are now offset by high-angle faults into six deposits (Dashevsky and others, 2003).

The rocks around the Val prospect are part of the Tiger unit; however, the massive sulfide mineralization was intersected by drilling into the underlying metavolcanic rocks of the upper Lagoon unit. Drilling has defined an inferred resource of 1.3 million tons that average 0.3 percent copper, 0.6 percent lead, 4.4 percent zinc, 27 parts per million silver (ppm) and 1.2 ppm gold, accompanied by high arsenic and antimony values.

The Lagoon unit is a succession of dark gray, rusty, phyllitic metamorphosed mudstones interbedded with light-gray to white to pale-green siliceous quartz-sericite(-chlorite) schist. Locally the rocks contain coarse-grained blue quartz eyes and rare fragmental volcanic textures preserved as chloritized lithic fragments. The upper part is dominated by white to pale green, massive to laminated quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist; finely laminated schist with minor metamorphosed black mudstone; and thin intercalations of quartzite and fine-grained metamorphosed grit. The protoliths of the volcanic rocks of the upper Lagoon unit are mainly rhyodacite and dacite, but they also include rare rhyolite and minor andesite and basalt (Dashevsky and others, 2003).

Alteration:

Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:

The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
The Val prospect was discovered by finding massive sulfide float boulders during stream-sediment reconnaissance in 1976 (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976). The deposit is a buried target that is covered by glacial ice and moraine. Extensive geological, geochemical, and geophysical surveys were conducted from 1976 to 1998. Electromagnetic geophysical surveys were instrumental in recognizing this deposit. Three core holes totaling 2,018 feet have been drilled (Dashevsky and others, 2003).

Production notes:

Reserves:
The Val deposit has an inferred resource of 1.3 million tons that averages 0.3 percent copper, 0.6 percent lead, 4.4 percent zinc, 27 parts per million (ppm) silver and 1.2 ppm gold. The resource calculation includes only those contiguous bodies with a true thickness greater than 8 feet and a gross metal value of greater than $80.00 per ton at 1998 prices (Dashevsky and others, 2003).

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): DW East

Site type: Occurrence

ARDF no.: MH335

Latitude: 63.2584 **Quadrangle:** MH B-1

Longitude: 144.0890

Location description and accuracy:
The DW East prospect is approximately 3.4 miles south-southeast of the confluence of the Robertson River and Rumble Creek in the NW1/4 section 16, T. 17 N., R. 7 E., Copper River Meridian. The prospect is at an elevation of about 5,800 feet one-half mile south-southeast of peak 6220. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Quartz, sericite

Geologic description:
The DW East prospect is a massive sulfide outcrop less than 2 feet thick at the northern fringe of the DW-LP mineralized system (Dashevsky and others, 2003). The prospect is one block of what was once part of a single continuous massive sulfide sheet that extends more than 2 miles along strike and is more than 40 feet thick. The sheet is now offset by high-angle faults into six deposits (Dashevsky and others, 2003).

The average grade of samples from the DW East occurrence is 0.3 percent copper, 2.5 percent lead, 1.6 percent zinc, 90 parts per million (ppm) silver, and 2.2 ppm gold (S.S. Dashevsky, unpublished data, 2002).

The DW East massive sulfide is in metavolcanic rocks of the upper Lagoon unit of Devonian age. The unit consists of a succession of dark gray, rusty, phyllitic metamudstones with interbedded light gray to white to pale green siliceous, quartz sericite (-chlorite) schists. Locally the unit has coarse-grained blue quartz eyes and rare fragmental volcanic textures preserved as chloritized lithic fragments. The uppermost part of the unit is dominated by white to pale green, massive to laminated, quartz-eye-bearing, quartz-sericite(-chlorite-pyrite) schist and finely laminated quartz-sericite paper schist with lesser black phyllitic metamudstones and thin intercalations of quartzite and fine metagrit. The volcanic protoliths of the upper Lagoon are rhyodacite and dacite, but it contains rare rhyolite and minor andesite and basalt (Dashevsky and others, 2003).

Alteration:
Extensive chlorite (-chalcopyrite) footwall alteration.

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:

Extensive geological, geochemical, and geophysical surveys were conducted at the DW East prospect from 1976 to 1981 by Resource Associates of Alaska and 1994 through 1998 by American Copper and Nickel Company (S.S. Dashevsky, oral communication, 2002).

Production notes:

Reserves:

Additional comments:

The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Trio West

Site type: Occurrence

ARDF no.: MH336

Latitude: 63.2604 **Quadrangle:** MH B-1

Longitude: 144.0536

Location description and accuracy:
The Trio West occurrence is located about 3.8 miles southeast of the confluence of the Robertson River and Rumble Creek. It is at an elevation of about 5,300 feet elevation about one-half mile north-northeast of the center of section 15, T. 17N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Zn

Other: Ag, Cu, Pb

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Actinolite, carbonate, chlorite

Geologic description:
The Trio West occurrence is a 2- to 3-foot-thick massive sulfide body that crops out discontinuously on a talus-covered hillside for approximately 60 feet. The massive sulfide contains quartz (exhalite?) fragments as much as 8 inches long; it has an upper pyrrhotite-chalcopyrite-rich zone and a lower pyrrhotite-sphalerite-galena-rich zone. The massive sulfide is everywhere underlain by an 8-inch- to 1-foot-thick quartz exhalite that is chloritically altered and associated sphalerite and galena (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978). The quartz exhalite overlies a gabbroic body of undetermined attitude and size (C. Schaefer, written communication, 2003). Three chip samples had average values of 0.49 percent copper, 0.22 percent lead, 10.5 percent zinc, 0.187 ounce of silver per ton, and less than 0.004 ounce of gold per ton (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1978).

The Trio West prospect is in the lower Lagoon unit of Devonian age. The lower Lagoon unit has a basal section of banded, medium- to coarse-grained quartz-sericite(-chlorite) schists and carbonaceous schists. The upper section is finer grained schist and phyllite. Protoliths of the basal section are immature sediments or wackes, mudstone, quartz arenite, and lesser calcareous arenite and carbonate units. Thin, gray to white and pale-green interbedded metavolcanic members of the lower Lagoon unit typically are rhyolite and rhyodacite but include rare andesite and basalt. A prominent graphitic member in the lower section also hosts the nearby SC East (MH 332)and Trio (MH333) prospects. The graphitic member serves as a stratigraphic marker near the lower contact and can be traced in float and by electromagnetic surveys as an extensive low-resistivity zone. A less prominent, but distinctive chloritoid-kyanite assemblage within the graphitic member forms a discontinuous but identifiable horizon for 3 miles along strike that is spatially related to the VMS occurrences in lower Lagoon unit. This mineral assemblage has delineated a metamorphosed advanced-argillic alteration zone, that has been associated with high-sulfidation volcanogenic massive sulfide deposit environments elsewhere (Dashevsky and others, 2003).

Alteration:
Intense chlorite +/- carbonate alteration.

Age of mineralization:
The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit,

has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Probably inactive

Workings/exploration:
Surface sampling, mapping, and geophysical surveys were conducted from 1976 to 1984 by Resource Associates of Alaska.

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): Ellis, W.T., (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg (USGS)

Last report date: 03/20/03

Site name(s): Trio East

Site type: Occurrence

ARDF no.: MH337

Latitude: 63.2525 **Quadrangle:** MH B-1

Longitude: 144.0175

Location description and accuracy:
The Trio East occurrence is about 5 miles southeast of the confluence of the Robertson River and Rumble Creek at an elevation of about 6,200 feet. The location is the area that was drilled by Phelps Dodge in 1990, about 0.1 mile south-southwest of the center of section 14, T. 17 N., R. 7 E., Copper River Meridian. Additional exposures of the mineralized layer or unit occur about one-half mile to the north at an elevation of about 5,900 feet. The location is accurate.

Commodities:

Main: Ag, Pb, Zn

Other: Cu

Ore minerals: Galena, pyrite, pyrrhotite, sphalerite

Gangue minerals: Andalusite, kaolin, quartz, sericite

Geologic description:
The Trio East occurrence follows an intermittently exposed siliceous (metavolcanic or exhalative) pyritic schist unit with semimassive sulfide mineralization; it is in a sequence of carbonaceous metasedimentary rocks. Local blocks of semimassive to massive sulfide as much as 5 feet thick are found in talus near this altered unit (C. Schaefer, oral communication, 2003). Most samples were only moderately enriched in metals and contain as much as 0.1 percent copper, 0.2 percent lead, 0.5 percent zinc, no silver, and 0.2 part per million gold (S.S. Dashevsky, unpublished data, 2003). An analysis of massive sulfide samples reported by Resource Associates of Alaska showed 0.85 percent copper, 9.2 percent lead, 4.5 percent zinc, and 130.6 grams of silver per ton (Lange and others, 1993).

Alteration:
Strong to intense sericite-quartz-CO3 +/- kaolin +/- andalusite alteration (Lange and others, 1993).

Age of mineralization:
The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:

The Trio East area was covered by a number of geological and geophysical surveys in the late 1970's and in 1990. Phelps Dodge drilled one hole near this occurrence in 1990; it intersected extensive quartz-pyrite-sericite alteration but no significant values in base or precious metals (R. Cheff, unpublished Phelps Dodge Exploration, Inc. report, 1990).

Production notes:

Reserves:

Additional comments:

References:

Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg (USGS)

Last report date: 03/20/03

Site name(s): DW

Site type: Prospect

ARDF no.: MH338

Latitude: 63.2534 **Quadrangle:** MH B-1

Longitude: 144.1038

Location description and accuracy:

The DW prospect is approximately 3.5 miles south-southeast of the confluence of Robertson River and Rumble Creek. The prospect is at an elevation of 5,700 feet and 1.1 mile south-southeast of peak 6220, about one-third mile east-southeast of the center of section 17, T. 17 N., R. 7 E., Copper River Meridian. The location is is accurate. The deposit is partly covered by a glacier.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Quartz, sericite

Geologic description:

The DW massive sulfide deposit is in felsic metavolcanic rocks of the upper Lagoon unit of Devonian age. The deposit is a sheet-like body as much as 19 feet thick. The prospect is one block of what was once part of a single continuous massive sulfide sheet that extended more than 2 miles along strike and is more than 40 feet thick. The deposit is now offset by high-angle faults into six deposits (Dashevsky and others, 2003). The DW mineralized horizon projects up-dip to a thin distal edge exposed at the DW East (MH335) massive sulfide prospect.

The rocks surrounding the DW prospect are part of the Tiger unit; however, the massive sulfide mineralization was intersected by drilling into the underlying metavolcanic stocks of the upper Lagoon unit. Drilling has defined an inferred resource of 0.4 million tons that average 0.4 percent copper, 1.7 percent lead, 4.8 percent zinc, 58 parts per million (ppm) silver and 1.4 ppm gold, accompanied by high arsenic and antimony values.

The Lagoon unit is a succession of dark gray, rusty, phyllitic metamorphosed mudstones interbedded with light-gray to white to pale green siliceous quartz-sericite(-chlorite) schist. Locally the rocks contain coarse-grained blue quartz eyes and rare fragmental volcanic textures preserved as chloritized lithic fragments. The upper part is dominated by white to pale green, massive to laminated quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist; finely laminated schist with minor metamorphosed black mudstone; and thin intercalations of quartzite and fine-grained metamorphosed grit. The protoliths of the volcanic rocks of the upper Lagoon unit are mainly rhyodacite and dacite, but they also include rare rhyolite and minor andesite and basalt (Dashevsky and others, 2003).

Alteration:

Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:

The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
The DW prospect was discovered by finding massive sulfide float boulders during stream-sediment reconnaissance in 1976 (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976). Extensive geological, geochemical, and geophysical surveys were conducted from 1976 to 1981 by Resource Associates of Alaska and from 1994 to 1998 and by American Copper and Nickel Company. Eleven core holes totaling 6,804 feet have been drilled. Electromagnetic geophysical surveys were instrumental in recognizing this blind deposit.

Production notes:

Reserves:
The DW deposit has an inferred resource of 0.4 million tons that average 0.4 percent copper, 1.7 percent lead, 4.8 percent zinc, 58 parts per million (ppm) silver and 1.4 ppm gold. The resource calculation includes only those contiguous bodies with a true thickness greater than 8 feet and a gross metal value of greater than $80.00 per ton at 1998 prices (Dashevsky and others, 2003).

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Nunatak

Site type: Prospect

ARDF no.: MH339

Latitude: 63.2503 **Quadrangle:** MH B-1

Longitude: 144.0919

Location description and accuracy:
The Nunatak prospect is approximately 4 miles south-southeast of the confluence of Robertson River and Rumble Creek. It is at an elevation of about 6,000 feet elevation, south of the toe of the remnant glacier in the SW1/4 section 16, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Quartz, sericite

Geologic description:
The Nunatak deposit is in metarhyolite of the upper Lagoon unit of Devonian age. The deposit is a massive sulfide sheet-like body at least 9 feet thick. Its true thickness is undetermined because its lower portion is terminated by a fault against an underlying gabbroic sill. The Nunatak is a concealed deposit discovered by step-out drilling of a favorable stratigraphic layer (S.S. Dashevsky, oral communication, 2003). The prospect is one block of what was once part of a single continuous massive sulfide sheet that extends more than 2 miles along strike and is more than 40 feet thick. The sheet is now offset by high-angle faults into six deposits (Dashevsky and others, 2003). The metavolcanic rocks at the surface above the Nunatak prospect are part of the Tiger unit; however, the massive sulfide mineralization is in metavolcanic rocks of the upper Lagoon unit intersected by drilling into the underlying metavolcanic rocks of the upper Lagoon unit.

The Lagoon unit is a succession of dark gray, rusty, phyllitic metamorphosed mudstones interbedded with light-gray to white to pale-green siliceous quartz-sericite(-chlorite) schist. Locally the rocks contain coarse-grained blue quartz eyes and rare fragmental volcanic textures preserved as chloritized lithic fragments. The upper part is dominated by white to pale green, massive to laminated quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist; finely laminated schist with minor metamorphosed black mudstone; and thin intercalations of quartzite and fine-grained metamorphosed grit. The protoliths of the volcanic rocks of the upper Lagoon unit are mainly rhyodacite and dacite, but they also include rare rhyolite and minor andesite and basalt (Dashevsky and others, 2003).

Alteration:
Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
The Nunatak deposit is a concealed deposit discovered when previously drilled core was re-examined and was found to have missed the target mineralized layer because of structural complications and insufficient depth. In 1997 American Copper and Nickel Company drilled one core hole totaling 479 feet and intersected 9 feet of massive sulfide (S.S. Dashevsky, oral communication, 2003). Stratigraphic projection was instrumental in recognizing this blind deposit.

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): MID

Site type: Prospect

ARDF no.: MH340

Latitude: 63.2485 **Quadrangle:** MH A-1

Longitude: 144.0965

Location description and accuracy:

The MID prospect is approximately 4 miles south-southeast of the confluence of Robertson River and Rumble Creek. It is at an elevation of about 5,700 feet at the toe of the remnant glacier and is located on the section line between sections 16 and 17, T. 17 N., R. 7 E., Copper River Meridian. This prospect is a concealed by glacial material. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Quartz, sericite

Geologic description:

The MID massive sulfide deposit is in metarhyolite of the upper Lagoon unit of Devonian age. The deposit is a sheet-like body as much as 47 feet thick in its longest drill intersection. It is the thickest block in what was once a single continuous massive sulfide layer that extends more than 2 miles along strike and is more than 40 feet thick. The layer is now offset by high-angle faults into six deposits. The MID deposit is a blind deposit covered by glacial ice and moraine (Dashevsky and others, 2003).

The rocks surrounding the MID prospect are part of the Tiger unit; however, the massive sulfide mineralization was intersected by drilling into the underlying metavolcanic rocks of the upper Lagoon unit. Drilling has defined an inferred resource of 7.2 million tons averaging 0.4 percent copper, 1.6 percent lead, 4.5 percent zinc, 62 parts per million (ppm) silver and 1.6 ppm gold, accompanied by high arsenic and antimony values.

The Lagoon unit is a succession of dark gray, rusty, phyllitic metamorphosed mudstones interbedded with light-gray to white to pale green siliceous quartz-sericite(-chlorite) schist. Locally the rocks contain coarse-grained blue quartz eyes and rare fragmental volcanic textures preserved as chloritized lithic fragments. The upper part is dominated by white to pale green, massive to laminated quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist; finely laminated schist with minor metamorphosed black mudstone; and thin intercalations of quartzite and fine-grained metamorphosed grit. The protoliths of the volcanic rocks of the upper Lagoon unit are mainly rhyodacite and dacite, but they also include rare rhyolite and minor andesite and basalt (Dashevsky and others, 2003).

Alteration:

Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:

The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
MID was discovered by finding massive sulfide float boulders during stream-sediment reconnaissance in 1976 (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976). The MID deposit is a blind target beneath glacial ice and moraine. Electromagnetic geophysical surveys were instrumental in recognizing this deposit.

Extensive geological, geochemical, geophysical surveys and drilling were conducted by Resource Associates of Alaska from 1976 to 1981, by Phelps Dodge in 1990, and by American Copper and Nickel Company from 1994 to 1997. Fifteen core holes totaling 11,655 feet have been drilled (S.S. Dashevsky, unpublished data, 2002).

Production notes:

Reserves:
The MID deposit has an inferred resource of 7.2 million tons averaging 0.4 percent copper, 1.6 percent lead, 4.5 percent zinc, 62 parts per million (ppm) silver, and 1.6 ppm gold. The resource calculation includes only those contiguous bodies with a true thickness greater than 8 feet and a gross metal value of greater than $80.00 per ton at 1998 prices (S.S. Dashevsky and others, 2003).

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences), A.W. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg (USGS)

Last report date: 03/20/03

Site name(s): LP

Site type: Prospect

ARDF no.: MH341

Latitude: 63.2485 **Quadrangle:** MH A-1

Longitude: 144.0864

Location description and accuracy:

The LP prospect is approximately 4 miles south-southeast of the confluence of Robertson River and Rumble Creek. It is at an elevation of about 6,400 feet on the southwest side of the remnant glacier located in the SW1/4 section 16, T. 17 N., R. 7 E., Copper River Meridian. The LP massive sulfide is situated approximately halfway between the PP2 (MH345) and DW (MH338) prospects. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:

The LP massive sulfide zone was discovered by geophysical exploration in 1977 and verified by drilling and mapping of outcrops of the massive sulfide at the base of the LP cliffs in 1978. Subsequent geological and geophysical work and drilling has established a zone that extends at least 1,200 feet along strike, extends at least 450 feet down-dip, averages about 11 feet thick, and has a maximum thickness of 18 feet. A total of 5,657 feet in 15 holes has been core drilled at this prospect (American Copper and Nickel Company, unpublished data, 1998). This drilling has defined an inferred resource of 0.7 million tons averaging 0.4 percent copper, 2.1 percent lead, 4.9 percent zinc, 66 parts per million (ppm) silver, and 2.2 ppm gold (Dashevsky and others, 2003).

The LP prospect is in a narrow exposure of felsic metavolcanic rocks of the upper Lagoon unit, and it is surrounded and overlain by unmineralized metavolcanic rock of the Tiger unit. The Lagoon unit is a succession of dark gray, rusty, phyllitic metamorphosed mudstones interbedded with light-gray to white to pale-green siliceous quartz-sericite(-chlorite) schist. Locally the rocks contain coarse-grained blue quartz eyes and rare fragmental volcanic textures preserved as chloritized lithic fragments. The upper part is dominated by white to pale-green, massive to laminated quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist; finely laminated schist with minor metamorphosed black mudstone; and thin intercalations of quartzite and fine-grained metamorphosed grit. The protoliths of the volcanic rocks of the upper Lagoon unit are mainly rhyodacite and dacite, but they also include rare rhyolite and minor andesite and basalt (Dashevsky and others, 2003).

Alteration:

Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:

The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
The LP massive sulfide zone was discovered by geophysical exploration in 1977 and verified by drilling and mapping of outcrops of the massive sulfide at the base of the LP cliffs in 1978. Subsequent geological and geophysical work and drilling has established a zone that extends at least 1,200 feet along strike, extends at least 450 feet down-dip, averages about 11 feet , and has a maximum thickness of 18 feet. A total of 5,657 feet in 15 holes has been core drilled at the prospect (American Copper and Nickel Company, unpublished data, 1998).

Production notes:

Reserves:
Drilling has defined an inferred resource of 0.7 million tons averaging 0.4 percent copper, 2.1 percent lead, 4.9 percent zinc, 66 parts per million (ppm) silver and 2.2 ppm gold. The resource calculation includes only those contiguous bodies with a true thickness greater than 8 feet and a gross metal value of greater than $80.00 per ton at 1998 prices (Dashevsky and others, 2003).

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Rum North

Site type: Prospect

ARDF no.: MH342

Latitude: 63.2385 **Quadrangle:** MH A-1

Longitude: 144.1239

Location description and accuracy:

The Rum North prospect is at an elevation of about 5,500 feet approximately 1.75 miles east of Rumble Creek. It is about 0.7 mile east of peak 7405 and in the SW1/4 section 20, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate to within 150 feet.

Commodities:

Main: Cu, Pb, Zn

Other: Ag

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Chlorite, quartz

Geologic description:

The Rum North prospect is in a west-northwest-trending, steeply south dipping sequence of metavolcanic and metasedimentary rocks that have been intruded by gabbroic sills in the central and basal part of the Drum unit. The Rum North prospect is about 1,000 feet away from the Rum South prospect (MH343) and separated from it by an inferred fault (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). The Drum unit that hosts the Rum prospects consists of white to pale gray-green, rusty weathering, quartz-sericite(-chlorite-pyrite) schist with minor gray to black carbonaceous phyllite and rare interbeds of chloritic phyllite. The schist commonly contains 1 to 5 percent quartz eyes but may contain more. The protoliths of the schist are about two-thirds of volcanic origin and one-third of sedimentary origin. The schist has a phyllitic parting in many places (Dashevsky and others, 2003).

The Rum North massive sulfide deposit is poorly exposed near the top of a steep talus-covered slope. A train of sparse sulfide float below it contains both copper-rich and lead-zinc-rich cobbles that suggest the presence of a strongly zoned sulfide horizon. Cobbles of massive sulfide found in Rum Creek are generally fairly small, rarely as large as 12 inches. The limited outcrop exposure shows two bands of massive sulfide, each less than 1 foot thick. Representative assays have 3.9 percent copper, 5.5 percent lead, 10.1 percent zinc, 20.5 parts per million (ppm) silver, and 0.2 ppm gold (Lange and others, 1993; S.S. Dashevsky, written communication, 2003).

Nine grab samples of massive sulfide from the Rum North and Rum South zones average 4.21 percent copper, 7.07 percent lead, 8.95 percent zinc, 2.89 ounces of silver per ton, and traces of gold. The highest grade samples contain 37.2 percent combined copper, lead, and zinc with as much as 11.7 ounces of silver per ton (J.K. Muntzert and others, unpublished Resource Associates of Alaska Inc. report, 1977).

The rocks at the Rum prospect include fairly thin, discontinuous, interbedded metarhyolite tuffs, rhyodacite and dacite tuffs, and tuffaceous sedimentary rocks that have characteristic undulating graphitic phyllite layers throughout the section. Massive sulfide float boulders are found at what appears to be the top of a thick, predominantly felsic sequence of rocks that includes crystal and lapilli tuffs and lesser rhyodacite, dacite, and metasedimentary rocks. The basal part of this sequence that consists of thin, cherty, siliceous schists and thin, pyritic rhyolite flows is oxidized to form a spectacular color anomaly north of Rum Creek. The rocks above the massive sulfide float train are generally more chloritic, finer grained, and probably have a greater metasedimentary component (J.K. Muntzert and others, unpublished Resource Associates of Alaska Inc. report, 1977).

Alteration:
The massive sulfides are associated with an intensely chloritized layer or unit with peripheral sericite-quartz-pyrite +/- chalcopyrite alteration (Lange and others, 1993).

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
One hole was drilled to 1,173 feet in the Rum North prospect; no massive sulfides were intersected (American Copper and Nickel Company, unpublished data, 1998). Field work has also included detailed geologic mapping, trenching, and magnetic and soil geochemistry surveys over the mineralized area (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1979).

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Rum South

Site type: Prospect

ARDF no.: MH343

Latitude: 63.2362 **Quadrangle:** MH A-1

Longitude: 144.1170

Location description and accuracy:

The Rum South prospect is at an elevation of about 5,900 feet about 2 miles east of Rumble Creek and one-half mile west-southwest of peak 7405 and in the SW1/4 section 20, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Ag, Pb, Zn

Other: Au, Cu

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Actinolite, chlorite, quartz

Geologic description:

The Rum South prospect is in a west-northwest-trending, steeply south dipping sequence of metavolcanic and metasedimentary rocks that have been intruded by gabbroic sills in the central and basal part of the Drum sequence. The Rum North (MH342) occurrence is about 1,000 feet away from this prospect (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978). The Drum unit that hosts the Rum prospects consists of white to pale gray-green, rusty weathering, quartz-sericite(-chlorite-pyrite) schist with minor gray to black carbonaceous phyllite and rare interbeds of chloritic phyllite. The schist commonly contains 1 to 5 percent quartz eyes but may contain more. The protoliths of the schist are about two-thirds of volcanic origin and one-third of sedimentary origin. The schist has a phyllitic parting in many places (Dashevsky and others, 2003).

The Rum South prospect is stratigraphically below the Rum North prospect and separated from it by a major fault. The base of the footwall of the Rum South deposit is a fine-grained gabbroic body of unknown thickness. Immediately above the gabbro body, felsic metavolcanic rocks crop out; they consist of quartz-sericite schist, sericite-quartz schist, and quartz-sericite-chlorite schist with abundant quartz eyes and banded and disseminated pyrite. Ferricrete masses more than 8 feet thick are present, indicating considerable oxidation. The contact between the rhyolites and overlying graphitic schists displays considerable 'S' style folding and shearing. The layering generally has a southeast dip, and fold axes strike S73E. The quartz-graphite schist contains abundant interbedded lenses and beds of metarhyolite and arenaceous tuffs as much as 15 feet thick. Massive pyrite bands as much as a half-inch-thick are common along the margins of these units (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1978).

The hanging wall rocks are similar to the footwall rocks. They are mostly fairly thin bedded felsic tuffs, crystal tuffs, and arenaceous tuffs that overlie the dark massive sulfide-bearing metasiltstone and arenites (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1979).

The mineralization is exposed in three major and several smaller trenches over a strike length of 260 feet at Rum South. The westernmost occurrences is composed of several massive pyrrhotite boulders as much as 30 inches in diameter. This sulfide is composed of crudely banded fine- to coarse-grained (1 to 2 millimeter) sphalerite and blebs and veinlets of chalcopyrite set in a matrix of medium-grained pyrrhotite with subordinate pyrite. The gangue is quartz, chlorite, and actinolite (?). Chalcocite, hematite, and gypsum are locally present along fractures, and fine-grained galena is disseminated throughout. A grab sample from these boulders contains 0.85 percent copper, 5.8 percent lead, 7.6 percent zinc, and 5.5 ounces of silver per ton

(R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1979). The main Rum South massive sulfide is commonly higher grade and has values that average 0.7 percent copper, 12.3 percent lead, 14.4 percent zinc, 180 parts per million (ppm) silver, and 1.8 ppm gold (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
As of 1979, a total footage of 725 feet of drilling in two holes had been completed at the Rum South prospect; there is no information on any more recent drilling. No significant thickness of sulfide was reported from the drilling, though poor recovery may have been a factor (S.S. Dashevsky, written communication, 2003). In addition, field work has included detailed geologic mapping, trenching, and detailed magnetic and soil geochemistry surveys over the mineralized areas (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1979).

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg(USGS)

Last report date: 03/20/03

Site name(s): LBB

Site type: Occurrence

ARDF no.: MH344

Latitude: 63.2310 **Quadrangle:** MH A-1

Longitude: 144.1000

Location description and accuracy:

The LBB occurrence is at an elevation of about 6,400 feet approximately 2.5 miles east of Rumble Creek. The occurrence is about 0.6 mile south of peak 7405 and in the NE1/4NE1/4 section 29, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Ag, Cu, Pb, Zn

Other: Au

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, dolomite, graphite, quartz, sericite

Geologic description:

The LBB massive sulfide occurrence crops out on a steep talus slope as a 1-foot-thick band of fine- to medium-grained, banded, pyrite-rich rock that has a fairly high base metal grade. The host rocks are thin, discontinuous, fine-grained, interbedded felsic tuffs and graphitic sedimentary rocks flanked by bands of metasedimentary rocks. Sericite-quartz schist, quartz-sericite-chlorite schist, and chloritic and graphitic phyllites predominate. Dikes of hornblende basalt, diabase, and andesite cross-cut the area. Intense deformation is locally common, and quartz veins are ubiquitous in the area (J.K. Muntzert and others, unpublished Resource Associates of Alaska Inc. report, 1977).

The LBB sulfide horizon can be traced in scree for about 100 feet along strike. Two types of sulfide textures are noted in cobbles derived from an area of thin interbedded felsic metavolcanic rocks and carbonaceous phyllite. The first is a medium- to coarse-grained, banded pyrite-sphalerite-galena rock with minor chalcopyrite. The other is a fine-grained black pyrite-sphalerite-chalcopyrite-galena rock typically occurring as smaller cobbles topographically higher in the scree than the first type. Six grab samples of float average 1.38 percent copper, 5.54 percent lead, 10.04 percent zinc, and 3.89 ounces of silver per ton (J.K. Muntzert and others, unpublished Resource Associates of Alaska Inc. report, 1977). A sample from subcrop contained 0.1 percent copper, 8.0 percent lead, 20.6 percent zinc, 139 parts per million (ppm) silver, and 0.4 ppm gold (S.S. Dashevsky, written communication, 2003).

The LBB prospect is located within a moderately to steeply southwesterly dipping section of the Drum unit (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1979). The Drum metavolcanic rocks that host this deposit are composed of white to pale-gray-green, rusty weathering, quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist with minor gray to black carbonaceous phyllite and rare interbeds of chloritic phyllite. The protoliths of the schist are about two-thirds volcanic rocks of rhyodacite and dacite composition and one-third sedimentary rocks. A phyllitic parting is present in the schist in many places (Dashevsky and others, 2003).

Alteration:

Age of mineralization:

The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6

Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
One core hole was drilled to a depth of 339 feet near the LBB prospect, but it was collared stratigraphically beneath the target horizon and failed to test the down-dip projection of the massive sulfide (S.S. Dashevsky, written communication, 2003). Surface trenching exposed as much as 1 foot of massive sulfide (S.S. Dashevsky, written communication, 2003).

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): PP2

Site type: Prospect

ARDF no.: MH345

Latitude: 63.2390 **Quadrangle:** MH A-1

Longitude: 144.0784

Location description and accuracy:
The PP2 massive sulfide deposit crops out beneath a scree slope at an elevation of about 6,400 feet about 0.4 mile southwest of peak 7505. The prospect is approximately one-half mile south of the remnant glacier in the SE1/4 section 21, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

Ore minerals: Arsenopyrite, chalcopyrite, galena, gold, magnetite, pyrite, pyrrhotite, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
The PP2 mineralized zone was identified at the surface by talus of massive pyritic boulders 2 to 4 feet in diameter that are scattered over the slope for a distance of about 100 feet (R.A. Blakestad and others, unpublished Resource Associates of Alaska, Inc. report, 1976). The PP2 prospect represents a second mineralized layer in the Lagoon unit. It occurs in the middle Lagoon unit about 800 to 1,000 feet stratigraphically beneath the DW-LP massive sulfide layer of the upper Lagoon unit. Although the layer that contains the PP2 deposit is dominated by metasedimentary rocks at this level, the mineralization is associated with a felsic volcanic sequence in the sedimentary rocks (Dashevsky and others, 2003). The middle Lagoon unit is a transitional sequence that marks the change from the carbonaceous-dominated sedimentary rocks of the lower Lagoon unit to the felsic volcanic rocks of the upper Lagoon unit, which is of Devonian age.

A total of 6,703 feet in 14 core holes has been drilled on the PP2 prospect. The drill intersections of the PP2 horizon indicate it is a remarkably planar body averaging 14 feet in true thickness and having a maximum thickness of 29 feet (American Copper and Nickel Company, unpublished data, 1998). An inferred resource of 5.9 million tons has been calculated; it averages 0.4 percent copper, 2.1 percent lead, 4.6 percent zinc, 71 parts per million (ppm) silver, and 1.7 ppm gold (Dashevsky and others, 2003).

Alteration:
Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:

Extensive geological, geochemical, and geophysical surveys were conducted on the PP2 prospect from 1976 to 1981 by Resource Associates of Alaska and from 1994 to 1998 by American Copper and Nickel Company (S.S. Dashevsky, oral communication, 2002). Drilling of 6,703 feet of core in a total of 14 holes has been done here (American Copper and Nickel Company, unpublished data, 1998). An inferred resource of 5.9 million tons has been calculated for the prospect; it averages 0.4 percent copper, 2.1 percent lead, 4.6 percent zinc, 71 parts per million (ppm) silver, and 1.7 ppm gold (Dashevsky and others, 2003).

Production notes:

Reserves:

The PP2 prospect has an inferred resource of 5.9 million tons that averages 0.4 percent copper, 2.1 percent lead, 4.6 percent zinc, 71 parts per million (ppm) silver, and 1.7 ppm million gold. The resource calculation includes only those contiguous bodies with a true thickness greater than 8 feet and a gross metal value of greater than $80.00 per ton at 1998 prices (Dashevsky and others, 2003).

Additional comments:

The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): LPH

Site type: Prospect

ARDF no.: MH346

Latitude: 63.2426 **Quadrangle:** MH A-1

Longitude: 144.0728

Location description and accuracy:
The LPH prospect is about 0.1 mile east of peak 7505 in the upper reaches of a glacial cirque. It is at an elevation of about 7,000 feet in the NE1/4 section 21, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Au, Cu

Ore minerals: Arsenopyrite, chalcanthite (?), chalcopyrite, galena, magnetite, sphalerite, pyrite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
The LPH massive sulfide occurrence was discovered in 1977 in the upper reaches of a glacial cirque. Fine-grained, pyritic massive sulfides with distinctive quartz knots and silica gangue occur as float, rubble crop, and in glacial ice and debris for approximately 100 feet along strike before they are covered by a glacier at both ends. Vitreous blue chalcanthite (?) as a secondary oxidation product is present on pyrite-rich massive sulfides (S.S. Dashevsky, oral communication, 2003). The massive sulfide overlies a gabbro sill that is foliated in part; the massive sulfides are separated from the sill by a thin band of graphitic phyllite and sericite-quartz schist (J.K. Muntzert and others, unpublished Resource Associates of Alaska, Inc. report, 1977).

The LP prospect is in a narrow exposure of felsic metavolcanic rocks of the upper Lagoon unit of Devonian age; it is surrounded and overlain by unmineralized metavolcanic rocks of the Tiger unit. The Lagoon unit is a succession of dark-gray, rusty, phyllitic metamorphosed mudstones interbedded with light-gray to white to pale-green siliceous quartz-sericite(-chlorite) schist. Locally the rocks contain coarse-grained blue quartz eyes and rare fragmental volcanic textures preserved as chloritized lithic fragments. The upper part is dominated by white to pale-green, massive to laminated quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist; finely laminated schist with minor metamorphosed black mudstone; and thin intercalations of quartzite and fine-grained metamorphosed grit. The protoliths of the volcanic rocks of the upper Lagoon unit are mainly rhyodacite and dacite, but they also include rare rhyolite and minor andesite and basalt (Dashevsky and others, 2003).

Alteration:
Development of sericite, quartz, pyrite, and carbonate in the hanging wall; extensive chlorite and magnesium enrichment and sodium depletion in the footwall.

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325).

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
Geological and geophysical surveys were conducted on the LPH prospect by Resource Associates of Alaska from 1976 to 1981, by Phelps Dodge in 1990, and by American Copper and Nickel Company from 1994 to 1997 (S.S. Dashevsky, oral communication, 2002). A total of 285 feet in two holes was drilled in 1978 at this prospect. Both holes were terminated early due to frozen or stuck rods.

Production notes:

Reserves:
The LPH prospect has an inferred resource of 1.1 million tons averaging 0.4 percent copper, 2.5 percent lead, 5.1 percent zinc, 73 parts per million (ppm) silver, and 1.4 ppm gold. The resource calculation includes only those contiguous bodies with a true thickness greater than 8 feet and a gross metal value of greater than $80.00 per ton at 1998 prices (Dashevsky and others, 2003).

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003.

Primary reference: Dashevsky and others, 2003

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): LPH South

Site type: Occurrence

ARDF no.: MH347

Latitude: 63.2419 **Quadrangle:** MH A-1

Longitude: 144.0732

Location description and accuracy:
The LPH South prospect is at an elevation of about 7,200 feet about 0.1 mile southeast of peak 7905. It is northeast of the center of section 21, T. 17 N., R. 7 E., in the Copper River Meridian. The location is accurate.

Commodities:

Main: Pb, Zn

Other: Ag, Cu

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

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
The LPH South occurrence consists of zinc- and lead-rich massive sulfides about 800 feet above and one-third mile northeast of the PP2 prospect (MH345). Like the nearby LP prospect (MH341), mineralization is in the upper Lagoon unit metavolcanic rocks. Five samples representative of the sulfide variations average 6.1 percent zinc, 4.0 percent lead, 0.2 percent copper, 52 grams of silver per ton, and no gold (Dashevsky and others, 2003).

Alteration:
The metavolcanic rocks have been subjected to quartz-sericite-pyrite alteration.

Age of mineralization:
The Drum unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma at the nearby DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
Only surface examinations and prospecting has been done at this occurrence.

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): CC Barite

Site type: Occurrence

ARDF no.: MH348

Latitude: 63.2138 **Quadrangle:** MH A-1

Longitude: 144.0589

Location description and accuracy:
The CC Barite occurrence is located at an elevation of about 5,600 feet, 0.2 mile north-northwest of peak 6835 and 0.8 mile west-northwest of peak 6740 in the NW1/4 section 34, T. 17 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Ba

Other: Cu, Pb

Ore minerals: Barite, chalcopyrite, galena, pyrite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
The CC Barite occurrence is in an exposure of the Drum unit; bedded barite is enclosed in quartz-sericite schist that contains sparse disseminated galena and chalcopyrite. This is the only occurrence of bedded barite that has been identified in the Delta mineral belt; it may represent an exhalative precipitate that accumulated peripheral to or capping a sulfide system. It was found during field checking of airborne electromagnetic anomalies that trace a graphitic schist unit below this barite occurrence (S.S. Dashevsky, written communication, 2003).

The Drum unit that hosts the CC Barite occurrence consists of white to pale gray-green, rusty weathering, quartz-sericite(-chlorite-pyrite) schist with minor gray to black carbonaceous phyllite and rare interbeds of chloritic phyllite. The schist commonly contains 1 to 5 percent quartz eyes but may contain more. The protoliths of the schist are about two-thirds of volcanic origin and one-third of sedimentary origin. The schist has a phyllitic parting in many places.

Alteration:

Age of mineralization:
The enclosing Drum unit has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma determined at the DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:

There has only been surface sampling and mapping at this occurrence (S.S. Dashevsky, written communication, 2003).

Production notes:

Reserves:

Additional comments:

Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): CC South

Site type: Occurrence

ARDF no.: MH349

Latitude: 63.1963 **Quadrangle:** MH A-1

Longitude: 144.0310

Location description and accuracy:
The CC South occurrence is at an elevation of about 5,200 feet, a mile south of peak 6740 near the center of section 2, T. 16 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Zn

Other: Ag, Au, Cu, Pb

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Chlorite, quartz, sericite

Geologic description:
The CC South occurrence is in felsic metavolcanic rocks of the Drum unit. It follows a 100-foot-thick section of strongly altered and variably mineralized felsic volcanic rocks that can be traced by iron staining and anomalous soil chemistry for 2,000 feet in an east-west direction before being covered by talus. Semimassive sulfides are locally as much as a few inches thick; disseminated sulfide occurrences with as much as 5 percent pyrite are common. The nearest exposure of the Drum mineralized layer or bed is a mile northwest at the CC Barite occurrence (MH348), where bedded barite and anomalous base metals were discovered (E. Hunter, unpublished data, 1998).

Soil samples along the CC South deposit have varied contents of base and precious metal. Samples contain as much as 701 parts per million (ppm) copper, 3,040 ppm lead, 1,400 ppm zinc, 6.6 ppm silver, and 405 parts per billion (ppb) gold. A float sample of semimassive sulfide within the area of the soil anomaly contained 115 ppm copper, 775 ppm lead, 3.7 percent zinc, 4.0 ppm silver, and 70 ppb gold (E. Hunter, unpublished data, 1998).

The Drum metavolcanic rocks that host this deposit are composed of white to pale gray-green, rusty weathering, quartz-eye-bearing quartz-sericite(-chlorite-pyrite) schist with minor gray to black carbonaceous phyllite and rare interbeds of chloritic phyllite. The protoliths of the schist are about two-thirds volcanic rocks of rhyodacite and dacite composition and one-third sedimentary rocks. A phyllitic parting is present in the schist in many places (Dashevsky and others, 2003).

Alteration:

Age of mineralization:
The enclosing Drum unit has been dated at the Devonian-Mississippian boundary on the basis of one SHRIMP U-Pb zircon age of 359 +/- 6 Ma determined at the DD South prospect (MH325) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Active

Workings/exploration:
Only surface sampling and prospecting has been done at this occurrence.

Production notes:

Reserves:

Additional comments:
Unpublished data cited is available for viewing by contacting Grayd Resources Inc. in Vancouver, B. C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Cascade

Site type: Occurrence

ARDF no.: MH350

Latitude: 63.1625 **Quadrangle:** MH A-1

Longitude: 144.1170

Location description and accuracy:

The Cascade occurrence is one-half mile west of the upper Tok River at an elevation of about 4,700 feet. It is approximately 8,000 feet southeast of the LZ East prospect (MH328). The occurrence about one-half mile southeast of the center of section 17, T. 16 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Cu, Zn

Other: Ag, Pb

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, dolomite, graphite, quartz, sericite

Geologic description:

The Cascade occurrence is one part of a series of massive sulfide occurrences (MH327-MH328, MH350-MH353) that are intermittently exposed for 7 miles along strike in a thrust-repeated section of the lower Lagoon unit (Dashevsky and others, 2003). Outcrop with semimassive sulfides forms a backdrop for a small waterfall, and massive sulfide lenses are exposed on a cliff face above the waterfall. The occurrence is in a pelitic metasedimentary sequence that consists of metasiltstone, quartzite, carbonaceous phyllite, and siliceous marble or calcareous schist.

At least two layers with sulfide lenses have been identified, each associated with a thin limestone unit. The sulfide lenses are as much as 1 foot thick but average less than 6 inches. Samples of the massive sulfides average 0.5 percent copper, 0.4 percent lead, 1.8 percent zinc, 20 parts per million silver, and 15 parts per billion gold. A sample taken beneath the waterfall had an alkaline depletion index of 0.98, it is among the strongest alteration in the Delta district (E. Hunter, unpublished data, 1998).

Alteration:

A sample taken beneath the waterfall had an alkaline depletion index of 0.98, it is among the strongest alteration in the Delta district (E. Hunter, unpublished data, 1998).

Age of mineralization:

The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the nearby LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

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

28a

Production Status: None

Site Status: Active

Workings/exploration:
Limited surface sampling and an electromagnetic geophysical survey have been carried out in the vicinity (S.S. Dashevsky, written communication, 2003).

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): UPP

Site type: Occurrence

ARDF no.: MH351

Latitude: 63.1554 **Quadrangle:** MH A-1

Longitude: 144.0927

Location description and accuracy:
The UPP occurrence is located on the southeast side of the upper Tok River valley at an elevation of about 4,400 feet in the NE1/4 section 21, T. 16 N., R. 7 E., Copper River Meridian. It is about 5,000 feet southeast of the Cascade occurrence (MH350). The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other: Ag

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, dolomite, graphite, quartz, sericite

Geologic description:
The UPP massive sulfide occurrence is part of a series of massive sulfide occurrences (MH327-MH328, MH350-MH353) that are intermittently exposed for 7 miles along strike in a thrust-repeated section of the lower Lagoon unit (Dashevsky and others, 2003). Disseminated to massive sulfide bands and lenses are closely associated with marble within a pelitic metasedimentary sequence that consists of metasiltstone, quartzite, carbonaceous phyllite, and siliceous marble or calcareous schist. Thin bands of white to pale-gray quartz-sericite schist, rarely hematitic or chloritic, occur within the metasedimentary rocks. A sequence of medium- to deep-green chlorite schist, in part calcareous and siliceous, occurs northeast of this occurrence (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976). Local, high-grade lenses contain as much as 3.2 percent copper, 4.6 percent lead, 9.5 percent zinc, 47 parts per million (ppm) silver, and 90 parts per billion (ppb) gold. More typical assays from the mineralized zone average 0.3 percent copper, 0.1 percent lead, 0.1 percent zinc, 3 ppm silver, and 20 ppb gold (E. Hunter, unpublished data, 1998).

Alteration:

Age of mineralization:
The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the nearby LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status:

Workings/exploration:
The UPP occurrence has been evaluated by surface prospecting and mapping.

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): PP

Site type: Prospect

ARDF no.: MH352

Latitude: 63.1445 **Quadrangle:** MH A-1

Longitude: 144.0442

Location description and accuracy:
The PP prospect is located between Dry Tok Creek and the Tok River at an elevation of about 5,500 feet. It is about one-half mile east of peak 6660 in the NW1/4 section 26, T. 16 N., R. 7 E., Copper River Meridian. The location is accurate.

Commodities:

Main: Cu, Pb, Zn

Other: Ag, Au

Ore minerals: Arsenopyrite, chalcopyrite, galena, marcasite, pyrite, pyrrhotite, sphalerite, tennantite

Gangue minerals: Calcite, chlorite, dolomite, graphite, quartz, sericite

Geologic description:
The PP massive sulfide prospect is part of a series of massive sulfide occurrences (MH327-MH328, MH350-MH353) that are intermittently exposed along strike for 7 miles in a thrust-repeated section of the lower Lagoon unit (Dashevsky and others, 2003). The mineralized section is as much as 20 feet thick, but the true thickness is difficult to determine due to drag folding and thickening of the mineralized layer or unit (E. Hunter, unpublished data, 1998). Surface samples contain from 0.5 to 1.2 percent copper, 4.0 to 9.1 percent lead, 4.5 to 11.7 percent zinc, 1.0 to 6.0 ounces of silver per ton, and 0.05 to 6.08 parts per million gold. Assays on the limited core recovered from the drilling gave values of 0.5 to 0.9 percent copper, 2.7 to 5.8 percent lead, 4.4 to 9.0 percent zinc, 17 to 28 parts per million (ppm) silver, and 0.05 to 6.08 ppm gold (E. Hunter, unpublished data, 1998). The PP prospect was one of the original massive sulfide discoveries in the Delta District. Surface exposures of massive sulfides as thick as 22 feet have been reported.

The rocks in the vicinity of the PP prospect are mainly north-south-trending metasedimentary rocks with minor bands of quartz-sericite schist of volcanic origin that occur near the massive pyritic sulfide bands. The metasedimentary rocks include interfolded metasiltstone and quartzite, black carbonaceous schist or phyllite, and light gray recrystallized marble (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976).

Alteration:

Age of mineralization:
The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the nearby LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:
Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status:

Workings/exploration:

Extensive field work has been done to evaluate the PP mineralized zone, including geologic mapping, soil sampling, stream-sediment sampling, geophysical surveys, and limited drilling. In 1977 five core holes were drilled on this target, but due to exceptionally poor recovery (about 25 percent), only a few massive sulfide pieces of core were recovered. Surface samples contain from 0.5 to 1.2 percent copper, 4.0 to 9.1 percent lead, 4.5 to 11.7 percent zinc, 1.0 to 6.0 ounces of silver per ton, and 0.05 to 6.08 parts per million gold. Assays on the limited core recovered from the drilling gave values of 0.5 to 0.9 percent copper, 2.7 to 5.8 percent lead, 4.4 to 9.0 percent zinc, 17 to 28 parts per million (ppm) silver, and 0.05 to 6.08 ppm gold (E. Hunter, unpublished data, 1998).

Production notes:

Reserves:

Additional comments:

The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:

Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences), A.S. Wyatt and S.S. Dashevsky (Northern Associates, Inc.), and W.J. Nokleberg (USGS)

Last report date: 03/20/03

Site name(s): LPP

Site type: Occurrence

ARDF no.: MH353

Latitude: 63.1277 **Quadrangle:** MH A-1

Longitude: 144.0130

Location description and accuracy:

The LPP occurrence is located about 2 miles north of Dry Tok Creek at an elevation of about 4,300 feet. It is about one-half mile northwest of the center of section 36, T. 16 N., R. 7 E., Copper River Meridian. It is accurately located about 8,000 feet southeast along strike from the PP prospect (MH352), but it corresponds to just one point along the mineralized layer or unit.

Commodities:

Main: Cu, Pb, Zn

Other: Ag

Ore minerals: Chalcopyrite, galena, pyrite, sphalerite

Gangue minerals: Calcite, chlorite, dolomite, graphite, quartz, sericite

Geologic description:

The LPP occurrence is at the southeastern end of a series of massive sulfide occurrences (MH327-MH328, MH350-MH353) that are intermittently exposed along a strike length of 7 miles in a thrust-repeated section of the lower Lagoon unit (Dashevsky and others, 2003).

The rocks in the vicinity of the occurrence are metamorphosed felsic siliceous, sericitic to chloritic schists of volcaniclastic origin. The metavolcanic rocks are interlayered with metasedimentary rocks consisting of quartzite, carbonaceous phyllite, black calcareous schist, and marble. Small, nonresistant, weathered diabase dikes intrude the metamorphic rocks in the area (R.A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976).

The LPP occurrence is one of several deposits along a Devonian stratigraphic unit. Abundant iron-stained float of sponge-textured siliceous material occurs along this series of deposits; this gossan-like material is the product of oxidization of pyrite in a siliceous matrix (S.S. Dashevsky, written communication, 2003). At several locations, disseminated pyritic sulfide bands 0.5 to 3.0 feet thick have appreciable sphalerite and chalcopyrite contents. Samples contain as much as 0.5 percent copper, to 0.5 percent lead, 0.5 to 2.5 percent zinc, and 10 to 30 parts per million silver (Rodney A. Blakestad and others, unpublished Resource Associates of Alaska Inc. report, 1976). No high-grade mineralization has been located at the LPP occurrence, but it is one of several that together define a favorable massive sulfide unit (E. Hunter, unpublished data, 1998).

Alteration:

Weak dolomite alteration (Lange and others, 1993).

Age of mineralization:

The lower Lagoon unit, which is part of the metamorphic sequence that includes the rocks at this deposit, has been dated as Devonian on the basis of one SHRIMP U-Pb zircon age of 372 +/- 6 Ma at the nearby LZ East prospect (MH328) (Dashevsky and others, 2003).

Deposit model:

Kuroko massive sulfide (Cox and Singer, 1986; model 28a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
28a

Production Status: None

Site Status: Inactive

Workings/exploration:
Only surface sampling and mapping has been done near the LPP occurrence.

Production notes:

Reserves:

Additional comments:
The unpublished data that is cited can be seen by contacting Grayd Resources Inc. in Vancouver, B.C., Canada (www.grayd.com), or Northern Associates Inc. in Fairbanks, Alaska.

References:
Lange and others, 1993; Dashevsky and others, 2003; this record.

Primary reference: This record

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and A.W. Wyatt and S.S. Dashevsky (Northern Associates Inc.)

Last report date: 03/20/03

Site name(s): Daisy Creek

Site type: Prospects (?)

ARDF no.: MH354

Latitude: 63.0391 **Quadrangle:** MH A-2

Longitude: 144.8842

Location description and accuracy:
Daisy Creek flows southeast to enter the Chistochina River about 1 mile south of Dempsey. At least one mile of Daisy Creek was probably staked and explored. The location is the approximate center of claim activity reported as the Daisy Creek placer prospect by Cobb and Kachadoorian (1961). The claims are mainly in the NW1/4 section 4, T. 22 S., R. 15 E., Fairbanks Meridian.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
Daisy Creek flows through extensive outwash gravels and morainal deposits. Granitic rocks of Permian and Pennsylvanian age crop out on highlands north and south of the creek (Nokleberg and others, 1991).
Placer gold deposits occur in frozen benches along the creek and were actively prospected in 1908 (Moffit, 1909). Plans for thawing and hydraulically mining both Daisy and the Chistochina River at Dempsey (MH355) were announced for 1909, but apparently neither creek was extensively developed. The gold in the bench deposits was probably concentrated from low-grade outwash and moraine deposits during the late Pleistocene or Holocene.

Alteration:

Age of mineralization:
Late Pleistocene or Holocene.

Deposit model:
Placer Au, bench deposit (Cox and Singer, 1986; model 39a).

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

Production Status: Undetermined.

Site Status: Probably inactive

Workings/exploration:
Some exploration was done in 1908 (Moffit, 1909).

Production notes:

Reserves:
Possible low-grade gold resource in frozen bench deposits along the creek.

Additional comments:

References:
Moffit, 1909; Cobb and Kachadoorian, 1961.

Primary reference: Moffit, 1909

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/11/03

Site name(s): Dempsey

Site type: Prospect

ARDF no.: MH355

Latitude: 63.0388 **Quadrangle:** MH A-2

Longitude: 144.8525

Location description and accuracy:
The Dempsey prospect is in the main valley of the Chistochina River about one-half mile below the mouth of the Chisna River. The prospect is in the SE1/4NW 1/4 section 3, T. 22 S., R. 15 E., Fairbanks Meridian. The prospect may extend south as far as the mouth of Daisy Creek, which enters the Chistochina River about one mile below the abandoned site of Dempsey on the Mount Hayes A-2 quadrangle. The Dempsey prospect is locality 22 on figure 6 of Cobb (1979 [OFR 79-238]) and locality 17 in table 3 of Nokleberg and others (1991), and it is about one mile west in the Daisy Creek drainage.

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
The Dempsey prospect explored and attempted to develop auriferous bench gravels on the west side of the Chistochina River, a major glacier-fed river. Near Dempsey and as far south as the mouth of Daisy Creek, the flood plain of the modern Chistochina River is narrow, and there is an extensive bench developed on the west side of the river. The bench gravels are frozen locally; they contain small amounts of fine-grained gold. The area was prospected and a ditch was constructed in 1907; a prospect tunnel was reportedly driven in frozen bench gravels near Daisy Creek (Moffit, 1909; Brooks, 1910), but a mineable deposit was not found (Moffit, 1912).

Alteration:

Age of mineralization:
Pleistocene.

Deposit model:
Placer Au, glacio-fluvial (Cox and Singer, 1986; model 39a).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Explored by surface workings and a tunnel (adit) driven in frozen bench gravels (Moffit, 1909, 1912).

Production notes:

Reserves:

Additional comments:

References:

Moffit, 1909; Brooks, 1910; Moffit, 1912; Moffit, 1944; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Moffit, 1909

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/12/03

Site name(s): Chisna River

Site type: Mine

ARDF no.: MH356

Latitude: 63.0727 **Quadrangle:** MH A-2

Longitude: 144.8118

Location description and accuracy:

This mine is in the lower canyon and the flood plain of Chisna River about one-third mile below the mouth of Red Mountain Creek at an elevation of about 3,300 feet. The mine was referred to as the Lower Chesna by Mendenhall and Schrader (1903). The mine is near the historic settlement of Chisna, approximately at the north boundary of section 26, T. 21 S., R. 15 E., Fairbanks Meridian. The location is at the approximate center of a 3-mile length of the Chisna that has been mined intermittently since 1899. The Chisna mine is locality 21 on figure 6 of Cobb (1979 [OFR 79-238]), locality 70 of MacKevett and Holloway (1977), and locality 16 in table 3 of Nokleberg and others (1991).

Commodities:

Main: Au

Other: Ag

Ore minerals: Gold

Gangue minerals: Magnetite

Geologic description:

The Chisna River valley was occupied by ice at the height of glaciation. Surficial deposits include poorly sorted glacial moraine and somewhat sorted glacial outwash gravels of Pleistocene age and moderately sorted deposits of late Pleistocene and Holocene age on and near the modern stream (Moffit, 1944). About 1.25 miles north of the site of the old Chisna post office, the Chisna flows through a short canyon cut in felsic and intermediate volcanic rocks of the Slana Spur Formation of Pennsylvanian and Early Permian (?) age. The volcanic rocks are cut by a small diorite intrusion of probable Mesozoic age (Nokleberg and others, 1991; Moffit, 1944).

For a short distance above the mouth of the canyon, the placer deposit consisted of 4 to 8 feet of gravel with boulder deposits near bedrock. This part of the deposit was exploited by shovel-in hand operations. Below the canyon, the depth of gravel increases fairly rapidly, and the auriferous bedrock interface was not accessible to small-scale mining operations.

Placer gold at the Chisna mine is about 906 fine, or somewhat purer than gold mined upstream at Slate Creek (MH295 and MH298) and Miller Gulch (MH296); it is also finer grained and more uniform. Flakes of gold about one-eighth inch in diameter were abundant in the early mined placer deposits (Mendenhall, 1903; Mendenhall and Schrader, 1903). Most of the shallow alluvium at the mine was auriferous and had values ranging from 1.7-5.5 cents per pan to a maximum of $1.00 per pan (approximately a twentieth of an ounce) at the bedrock interface. Most of the bedrock exposed in the canyon had been swept clean of gold.

Gold was discovered in the Chisna River in the summer of 1898 (Tower, 1996), and small-scale mining commenced in 1899. By 1902, George Hazelet and A.J. Meals had a fairly extensive hydraulic operation (Mendenhall and Schrader, 1903). Attempts at mining the deeper ground below the canyon have been less successful.

Alteration:

Age of mineralization:

Pleistocene and Holocene.

Deposit model:
Placer Au (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:
Gold was discovered near Chisna by George Hazelet and A.J. Meals in the summer of 1898 (Tower, 1996), and mining began in the following year. An earlier discovery may have been made by Captain I.N. West in the late 1880's, but no substantial mining took place (Lethcoe and Lethcoe, 1996).

By 1902, Hazelet and Meals had constructed a ditch and mined hydraulically. By about 1910 the rich shallow deposits had been mined. Because of the remoteness of the district and resultant high costs, only the richest deposits could be mined (Moffit, 1912).

The claims downstream from a point near the canyon were surveyed and patented by Hazelet and associates. A series of unpatented claims above the canyon was part of the so-called Dempsey group or property (Moffit, 1944). These claims extend northward to the Slate Creek drainage. Some development activity was reported in this area in 1941, but there was little production.

In recent years, an attempt at large-scale open-cut mining by Del Ackels of Fairbanks was unsuccessful (Ackels, oral communication, 2001); results of modern exploration carried out for Ashton Mining Co. suggest that the remaining resource can not support a large operation (Donald Stevens, oral communication, 2001) at present gold prices (about $300 to $400 per ounce of gold). Local concentrations of high-grade gravel probably do exist.

Production notes:
The Chisna River possibly produced a few hundred ounces of gold between 1898 and 1902 (Mendenhall and Schrader, 1903).

Reserves:
A low-grade gold resource exists in the lower Chisna.

Additional comments:

References:
Mendenhall, 1903; Mendenhall and Schrader, 1903; Moffit, 1912; Chapin, 1919; Moffit, 1944; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991; Lethcoe and Lethcoe, 1996; Tower, 1996.

Primary reference: Mendenhall, 1903; Moffit, 1944

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/11/03

Site name(s): Unnamed (west of Slana River)

Site type: Occurrence

ARDF no.: MH357

Latitude: 63.0814 **Quadrangle:** MH A-1

Longitude: 144.3707

Location description and accuracy:

The occurrence is on the west side of the Slana River about 3.7 miles west-northwest of Gillett Pass at an elevation of 4,200 feet. The occurrence is about 0.3 mile east of the center of section 13, T. 15 N., R. 5 E., Copper River Meridian. The occurrence corresponds to locality 5 of Richter (1967), locality 4 of Richter and others (1977), locality 31 on figure 5 of Cobb (1979 [OFR 79-238]), and locality 143 in table 2 of Nokleberg and others (1991).

Commodities:

Main: Cu

Other: Ag, Au, Ni

Ore minerals: Chalcopyrite, pyrrhotite

Gangue minerals:

Geologic description:

The rocks at this occurrence are Nikolai Greenstone of Middle or Late Triassic age (Richter and others, 1977). The rocks were previously mapped as Slana basalt (Richter (1967). The basalt is amygdaloidal and pervasively altered; phenocrysts of plagioclase, pyroxene, and olivine are altered and occur in a groundmass that has been largely altered to chlorite, epidote, and serpentinite. Minerals contained in amygdules include quartz, potassium feldspar, calcite, chlorite, epidote, pumpellyite, prehnite, and zeolite minerals (Richter and others, 1977).

The mineralized area is about one-half mile south of the Denali Fault and is cut by subsidiary faults subparallel to it (Richter and others, 1967). The occurrence consists of pyrrhotite with lesser chalcopyrite in a lenticular mass about 10 feet thick and 100 to 150 feet long enclosed in the altered basalt. The topography is very steep, and only float material was sampled. A sample of pyrrhotite-rich float contained 0.6 percent copper, 0.04 percent nickel, 0.02 ounce of gold per ton, and a trace of silver (Richter, 1967).

A stream-sediment sample collected in the gulch below the deposit contained 340 parts per million (ppm) copper, 60 ppm lead, and more than 1,000 ppm arsenic (Richter, 1967).

Alteration:

Pervasive propyllitic alteration of basalt.

Age of mineralization:

Late Triassic or younger, on the basis of the age of host rock.

Deposit model:

Basaltic Cu (Cox and Singer, 1986; model 23).

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

23

Production Status: None

Site Status: Inactive

Workings/exploration:
The massive sulfide lens is exposed on a very steep slope and has not been mapped or sampled in detail.

Production notes:

Reserves:

Additional comments:

References:
Richter, 1967; Richter and others, 1977; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Richter, 1967; Richter and others, 1977

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/14/03

Site name(s): Eagle Creek

Site type: Mines

ARDF no.: MH358

Latitude: 63.0075 **Quadrangle:** MH A-1

Longitude: 144.4377

Location description and accuracy:

Eagle Creek is a 7.5-mile-long tributary to the East Fork Chistochina River. The mouth of the creek is on the Gulkana quadrangle. The Eagle Creek mine is a few hundred feet east of the center of section 10, T. 14 N., R. 5 E., Copper River Meridian (Moffit, 1944; Richter and others, 1977). (A feature shown in the SE1/4 section 34, T. 15 N., R. 5 E., Copper River Meridian, on the topographic map of the Mount Hayes A-1 quadrangle is almost certainly a landslide, not tailings [see Richter and others, 1977].)

The Eagle Creek mine is locality 30 on figure 6 of Cobb (1979 [OFR 79-238]) and locality 18 in table 3 of Nokleberg and others (1991). Eagle Creek was fairly extensively prospected, and there are other prospect sites nearby. The location given here is accurate as a general central location on the creek and as the location of some mining activity.

Commodities:

Main: Au

Other: Ag, Ba, Cu, platinum group elements (PGE)

Ore minerals: Barite, copper (native), gold, PGE, pyrite

Gangue minerals: Magnetite

Geologic description:

Bedrock in the upper part of Eagle Creek consists of limestone, argillite, chert, and porcellanite (Richter, 1967; Richter and others, 1977); the lower canyon and lowlands below the canyon are cut in volcanic flows, clastic debris, and tuff that is locally pyritic and silicified (Moffit, 1944; Richter and others, 1977). Bedrock at the mine consists mainly of andesitic volcanic rocks of the Tetelna Volcanics of Pennsylvanian age. The Tetelna is overlain by volcanic and impure limy rocks of the Slana Spur Formation of Pennsylvanian and Permian age. Up the canyon, the Slana Spur Formation is successively overlain by Eagle Creek Formation of Permian age and the Nikolai Greenstone of Late Triassic age. Small granitic plutons are present in upper Eagle Creek. The placer mine site is just west of the type area for the Slana Spur Formation (Richter and Dutro, 1975). The placer mine is in valley alluvium of Holocene age. The area is extensively mantled by glacial drift of Wisconsin age.

The placer contains gold that varies from flaky and smooth to rough and heavy (Moffit, 1944). Magnetite is abundant enough in the concentrate to plug sluice boxes; magnetite ranges from fine sand to small cobble in size. Barite is also present in the concentrate, as is native copper, and platinum metals have been reliably reported (Moffit, 1944). As recognized by Moffit (1944), the presence of some coarse rough gold is consistent with short transport and a local bedrock source, as is the presence of barite.

Alteration:

Volcanic rocks near the site are silicified and pyritized.

Age of mineralization:

Holocene; probably some gold and heavy metals reconcentrated from Wisconsin-age glacial drift.

Deposit model:

Placer Au-PGE (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 workings and numerous shallow prospect pits. Eagle Creek was actively explored and worked in a small way by the White brothers in 1939 to 1942 (Moffit, 1944). A hydraulic operation begun in 1942 was not active after World War II (Moffit, 1954).

Production notes:

Reserves:
Probable reserves; an operation planned to begin in 1942 was halted by World War II (Moffit, 1954).

Additional comments:

References:
Moffit, 1944; Moffit, 1954; Richter, 1967; Richter and Dutro, 1975; Richter and others, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Moffit, 1944; Richter and others, 1977

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/14/03

Site name(s): Unnamed (near Gillett Pass)

Site type: Occurrence

ARDF no.: MH359

Latitude: 63.0761 **Quadrangle:** MH A-1

Longitude: 144.2809

Location description and accuracy:
The occurrence is about 1.2 miles west of Gillett Pass at an elevation of about 4,200 feet. It is in the SW1/4SE1/4 section 16, T. 15 N., R. 6 E., Copper River Meridian. It corresponds to locality 6 of Richter (1967), locality 32 on figure 6 of Cobb (1979 [OFR 79-238]), locality 53 of MacKevett and Holloway (1977), and locality 144 in table 2 of Nokleberg and others (1991). The location is a general one in a dunite body that is exposed for a strike length of about 2 miles.

Commodities:

Main: Cr

Other: Ni

Ore minerals: Chromite, pyrrhotite

Gangue minerals:

Geologic description:
Low-grade chromite deposits occur in a lenticular body of dunite about 2 miles long and one-half mile wide; the dunite is a near-vertical body within the Denali Fault zone (Richter, 1967). The dunite is partly enclosed by amphibolite and pyroxenite that extend to the east beyond the dunite mass. Chromite occurs in gneissoid layers in the ultramafic rocks. On the basis of representative samples, the dunite contains about 1.2 percent chromic oxide and 0.4 percent nickel. The nickel possibly occurs in olivine and its alteration products. At places chromite is segregated into massive lenses. The largest lens found by Richter (1967) was about 1 foot long and 2 inches thick, but he noted that the body was poorly exposed and that larger bodies of chromite could exist. No samples were analyzed for platinum group metals.

Alteration:
Serpentinization of dunite.

Age of mineralization:
Late Triassic (?).

Deposit model:
Chromite disseminated in layered mafic-ultramafic complex (Cox and Singer, 1986; model 8a).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
8a

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no workings.

Production notes:

Reserves:

Additional comments:

References:

Richter, 1967; MacKevett and Holloway, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Richter, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/14/03

Site name(s): Unnamed (near peak 6305)

Site type: Occurrence

ARDF no.: MH360

Latitude: 63.0602 **Quadrangle:** MH A-1

Longitude: 144.2662

Location description and accuracy:
This occurrence is float that was found in a saddle about 0.2 mile west-northwest of peak 6305. It is at an elevation of about 5,850 feet and is about 1.3 miles southwest of Gillett Pass. The occurrence is in the SW1/4SW1/4 section 22, T. 15 N., R. 6 E., Copper River Meridian. It corresponds to locality 2 of Richter and others (1977) and locality 33 on figure 6 of Cobb (1979 [OFR 79-238]). The location is probably accurate within 0.2 mile.

Commodities:

Main: Cu

Other:

Ore minerals: Copper (native)

Gangue minerals:

Geologic description:
The rocks at this occurrence are Nikolai Greenstone of Late Triassic age; they are overlain to the east by Upper Triassic limestone (Richter and others, 1977). These units were mapped earlier, respectively, as the Slana basalt and Jack limestone (Richter 1967). Native copper occurs in float at the site; the Nikolai Greenstone is the probable source.

Alteration:

Age of mineralization:
Late Triassic or younger, on the basis of the age of probable host rocks.

Deposit model:
Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23

Production Status: None

Site Status: Inactive

Workings/exploration:
There are no workings. Native copper was found in float at the site.

Production notes:

Reserves:

Additional comments:

References:

Richter, 1967; Richter and others, 1977; Cobb, 1979 (OFR 79-238).

Primary reference: Richter and others, 1977

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/13/03

Site name(s): Unnamed (east of Slana River)

Site type: Occurrence

ARDF no.: MH361

Latitude: 63.0522 **Quadrangle:** MH A-1

Longitude: 144.2867

Location description and accuracy:
The occurrence is on the west side of a steep ridge about 1.25 miles east of Slana River and 2 miles southwest of Gillett Pass at an elevation of about 4,600 feet. The occurrence is about 0.1 mile west-northwest of the center of section 28, T. 15 N., R. 6 E., Copper River Meridian. The site corresponds to locality 4 of Richter (1967) and locality 34 on figure 6 of Cobb (1979 [OFR 79-238]). The location is accurate within 0.1 mile.

Commodities:

Main: Cu

Other:

Ore minerals: Chalcocite

Gangue minerals:

Geologic description:
A piece of chalcocite about 2 inches in diameter was found in talus below an outcrop of Nikolai Greenstone overlain by upper Triassic limestone (Richter and others, 1977). These units were formerly mapped as Slana basalt and Jack limestone by Richter (1967). The area is cut by west-northwest-trending faults and small cross faults. The west-northwest faults are subparallel to the Denali Fault that is about 2 miles north-northeast (Richter, 1967). A stream-sediment sample collected in the drainage below the sample was not anomalous in copper.

Alteration:

Age of mineralization:
Late Triassic or younger, on the basis of the age of potential host rocks.

Deposit model:
Float from a chalcocite vein; possibly a Kennecott-type occurrence or Basaltic Cu (Cox and Singer, 1986; model 23).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):
23 (?)

Production Status: None

Site Status: Undetermined

Workings/exploration:
Only limited surface sampling and reconnaissance mapping.

Production notes:

Reserves:

Additional comments:

References:
Richter, 1967; Richter and others, 1977; Cobb, 1979 (OFR 79-238).

Primary reference: Richter, 1967; Richter and others, 1977

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/14/03

Site name(s): Unnamed (on upper Alteration Creek)

Site type: Occurrence

ARDF no.: MH362

Latitude: 63.0200 **Quadrangle:** MH A-1

Longitude: 144.2578

Location description and accuracy:

Alteration Creek is a south-southeast-flowing tributary of the Slana River, which it enters about 5 miles south of Gillett Pass. The occurrence is on the west side of Alteration Creek at an elevation of about 3,800 feet. It is near the center SW1/4 section 3, T. 14 N., R. 6 E., Copper River Meridian. The occurrence corresponds to locality 2 of Richter and others (1977) and locality 144 in table 2 of Nokleberg and others (1991) and is near locality 32 on figure 6 of Cobb (1979, [OFR 79-238)].

Commodities:

Main: Ag, Au, Cu

Other:

Ore minerals: Azurite, chalcopyrite, malachite, pyrite

Gangue minerals: Quartz

Geologic description:

The rocks in the vicinity of this occurrence consist of intensely hydrothermally altered Tetelna Volcanics of Pennsylvanian age (Richter and others, 1977). (Richter [1967] originally mapped the country rocks as Slana basalt.) The Tetelna Volcanics are mainly composed of flows, avalanche deposits, and tuff interbedded with lesser amounts of fine-grained volcaniclastic rock. A granitic pluton of Cretaceous (?) age crops out about a mile east of the altered zone and could underlie it.

The occurrence consists of azurite- and malachite-stained quartz veins that cut intensely iron stained silicified volcanic rocks. The veins contain small amounts of chalcopyrite and pyrite. A sample collected from a chalcopyrite-bearing vein assayed 1.5 percent copper, 0.02 ounce of gold per ton, and 0.54 ounce of silver per ton (Richter, 1967).

Alteration:

Silicification and pyritization of Tetelna Volcanics. Oxidation of iron sulfides has been so extensive that primary rock textures are largely obliterated (Richter, 1967).

Age of mineralization:

Possibly Pennsylvanian to Permian, on the basis of the age of the host rocks; may be related to a nearby Cretaceous (?) intrusion.

Deposit model:

Porphyry Cu, distal (Cox and Singer, 1986; model 20c).

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

20c

Production Status: None

Site Status: Inactive

Workings/exploration:
Only limited surface sampling.

Production notes:

Reserves:

Additional comments:

References:
Richter, 1967; Richter and others, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Richter, 1967; Richter and others, 1977

Reporter(s): W.T. Ellis (Alaska Earth Sciences), C.C. Hawley (Hawley Resource Group), and W.J. Nokleberg (USGS)

Last report date: 7/14/03

Site name(s): Unnamed (on lower Alteration Creek)

Site type: Occurrence

ARDF no.: MH363

Latitude: 63.0149 **Quadrangle:** MH A-1

Longitude: 144.2469

Location description and accuracy:
This occurrence is on the east side of Alteration Creek. It is near the north edge of the NW1/4NE1/4 section 10, T. 14 N., R. 6 E., Copper River Meridian, at an elevation of about 3,900 feet. The occurrence corresponds to locality 15 of Richter (1967).

Commodities:

Main: Au

Other: Cu (?)

Ore minerals: Limonite, pyrite

Gangue minerals: Quartz

Geologic description:
The rocks at this occurrence are highly altered Tetelna Volcanics of Pennsylvanian age (Richter and others, 1977). Earlier Richter [1967] mapped the rocks as Slana basalt. The Tetelna Volcanics are largely composed of flows, avalanche deposits, and tuff with lesser amounts of fine-grained volcaniclastic rocks. An extensive area extending easterly has been silicified and pyritized. Subsequent oxidation, acid leaching, and formation of secondary limonite has nearly obliterated primary volcanic textures in the rocks. Richter (1967) found a trace of gold in two of three samples collected at or near this site.

Two stream-sediment samples collected from Alteration Creek below the occurrence were weakly anomalous in copper (Richter, 1967). Extensive oxidation of pyrite at the site possibly resulted in acidic surface waters that mobilized copper and minimized the copper values in the stream-sediment samples.

Alteration:
Intense silicification and pyritization of original volcanic rocks.

Age of mineralization:
Pennsylvanian to Permian on the basis of the age of the host rocks; may be related to and synchronous with a Cretaceous (?) intrusion about a mile to the east.

Deposit model:
Porphyry Cu, distal (Cox and Singer, 1986; model 20c).

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

Production Status: None

Site Status: Inactive

Workings/exploration:
Only limited surface sampling.

Production notes:

Reserves:

Additional comments:

References:
Richter, 1967; Richter and others, 1977.

Primary reference: Richter, 1967

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/15/03

Site name(s): Unnamed (east of Alteration Creek)

Site type: Mine

ARDF no.: MH364

Latitude: 63.0118 **Quadrangle:** MH A-1

Longitude: 144.2015

Location description and accuracy:
This placer mine is on an unnamed tributary of the Slana River that is about 1.5 miles east of Alteration Creek (see Richter, 1967). The placer mine site is at an elevation of about 3,200 feet. It is in the NW1/4 section 12, T. 14 N., R. 6 E., Copper River Meridian. The mine location corresponds to locality 1 of Richter (1967) and locality 36 on figure 5 of Cobb (1979 [OFR 79-238]), placer locality 19 in table 3 of Nokleberg and others (1991), and probably is Kardex site number KX68-118 of Heiner and Porter (1972).

Commodities:

Main: Au

Other:

Ore minerals: Gold

Gangue minerals:

Geologic description:
This placer mine is in a creek that drains granodiorite of probable Cretaceous age and Nikolai Greenstone of Late Triassic age (Richter and others, 1977). The Nikolai Greenstone has been metamorphosed to amphibolite near the Cretaceous (?) pluton.
The creek was mined on a small scale. The gold reportedly was angular,. and Richter (1967) inferred that it was locally derived.

Alteration:
Metamorphism of greenstone to amphibolite.

Age of mineralization:
Holocene.

Deposit model:
Placer Au (Cox and Singer, 1986; model 39a).

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

Production Status: Yes; small

Site Status: Probably inactive

Workings/exploration:
The mine was operated by Newt Peterson of Tok Junction possibly in the 1940's and 1950's (Richter (1967). The claims were restaked as the Genesee group by J. Frey in 1966 (Heiner and Porter, 1972).

Production notes:

Probably 100 ounces or less.

Reserves:

Additional comments:

References:

Richter, 1967; Heiner and Porter, 1972; Richter and others, 1977; Cobb, 1979 (OFR 79-238); Nokleberg and others, 1991.

Primary reference: Richter, 1967; Richter and others, 1977

Reporter(s): W.T. Ellis (Alaska Earth Sciences) and C.C Hawley (Hawley Resource Group)

Last report date: 7/15/03

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