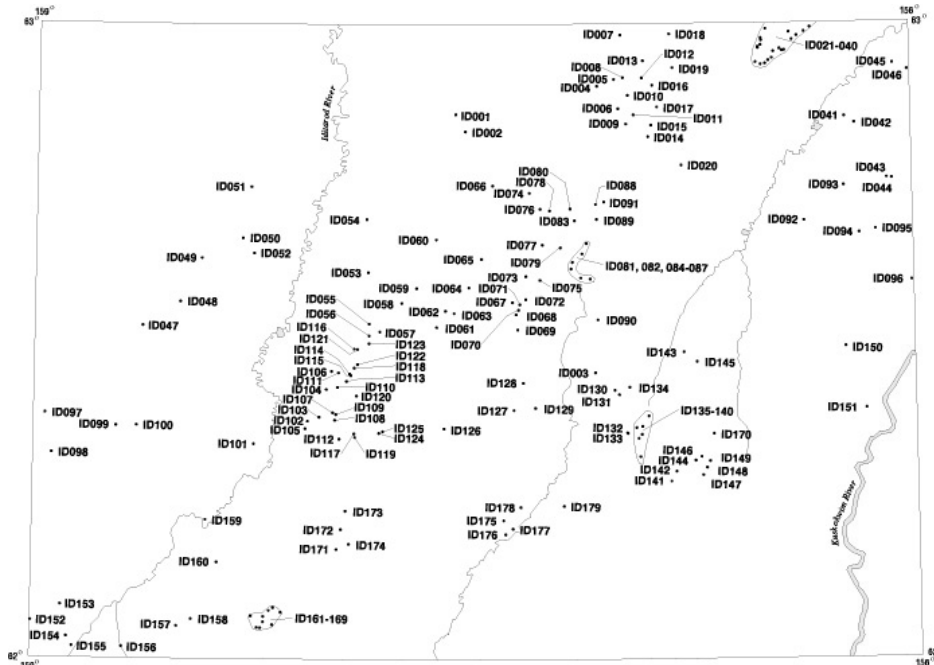


Iditarod quadrangle

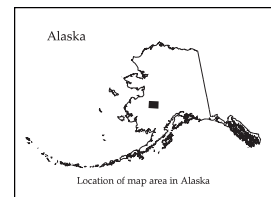
Descriptions of the mineral occurrences shown on the accompanying figure follow. See U.S. Geological Survey (1996) for a description of the information content of each field in the records. The data presented here are maintained as part of a statewide database on mines, prospects and mineral occurrences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



*Distribution of mineral occurrences in the Iditarod
1:250,000-scale quadrangle, Alaska*

This and related reports are accessible through the USGS World Wide Web site <http://ardf.wr.usgs.gov>. Comments or information regarding corrections or missing data, or requests for digital retrievals should be directed to: Frederic Wilson, USGS, 4200 University Dr., Anchorage, AK 99508-4667, e-mail fwilson@usgs.gov, telephone (907) 786-7448. This compilation is authored by:

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or with the North American Stratigraphic code. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Site name(s): Unnamed (south tributary of Dishna River)**Site type:** Occurrence**ARDF no.:** ID001**Latitude:** 62.8582**Quadrangle:** ID D-4**Longitude:** 157.5652**Location description and accuracy:**

This placer occurrence is at an elevation of about 600 feet in an unnamed, northeast-flowing tributary of the Dishna River. The occurrence is about 0.5 mile south-southeast of the center of section 17, T. 32 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Hg**Ore minerals:** Cinnabar, gold**Gangue minerals:****Geologic description:**

The rocks in the vicinity of this placer occurrence are shale and sandstone of the Upper Cretaceous, Kuskokwim Group near a fault contact with Jurassic ophiolite (Miller and Bundtzen, 1994; Miller, Bundtzen and Gray, 2005). A panned concentrate of alluvial sediments collected at the site contained several grains of gold and 20 to 50 percent cinnabar (Bennett and others, 1988). The lode source of the gold and cinnabar is unknown.

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

Placer Au-cinnabar deposit (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:**

Surface sampling by the U.S. Geological Survey in 1985 (Bennett and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Bennett and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bennett and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (west of Dishna River)**Site type:** Occurrence**ARDF no.:** ID002**Latitude:** 62.8313**Quadrangle:** ID D-4**Longitude:** 157.5321**Location description and accuracy:**

This occurrence is at an elevation of about 1,150 feet on an elongate, northeast-trending ridge. It is about 1.6 mile east-northeast of VABM Cabin and about 0.3 mile southeast of the center of section 28, T. 32 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:** As, Sb**Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is an extensively altered, mafic or intermediate dike with conspicuous iron oxide staining. It is part of a large northeast-trending dike swarm that cuts the shale and sandstone of the Cretaceous Kuskokwim Group just east of VABM Cabin (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One grab sample of altered dike rock contained 2.4 parts per million (ppm) mercury, 14 ppm antimony, and 10 ppm arsenic (McGimsey and others, 1988).

Alteration:

Silica-carbonate alteration of dike rock.

Age of mineralization:

Unknown; possibly Late Cretaceous, based on ages of similar dikes in Iditarod quadrangle (Miller and Bundtzen, 1994).

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface sampling was conducted by the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen and Gray, in 2004

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (southwest of Beaver Creek)**Site type:** Occurrence**ARDF no.:** ID003**Latitude:** 62.4512**Quadrangle:** ID B-3**Longitude:** 157.0899**Location description and accuracy:**

This occurrence is at an elevation of about 950 feet in a west headwater branch of Eldorado Creek, a tributary to the George River. The occurrence is about 0.7 mile south of hill 1545, near the northwest corner of section 9, T. 27 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** As, Sb**Ore minerals:****Gangue minerals:** Quartz**Geologic description:**

This occurrence is a quartz, fracture filling of unknown size and orientation in sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One sample contained slightly anomalous concentrations of antimony (14 ppm) and arsenic (20 ppm), and a trace of gold (McGimsey and others, 1988).

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:**

Samples were collected by the U.S. Geological Survey in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

None.

Additional comments:**References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Syenite Porphyry**Site type:** Prospect**ARDF no.:** ID004**Latitude:** 62.9021**Quadrangle:** ID D-3**Longitude:** 157.0785**Location description and accuracy:**

This prospect is on peak 3957 at the head of Windy Creek in the western Beaver Mountains. It is at an elevation of about 3,950 feet in the SW1/4 SW1/4, section 33, T. 33 N. , R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au, Hg, Sb**Other:** Ag, As, Zn**Ore minerals:** Cinnabar**Gangue minerals:****Geologic description:**

The Syenite Porphyry prospect consists of fine-grained cinnabar and stibnite along fracture surfaces in an altered iron-stained roof pendant and intrusive rocks of the 70.3 Ma, Beaver Mountain stock (Bundtzen and Laird, 1982). The roof pendant is a mudstone that has been altered to a hard, dark-gray hornfels. The underlying intrusion is a potassically altered, syenite-porphyry phase of the Beaver Mountains intrusion. The sulfide-bearing fractures contain amethyst, and smokey and chalcedonic quartz (Szumigala, 1993). Grab samples of mineralization collected by the U.S. Geological Survey contained more than 10 parts per million (ppm) mercury and 200 ppm zinc (McGimsey and others, 1988, Miller, Bundtzen, and Gray, 2005). Grab samples collected by Battle Mountain Mining Company contain up to 1,960 parts per billion (ppb) gold, 3.9 parts per million silver, 896 ppm arsenic, 1,896 ppm antimony, and more than 50 ppm mercury. Six of the nine samples contained greater than 50 ppm mercury (Szumigala, 1993).

Alteration:

Iron staining; potassic alteration.

Age of mineralization:

Undated; may be related to emplacement of the Beaver Mountains stock that has been dated at 70.3. Ma (Bundtzen and Laird, 1982).

Deposit model:

Hot springs Au-Ag (Cox and Singer, 1986; model 25a).

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

25a

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The Alaska Division of Geological and Geophysical Surveys examined the Syenite Porphyry prospect in 1979 (Bundtzen and Laird, 1980 and 1982). Noranda Exploration looked at the occurrence in 1983 (John Dunbier, oral communication, 1983). Surface sampling was conducted by the U.S. Geological Survey in 1984 and 1985 (McGimsey and others, 1988). Battle Mountain Mining Company investigated the Syenite Porphyry prospect in 1990 (Szumigala, 1993).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; McGimsey and others, 1988; Szumigala, 1993; Miller and Bundtzen, 1994; Szumigala, 1996; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Szumigala, 1993

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (near hill 3695 in northern Beaver Mountains)**Site type:** Occurrence**ARDF no.:** ID005**Latitude:** 62.9125**Quadrangle:** ID D-3**Longitude:** 157.0204**Location description and accuracy:**

This occurrence is at an elevation of about 3,700 feet, about 300 feet northwest of hill 3695 on a high ridge of the Beaver Mountains. It is at the head of a west fork of Tolstoi Creek in the NE1/4 NE1/4 section 34, T. 33 N., R. 41 W., of the Seward Meridian.

Commodities:**Main:** Ag, Au**Other:** As, Cu, Hg, Mo, Pb, Sb, Zn**Ore minerals:** Arsenopyrite, galena, pyrite**Gangue minerals:** Quartz**Geologic description:**

This occurrence consists of quartz veins in a cupola of the Beaver Mountains stock and roof pendants of Upper Cretaceous volcanic rocks (Bundtzen and Laird, 1982; Bundtzen and Miller, 1997). The Beaver Mountain stock has been dated at 70.3 Ma. The deposit consists of: 1) massive arsenopyrite with minor pyrite and quartz; 2) quartz vein with pyrite, galena, and arsenopyrite veinlets; and 3) silicified andesite with grains of arsenopyrite. Grab samples of mineralization collected by the Battle Mountain Mining Company contain up to 12.9 parts per million (ppm) gold, 317.8 ppm silver, 1,423 ppm copper, 9,835 ppm lead, 4,394 ppm zinc, 29 ppm molybdenum, 1,911 ppm arsenic, 214.8 ppm antimony, and 3,849 parts per billion mercury (Szumigala, 1993).

Alteration:

Silicification.

Age of mineralization:

Unknown; may be related to emplacement of the Beaver Mountains stock which has been dated at 70.3 Ma (Bundtzen and Laird, 1982).

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:**

Battle Mountain Mining Company sampled the site in 1990.

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; Szumigala, 1993; Bundtzen and Miller, 1997.

Primary reference: Szumigala, 1993

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (north of upper Billy Goat Creek)**Site type:** Prospect**ARDF no.:** ID006**Latitude:** 62.8666**Quadrangle:** ID D-3**Longitude:** 157.0063**Location description and accuracy:**

This prospect is at an elevation of about 3,200 feet near the top of the steep headwall of a cirque that is north of the head one of the upper tributaries of Billy Goat Creek. The prospect is about 0.6 mile east-southeast of the northwest corner of section 17, T. 32 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Cu**Other:** Bi, Pb, Sb, Sn, Zn**Ore minerals:** Chalcopyrite, galena, sphalerite**Gangue minerals:** Quartz, tourmaline**Geologic description:**

This prospect consists of disseminated chalcopyrite with minor galena and sphalerite, and their oxidation products. The sulfides are in a N70E, high-angle fracture zone in andesite, which is a roof pendant over the western part of the 70.9 Ma, Beaver Mountain pluton (Bundtzen and Laird, 1982; Miller, and Bundtzen, 1994). No size or orientation of the mineralized zone is available. One grab sample of mineralization collected by the Alaska Division of Geological and Geophysical Surveys contained 55.3 parts per million (ppm) silver, 0.50 percent copper, 0.70 percent lead, 900 ppm zinc, 100 ppm bismuth, 200 ppm antimony, and 60 ppm tin (Bundtzen and Laird, 1982; Miller, Bundtzen, and Gray, 2005). Grab samples collected by Battle Mountain Mining Company contained up to 1,730 parts per billion (ppb) gold, 87.1 ppm silver, 589 ppm copper, 1.61 percent lead, 6,232 ppm zinc, and 319 ppm antimony (Szumigala, 1993).

Alteration:**Age of mineralization:**

Undated; may be related to emplacement of the Beaver Mountains stock which has been dated at 70.3 Ma. (Bundtzen and Laird, 1982).

Deposit model:

Sn-polymetallic veins (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Surface sampling was conducted by the Alaska Division of Geological and Geophysical Surveys and U.S.

Geological Survey in 1979 and the mid 1980s. The prospect was investigated by Noranda Exploration in 1983 and by Battle Mountain Mining Company in 1990 (John Dunbier, oral communication, 1983; Szumigala, 1993).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; Szumigala, 1993; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Tolstoi Creek**Site type:** Prospect**ARDF no.:** ID007**Latitude:** 62.9825**Quadrangle:** ID D-2**Longitude:** 156.9972**Location description and accuracy:**

This prospect at an elevation of about 1,400 feet on an unnamed tributary of Tolstoi Creek. It is about 1.0 mile north of hill 2008 and about 0.4 mile southwest of the northeast corner of section 2, T. 33 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Cu, Hg, Nb, Ta**Ore minerals:** Chalcopyrite, cinnabar, gold, ilmenite, ilmenorutile, magnetite**Gangue minerals:** Tourmaline (variety dravite)**Geologic description:**

The Tolstoi Creek prospect is a black-sand-rich gold placer that contains visible gold, abundant magnetite, ilmenite, less abundant ilmenorutile, a Nb-Ta mineral, cinnabar, tourmaline (variety dravite), and a trace of chalcopyrite (Bundtzen, Cox and Veach, 1987). The creek is about 30 feet wide and is incised in glacial moraine of late Pleistocene age. The alluvium is poorly sorted; most of the gold and heavy minerals occur in sand and gravel that is interstitial to erratic boulders that originated in the Beaver Mountains (Bundtzen and Laird, 1980). The placer gold is mostly fine-grained with occasional grains to 5 mm across. Six pans collected at intervals across the creek contained from 1 to 5 grains of gold per pan (Bundtzen, Cox and Veach, 1987). The average fineness of the placer gold as determined by fire assay is 891. One placer concentrate contained 214 parts per million (ppm) niobium 14 ppm tantalum, 8.1 ppm gold, and 1.0 ppm silver (Bundtzen, Cox, and Veach, 1987).

Alteration:

None.

Age of mineralization:

The prospect is in reworked, glacial moraine of Late Pleistocene (Wisconsin?) age and the placer is either late Pleistocene or Holocene in age (Bundtzen, 1980 [GR 63]).

Deposit model:

Placer Au deposit (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:**

Placer occurrences in this area were prospected during the early part of the 20th century (Mertie, 1936). The placer was sampled by the Alaska Division of Geological and Geophysical Surveys in the 1980s (Bundtzen, Cox, and Veach, 1987).

Production notes:

No known production.

Reserves:**Additional comments:****References:**

Mertie, 1936; Bundtzen, 1980 (GR 63); Bundtzen and Laird, 1982; Bundtzen, Cox, and Veach, 1987.

Primary reference: Bundtzen, Cox, and Veach, 1987; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/11/2003

Site name(s): Tolstoi**Site type:** Prospect**ARDF no.:** ID008**Latitude:** 62.9154**Quadrangle:** ID D-2**Longitude:** 156.9898**Location description and accuracy:**

The Tolstoi prospect is at an elevation of about 3,400 feet on a steep saddle at the head one of the head-water tributaries of Tolstoi Creek. It is about 0.5 mile south-southeast of peak 3970 and 0.1 mile northwest of the southeast corner of section 26, T. 33 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, As, Cu**Other:** Au, Be, Bi, Cd, Pb, Sb, Sn**Ore minerals:** Arsenopyrite, boulangerite, chalcopyrite, galena, pyrite, stromeyerite**Gangue minerals:** Axinite, fluorite, quartz, tourmaline, white mica**Geologic description:**

The Tolstoi prospect consists of several tabular-to-pipe- shaped, tourmaline-sulfide breccia zones in a cupola of the 70.3 Ma, Beaver Mountains stock (Bundtzen and Laird, 1982; Bundtzen and Miller, 1997). The tourmaline-axinite-quartz breccia bodies are from 6 to 65 feet thick and contain from 1 to 8 percent arsenopyrite, chalcopyrite, and pyrite. Stromeryite and boulangerite, possibly the source of the high silver values in samples, have been identified in polished sections. The Tolstoi prospect is similar to a nearby unnamed prospect (ID006) except that sulfides at the Tolstoi Prospect are more disseminated and the boron metasomatism in the form of tourmaline and axinite is more extensive. Grab samples of the mineralization at the Tolstoi prospect contained up to 10.0 percent copper, 500 parts per million (ppm) silver, 2.0 percent arsenic, more than 2.0 percent lead, 2.0 percent zinc, 1.0 percent antimony, 1,400 parts per billion (ppb) gold, 39 ppm bismuth, 200 ppm cadmium, and 200 ppm tin (McGimsey and others, 1988; Bundtzen and Laird, 1982). Grab samples collected by Battle Mountain Mining Company in 1990 contained up to 1,137 ppb gold, 86.1 ppm silver, 2.03 percent lead, more than 2.00 percent arsenic, and 81 ppm tin (Szumigala, 1993).

Alteration:

Extensive greisen development with tourmaline, quartz, white mica, and fluorite.

Age of mineralization:

Undated; may be related to emplacement of the Beaver Mountains stock which has been dated at 70.3 Ma. (Bundtzen and Laird, 1982).

Deposit model:

Sn-polymetallic veins (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None

Site Status: Inactive

Workings/exploration:

The prospect was mapped and sampled by the Alaska Division of Geological and Geophysical Surveys and the U.S. Geological Survey in from 1979 to 1986. Anaconda Minerals Company sampled and mapped the prospect in 1981 (D. Obolewicz, oral communication, 1981). Noranda Exploration examined the property in 1983 (John Dunbier, oral communication, 1983). The prospect was studied by Battle Mountain Mining Company in 1990 (Szumigala, 1993 and 1996). A geologic description of the Tolstoi prospect is in Bundtzen and Miller (1997).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; McGimsey and others, 1988; Szumigala, 1993; Szumigala, 1996; Bundtzen and Miller, 1997.

Primary reference: Bundtzen and Miller, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Cirque**Site type:** Prospect**ARDF no.:** ID009**Latitude:** 62.8425**Quadrangle:** ID D-2**Longitude:** 156.9798**Location description and accuracy:**

The Cirque prospect is on the west-facing, steep headwall of a cirque at the head of a fork of Billy Goat Creek. The prospect is at an elevation of about 3,000 feet about 0.5 mile south-southwest of the center of section 21, T. 32 N., R 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, As, Cu, Pb**Other:** Au, Bi, Cd, Sb, Sn, W, Zn**Ore minerals:** Boulangerite, chalcopyrite, galena, pyrite, sphalerite, stromeyerite**Gangue minerals:** Axinite, fluorite, quartz, tourmaline**Geologic description:**

The Cirque prospect consists of a series of parallel, tourmaline-axinite- quartz-sulfide fracture fillings and breccia bodies in monzonite and quartz syenite of the Beaver Mountains stock. The major fractures strike N75E and dip steeply to vertically; they are discontinuously exposed for about 2 miles. The unnamed deposit at about a mile to the northeast may be an easterly extension of this mineralized zone. The Cirque prospect is one of the best-exposed lode deposits in the Iditarod quadrangle.

The most extensive zone of mineralization lies along the side of a steep cirque headwall where nearly massive chalcopyrite-tourmaline pods up to 6 feet wide are exposed for almost 65 feet along strike. Lesser amounts of galena, pyrite, sphalerite, and bismuth-antimony sulfosalts, including boulangerite and stromeyerite, are found in a gangue of tourmaline, fluorite, and quartz. Axinite alteration is conspicuous in the walls of the deposit. Excellent exposures allow for a three dimensional estimate of the size of the main zone; it is about 500 feet long, 10 feet thick, and extends for about 800 vertically. Szumigala (1993) placed the Cirque prospect in the center of a large mineralized area called the 'south quartz zone' mineralized area. Samples contained up to 21.00 percent copper, 1,108 parts per million (ppm) silver, 1,400 parts per billion (ppb) gold, more than 2,000 ppm arsenic, 570 ppm bismuth, 60 ppm cadmium, more than 2.00 percent lead, 0.70 percent antimony, 200 ppm tin, 100 ppm tungsten, and 0.50 percent zinc (Bundtzen and Laird, 1982; Bundtzen and Miller, 1997; McGimsey and others, 1988; Miller, Bundtzen, and Gray, 2005).

The systematic surface sampling and excellent exposure suggests an inferred resource of 190,000 tons of material with 3.50 percent copper and 445 ppm silver in the main mineralized zone at the Cirque prospect (Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005).

Alteration:

Greisen developed with tourmaline, quartz, and white mica in the mineralized zone, with axinite on the walls.

Age of mineralization:

Undated; may be related to emplacement of the Beaver Mountains stock that has been dated at 70.3 Ma (Bundtzen and Laird, 1982).

Deposit model:

Sn-polymetallic veins (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None

Site Status: Inactive

Workings/exploration:

Several groups have conducted surface sampling at the Cirque prospect. The U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys sampled the prospect between 1981 and 1986. Anaconda Minerals sampled the property in 1981. Noranda Exploration sampled the prospect in 1983 (John Dunbier, oral communication, 1983). Battle Mountain Mining Company sampled the prospect in 1990 (Szumigala, 1993).

Production notes:

Reserves:

The systematic surface sampling and excellent exposure suggests an inferred resource of 175,000 tonnes of material with 3.50 percent copper and 445 ppm silver for the main mineralized zone at the Cirque prospect (Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005).

Additional comments:

References:

Bundtzen and Laird, 1982; McGimsey and others, 1988; Szumigala, 1993; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Laird, 1982; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (head of Beaver Creek)**Site type:** Prospect**ARDF no.:** ID010**Latitude:** 62.8875**Quadrangle:** ID D-2**Longitude:** 156.9735**Location description and accuracy:**

This prospect is on a steep, north-northwest trending ridge that separates the head of Beaver Creek to the east from Windy Creek to the west. The prospect is at an elevation of about 3,200 feet, about 0.3 mile southeast of peak 3544, in the SW1/4 SE1/4 section 4, T. 32 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au, Cu**Other:** As, Hg, Pb, Sn, W**Ore minerals:** Chalcopyrite, pyrite**Gangue minerals:** Quartz, tourmaline, white mica**Geologic description:**

This prospect consists of chalcopyrite and pyrite in a tourmaline-quartz breccia near a N20E, steeply dipping, high-angle fault (Bundtzen and Laird, 1982). The size of the mineralized structure is not known. One grab sample from the breccia contained 2.00 percent copper, 110 parts per million (ppm) silver, 700 parts per billion (ppb) gold, and 300 ppm tungsten (Bundtzen and Laird, 1982; Miller, Bundtzen, and Gray, 2005). Grab samples of sulfide-quartz breccia collected by Battle Mountain Mining Company contained up to 10.7 parts per million gold, more than 50 ppm silver, 2,879 ppm copper, 983 ppm lead, 381 ppm arsenic, 4.2 ppm mercury, and 90 ppm tin (Szumigala, 1993).

Alteration:

Greisen developed with tourmaline, quartz, and white mica.

Age of mineralization:

Undated; may be related to emplacement of the Beaver Mountains stock which has been dated at 70.3 Ma (Bundtzen and Laird, 1982).

Deposit model:

Sn-polymetallic veins (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The area was mapped and sampled by the U.S. Geological Survey and the Alaska Division of Geological and Geophysical Surveys in the late 1970s and in the 1980s. The area was studied by Anaconda Minerals

Company in 1980 and 1981 (D. Obolewicz , written communication, 1981), and by Battle Mountain Mining Company in 1990 (Szumigala, 1993).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; McGimsey and others, 1988; Szumigala, 1993; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Laird, 1982

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Ganes Creek**Site type:** Prospect**ARDF no.:** ID011**Latitude:** 62.8567**Quadrangle:** ID D-2**Longitude:** 156.9541**Location description and accuracy:**

This prospect is at an elevation of about 3,000 feet in a saddle on a north-south-trending ridge that separates two forks of Billy Goat Creek from the cirque at the head of Ganes Creek. The prospect is about 0.7 mile west-southwest of peak 3440 and about 0.6 mile south-southwest of the center of section 15, T. 32 N., R. 41 W., of the Seward Meridian. The location is accurate. This site is sometimes called the 'Ganes Creek' prospect, but it should not be confused with the large placer mine further down Ganes Creek.

Commodities:**Main:** Ag, Au, Cu**Other:** Pb, Sb, Sn, W, Zn**Ore minerals:** Chalcopyrite, galena, jamesonite, pyrite, tetrahedrite, wolframite**Gangue minerals:** Axinite, fluorite, quartz, topaz, tourmaline, white mica**Geologic description:**

This prospect consists of sulfide-bearing veins and veinlets with tourmaline, quartz, fluorite, and white mica; it occurs in a small quartz porphyry body that intrudes andesitic roof pendants that overlie the Beaver Mountains volcanic field (Bundtzen and Laird, 1982; Miller and Bundtzen, 1994). The quartz porphyry intrusion is probably a phase of the composite Beaver Mountains pluton that has been dated at 70.3 Ma. Szumigala (1993, 1996) who investigated this area for Battle Mountain characterizes the prospect as in the northern part of the 'south quartz zone'.

The deposit is controlled by a near-vertical fracture set that strikes about N75-80E. The deposit is possibly part of a mineralized trend that extends from the Cirque prospect (ID009) northeast to the head of Ganes Creek, a distance of more than 1.8 miles. The mineralization consists of parallel quartz-white mica-tourmaline-sulfide veins, 1 to 7 inches thick within the tourmalinized, quartz-porphyry intrusion. A sulfide-bearing zone about 50 by 100 feet in size that was sampled by Anaconda Minerals Company contains abundant fluorite, axinite, and topaz (D.B. Obolewicz, written communication, 1981). Veins with quartz and white mica typically have a vuggy coxcomb texture whereas the tourmaline-axinite-rich zones are tight; this suggests the deposit was formed by several different hydrothermal fluids over a period of time.

Samples collected by the U.S. Geological Survey and the Alaska Division of Geological and Geophysical Surveys contained up to 332 parts per million (ppm) silver, 8.00 percent copper, 100 ppm antimony, and 100 ppm tin (Bundtzen and Laird, 1982; Miller, Bundtzen, and Gray, 2005). Samples collected by Anaconda Minerals (D.B. Obolewicz, written communication, 1981) contained up to 3,400 ppm copper, more than 2.00 percent lead, 450 ppm zinc, more than 100 ppm silver, more than 2,000 ppm tungsten, 250 parts per billion (ppb) gold, more than 1,000 ppm arsenic, 425 ppm tin, and 330 ppm antimony. One grab sample collected by Battle Mountain Mining Company contained 52.4 ppm gold and 1.53 percent lead (Szumigala, 1993). The high lead values in grab samples can be attributed to visible galena in hand specimens. The high copper and silver values found in the grab samples might be attributed to tetrahedrite and jamesonite observed in hand specimens. Wolframite was also identified in hand specimens.

Alteration:

Development of greisen with tourmaline, quartz, axinite, white mica, and topaz.

Age of mineralization:

Undated; may be related to emplacement of the Beaver Mountains stock which has been dated at 70.3 Ma (Bundtzen and Laird, 1982).

Deposit model:

Sn-polymetallic veins (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None

Site Status: Inactive

Workings/exploration:

Personnel from the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys sampled the deposit in 1981. In 1981, Anaconda Minerals examined the prospect (D. Obolewicz, written communication, 1981). Szumigala (1993, 1996) investigated the prospect in the late 1980s, while working for Battle Mountain Mining Company.

Production notes:**Reserves:****Additional comments:****References:**

Bundtzen and Laird, 1982; McGimsey and others, 1988; Szumigala, 1993; Miller and Bundtzen, 1994; Szumigala, 1996; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (near hill 3670 in north-central Beaver Mountains)**Site type:** Occurrence**ARDF no.:** ID012**Latitude:** 62.9147**Quadrangle:** ID D-2**Longitude:** 156.9239**Location description and accuracy:**

This occurrence is on a steep north-facing slope about 500 feet east of hill 3670 in the north-central Beaver Mountains. The occurrence is at an elevation of about 3,000 feet in the SE1/4 SE1/4 section 30, T. 33 N., R. 40 W., of the Seward Meridian. The location is approximate.

Commodities:**Main:** Ag, Cu**Other:** As, Au, Pb, Zn**Ore minerals:** Chalcopyrite**Gangue minerals:** Quartz, tourmaline**Geologic description:**

This occurrence consists of a 10-foot-zone of vein-type mineralization in a cupola of the Upper Cretaceous, Beaver Mountains stock (Szumigala, 1993; Bundtzen and Laird, 1982). The zone contains veinlets of tourmaline, quartz, and minor chalcopyrite. No size or orientation information is available. One chip sample contained 43 parts per billion (ppb) gold, 60.0 parts per million (ppm) silver, 1.03 percent copper, 108 ppm lead, 247 ppm zinc, and 94.5 ppm arsenic (Szumigala, 1993).

Alteration:

None noted.

Age of mineralization:

May be related to the Beaver Mountains pluton which has been dated at 70.1 Ma. (Bundtzen and Laird, 1982).

Deposit model:

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

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

22c

Production Status: No**Site Status:** Inactive**Workings/exploration:**

Surface sampling was conducted by Battle Mountain Mining Company in 1990. Samples were collected and analyzed by the Alaska Division of Geological and Geophysical Surveys in 1992 (Szumigala, 1993).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; Szumigala, 1993; Miller and Bundtzen, 1994.

Primary reference: Szumigala, 1993

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/12/2003

Site name(s): Unnamed (northeast of Tolstoi Lake)**Site type:** Occurrence**ARDF no.:** ID013**Latitude:** 62.9417**Quadrangle:** ID D-2**Longitude:** 156.9195**Location description and accuracy:**

This occurrence is on a steep slope of an unnamed knob about 1.2 miles southeast of Tolstoi Lake (The name Tolstoi Lake, which is lake 2235 on current USGS 1:63,360-scale topographic maps was officially approved by the U.S. Board of Geographic Names in May, 1983). The occurrence is at an elevation of about 3,350 feet is in the NW1/4 NW1/4 section 20, T. 33N., R. 40W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Cu, Sb**Other:** As, Au, Pb, Zn**Ore minerals:** Chalcopyrite, pyrite**Gangue minerals:** Muscovite, quartz, tourmaline**Geologic description:**

This occurrence consists of an elongate zone of tourmaline rosettes and disseminated sulfides in a small body of sericitized syenite, a phase of the Cretaceous Beaver Mountains pluton (Bundtzen and Laird, 1982; Miller, Bundtzen, and Gray, 2005). The zone trends northeast for about 250 feet and averages about 15 feet wide. Grab samples of material with disseminated pyrite and minor chalcopyrite contain up to 33 parts per million (ppm) silver, 400 ppm arsenic, 1,000 ppm copper, 400 ppm antimony, 200 ppm lead, more than 10 ppm mercury, and more than 2,000 ppm boron. A trace of gold was found in two grab samples (McGimsey and others, 1988).

Alteration:

Development of tourmaline-muscovite-quartz greisen.

Age of mineralization:

May be related to the nearby Beaver Mountains pluton which has been dated at 70.1 Ma. (Bundtzen and Laird, 1982).

Deposit model:

Sn-Ag polymetallic veins (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The occurrence was sampled by the Alaska Division of Geological and Geophysical Surveys in 1979

(Bundtzen and Laird, 1982). The U.S. Geological Survey sampled the site in the mid-1980s (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; McGimsey and others, 1988; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Laird, 1982

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/11/2003

Site name(s): Unnamed (on divide between Billy Goat and Ganes Creek in Beaver Mountains)**Site type:** Occurrence**ARDF no.:** ID014**Latitude:** 62.8221**Quadrangle:** ID D-2**Longitude:** 156.9041**Location description and accuracy:**

This occurrence is at an elevation of about 3,200 feet in the southeastern Beaver Mountains. It is about 0.7 mile north-northeast of peak 3410, about 0.9 mile west of peak 2910, and about 0.3 mile east-northeast of the center of section 35, T. 32 N., R. 41 W., of the Seward Meridian.

Commodities:**Main:** Ag, Au**Other:** As, Cu, Pb, Zn**Ore minerals:** Chalcopyrite**Gangue minerals:** Quartz, tourmaline**Geologic description:**

This occurrence consists of a stockworks of quartz-tourmaline-chalcopyrite veins in altered lapilli tuff of the Beaver Mountains volcanic field (Bundtzen and Laird, 1982; Miller and Bundtzen, 1988, 1994; Szumigala, 1993). No size or structural information is available. A grab sample of the mineralization collected by Battle Mountain Mining Company contained 1,569 parts per billion (ppb) gold, 194.0 parts per million (ppm) silver, 2,715 ppm copper, 5,449 ppm lead, 304 ppm zinc, and 123 ppm arsenic (Szumigala, 1993).

Alteration:

Development of veins of quartz-tourmaline greisen.

Age of mineralization:

Unknown; the nearby Beaver Mountains stock, which probably underlies the area is 70.9 Ma (Miller and Bundtzen, 1994).

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:**

Surface samples were collected by Battle Mountain Mining Company in 1990 (Szumigala, 1993).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; Miller and Bundtzen, 1988; Szumigala, 1993; Miller and Bundtzen, 1994.

Primary reference: Szumigala, 1993

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (south of head of Ganes Creek)**Site type:** Occurrence**ARDF no.:** ID015**Latitude:** 62.8403**Quadrangle:** ID D-2**Longitude:** 156.8937**Location description and accuracy:**

This occurrence is on an east-west-trending ridge that separates two headwater forks of Ganes Creek in the Beaver Mountains. This occurrence is at an elevation of about 2,600 feet, about 0.7 mile northeast of peak 3490, and about 0.6 mile northwest of the center of section 25, T. 32 N., R. 41 W, of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au, Cu**Other:** As, Hg, Pb, Sb, Sn, Zn**Ore minerals:****Gangue minerals:** Tourmaline**Geologic description:**

This occurrence is a mineralized, iron-stained, fracture zone in monzonite (Miller, Bundtzen, and Gray, 2005). One grab sample collected by the U.S. Geological Survey in 1986 contained 1.0 part per million (ppm) silver, more than 2,000 ppm boron, 300 ppm copper, 100 ppm lead, and 0.32 ppm mercury (McGimsey and others, 1988). Two grab samples collected by Battle Mountain Mining Company contained up to 941 parts per billion (ppb) gold, 88.5 ppm silver, 1,180 ppm copper, 3.16 percent lead, 1,784 ppm zinc, more than 2,000 ppm arsenic, 904 ppm antimony, more than 50 ppm mercury, and 68 ppm tin (Szumigala, 1993).

Alteration:

Tourmaline greisen developed in monzonite.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The U.S. Geological Survey collected surface samples in the 1980s (McGimsey and others, 1988) and there was limited surface sampling by Battle Mountain Mining Company in 1990 (Szumigala, 1993).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Szumigala, 1993; Miller, Bundtzen, and Gray, 2005.

Primary reference: Szumigala, 1993; Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (ridge at head of Brown Creek)**Site type:** Occurrence**ARDF no.:** ID016**Latitude:** 62.9031**Quadrangle:** ID D-2**Longitude:** 156.8886**Location description and accuracy:**

This occurrence is on top of a prominent east-west trending ridge north of the headwaters of Beaver Creek. It is at an elevation of about 3,300 feet, about 0.6 mile west-southwest of the center of section 33, T. 33 N., R. 40 W., of the Seward Meridian.

Commodities:**Main:** Ag, As, Cu, Pb, Zn**Other:** Au, Sb**Ore minerals:** Unspecified sulfides**Gangue minerals:** Quartz, tourmaline**Geologic description:**

This occurrence is in a roof pendant of volcanic rocks near the eastern contact of the 70.9 Ma, Beaver Mountains stock (Bundtzen and Laird, 1982; Miller and Bundtzen, 1994). The occurrence consists of tourmaline-quartz-sulfide veinlets in hornfelsed andesite. One grab sample of mineralization collected by Battle Mountain Mining Company contained 91 parts per billion (ppb) gold, 129.9 parts per million (ppm) silver, 4,879 ppm copper, 1.71 percent lead, 1.78 percent zinc, more than 2,000 ppm arsenic, and 103 ppm antimony (Szumigala, 1993).

Alteration:**Age of mineralization:**

Undated; probably related to the emplacement of the Beaver Mountains stock that has an age of 70.3 Ma (Bundtzen and Laird, 1982).

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:**

Surface sampling was conducted by Battle Mountain Mining Company in 1990 (Szumigala, 1993).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen and Laird, 1982; Szumigala, 1993; Miller and Bundtzen, 1994.

Primary reference: Szumigala, 1993

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/17/2003

Site name(s): Unnamed (on hill 3420 north of Ganes Creek)**Site type:** Occurrence**ARDF no.:** ID017**Latitude:** 62.8689**Quadrangle:** ID D-2**Longitude:** 156.8728**Location description and accuracy:**

This occurrence is about 150 feet northeast of hill 3420 in the east-central Beaver Mountains. It is about 0.5 mile northeast of the center of section 13, T. 32 N., R. 41 W., of the Seward Meridian.

Commodities:**Main:** Ag, Au, Cu, Pb, Zn**Other:** As, Sb, Sn**Ore minerals:** Unspecified sulfides**Gangue minerals:** Axinite, quartz, tourmaline**Geologic description:**

This occurrence consists of a stockworks of thin quartz-tourmaline-axinite-sulfide veins in altered volcanic flows adjacent to the 70.9 Ma, Beaver Mountains stock (Bundtzen and Laird, 1982; Miller and Bundtzen, 1994). No size or other information or structural information is available. Grab samples of the mineralization collected by Battle Mountain Mining Company contained up 435 parts per billion (ppb) gold, 185.1 parts per million (ppm) silver, 3,346 ppm copper, 2.54 percent lead, 1.05 percent zinc, more than 2,000 ppm arsenic, 509 ppm antimony, and 94 ppm tin (Szumigala, 1993).

Alteration:

Silicification.

Age of mineralization:

Undated; probably related to the nearby Beaver Mountains stock which has been dated as 70.9 Ma (Miller and Bundtzen, 1994).

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:**

Surface sampling was conducted by Battle Mountain Mining Company in 1990 (Szumigala, 1993).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen and Laird, 1982; Szumigala, 1993; Miller and Bundtzen, 1994.

Primary reference: Szumigala, 1993

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (ridge between Beaver and Tolstoi Creeks)**Site type:** Occurrence**ARDF no.:** ID018**Latitude:** 62.9837**Quadrangle:** ID D-2**Longitude:** 156.8281**Location description and accuracy:**

This occurrence is at an elevation of about 1,350 feet on a knob that is about 0.8 mile northeast of hill 2340. It is about 0.2 mile south of the northeast corner of section 3, T. 33 N., R. 40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Zn**Other:** Au, Cu, Sb**Ore minerals:** Iron oxide, manganese oxide**Gangue minerals:** Tourmaline**Geologic description:**

This occurrence consists of rubble of iron-oxide-stained breccia in hornfels that is probably related to the Cretaceous Beaver Mountains pluton. Manganese-oxide-stained rosettes of tourmaline in the hornfels may be related to a nearby, potassically-altered andesite-porphyry dike. The occurrence is about 2 miles north of the northern contact of the Beaver Mountains pluton (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Grab samples contain up to 55.0 parts per million (ppm) silver, 1,000 ppm zinc, 500 ppm copper, 100 ppm antimony, and 100 parts per billion (ppb) gold (Bundtzen and Laird, 1982).

Alteration:

Rocks altered to tourmaline greisen.

Age of mineralization:

Probably related to the Beaver Mountains pluton which has been dated at 70.1 Ma (Bundtzen and Laird, 1982).

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:**

Limited surface sampling was conducted in 1979 (Bundtzen and Laird, 1982).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Laird, 1982

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/11/2003

Site name(s): Unnamed (west of upper Brown Creek)**Site type:** Occurrence**ARDF no.:** ID019**Latitude:** 62.9304**Quadrangle:** ID D-2**Longitude:** 156.8177**Location description and accuracy:**

This occurrence is at an elevation of about 2,400 feet on a knob near the head of Brown Creek. It is about 0.4 mile north-northwest of hill 2665 in the SW1/4, section 23, T. 33N., R. 40W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Fe**Other:** Ag, Cu, Sb**Ore minerals:** Pyrrhotite**Gangue minerals:** Quartz**Geologic description:**

This occurrence consists of a pod of pyrrhotite in dense hornfels, about 650 feet from the east contact of the Cretaceous, Beaver Mountains pluton. The pod is poorly exposed. From rubble scattered across the hillside, the pod is estimated to be 6 feet thick and 90 feet long. Two grab samples contained an average of about 20 percent iron, 1.0 parts per million (ppm) silver, 200 ppm copper, and 40 ppm antimony (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005).

Alteration:

In hornfels near contact of granitic pluton.

Age of mineralization:

Probably related to the Beaver Mountains pluton which has been dated at 70.1 Ma. (Bundtzen and Laird, 1982).

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:**

The occurrence was mapped and sampled by the Alaska Division of Geological and Geophysical Surveys in 1979 (Bundtzen and Laird, 1982).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: McGimsey and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 2/4/2003

Site name(s): Lincoln Creek**Site type:** Prospect**ARDF no.:** ID020**Latitude:** 62.7770**Quadrangle:** ID D-2**Longitude:** 156.7910**Location description and accuracy:**

This prospect is on a flat terrace about 2.0 miles south of the top of Crager Mountain. It is at an elevation of about 1,450 feet near the center of section 16, T31 W., R40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg**Ore minerals:** Gold**Gangue minerals:** Quartz, undetermined carbonate minerals**Geologic description:**

This prospect is in a zone of several northeast-trending, mafic to felsic dikes that intrude shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Bundtzen and Laird, 1982; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One dike is a quartz-feldspar porphyry; three others appear to be altered mafic dikes. Rock exposures are found in a series of old test pits and trenches that were dug before 1960 (J. Degnan, oral communication, 1979). Grab samples of rock exposed in the pits contained 0.15 parts per million (ppm) silver, and 1.3 ppm mercury, and free gold was panned from altered dike material. (McGimsey and others, 1988; J. Degnan, oral communication, 1979).

Alteration:

Mafic dikes altered to silica and carbonate minerals.

Age of mineralization:

Younger than the Upper Cretaceous host rocks.

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Trenches and test pits were dug before 1960 (Joe Degnan, oral communication, 1979).

Production notes:**Reserves:**

Additional comments:**References:**

Bundtzen and Laird, 1982; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Spaulding Creek Mine**Site type:** Mine**ARDF no.:** ID021**Latitude:** 62.9382**Quadrangle:** ID D-2**Longitude:** 156.5307**Location description and accuracy:**

Spaulding Creek (which is not labeled by name on the USGS 1:63,360-scale topographic map) is a 6-mile-long tributary of Ganes Creek (ID011). The mouth of Spaulding Creek is about 0.5 mile south of the mouth of Six Gulch; the lower 2.4 miles of Spaulding Creek has been mined. The coordinates are at the mouth of Spaulding Creek in the SW1/4 SW1/4, section 17, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate. The Spaulding Creek Mine was described as locality 40 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, W**Ore minerals:** Gold, scheelite**Gangue minerals:** Ilmenite, magnetite**Geologic description:**

Spaulding Creek is the largest auriferous tributary of Ganes Creek. Placer deposits have been mined for about 2.5 miles of lower Spaulding Creek, mainly below outcrops of a swarm of Cretaceous and Tertiary dikes and sills. The swarm is the probable source of the placer gold (Bundtzen and Laird, 1982; Bundtzen and Miller, 1997; Bundtzen and others, 1987). The placer deposits consist of fluvial gravels from 3 to 15 thick, that are covered with 3 to 10 feet of overburden (Cobb, 1976 [OFR 76-576]). The heavy mineral concentrates include magnetite, ilmenite, and a trace of scheelite (Bundtzen and others, 1987). The gold is from 837 to 857 fine, and averages 833. Incomplete records from 1909 to 1941 indicate that 7,925 ounces of gold and 1,591 ounces of silver were produced from several small placer mines.

Alteration:**Age of mineralization:**

Probably Pleistocene (Bundtzen, 1980 [GR 63]).

Deposit model:

Placer Au deposit (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 deposits on Spaulding Creek were initially mined in open cuts using scrapers; then bulldozers and

draglines were used. A dredge mined past the mouth of Spaulding Creek in the 1930s. Most of the mining in the creek was before World War II. Smith reported a non-dredge operation on Spaulding Creek in 1935 (Smith, 1937 [Bull 880-A]), also an operation in 1939 by Vibe and Schwaesdall (Smith, 1941 [Bull 926-A]).

Production notes:

Incomplete records from 1909 to 1941 indicate that 7,925 ounces of gold and 1,591 ounces of silver were produced from several small placer mines (Bundtzen and Miller, 1997).

Reserves:**Additional comments:****References:**

Smith, 1937 (B 880-A); Smith, 1941 (B 926-A); Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen and Laird, 1982; Bundtzen and others, 1987; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/12/2003

Site name(s): Ganes Creek**Site type:** Mine**ARDF no.:** ID022**Latitude:** 62.9621**Quadrangle:** ID D-2**Longitude:** 156.5218**Location description and accuracy:**

The Ganes Creek placer extends along the valley bottom and on benches for about 4 miles in the Iditarod quadrangle and about the same distance in the adjacent Ophir quadrangle. The coordinates are at the approximate midpoint of the mine in the Iditarod quadrangle in the SE1/4 section 8, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate. The Ganes Creek mine is locality 39 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Cr, Sb, W**Ore minerals:** Arsenopyrite, gold, ilmenite, magnesiochromite, pyrite, scheelite, stibnite**Gangue minerals:****Geologic description:**

Ganes Creek rises in the Beaver Mountains and flows northeasterly for more than 50 miles into the Innoko River. Upper Ganes Creek formerly flowed north into the Beaver Creek drainage from a point near the mouth of Last Chance Creek about 4 miles above the mouth of Spaulding Creek. At some time in the Pleistocene, headward erosion captured the upper drainage of Ganes and Beaver Creeks. Prior to that time, ancestral Ganes Creek eroded sedimentary rocks of the Upper Cretaceous Kuskokwim Group and the igneous rocks intruded into them; the older bench gravels deposited during this time lack glacial material. Subsequent to capture, glacial debris from the Beaver Mountains entered lower Ganes Creek (Mertie, 1936; Bundtzen, 1980 [GR 63]).

The placer gold and associated heavy minerals in the Ganes Creek placer were probably liberated from bedrock prior to stream capture of upper Ganes Creek. Paleochannels that formed before capture contain rich gold deposits that in part were eroded into present Ganes Creek. The flood plain of Ganes Creek consist mainly of coarse-grained, cobble gravels and sand with clasts of plutonic and volcanic rocks derived from the glaciated Beaver Mountains. The coarse gravels in the Ganes Creek flood plain are glacial outwash deposits of Late Pleistocene and early Holocene age (Mertie, 1936, Bundtzen, 1980 [GR 63]; Bundtzen and Miller, 1997). Although diluted with barren material, Ganes Creek was rich enough to support a dredge that mined a flood plain at least 500 feet wide (Mertie, 1936). The dredge encountered shallow bedrock at a depth of about 6 to 20 feet. Most of the pay was on slate bedrock; relatively fine gold, with a few nuggets to about 1.5 ounces, were accompanied by abundant black sand. Most alluvial gravels on the flood plain of Ganes Creek are thawed; tributary gulches contain some frozen ground.

At least two levels of ancestral paleochannels or terraces occur on the northwest and southeast flanks of Ganes Creek. Paleochannels are well exposed below the mouth of Spaulding Creek. All the clasts in these older fluvial paleochannels are of local origin and the older channels formed prior to the beheading of upper Beaver Creek in mid-to-Late Pleistocene time. The paleochannels are well known sources of coarse placer gold. The Baumeister Bench has produced gold-quartz nuggets that weighed up to 122 ounces. In 2002, gold nuggets that weighed up to 5.0 ounces were found by handheld metal detectors in Ganes Creek near the present Ganes Creek mining camp. The coarse gold nuggets often have a significant amount of coxcomb quartz attached to them that suggests an epithermal lode source.

The Ganes Creek placer gold varies from 817 to 874 fine, and averages 846 (Bundtzen, Cox, and Veach, 1987; Bundtzen and Miller, 1997). The heavy minerals also include magnesiochromite, scheelite, stibnite, and arsenopyrite (Berg and Cobb, 1967; Bundtzen and others, 1987). Most of the placer gold on Ganes Creek is believed to be derived from the mineralized sedimentary rocks and the igneous rocks along the northeast trending Ganes-Yankee Creek fault (Bundtzen and Laird, 1982; Bundtzen and Miller, 1997). However, some placer gold in Late Quaternary alluvial deposits of Ganes Creek could be derived from gold-lodes in the Beaver Mountains, (i.e., ID005; ID006, ID008, and ID012), as suggested by Szumigala (1993).

Alteration:**Age of mineralization:**

Paleochannel deposits probably formed in Pleistocene time prior to capture of upper Ganes Creek. Older deposits were eroded and reconcentrated in the later Pleistocene (?) and Holocene.

Deposit model:

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

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

39a

Production Status: Yes**Site Status:** Active**Workings/exploration:**

Placer gold was discovered on Ganes Creek during the summer of 1906 by Thomas Gane, F.C.H. Spencer, Mike Roke, and John Maki in gravel bars below the mouth of Ganes Creek (Maddren, 1910). In September 1906, the Discovery claim was located about 9 miles upstream near Last Chance Gulch (now Six Gulch). The entire length of Ganes Creek was staked from source to mouth until it was found that gold-bearing gravel did not exist above a point about 1 mile upstream from the mouth of Spaulding Creek. Claims were numbered from 83 Above Discovery to 58 Below Discovery (Mertie, 1936).

During the first period of activity, mining was mainly from open cuts dug by horse-drawn scrapers, and the rich terraces such as the Baumeister Bench (ID027) were the first to be exploited (Eakin, 1914). Gold in the main valley proved more difficult to mine because the wet, thawed ground precluded simple open-cut mining.

The valley was later successfully mined by bucket line dredges. The first dredge, constructed by the Innoko Dredging Company and freighted in from Greenstone Creek in the Ruby district began operations during 1923 and mainly mined gravel upstream of Number 5 above Discovery. In 1926, the Guinan and Ames dredge, which formerly operated on the Seward Peninsula, was freighted into Ganes Creek and began operations on 13 Above Discovery (Mertie, 1936). Both dredges operated intermittently through World War II; the Innoko Dredging Company dredge was rebuilt by Warren Magnuson in 1955, and operated until 1965. The remains of the old Guinan and Ames flume dredge can be found along the Ophir road.

Mechanized, open cut mining began in the 1930s. Toivo Rosander, Neal Beaton, and Frank Molitor mined with bulldozer and dragline on Ganes Creek during the 1940s and early 1950s. Magnuson Mining Company operated mechanized placer mines on Ganes Creek nearly continuously from 1955 to 1990. The Clark-Wiltz partnership acquired the Magnuson claims in 1993 and have operated mechanized placer mines on Ganes Creek and tributaries since 1994. In 2002, recreational miners recovered nuggets of coarse gold from tailings piles.

Production notes:

Ganes Creek is the largest producer of placer gold in the Innoko Mining District. From 1906 to 2002, Ganes Creek and its tributaries produced 104,000 ounces of gold and 13,318 ounces of silver from fluvial paystreaks in the Iditarod quadrangle; additional production has come from lower Ganes Creek in the Ophir quadrangle. The gold-bearing paystreaks can be traced for at least 7 miles in the Iditarod quadrangle and an

additional 6 miles in the Ophir quadrangle, making it one of the longest gold placers in southwest Alaska (Bundtzen, 1980 [MIRL]; Bundtzen and Miller, 1997).

Reserves:

Unknown; resources of placer gold probably exist on lower Ganes Creek. The placer has been drilled in recent years by Magnuson Mining Company and the Clark-Wiltz partnership but the results are not available.

Additional comments:**References:**

Maddren, 1910; Eakin, 1914; Mertie, 1936; Berg and Cobb, 1967; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, 1980 (GR 63); Bundtzen, 1980 (MIRL); Bundtzen and Laird, 1982; Bundtzen, Cox, and Veach, 1987; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Mertie, 1936; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/11/2003

Site name(s): Last Chance Gulch**Site type:** Mine**ARDF no.:** ID023**Latitude:** 62.9605**Quadrangle:** ID D-2**Longitude:** 156.5218**Location description and accuracy:**

Last Chance Gulch, which is not named on the D-2 topographic map, enters Ganes Creek about 0.4 mile south of the mouth of Six Gulch (ID025). The coordinates are at the mouth of the gulch in the SE1/4, section 8, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag**Ore minerals:** Gold**Gangue minerals:** Ilmenite, magnesiochromite, magnetite**Geologic description:**

Placer gold was discovered in Last Chance Gulch early in the 20th Century (Maddren, 1910). Mining took place mainly prior to 1912 (Eakin, 1914). Placer gold is accompanied ilmenite, magnesiochromite, and magnetite. The probable source of the placer gold is sub-volcanic intrusions associated with the Ganes-Yankee Creek fault (Bundtzen and Laird, 1980, 1982; Bundtzen and Miller, 1997).

Alteration:**Age of mineralization:**

Probably Quaternary, based on age estimates of pre-glacial stream deposits developed near ancestral Ganes Creek (Mertie, 1916; Bundtzen, 1980 [GR 63]).

Deposit model:

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

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

39a

Production Status: Yes; small**Site Status:** Inactive**Workings/exploration:**

Production came from surface mining of shallow deposits near the mouth.

Production notes:

Production was modest and included with totals reported from Ganes Creek (ID011). The lower gulch has not been mined since 1912 (Eakin, 1914; Doug Clark, oral communication, 2001).

Reserves:

Additional comments:**References:**

Maddren, 1910; Eakin, 1914; Mertie, 1936; Bundtzen and Laird, 1980; Bundtzen and Laird, 1982; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/12/2003

Site name(s): Unnamed (east of lower Spaulding Creek)**Site type:** Occurrence**ARDF no.:** ID024**Latitude:** 62.9345**Quadrangle:** ID D-2**Longitude:** 156.5130**Location description and accuracy:**

This occurrence is on a northeast-trending ridge east of Spaulding Creek, at an elevation of 550 meters. It is in the NE1/4 SE1/4, section 20, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate (T.K. Bundtzen, unpub. field data, 1979).

Commodities:**Main:** Ag**Other:** Au, Cr**Ore minerals:** Magnesiochromite, pyrite**Gangue minerals:** Clay minerals, silica-carbonate minerals**Geologic description:**

This occurrence is in a N60E-trending, mafic to intermediate dike or sill about 30 feet thick. The dike or sill intrudes the shale and sandstone of the Upper Cretaceous, Kuskokwim Group. The dike has been extensively altered to silica-carbonate rock in breccia zones up to 10 feet wide at the contacts of the dike and the sedimentary rocks. Shear zones in adjacent sandstone are pyritized (Bundtzen and Laird, 1982; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). A grab sample of mineralized dike contained 0.16 ounce of silver per ton, 1,000 parts per million chromium, and 150 parts per billion gold (Bundtzen and Laird, 1982; Miller, Bundtzen, and Gray, 2005). A highly brecciated felsic dike thought to be an extension of the breccia unit at the Katz prospect (ID028) is exposed about 65 feet west of this occurrence.

Alteration:

Extensive silica-carbonate alteration of a intermediate to mafic dike; sericitic alteration in felsic dike.

Age of mineralization:

Undated; probably Late Cretaceous based on nearby dated intrusions along Ganes-Yankee Creek fault (Bundtzen and Miller, 1997).

Deposit model:

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Three prospect pits about 50 feet apart expose the altered dike.

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Laird, 1982; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/13/2003

Site name(s): Six Gulch (Last Chance Gulch)**Site type:** Mine**ARDF no.:** ID025**Latitude:** 62.9650**Quadrangle:** ID D-2**Longitude:** 156.5124**Location description and accuracy:**

Six Gulch, formerly known as Last Chance Gulch is a west and northwest flowing tributary of Ganes Creek (Maddren, 1910). The mine extends up Six Gulch for about 800 feet. The coordinates are at the mouth of gulch in the SE1/4 NE1/4, section 8, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate. Cobb (1972 [MF 363]; 1976 [OFR 76-576]) referred to the site as Last Chance Gulch and described it as locality 42.

Commodities:**Main:** Au**Other:** Ag, W**Ore minerals:** Gold, scheelite**Gangue minerals:****Geologic description:**

Six Gulch is a 2-mile-long tributary of Ganes Creek (ID011). It is locally incised into detrital sedimentary rocks of the Upper Cretaceous, Kuskokwim Group, which are intruded by Cretaceous or Tertiary, felsic to mafic dikes and sills (Bundtzen and Laird, 1982; Miller and Bundtzen, 1994). Placer gold, locally accompanied by scheelite, was probably derived from mineralized dikes and sills. Stream gravels consist of locally derived sandstone, siltstone, and shale from the Kuskokwim group, and intrusive rocks (Bundtzen and Laird, 1982; Miller, Bundtzen, and Gray, 2005).

Gold was discovered on Ganes Creek in 1906 at the mouth of Six Gulch, then called Last Chance Creek (Maddren, 1910). The Six Gulch placer was mined for about 800 feet above its mouth. Early production was from open cuts; however, a dredge operated at the mouth of Six Gulch during the early 1930s (Mertie, 1936).

Alteration:**Age of mineralization:**

Quaternary; probably mid-to-late Pleistocene (Bundtzen, 1980 [MIRL]).

Deposit model:

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

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

39a

Production Status: Yes: small**Site Status:** Inactive**Workings/exploration:**

Prospectors following up the occurrences flour gold on the Innoko River and lower Ganes Creek found an economic placer deposit at the mouth of Six Gulch in 1906. The deposit was worked on a small scale for about 20 years and was dredged in the 1930s.

Production notes:

Six Gulch has produced gold for many years. The production is probably aggregated with Ganes Creek (ID011).

Reserves:

There are possible gold resources in upper Six Gulch and at the sides of paystreaks that have been mined.

Additional comments:**References:**

Maddren, 1910; Mertie, 1936; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen and Laird, 1982; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Mertie, 1936

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/12/2003

Site name(s): Potosi Creek**Site type:** Mine**ARDF no.:** ID026**Latitude:** 62.9759**Quadrangle:** ID D-2**Longitude:** 156.5117**Location description and accuracy:**

Potosi Creek, which is not named on the USGS D-2 topographic map, is a 1.6-mile-long west-flowing tributary of Ganes Creek. The mouth of Potosi Creek is about 0.8 mile north-northeast of the mouth of Six Gulch, near the mining camp of the Clark-Wiltz partnership in the SE1/4 SE 1/4, section 5, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg**Ore minerals:** Arsenopyrite, cinnabar, gold, pyrite, stibnite**Gangue minerals:** Ilmenite, magneisochromite, magnetite, quartz**Geologic description:**

The Potosi Creek gold placer is at least 1.6 mile long and averages about 160 feet wide. The overburden of organic silt and colluvium averages about 10 feet thick. The rocks in the area are mainly shale and sandstone of the Upper Cretaceous, Kuskokwim Group. Two dike-sill complexes occur along Potosi Creek; one is about 1,000 feet about its mouth and a second about 1 mile further. Samples of mineralized quartz in the dike rocks that outcrop in Potosi Creek contained up to 850 parts per billion (ppb) gold (T.K. Bundtzen, unpublished data, 1998).

Most of the material in the paystreak consists of rounded gravels of sandstone and siltstone and intermediate dike rocks that locally intrude the Kuskokwim Group sedimentary rocks. All the alluvium in the paystreak seems to be locally derived (Miller, Bundtzen and Gray, 2004). In addition to gold, the heavy minerals include major to minor amounts of magnesiochromite, ilmenite, pyrite, and magnetite, and traces of cinnabar, stibnite, and arsenopyrite (Bundtzen and others, 1987; T.K. Bundtzen, unpublished data, 1998). Gold locally occurs in large nuggets; a 55 ounce gold-quartz nugget was found in 1995 near the mouth of the creek (Dan Wilz, oral communication, 1998).

Placer deposits near the mouth of Potosi Creek were mined on a small scale during the early to middle 20th Century. More extensive mining began in 1994, when the Clark-Wiltz partnership began mining the Potosi Creek paystreak. Mining stopped at the junction of two unnamed tributaries about 1.6 mile upstream from the mouth. Total production from 1994 to 1999 was about 7,500 ounces of placer gold (Dan Wilz, written communication, 2002). In years past, some placer gold production credited to Potosi Creek was mined on a bench placer at French Hill, upstream and to the south (Mertie, 1936).

Alteration:

None.

Age of mineralization:

Quaternary; probably Early to Middle Pleistocene, before stream capture of upper Ganes Creek (Mertie, 1936; Bundtzen, 1980 [GR 63]).

Deposit model:

Placer Au deposit (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:

Exploration from 1994 to 1998 consisted of a series of churn drill lines each spaced about 800 feet apart , and backhoe cuts across the valley in key areas. Exploration prior to that time was mainly near the mouth of Potosi Creek.

Production notes:

Placer deposits near the mouth of Potosi Creek were mined on a small scale during the during the early to middle 20th Century. More extensive mining began in 1994, when the Clark-Wiltz partnership began mining the Potosi Creek paystreak. Mining stopped at the junction of two unnamed tributaries about 1.2 miles from the mouth of the creek. The total production from 1994 to 1999 was about 7,500 ounces of placer gold (Dan Wiltz, written communication, 2002). In years past, some placer gold production credited to Potosi Creek was mined on a bench placer at French Hill, upstream and to the south (Mertie, 1936).

Reserves:

None identified; probably some gold remains at the sides of the paystreaks that have been mined.

Additional comments:

A significant late producer of placer gold in the Ganes Creek basin. The ground that has been mined on Potosi Creek has been reclaimed by the Clark-Wiltz Partnership to State of Alaska reclamation standards.

References:

Mertie, 1936; Bundtzen, 1980 (GR 63); Bundtzen and Laird, 1982; Bundtzen and Laird, 1983; Bundtzen and others, 1987; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/11/2003

Site name(s): Baumeister Bench**Site type:** Mine**ARDF no.:** ID027**Latitude:** 62.9724**Quadrangle:** ID D-2**Longitude:** 156.5102**Location description and accuracy:**

The Baumeister Bench is on a dissected alluvial terrace about 100 feet higher than the modern flood plain of Ganes Creek. It is about 500 feet southeast of the Ganes Creek mining camp near the common corners of sections 4, 5, 8, and 9, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag**Ore minerals:** Gold, magnetite**Gangue minerals:** Quartz**Geologic description:**

The Baumeister Bench mine is on a relict strath terrace formed by ancestral Ganes Creek before headward erosion and stream piracy of upper Ganes Creek. In late Tertiary or early Pleistocene, upper Ganes Creek flowed into the Beaver Creek drainage (Eakin, 1914; Mertie, 1916; Bundtzen, 1980 (GR 63); Bundtzen and Miller, 1997). The bench is the part of ancestral Ganes Creek that is locally preserved on both flanks of modern Ganes Creek over a distance of more than 10 miles kilometers.

The rocks at the base of the Baumeister Bench are altered, probably by surficial weathering processes; up to 10 feet of the Upper Cretaceous, Kuskokwim Group sedimentary rocks on bedrock are oxidized and dike rocks are altered to clay and gossan. Alluvium on the bench consists of rounded gravel and cobbles of sedimentary and igneous rocks. Placer gold, often with adhering quartz, occurs in the alluvium, as well as magnetite. Exceptionally large nuggets have been found in the bench deposit.

Alteration:

Bedrock below the gold-bearing alluvium is altered to at least 3 meters of depth. Dike rocks have been gossanized and converted to clay.

Age of mineralization:

Probably late Tertiary or early Pleistocene (Hopkins and others, 1971).

Deposit model:

Placer Au deposit (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:**

The Baumeister Bench probably was discovered with other bench deposits of the area before 1910 (Maddren, 1910). The Baumeister Bench was mined by hydraulic methods at intervals between discovery and World War II (Warren Magnuson, pers. communication, 1986). After World War II, bulldozers were used for exploration and ground preparation activities.

Production notes:

Production prior to 1960 was lumped with Ganes Creek (ID011). About 3,500 ounces of gold were recovered from the Baumeister Bench during mining between 1960 and 1966 (Warren Magnuson, oral communication, , 1990). About 1,500 ounces were recovered from alluvium and reworked tailings in the 1980s and 1990s (T.K. Bundtzen, unpublished records, 1999). Between 1964 and 1986, 60-ounce and a 122-ounce gold nuggets were mined on the Baumeister Bench (Warren Magnuson, oral communication, 1990); during the 1990s, gold-quartz nuggets weighing up to 55 ounces were mined on the bench (Doug Clark, oral communication, 2001).

Reserves:**Additional comments:****References:**

Maddren, 1910; Eakin, 1914; Mertie, 1936; Hopkins and others, 1971; Bundtzen, 1980 (GR 63); Bundtzen and Miller, 1997.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/12/2003

Site name(s): Katz**Site type:** Prospect**ARDF no.:** ID028**Latitude:** 62.9356**Quadrangle:** ID D-1**Longitude:** 156.4978**Location description and accuracy:**

The Katz prospect is on a ridge about 1.2 miles east of Ganes Creek. It is at an elevation of about 1,400 feet near the center of section 21, T. 33 N., R. 38 W., of the Seward Meridian. The prospect (spelled Kaatz) was approximately located and described as locality 13 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au, Sb**Other:** Ag, As**Ore minerals:** Arsenopyrite, stibnite**Gangue minerals:** Carbonate minerals, quartz**Geologic description:**

The Katz (or Kaatz) deposit is a stibnite-quartz-gold vein 4 to 12 inches thick along the footwall of a granite porphyry dike that contains disseminated stibnite and arsenopyrite. The vein strikes N30E and dips 75SE; it is subparallel to the dike. According to Mertie and Harrington (1924), the vein and the associated dike can be traced for about a mile. The Katz lode occurs directly over the projection of the Ganes-Yankee fault and dike swarm (Bundtzen and Laird, 1982; Bundtzen and Miller, 1997). According to Miller, Bundtzen and Gray (2004), grab samples contain up to 1,100 parts per billion (ppb) gold, 2,000 ppb silver, and 35.00 percent antimony. The Katz deposit is similar to the Independence Mine (ID031) and the Goss Gulch deposit (ID039) which also occur along Ganes-Yankee fault and dike swarm (Bundtzen and Miller, 1997).

Alteration:

Dike is carbonatized and sericitized.

Age of mineralization:

Undated; probably Late Cretaceous, based on nearby dated intrusions along the Ganes-Yankee Creek fault (Bundtzen and Miller, 1997).

Deposit model:

Gold-antimony deposit (Berger, 1993) or simple antimony vein (Cox and Singer, 1986; model 27d).

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

27d

Production Status: Undetermined.**Site Status:** Inactive**Workings/exploration:**

The Katz prospect was explored by old trenches and an adit, now caved, probably before 1920.

Production notes:

Reserves:

Additional comments:

References:

Mertie and Harrington, 1924; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen and Laird, 1982; McGimsey and others, 1988; Berger, 1993; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/13/2003

Site name(s): Mackie Gulch**Site type:** Mine**ARDF no.:** ID029**Latitude:** 62.9904**Quadrangle:** ID D-1**Longitude:** 156.4947**Location description and accuracy:**

Mackie Gulch is a west-flowing stream that empties into Ganes Creek about 1 mile below the main Ganes Creek camp shown on the Iditarod D-2 topographic map. Mackie Gulch is not named on the USGS, D-1 topographic map but it flows across the SE1/4, section 33, T. 34N., R. 38W., Seward Meridian. The lower 1.2 miles mile is gold-bearing and the coordinates are at the mouth of the creek at an elevation of about 880 feet. The location is accurate. Mackie Gulch was described as locality 43 by Cobb (1972, [MF 363]).

Commodities:**Main:** Au**Other:** Ag**Ore minerals:** Gold**Gangue minerals:** Quartz**Geologic description:**

The rocks in the area of the Mackie Gulch Mine are shale, siltstone, and sandstone of the Upper Cretaceous, Kuskokwim Group. The sedimentary rocks are intruded by a Cretaceous to a Tertiary, mafic-to felsic swarm of dikes and sills near the Ganes-Yankee fault system (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994). The placer gold is probably derived from the bimodal intrusive complex.

The paystreak is about 50 feet wide and is covered by from 13 to 50 feet of overburden. The paystreak extends for about 1.2 miles upstream from the mouth of the gulch. Placer gold was first recognized in Mackie Gulch shortly after discovery of gold on Ganes Creek in 1906 (Maddren, 1910). A total of at least 1,794 ounces of placer gold was mined from 1915 to 1938 and gold was produced intermittently from 1970 to 2001. The gold is about 940 fine. Some of the placer gold has adhering quartz.

Alteration:

None.

Age of mineralization:

Undated; probably Quaternary based on estimates of the age of the stream valley summarized in Bundtzen (1980 [GR 63]) and Bundtzen and Miller (1997).

Deposit model:

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

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

39a

Production Status: Yes**Site Status:** Active

Workings/exploration:

Placer gold was found in Mackie Gulch shortly after the Ganes Creek discovery in 1906 (Maddren, 1910). The deposit was mined from 1915 to 1938 (Mertie, 1936; Cobb, 1972, [MF 363]; Cobb, 1976 [OFR 76-576]). Mining began again in 1999 by the Clark-Wiltz partnership, who mined Mackie Gulch through the 2001 season. The workings extend from the mouth of the gulch upstream for a maximum distance of 1.2 miles. In the 1930s, a cut 15 by 50 feet in area exposed 5 feet of gravel covered by 12-16 inches of organic materials; i.e., there was almost no overburden (Mertie, 1936). As mined between 1999 to 2001, the placer cut was about 160 feet long and the overburden was up to 50 feet thick.

Production notes:

From 1915 to 1938, Mackie Gulch produced 939 ounces of gold and 55 ounces of silver (Miller, Bundtzen, and Gray, 2005); it produced about 862 ounces of gold from 1970 to 2001 (T.K. Bundtzen, unpublished data, 2002). The total production is about 1,794 ounces of placer gold.

Reserves:**Additional comments:****References:**

Maddren, 1910; Mertie, 1936; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, 1980 (GR 63); Bundtzen and Laird, 1983; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cobb, 1976 (OFR 76 576)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/11/2003

Site name(s): Unnamed (near head of Glacier Gulch)**Site type:** Occurrence**ARDF no.:** ID030**Latitude:** 62.9408**Quadrangle:** ID D-1**Longitude:** 156.4866**Location description and accuracy:**

This occurrence is near the head of Glacier Gulch and about 1.8 miles east-southeast of the mouth of Spaulding Creek. It is at an elevation of about 1,600 feet in the NE1/4 NE1/4, section 21, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:****Ore minerals:** Arsenopyrite, pyrite**Gangue minerals:** Carbonate minerals, quartz**Geologic description:**

This occurrence consists of a 1.5-foot-thick, quartz-carbonate-sulfide vein in an altered feldspar-rich, dacite dike that intrudes shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Bundtzen and Laird, 1982; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Arsenopyrite and pyrite are disseminated near the edges of the vein. The dike is part of the intrusive suite associated with the Ganes-Yankee Creek fault (Bundtzen and Miller, 1997). One sample of sulfide-bearing quartz vein contained 1,110 parts per billion gold but no other elements in anomalous concentrations (Bundtzen and Laird, 1982).

Alteration:

The dike is carbonatized and the sulfides are weathered to iron oxides.

Age of mineralization:

Undated; probably Late Cretaceous, based on nearby dated intrusions along Ganes-Yankee Creek fault (Bundtzen and Miller, 1997).

Deposit model:

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Several prospect pits, probably dug before World War II, explored the vein. Placer Dome Exploration explored the Ganes-Yankee Creek fault and dike swarm in this area in 1997; their data are not available.

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1982; McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Laird, 1982

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/13/2003

Site name(s): Independence Mine**Site type:** Mine**ARDF no.:** ID031**Latitude:** 62.9445**Quadrangle:** ID D-1**Longitude:** 156.4745**Location description and accuracy:**

The Independence Mine is on a northwest-trending ridge about 2 kilometers east of Ganes Creek at an elevation of about 500 meters in the SW1/4 SW1/4, section 15, T. 33 N., R. 38 W., of the Seward Meridian. The mine is accurately located.

Commodities:**Main:** Au**Other:** Ag, As, Hg, Pb, Sb, Sn**Ore minerals:** Arsenopyrite, cinnabar, gold, magnetite, pyrite, stephanite, stibnite**Gangue minerals:** Quartz, siderite**Geologic description:**

The Independence Mine is one of two lode deposits in the Iditarod Quadrangle with a recorded production of gold. The deposit at the mine is a quartz-carbonate-sulfide vein about 1.5 to 3 feet thick on the hanging wall of an altered composite andesite-granite porphyry dike. According to Eakin (1914) the vein exposed in underground workings averaged about 2 feet thick. The dike strikes N55-70E and dips steeply SE. The granite porphyry phase, which may be dominant, averages about 32 feet thick and can be traced in rubble for about 1,000 feet. The altered andesite phase is exposed in trenches above the underground workings (Bundtzen and Laird, 1982).

About 1 to 5 percent sulfides, principally arsenopyrite, pyrite, and stibnite and minor cinnabar and stephanite, are disseminated in the vein and adjacent dike rock. Gold occurs in iron-stained crevices and vugs in quartz. Eakin (1914) reported microscopic native gold embedded in magnetite in vein material. Grab samples of the vein reported by McGimsey and others (1988) and Bundtzen and Miller (1997) contain up to 180.0 parts per million (ppm) gold, 13.0 ppm silver, 2.10 percent arsenic, 20 ppm bismuth, 0.56 percent antimony, more than 10.0 ppm mercury, 1,500 ppm lead, and 300 ppm tin.

The vein was developed by an adit and possibly several hundred feet of inclined and level workings. About 470 tonnes of ore mined in 1911 and 1912 produced 479 ounces of gold.

The Independence Mine is similar to other gold-polymetallic veins along the Ganes-Yankee Creek fault and dike swarm (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997). Anomalous tin is present at the Independence Mine, it is known elsewhere in the region in rocks of about 70 Ma age, as in felsic plutonic rocks at Donlin Creek prospect (ID167). Mineralization at the Independence and nearby deposits along the Ganes-Yankee Creek fault and dike swarm has been compared to the Donlin Creek system by Miller and Bundtzen (1988) and Bundtzen and Miller (1997).

Alteration:

Local silicification and development of siderite and other carbonate minerals in an altered dike; secondary oxidation.

Age of mineralization:

The granite-porphyry dike at the Independence Mine has been dated at 70.4 Ma (T.K. Bundtzen, unpublished data, 1998).

Deposit model:

Low sulfide gold-quartz vein or Porphyry gold-copper deposit; (Cox and Singer, 1986; models 36a and 20c); possibly the porphyry gold type deposit of Hollister (1992); or the peraluminous granite, porphyry gold-polymetallic type deposit of Bundtzen and Miller (1997).

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

36a or 20c

Production Status: Yes**Site Status:** Inactive**Workings/exploration:**

According to Eakin (1913), the underground work during 1912 consisted of a 60-foot tunnel, a 60-foot winze driven at the end of the adit, and two drifts about 30 and 50 feet long. The equipment at the mine site included a 12-horsepower engine and a Little Giant crusher and stamp mill. In 1979, the portal's entrance had caved and exposed the winze. Remnants of the stamp mill are about 650 feet meters south of the underground workings in a unnamed gulch.

The mine was abandoned after the early production but has been prospected in recent years. Warren Mag-nuson explored the mine with trenches and open cuts in the 1960s and 1970s. Westgold explored the area in the early 1990s. Placer Dome Exploration conducted a detailed soil survey over the Independence Mine and drilled two core holes totaling about 500 feet in 1996-97 (St. George, 1998). Although the full details of the Placer Dome Exploration exploration are confidential, gold-bearing veins are known to have been intersected below the mine workings.

Production notes:

The only production was in 1911 and 1912 when the Carter Creek Mining Company produced 479 ounces of gold from the underground workings.

Reserves:

Probably small.

Additional comments:**References:**

Eakin, 1913; Eakin, 1914; Cobb, 1976 (OFR 76-576); Bundtzen and Laird, 1982; Miller and Bundtzen, 1988; McGimsey and others, 1988; Hollister, 1992; Bundtzen and Miller, 1997; St. George, 1998; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/13/2003

Site name(s): Unnamed (northwest of head of Six Gulch)**Site type:** Occurrence**ARDF no.:** ID032**Latitude:** 62.9546**Quadrangle:** ID D-1**Longitude:** 156.4687**Location description and accuracy:**

This unnamed occurrence is at an elevation of about 1,600 feet near the divide between Yankee (ID037) and Ganes creeks (ID011), north of the head of Six Gulch. It is about 0.2 mile north of hill 2024 and 0.4 mile north-northwest of the center of section 15, T. 33N., R. 38W., Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** As**Ore minerals:** Arsenopyrite**Gangue minerals:** Quartz**Geologic description:**

This occurrence consists of gold-arsenopyrite-quartz veins in a quartz-feldspar porphyry dike. The dike intrudes shale and sandstone of the Upper Cretaceous Kuskokwim Group (Miller and Bundtzen, 1994). This occurrence is within 100 meters of the Ganes-Yankee Creek fault zone (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994). A grab sample contained 280 parts per billion gold (Bundtzen and Laird, 1983).

Alteration:**Age of mineralization:****Deposit model:**

Polymetallic vein or Porphyry Au-Cu (Cox and Singer, 1986; models 22c or 20c).

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

22c or 20c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The mineralized dike was explored by a pit dug before 1979 (Bundtzen and Laird, 1983). Placer Dome Exploration trenched and drilled near the prospect in 1997; the results of that work have not been published.

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen and Laird, 1983; Miller and Bundtzen, 1994.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (head of Yankee Creek)**Site type:** Prospect**ARDF no.:** ID033**Latitude:** 62.9591**Quadrangle:** ID D-1**Longitude:** 156.4474**Location description and accuracy:**

This prospect is at an elevation of about 2,000 feet on the south flank of feature locally called Telephone Hill. It is about 2.3 miles east-southeast of the mouth of Six Gulch and about 0.6 mile southeast of the center of section 11, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au**Other:** As, Pb, Sb**Ore minerals:** Arsenopyrite, gold, iron oxide, jamesonite**Gangue minerals:** Carbonate minerals, dickite, quartz**Geologic description:**

This prospect consists of: 1) quartz breccia and vuggy veins on the hanging wall of an altered, N30E-trending, granite-porphyry dike, and 2) sheeted quartz-sulfide veins in sandstone of the Upper Cretaceous, Kuskokwim Group. The deposit is exposed in several pits, and locally is oxidized to iron-oxide-rich gossan (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). Arsenopyrite, jamesonite, and visible free gold are reported from quartz-sulfide veins in the old prospect pits. Bundtzen and Laird (1983) collected samples that contained 730 parts per billion gold and 5.0 parts per million. The geology and mineralization at this prospect is similar to that at the Independence Mine (ID031) about 2 miles to the southwest.

Alteration:

The dike rocks is carbonatized, silicified, and argillized.

Age of mineralization:

Probably Late Cretaceous, based on the age of nearby, dated intrusives at the Telephone Hill prospect (ID035).

Deposit model:

Polymetallic vein or Porphyry Au-Cu (Cox and Singer, 1986; models 22c, 20c).

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

22c or 20c

Production Status: No**Site Status:** Active**Workings/exploration:**

Prospect pits were dug prior to World War II. The Telephone Hill area was prospected by Westgold Inc., in 1989 and by Placer Dome Exploration in 1997. From 1997 to 2002, the prospect was included in the area

of a an option agreement between Doyon Limited (the land owner) and North Star Exploration, Inc., a Colorado-based exploration firm.

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1983; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Laird, 1983; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (west of upper Yankee Creek)**Site type:** Prospect**ARDF no.:** ID034**Latitude:** 62.9561**Quadrangle:** ID D-1**Longitude:** 156.4390**Location description and accuracy:**

This prospect is at an elevation of about 1,900 feet above a low saddle on an east-west-trending ridge near the head of Yankee Creek. The prospect is about 600 feet west of the Telephone Hill prospect (ID035) near the center of the N1/2 NW1/4, section 14, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, As, Sb**Ore minerals:** Arsenopyrite, gold, iron oxides, stibnite**Gangue minerals:** Quartz**Geologic description:**

This deposit at this prospect is a thin gold-quartz-sulfide vein that cuts a quartz-feldspar porphyry dike near its contact with sandstone of the Upper Cretaceous, Kuskokwim group (Miller and Bundtzen, 1994). The dike, as partly exposed in rubble crop, is about 25 feet thick and strikes about N70E. The vein, which is probably subparallel to the dike, is about 16 inches thick. The vein contains about 2 percent, fine-grained arsenopyrite and less abundant, bladed stibnite crystals. Free gold occurs in pockets of iron oxide oxidized from the sulfides. One sample of sulfide-bearing quartz vein contained 7.02 parts per million gold (Bundtzen and Laird, 1983; McGimsey and others, 1988). The quartz-feldspar porphyry dike is part of the dike-sill complex associated with the Ganes-Yankee Creek fault zone (Bundtzen and Laird, 1983; Bundtzen and Miller, 1997).

Alteration:

The quartz-feldspar dike is moderately sericitized.

Age of mineralization:

Biotite from a dike at the Telephone Hill prospect (ID035) nearby has a $40\text{Ar}/39\text{Ar}$ age of 70.6 Ma (Bundtzen and others, 2000).

Deposit model:

Low sulfide gold-quartz vein or Porphyry gold-copper deposit; (Cox and Singer, 1986; models 36a and 20c); possibly the porphyry gold type deposit of Hollister (1992); or the peraluminous granite, porphyry gold-polymetallic type deposit of Bundtzen and Miller (1997).

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

36a or 20c

Production Status: None**Site Status:** Probably inactive

Workings/exploration:

Prior to World War II, the prospect was explored by two elongate pits about 50 feet apart. West Gold Inc. explored the area and collected soil samples in the prospect area in 1989; Placer Dome Exploration collected soils in the area in 1997. North Star Exploration, Inc. conducted exploration and sampled rocks and soils in 1998 and 2001.

Production notes:**Reserves:****Additional comments:****References:**

Bundtzen and Laird, 1983; McGimsey and others, 1988; Hollister, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Bundtzen and others, 2000.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Telephone (Tele) Hill**Site type:** Prospect**ARDF no.:** ID035**Latitude:** 62.9564**Quadrangle:** ID D-1**Longitude:** 156.4311**Location description and accuracy:**

The Telephone (or Tele) Hill prospect is centered on a prominent, unnamed, 1,800-foot-high knob near the end of an east-trending ridge west of upper Yankee Creek. The prospect is about 0.5 mile north-northeast of the center of section 14, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate. The Telephone Hill prospect is informally named for a remote telephone-repeater site about 0.6 mile west of the prospect.

Commodities:**Main:** Au**Other:** Ag, As, Sb**Ore minerals:** Arsenopyrite, pyrite, stibnite, unspecified sulfosalts**Gangue minerals:** Dolomite, mariposite, quartz, sericite, siderite**Geologic description:**

The Telephone (Tele) Hill prospect consists of arsenical gold deposits in hornfels, deformed sedimentary rocks of the Upper Cretaceous, Kuskokwim Group, and in fine-grained quartz-feldspar and granite porphyry and somewhat coarser-grained biotite-pyroxene monzonite (Bundtzen and Miller, 1997). The prospect is within 500 feet of the trace of the Ganes-Yankee Creek fault zone (Bundtzen and Laird, 1983, Miller and Bundtzen, 1994). The mineralized intrusions at the prospect are elongated in a north-south direction.

The deposit consists of: 1) arsenopyrite-rich, quartz-iron carbonate, crackle breccias in hornfels and deformed shale; 2) disseminated arsenopyrite in quartz-feldspar porphyry; 3) disseminated pyrite and arsenopyrite in sericitized monzonite; and 4) thin, 0.4- to 1-inch-thick sulfide-sulphosalt-quartz veins in monzonite and quartz-feldspar porphyry. Surface samples locally contained stibnite and unidentified sulfosalts.

The richest material found during sampling at the surface was in arsenic-rich, iron-carbonate-bearing crackle breccia in hornfels and deformed shale. Mineralized grab samples contained from 6.6 parts per million (ppm) to 13.8 ppm gold and from 2,500 to 5,500 ppm arsenic (North Star Exploration, Inc. unpublished brochure, 1999; T.K. Bundtzen, unpublished data, 2002). The correlation coefficients between gold and arsenic in samples averaged 0.90 (Bundtzen and others, 2000). Biotite from the Telephone Hill prospect has a $^{40}\text{Ar}/^{39}\text{Ar}$ age of 70.6 Ma (T.K. Bundtzen, unpublished data, 1999).

Three reconnaissance diamond drill holes tested the prospect in 2001. Drill hole TH-01-01 intersected three main mineralized intervals. From 90.0 to 106.0 feet, the core contained 1,970 parts per billion (ppb) gold, 350 ppb silver, and 2,988 parts per million (ppm) arsenic. From 170.0 to 179.8 feet, the core contained 1,233 ppb gold, 750 ppb silver, and 2,770 ppm arsenic. And from 230.0 to 273.0 feet, the core contained 1,166 ppb gold and 1,070 ppm arsenic. The core from drill hole TH-01-02 contained 3,050 ppb gold, 1,220 ppb silver, and 4,468 ppm arsenic from 586.6 to 594.5 feet. The core from 410.1 to 435.0 feet in drill hole TH-01-03 contained 598 ppb gold and 1,220 ppb gold. (Galey and others, 2002; EMEX Corporation press release, February 14, 2002). Anomalous antimony values were also present in the drill holes. The highest gold values in the drill holes were in zone of quartz-carbonate veins and in altered sedimentary rocks near intrusive contacts.

The geology and age of the Telephone Hill prospect is similar to the Vinasale Mountain (see McGrath ARDF report) and the Donlin Creek gold-arsenic-antimony deposit (ID167) of the Kuskokwim mineral belt

(Bundtzen and Miller, 1997; Bundtzen, 1999).

Alteration:

Alteration assemblages include: 1) pervasive clay alteration in brecciated quartz-feldspar porphyry; 2) ubiquitous sericite alteration in monzonite; 3) dolomite replacement of monzonite; and 4) mariposite in altered intermediate dikes near porphyritic intrusions.

Age of mineralization:

Secondary biotite in altered monzonite at the Telephone Hill prospect has $^{40}\text{Ar}/^{39}\text{Ar}$ age of 70.6 Ma (Bundtzen and others, 2000).

Deposit model:

Low sulfide gold-quartz vein or Porphyry gold-copper deposit; (Cox and Singer, 1986; models 36a and 20c); possibly the porphyry gold type deposit of Hollister (1992); or the peraluminous granite, porphyry gold-polymetallic type deposit of Bundtzen and Miller (1997).

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

36a or 20c

Production Status: None**Site Status:** Active**Workings/exploration:**

Westgold, Inc. analyzed soils and rocks over the Telephone Hill prospect in 1989. Placer Dome Exploration also collected soils and rock samples in the Telephone Hill prospect area in 1996 and 1997 (St. George, 1998). North Star Exploration, Inc., which held a minerals option agreement with the landowner, Doyon Limited, collected rock and soil samples over Telephone Hill prospect in 1998 (Hinderman and others, 1999). In 2001, North Star Exploration, Inc. explored the Telephone Hill prospect with three diamond drill holes totaling about 1,720 feet. All three drill holes intersected zones with anomalous gold, silver, antimony, and arsenic.

Production notes:

None; the gold deposits at Telephone Hill and nearby prospects along the Ganes-Yankee Creek fault zone are likely to be the lode source for the more than 70,000 ounces of gold that has been produced in Yankee Creek (ID037).

Reserves:

No reserve or resource estimates have been made.

Additional comments:**References:**

Hollister, 1992; Bundtzen and Laird, 1983; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; St. George, 1998; Hinderman and others, 1999; Bundtzen and others, 2000; Galey and others, 2002.

Primary reference: Galey and others, 2002

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (west wall of Yankee Creek)**Site type:** Prospect**ARDF no.:** ID036**Latitude:** 62.9852**Quadrangle:** ID D-1**Longitude:** 156.4143**Location description and accuracy:**

This prospect is west of Yankee Creek at an elevation of about 1,500 feet. It is near the northwest corner of section 1, T. 33 N., R 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Cr**Other:** Ni**Ore minerals:****Gangue minerals:** Mariposite**Geologic description:**

This prospect is in a highly altered, northeast-trending mafic (ultramafic?) dike that intrudes sandstone and siltstone of the Upper Cretaceous, Kuskokwim Group (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994). The dike is brown to tan in color and is almost completely altered to silica-carbonate minerals and mariposite. Rubble-crop suggests that the dike is 6 to 25 feet wide; it can be traced along strike for about 500 feet in old prospect pits and rubble crop (Bundtzen and Laird, 1983). A grab sample of the altered dike contained 5.0 parts per million (ppm) silver, 200 ppm nickel, and 2,000 ppm chromium (Bundtzen and Laird, 1983).

This occurrence is an example of chromium, nickel, and occasional precious metal enrichment that occurs in altered mafic and ultramafic? dikes in the Ganes -Yankee Creek fault zone and in other areas of the Iditarod quadrangle. The abundant chromite and magnesiochromite found in panned concentrates from Yankee Creek (ID037) and Ganes Creek (ID011) may be derived from occurrences of this type (Bundtzen, Cox, and Veach, 1987).

Alteration:

Pervasive alteration of mafic to ultramafic dikes to silica and carbonate minerals and mariposite.

Age of mineralization:

Undated; similar mafic dikes near the DeCourcy Mountain Mine (ID158) have 40K/40Ar dates of 71 to 76 Ma (Miller and Bundtzen, 1994).

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

The altered dike at this unnamed prospect has been explored by several old prospect pits.

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1983; Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Yankee Creek**Site type:** Mine**ARDF no.:** ID037**Latitude:** 62.9733**Quadrangle:** ID D-1**Longitude:** 156.4046**Location description and accuracy:**

The Yankee Creek placer extends for 6 miles in the upper part of Yankee Creek. The coordinates are for a point about halfway in the mined portion of the creek in the Iditarod quadrangle, the center is in the SE1/4 SW1/4 of section 1, T. 33 N., R. 38 W., of the Seward Meridian. The location is accurate. Yankee Creek is locality 44 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Cr, Sb, W**Ore minerals:** Arsenopyrite, chromite, gold, magnesiochromite, scheelite, stibnite**Gangue minerals:** Anatase, ekermanite, hidalgoite, ilmenite, quartz**Geologic description:**

Yankee Creek is one of the larger producers of placer gold mine in the Innoko mining district. Production from 1909 to 1995 has been at least 58,120 ounces of gold and 7,505 ounces of silver (Miller, Bundtzen, and Gray, 2005). About 20,000 ounces of placer gold has been mined in the Ophir-quadrangle part of the Yankee Creek drainage (Bundtzen and Laird, 1980).

Yankee Creek occupies a broad, 1,600-foot-wide valley. The auriferous gravel deposits were thawed and shallow, and covered by 6 to 15 feet of overburden. The pay gravel varies from about 5 to 12 feet thick and most of the gold occurred within 3 feet of bedrock.

Minor gold that was aggregated with the production from Yankee Creek came from its tributary creeks or gulches including Marten and Skookum Gulches. Although not important as producers themselves they are important as the sources of the gold in Yankee Creek as much of its production came from near the mouths of these tributaries. More than 90 percent of the gold-bearing gravels in Yankee Creek basin were in a single, fluvial, distributary channel about 7 miles long and 50 to about 250 feet wide. The remaining gold was produced from an ancestral terrace deposit on the east bank of Yankee Creek downstream from Yankee Creek placer camp. The placer gold in the Yankee Creek basin is downslope and downstream from the Ganes-Yankee Creek fault zone and its associated gold-bearing intrusions and country rocks (Bundtzen, 1980; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005).

The gold from Yankee Creek varied from 850 to 886 fine and averages about 870 fine (Smith, 1941 [B 910-C]; Bundtzen, Cox, and Veach, 1987). Considerable placer scheelite was found near the head of the creek, just downstream from the Telephone Hill prospect (ID035). Other heavy minerals found in concentrates include arsenopyrite, magnesiochromite, ilmenite, anatase, ekermanite, and a trace of hidalgoite (Bundtzen, Cox, and Veach, 1987). Nuggets up to 32 ounces in weight have been mined from Yankee Creek (Babe Anderson, oral communication, 2003). Although no large mafic or ultramafic rock bodies are known in the area, chromite and magnesiochromite are abundant in heavy mineral concentrates from Yankee Creek and also from Ganes Creek. Easily eroded, altered mafic-ultramafic dikes and sills near the Ganes-Yankee fault might be the source of the chromite and magnesiochromite.

Alteration:

Weathering at bedrock surface.

Age of mineralization:

The Yankee Creek placer is probably Late Tertiary to Quaternary in age (Hopkins and others, 1971).

Deposit model:

Placer Au deposit (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:**

Yankee Creek was prospected in the winter of 1908-09 (Maddren, 1910) and mining probably began later in 1909. Most of the creek was explored with churn drills in 1918 and 1919 (Toivo Rosander, oral communication, 1979). Because the placer deposit was shallow and thawed, most prospecting and exploration since World War II has been in bulldozer cuts and test pits.

Production notes:

Yankee Creek has been a significant producer of placer gold in the Innoko mining district. Production from 1909 to 1995 has been at least 58,120 ounces of gold and 7,505 ounces of silver (Miller, Bundtzen, and Gray, 2005). About 20,000 ounces of placer gold has been mined in the Ophir-quadrangle part of the Yankee Creek drainage (Bundtzen and Laird, 1980).

The creek was first mined in open cuts with scrapers and draglines and later by dredging. The Discovery claim is near the Rosander mine camp in section 1, T. 33 N., R. 38 W, of the Seward Meridian. The creek has been worked from 14 Above to 11 Below Discovery, almost all of which is in the Iditarod quadrangle. A diesel-powered flume dredge, the Felder, Gale, and Higgins dredge, operated from 1921 to about World War II (Smith, 1942). The dredge burned; remnants of the dredge are on No. 6 Above Discovery in the SE1/4 section 21, T. 33 N., R. 38 W (Eakin, 1914; Mertie, 1936; T.K. Bundtzen, unpublished data, 1978, 1979, 2002).

Mining was renewed in 1946, when the Toivo Rosander and Larry Reed began mining Yankee Creek and recovered the gold with a large elevated-slucice box fed by bulldozers and draglines (Stewart, 1947). This operation, which accounts for about 65 percent of the recorded production on Yankee Creek, continued until 1968 (unpublished U.S. Mint records; Toivo Rosander oral communication, 1980). From 1986-1994, Anderson and Sons, Inc. mined in open cuts with bulldozers on Yankee Creek and two Yankee Creek has produced gold nuggets up to 32 ounces in weight (Babe Anderson, oral communication., 2003).

Reserves:

None documented. Placer gold resources probably exist in tributary creeks and in low-grade terrace deposits in the lower part of the Yankee Creek basin.

Additional comments:**References:**

Maddren, 1910; Eakin, 1914; Mertie, 1936; Smith, 1941(B 910-C); Smith, 1942; Stewart, 1947; Hopkins and others, 1971; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, 1980 (MIRL); Bundtzen and Laird, 1983; Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Bundtzen and others, 1996; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Mertie, 1936; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (east of upper Yankee Creek)**Site type:** Prospect**ARDF no.:** ID038**Latitude:** 62.9797**Quadrangle:** ID D-1**Longitude:** 156.3875**Location description and accuracy:**

This prospect is on the end of a northwest-trending ridge southeast of Yankee Creek at an elevation of about 1,400 feet. It is about 0.5 mile east of the center of section 1, T. 33 N. R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** As**Ore minerals:** Arsenopyrite, pyrite**Gangue minerals:** Biotite, quartz, siderite**Geologic description:**

This prospect is in altered, quartz-feldspar porphyry dikes and sills that intrude shale and siltstone of the Upper Cretaceous, Kuskokwim Group (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994). The prospect is poorly exposed and the data is based on examination of float, rubble, and geochemical anomalies in rock and soil surveys (North Star Exploration Ltd.; information brochure, 1999). The dikes and sills vary from about 15 to 100 feet thick. The intrusive rocks are cut by hairline fractures filled with quartz and very fine-grained sulfides, mainly arsenopyrite and subordinate pyrite. Iron carbonates, including siderite, are present (Galey and others, 2002). Rock samples collected from mineralized zones contain as much as 5,725 parts per billion (ppb) gold and up to 6,000 parts per million (ppm) arsenic. Soil samples contain up to 250 ppb gold (North Star Exploration, Ltd., press release, Feb. 14, 2002; S. Dashevsky and T.K. Bundtzen, unpublished data, 2002).

Alteration:

Phyllic and potassic alteration; secondary biotite has developed in the intrusive rocks.

Age of mineralization:

Undated; the intrusion on nearby French Joe Mountain has a $40\text{Ar}/39\text{Ar}$ age of 71.3 Ma (T.K. Bundtzen, unpub. data, 1999).

Deposit model:

Low sulfide gold-quartz vein or Porphyry gold-copper deposit; (Cox and Singer, 1986; models 36a and 20c); possibly the porphyry gold type deposit of Hollister (1992); or the peraluminous granite, porphyry gold-polymetallic type deposit of Bundtzen and Miller (1997).

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

36a or 20c

Production Status: None**Site Status:** Active

Workings/exploration:

Most of the exploration was in 1998 and 2001 by North Star Exploration, Inc. (Hinderman and others, 1999; Galey and others, 2002; EMEX Corporation press release, February 14, 2002).

Production notes:**Reserves:****Additional comments:****References:**

Bundtzen and Laird, 1983; Hollister, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Hinderman and others, 1999; Galey and others, 2002.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Goss Gulch**Site type:** Prospect**ARDF no.:** ID039**Latitude:** 62.9858**Quadrangle:** ID D-1**Longitude:** 156.3626**Location description and accuracy:**

The Goss Gulch prospect is on a high level terrace at an elevation of 1,500 feet, about 1.5 kilometers southeast of the Yankee Creek 'placer mine' shown on the USGS 1:63,360-scale topographic. The prospect is about 0.4 mile west of the northeast corner of section 6, T. 33N., R. 37W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au, Sb**Other:** Ag, As**Ore minerals:** Arsenopyrite, pyrite, stibnite**Gangue minerals:** Biotite, quartz**Geologic description:**

The Goss Gulch prospect is in a mineralized quartz-feldspar dike or sill that intrudes sandstone and shale of the Upper Cretaceous Kuskokwim Group and chert of the Late Paleozoic to Mesozoic, Innoko Terrane (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994). The mineralized intrusion is about 160 feet thick. A 800-foot-thick, fine-grained, biotite quartz monzonite sill cuts the sediments about 650 feet southeast of southeast of Goss Gulch. This intrusion has a $40\text{Ar}/39\text{Ar}$ age of 71.3 Ma (Bundtzen, unpublished data, 1999). The Goss Gulch prospect lies directly over the trace of the Ganes-Yankee Creek fault zone (Bundtzen and Miller, 1997).

At the prospect, fault-controlled lensoid veins of nearly pure stibnite from 0.4 to 8 inches thick can be traced in rubble crop for 100 feet. The veins are oriented in two planes. One has a strike of N70E and a vertical dip; the other strikes N10-15E strike and dips 80SE. Samples of the vein contained as much as 35.0 percent antimony, 2.40 parts per million (ppm) gold, and 1,500 ppm arsenic (Bundtzen and others, 2000). Despite the conspicuous presence of stibnite, the correlation coefficient between gold and antimony is only 44; the coefficient between gold and arsenic is about 92 (Bundtzen and others, 2000; T.K. Bundtzen, unpublished data, 2002).

In 2001, two reconnaissance diamond drill holes totaling 1,214 feet were completed at the prospect (EMEX Corporation press release, February 14, 2002). Drill Hole GG01-01 did not penetrate significant mineralization. Drill hole GG-01-02 intersected three auriferous zones. Core from 277.6 to 279.9 feet contained 1,045 parts per billion (ppb) gold, 2,020 parts per million (ppb) arsenic, and 55 ppm antimony; core from 282.5 to 285.4 feet contained 750 ppb gold, 2,180 ppm arsenic, and 75 ppm antimony; and core from 650.0 to 665.0 feet contained 4,100 ppb gold, 1,000 ppb silver, 220 ppm arsenic, and 60 ppm antimony. The upper auriferous intercepts are in dike rock; the lower gold-bearing intercept is at the contact between quartz porphyry and quartz-veined sedimentary rocks.

Alteration:

Phyllic alteration in sedimentary rocks; potassic alteration with secondary biotite in quartz monzonite.

Age of mineralization:

Quartz monzonite on nearby French Joe Mountain (ID040) has a $40\text{Ar}/39\text{Ar}$ age of 71.3 Ma (T.K. Bund-

tzen, unpublished data, 1999).

Deposit model:

Low sulfide gold-quartz vein or Simple antimony vein; (Cox and Singer, 1986; models 36a and 27d); or the peraluminous granite porphyry gold-polymetallic type deposit of Bundtzen and Miller (1997).

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

36a or 27d

Production Status: None

Site Status: Active

Workings/exploration:

The prospect was discovered in 1998 during a soil and rock-chip geochemical survey for North Star Exploration, Inc. on land optioned from Doyon Limited (Hinderman and others, 1999). In 2001, two reconnaissance diamond drill holes totaling 1,214 feet were completed at the prospect (Galey and others, 2002; EMEX Corporation press release, February 14, 2002).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1983; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Hinderman and others, 1999; Bundtzen and others, 2000; Galey and others, 2002.

Primary reference: Galey and others, 2002

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 05/16/03

Site name(s): French Joe Mountain**Site type:** Occurrence**ARDF no.:** ID040**Latitude:** 62.9924**Quadrangle:** ID D-1**Longitude:** 156.3416**Location description and accuracy:**

This occurrence is at an elevation of about 1,600 feet of a hill locally named French Joe Mountain. The prospect is about 1.3 mile east of the 'placer mine' on Yankee Creek which is labeled on the USGS 1:63,360-scale topographic map. It is near the center of section 32, T. 33N., R. 37W., of the Seward Meridian.

Commodities:**Main:** Au**Other:** As**Ore minerals:** Arsenopyrite**Gangue minerals:** Quartz**Geologic description:**

The French Joe Mountain occurrence consists of hairline gold-bearing quartz veinlets and fracture fillings in quartz monzonite and quartz-feldspar porphyry that intrude shale and sandstone of the Late Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997). Disseminated arsenopyrite was observed in hand specimen. The quartz monzonite has a 40Ar/39Ar age of 71.3 Ma (T.K. Bundtzen unpublished data, 1999).

Alteration:

Sericite alteration in quartz-feldspar porphyry.

Age of mineralization:

The French Joe Mountain intrusion has a 40Ar/39Ar age of 71.3 Ma (T.K. Bundtzen, unpublished data, 1999).

Deposit model:

Polymetallic vein or Porphyry Au-Cu (Cox and Singer, 1986; models 22c or 20c).

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

22c or 20c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

According to Toivo Rosander (oral communication, 1990), a gold deposit was found on French Joe Mountain between 1914 and 1916 and it was explored with a series of shallow prospect pits. This is one of the earliest lode discoveries in the area. Bundtzen and Laird (1983) located several old prospect pits on the south side of French Joe Mountain. North Star Exploration, Inc., collected rocks and soils on French Joe

Mountain in 1998, but could not locate the old prospect pits (Hinderman and others, 1999).

Production notes:

Reserves:

Additional comments:

References:

Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Hinderman and others, 1999.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Joaquin**Site type:** Prospect**ARDF no.:** ID041**Latitude:** 62.8516**Quadrangle:** ID D-1**Longitude:** 156.2284**Location description and accuracy:**

The Joaquin prospect is at an elevation of about 2,200 feet, about 0.7 mile south-southeast of the top of Mount Joaquin. It is about 0.2 mile north-northwest of the center of section 21, T. 32 N., R. 37 W., of the Seward Meridian. The location is accurate. The prospect was approximately located as locality 14 of Cobb (1972 [MF 363]). The published locations of the prospect are ambiguous and it is difficult to locate (T.K. Bundtzen, unpublished field data, 1978).

Commodities:**Main:** Hg**Other:** Ag, As, Au**Ore minerals:** Arsenopyrite, cinnabar**Gangue minerals:** Quartz**Geologic description:**

The Joaquin prospect consists of thin quartz -sulfide veinlets and stringer zones in a small calcareous sandstone inclusion within the Upper Cretaceous, Mount Joaquin pluton (Malone, 1962; Bundtzen and Laird, 1983). The quartz veinlets contain disseminated grains of cinnabar and arsenopyrite. The prospect is exposed in lichen-covered talus near the toe of a talus fan; the mineralized zone can be traced for about 50 feet along strike and it is about 2 feet thick. The property was staked as a mercury prospect in 1957 but no production has been reported (Malone, 1962). One grab sample from the prospect dump contained 2.00 percent mercury, 240 parts per billion (ppb) gold, 800 ppb silver, and 2.00 percent arsenic (Miller, Bundtzen, and Gray, 2005).

Alteration:**Age of mineralization:**

Undated; may be related to emplacement of the Mount Joaquin pluton, which has a 40K/40Ar age of 70.6 Ma (Bundtzen and Laird, 1983).

Deposit model:

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The Mount Joaquin mercury prospect has appeared on many compilations of Alaskan mercury deposits (i.

e., Sainsbury and MacKevett, 1965; Malone, 1962). The property was located as a mercury prospect by Knute P. Lind in 1957, but no production has been reported (Malone, 1962). In 1978, a crude pit about 15 feet square that was dug in talus in talus was still visible (T.K. Bundtzen, unpublished field data, 1978).

Production notes:

None recorded, but the site was equipped to be small scale mercury producer in the late 1950s (J. Murphy, oral communication, 1987). A retort was to be assembled on site. A small cabin in a state of disrepair in 1978 was about 1,000 feet from the prospect pit. The cabin contained mallets, sledge hammers, and a small crusher (T.K. Bundtzen, unpublished data, 1978).

Reserves:

None.

Additional comments:**References:**

Malone, 1962; Sainsbury and MacKevett, 1965; Cobb, 1972 (MF 363); Bundtzen and Laird, 1983; Miller, Bundtzen, and Gray, 2005.

Primary reference: Malone, 1962; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (southwest of Mount Joaquin)**Site type:** Occurrence**ARDF no.:** ID042**Latitude:** 62.8412**Quadrangle:** ID D-1**Longitude:** 156.1940**Location description and accuracy:**

This placer occurrence is near the head of a stream that flows southeast from Mount Joaquin. The stream was sampled at an elevation of about 900 feet, about 0.5 mile north of the center of section 27, T. 32 N., R. 37W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Hg, W**Ore minerals:** Cinnabar, gold, scheelite**Gangue minerals:****Geologic description:**

This stream locally contains gold-bearing gravel (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994, and Miller, Bundtzen, and Gray, 2005). The U.S. Geological Survey found abundant heavy minerals in a panned concentrate taken from the stream at an elevation of about 900 feet (Bennett and others, 1988). The nonmagnetic heavy mineral fraction of the sample contained less than 1 percent visible gold, 1 to 5 percent cinnabar, and 1 to 5 percent scheelite (Bennett and others, 1988). The Mount Joaquin cinnabar-arsenic(-gold) prospect (ID041) is upstream from this site.

Alteration:**Age of mineralization:****Deposit model:**

Placer Au deposit (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:**

Panned-concentrate samples were collected by the U.S. Geological Survey in 1985 and 1986 (Bennett and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

Bennett and others, 1988; Bundtzen and Laird, 1983; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bennett and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Tatalina Creek**Site type:** Mine**ARDF no.:** ID043**Latitude:** 62.7541**Quadrangle:** ID D-1**Longitude:** 156.0861**Location description and accuracy:**

What is locally called Tatalina Creek has its headwaters just west of VABM Tatalina; it flows about 2 miles north-northwest to Carl Creek. One of the reporters of this record (T.K. Bundtzen) collected anomalous panned concentrates in upper Tatalina Creek in 1978. The coordinates reflect the location of that sampling at an elevation of about 1,200 feet. However there was also some placer mining along Tatalina Creek prior to 1917 but the location is uncertain. A placer gold prospect with the same name has also been located in the McGrath quadrangle south of Candle Hills (Bundtzen, 1999).

Commodities:**Main:** Ag, Au**Other:** As, Pb**Ore minerals:** Galena, gold, ilmenite, magnetite**Gangue minerals:** Crossite, fluorapatite**Geologic description:**

Tatalina Creek which has its headwaters near VABM Tatalina, flows about 2 miles north-northwest to Carl Creek. Unpublished U.S. Mint records indicate prospecting in Tatalina Creek in 1917 and 1918 and the production of about 18 ounces of placer gold. However, the location of this production is uncertain (Wimmler, 1927). Heavy-mineral-concentrate samples were collected by Bundtzen, Cox and Veach (1987) in Tatalina Creek at an elevation of about 1,200 feet. The samples contained anomalous values of lead, silver, arsenic, and gold; the heavy minerals in the samples include magnetite, galena, ilmenite, crossite, and fluorapatite (Bundtzen and others, 1987). The base-metal deposit in tourmaline hornfels upstream near VABM Tatalina (ID044) is the possible source of the anomalous samples in Tatalina Creek.

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

Placer Au deposit (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:**

There are old placer tailings in Tatalina Creek. Panned-concentrate samples were collected by the Alaska

Division of Geological and Geophysical Surveys in 1978 and by the U.S. Geological Survey in 1985 (Bundtzen and Laird, 1983; McGimsey and others, 1988; Bennett and others, 1988). Anaconda Minerals Company took stream-sediment samples in Carl and other tributary creeks in 1981; they reportedly contained five to ten times above background values for lead, zinc, and silver (D.B. Obolewicz, written communication, 1981).

Production notes:

Unpublished U.S. Mint records show that Tatalina Creek was prospected in 1917 and 1918 and about 18 ounces of placer gold were recovered (Wimmler, 1927).

Reserves:**Additional comments:****References:**

Wimmler, 1927; Bundtzen and Laird, 1983; Bundtzen, Cox, and Veach, 1987; Bennett and others, 1988; McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen, 1999; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/17/2003

Site name(s): VABM Tatalina**Site type:** Prospect**ARDF no.:** ID044**Latitude:** 62.7532**Quadrangle:** ID D-1**Longitude:** 156.0689**Location description and accuracy:**

This prospect is an area about 0.6 by 1.2 mile in size centered on VABM Tatalina. It is at an elevation of about 2,400 feet, just south of the middle of the northern boundary of section 29, T. 31 N., R. 36 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Pb**Other:** As, Au, Hg, Sb, Sn, V, Zn**Ore minerals:** Iron oxide, pyrite**Gangue minerals:** Quartz, tourmaline**Geologic description:**

This prospect near VABM Tatalina consists of several tourmaline-bearing breccia bodies in an irregularly shaped body of quartz porphyry near the Tatalina Mountain syenite intrusion. The Tatalina Mountain syenite body just east of the prospect area has a 40K/40Ar biotite age of 61.3 Ma (Bundtzen and Laird, 1983). The tourmaline breccias crop out discontinuously over an area about 0.6 mile by 1.2 mile in size south of VABM Tatalina. Near the breccia, tourmaline has replaced some of the hornfels and the quartz syenite pluton as well as the quartz porphyry intrusion (D.B. Obolewicz, written communication, 1981; Bundtzen and Laird, 1983). Grab samples of stained tourmaline breccia have ocherous coatings without sulfides and contained up to 0.96 percent lead, 90.0 parts per million (ppm) silver, 240 ppm copper, 900 ppm zinc, 45 parts per billion (ppb) gold, more than 1,000 ppm arsenic, 200 ppm antimony, 760 ppb mercury, and 28 ppm tin (D.B. Obolewicz, written communication, 1981). Samples collected by McGimsey and others (1988) contained up to 10.0 ppm silver, 500 ppm lead, and 20 ppm tin. Two samples collected by Bundtzen and Laird (1983) contained 5.0 ppm silver and 1,000 ppm vanadium. In 2001, North Star Exploration, Inc., conducted a soil survey over the prospect and detected several elliptical-shaped anomalous areas. The soils contained up to 125 parts per billion (ppb) gold, 16.8 parts per million (ppm) silver, 1,039 ppm lead, 1,096 ppm zinc, 4.4 ppm cadmium, 1,308 ppm boron, 438 ppm arsenic, 54 ppm antimony, and 104 ppm bismuth (North Star Exploration, Inc., unpublished data, 2001). The elevated gold values in the soil were more sparsely distributed than the anomalous base metal and silver values. Bundtzen and Miller (1997) correlate this prospect with other silver-tin-polymetallic prospects in the Kuskokwim mineral belt.

Alteration:

Greisen developed in tourmaline breccia pipes.

Age of mineralization:

Undated; probably genetically related to emplacement of Tatalina Mountain pluton which has been dated at 61.3 Ma (Bundtzen and Laird, 1983; Bundtzen and Miller, 1997).

Deposit model:

Sn-polymetallic veins (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None**Site Status:** Active**Workings/exploration:**

There are at least six old prospects near VABM Tatalina. Surface samples were collected by the Alaska Division of Geological and Geophysical Surveys in 1978, by Anaconda Minerals in 1981, by the U.S. Geological Survey in the 1985, and by North Star Exploration, Inc. in 2001.

Production notes:**Reserves:****Additional comments:****References:**

Bundtzen and Laird, 1983; McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record**Reporter(s):** T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)**Last report date:** 5/17/2003

Site name(s): Unnamed (west flank of Takotna Mountain)**Site type:** Occurrence**ARDF no.:** ID045**Latitude:** 62.9342**Quadrangle:** ID D-1**Longitude:** 156.0588**Location description and accuracy:**

This occurrence is near upper Beef Steak Creek at an elevation of about 1,300 feet. It is about 1.5 mile west to north-northwest of the top of Takotna Mountain in the SW1/4, section 23, T. 33 N., R. 36 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag**Other:** As, Cr, Hg**Ore minerals:** Pyrite**Gangue minerals:** Quartz**Geologic description:**

The rocks in the vicinity of this occurrence are part of the Takotna pluton which has been dated as 71.0 Ma; the pluton intrudes shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994). Iron-oxide-stained hornfelsed sandstone contains minor disseminated pyrite and is cut by quartz veinlets. Samples contained up to 1,000 parts per million (ppm) chromium, 300 parts per billion (ppb) silver, 1.1 ppm mercury, and 30 ppm arsenic (Bundtzen and Laird, 1983; McGimsey and others, 1988; Miller, Bundtzen, and Gray, 2005).

Alteration:

Iron oxides produced by the weathering of pyrite and other (?) sulfides.

Age of mineralization:

Probably Late Cretaceous, based on its host rock, the Takotna pluton that has been dated at 71.0 Ma (Miller and Bundtzen, 1994).

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:**

Surface sampling was conducted by the Alaska Division of Geological and Geophysical Surveys in 1978 and by the U.S. Geological Survey in 1985 (Bundtzen and Laird, 1983; McGimsey and others, 1985).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and Laird, 1983; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (south flank of Takotna Mountain)**Site type:** Occurrence**ARDF no.:** ID046**Latitude:** 62.9235**Quadrangle:** ID D-1**Longitude:** 156.0081**Location description and accuracy:**

This occurrence is on the steep south flank of Takotna Mountain about 0.4 mile south of the summit along the access road to the radar site at the top of the mountain. The occurrence is at an elevation of about 2,100 feet in the NE1/4, section 25, T. 33 N., R. 36 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag**Other:** Au, Cu, Zn**Ore minerals:** Iron oxide**Gangue minerals:** Quartz**Geologic description:**

This occurrence is an iron-oxide-stained quartz-cemented breccia in hornfels at the edge of the Takotna pluton. The pluton has been dated as 71.0 Ma (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994). The mineralized quartz-breccia zone was estimated to be at least 6 feet thick. One sample contained 13.7 parts per million (ppm) silver, 280 ppm copper, 1,030 ppm zinc, and 30 parts per billion (ppb) gold (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005).

Alteration:**Age of mineralization:**

Probably related to the Takotna pluton that has been dated at 71.0 Ma (Bundtzen and Laird, 1983; Miller and Bundtzen, 1994).

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:**

Surface samples were collected in 1977 by the Alaska Division of Geological and Geophysical Surveys (Bundtzen and Laird, 1983).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen and Laird, 1983; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Laird, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/16/2003

Site name(s): Unnamed (east of upper Little Yetna River)**Site type:** Occurrence**ARDF no.:** ID047**Latitude:** 62.5242**Quadrangle:** ID C-6**Longitude:** 158.6321**Location description and accuracy:**

This occurrence is on hill 540, about 1 mile east of the head of the Little Yetna River. The occurrence is in the SE1/4 SE1/4, section 12, T. 28 N., R. 51 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg**Ore minerals:** Iron oxide**Gangue minerals:** Quartz (var. chalcedony)**Geologic description:**

This occurrence is in a zone of unknown size marked by Silicification of felsic volcanic rocks. The silicification is largely chalcedony. The volcanics are part of the Upper Cretaceous or early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Iron-oxide-rich gossan after sulfides was noted in part of the zone. Two samples contained 100 parts per billion (ppb) gold, and 140 ppb mercury (McGimsey and others, 1988).

Alteration:

Chalcedonic silicification; iron oxide alteration.

Age of mineralization:

Unknown; the rhyolite is part of the Upper Cretaceous or early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994).

Deposit model:

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

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

25a?

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey in 1984 and 1985 (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (east of upper Little Yetna River)**Site type:** Occurrence**ARDF no.:** ID048**Latitude:** 62.5625**Quadrangle:** ID C-6**Longitude:** 158.5047**Location description and accuracy:**

This occurrence is on hill 480, which overlooks an easterly fork of the Yetna River. It is near the center of the NE1/4, section 32, T. 29 N., R. 49 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Hg**Ore minerals:****Gangue minerals:** Chalcedony**Geologic description:**

This occurrence is a zone of bleached, silicified rhyolite of unknown extent; the silicification is largely chalcedony. The rhyolite is part of the Upper Cretaceous or Early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One grab sample of silicified rhyolite contained 100 parts per billion (ppb) gold and 60 ppb mercury (McGimsey and others, 1988).

Alteration:

Silicification with deposition of chalcedony.

Age of mineralization:

Unknown; the rhyolite of the altered zone is part of the Upper Cretaceous or early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994).

Deposit model:

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

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

25a?

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey in 1985 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (on hill 1012)**Site type:** Occurrence**ARDF no.:** ID049**Latitude:** 62.6311**Quadrangle:** ID C-5**Longitude:** 158.4328**Location description and accuracy:**

This occurrence is on hill 1012 at the head of an unnamed tributary of the Yetna River. The occurrence is in the SE1/4, section 3, T. 29 N., R. 49 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag**Other:** Pb**Ore minerals:** Iron Oxide**Gangue minerals:** Quartz (var. chalcedony)**Geologic description:**

This occurrence consists of iron-oxide-stained, altered rhyolite tuff in the Upper Cretaceous to early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One grab sample contained 5.0 parts per million (ppm) silver and 200 ppm lead (McGimsey and others, 1988).

Alteration:

Chalcedonic alteration.

Age of mineralization:

Unknown; the Yetna River volcanic field is Late Cretaceous to Tertiary (58-68 Ma) in age (Miller and Bundtzen (1994).

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the U.S. Geological Survey in 1985 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

Locality equivalent to #69 of Miller, Bundtzen, and Gray (2005), Table 1.

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 6/28/2006

Site name(s): Unnamed (on hill 935)**Site type:** Occurrence**ARDF no.:** ID050**Latitude:** 62.6630**Quadrangle:** ID C-5**Longitude:** 158.2935**Location description and accuracy:**

This occurrence is on hill 935 in the SE1/4 SW1/4, section 28, T. 30 N., R. 49 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Pb**Other:** Sn**Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is in vuggy silicified rhyolite of the Upper Cretaceous to Early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). A grab sample of iron-stained rhyolite contained 10.0 parts per million (ppm) silver, 500 ppm lead, and 20 ppm tin (McGimsey and others, 1988).

Alteration:

Silicification.

Age of mineralization:

Unknown; the Yetna River volcanic field is Late Cretaceous to Tertiary (58-68 Ma) in age (Miller and Bundtzen (1994).

Deposit model:

May be a tin-granite-type deposit (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):**Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface sampling was conducted by the U.S. Geological Survey in 1984 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/17/2003

Site name(s): Unnamed (northeast of hill 1095)**Site type:** Occurrence**ARDF no.:** ID051**Latitude:** 62.7437**Quadrangle:** ID C-5**Longitude:** 158.2658**Location description and accuracy:**

This occurrence is at an elevation of 600 feet, about 1.4 mile northwest of hill 930 and 1.3 mile northeast of hill 725, about 0.2 mile northeast of the southwest corner of section 27, T. 31 N., R. 48 W., of the Seaward Meridian. The location is accurate.

Commodities:**Main:** Nb, Sn**Other:** Be, Pb**Ore minerals:****Gangue minerals:****Geologic description:**

Upper Cretaceous or Tertiary rhyolitic tuff of the Yetna River volcanic field contains anomalous concentrations of several metals (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Grab samples of rhyolitic tuff contain up to 100 parts per million (ppm) niobium, 50 ppm tin, 15 ppm beryllium, and 150 ppm lead (McGimsey and others, 1988). No ore minerals were recognized.

Alteration:**Age of mineralization:**

Unknown; the Yetna River volcanic field is Late Cretaceous to Tertiary (58-68 Ma) in age (Miller and Bundtzen, 1994).

Deposit model:

May be a tin-granite-type deposit (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997).

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):**Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey in 1984 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

This occurrence is in the Innoko Wilderness of the Innoko Wildlife Refuge.

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/17/2003

Site name(s): Unnamed (west of VABM Idono)**Site type:** Occurrence**ARDF no.:** ID052**Latitude:** 62.6392**Quadrangle:** ID C-5**Longitude:** 158.2542**Location description and accuracy:**

This occurrence is about 4,000 feet west-northwest of VABM Idono at an elevation of about 650 feet. It is in the northern part of section 3, T. 29 N., R. 48 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** As, Hg, Sn**Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is a potassically altered outcrop of rhyolite of the Upper Cretaceous to early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994). A grab sample of the rhyolite contained 130 parts per million (ppm) arsenic, 50 parts per billion (ppb) gold, 1,400 ppb mercury, and 20 ppm tin (McGimsey and others, 1988; Miller, Bundtzen, and Gray, 2005).

Alteration:

Potassic alteration.

Age of mineralization:

Unknown; the Yetna River volcanic field is Late Cretaceous to Tertiary (58-68 Ma) in age (Miller and Bundtzen (1994).

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

The U.S. Geological Survey sampled the occurrence in 1984 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

Locality equivalent to #70 of Miller, Bundtzen, and Gray (2005), Table 1.

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 6/27/2006

Site name(s): Unnamed (west of upper Moose Creek)**Site type:** Occurrence**ARDF no.:** ID053**Latitude:** 62.6094**Quadrangle:** ID C-4**Longitude:** 157.8644**Location description and accuracy:**

This occurrence is on a northeast-trending knob overlooking Moose Creek, about 500 feet southwest of hill 1115. It is at an elevation of about 1,000 feet, near the northwest corner of section 14, T. 29 N., R. 46 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Sb**Other:** As, Hg**Ore minerals:** Hematite (secondary)**Gangue minerals:** Quartz**Geologic description:**

This occurrence consists of a zone of sericitized, iron-oxide-stained porphyritic dike rock that cuts a sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The dike is probably related to the Late Cretaceous or early Tertiary intrusions of the Kuskokwim mineral belt (Bundtzen and Miller, 1997). One sample collected in the altered zone contained 740 parts per million (ppm) antimony, 80 ppm arsenic, 680 parts per billion mercury, and a trace of gold (McGimsey and others, 1988).

Alteration:

Sericite alteration in granite-porphyry dike.

Age of mineralization:

Undated; the dike is probably part of the Upper Cretaceous or early Tertiary intrusions of the Kuskokwim mineral belt (Bundtzen and Miller, 1997).

Deposit model:

Possibly a silica-carbonate mercury deposit or a simple antimony deposit (Cox and Singer, 1986; models 27d and 27e).

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

27d and 27e

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The occurrence was sampled by the U.S. Geological Survey in 1985 (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

Locality equivalent to #71 of Miller, Bundtzen, and Gray (2005), Table 1.

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 6/27/2006

Site name(s): Unnamed (near Hickey Creek)**Site type:** Occurrence**ARDF no.:** ID054**Latitude:** 62.6929**Quadrangle:** ID C-4**Longitude:** 157.8699**Location description and accuracy:**

This occurrence is on a south-facing bluff beside Hickey Creek about 1 mile upstream from its mouth on Moose Creek. The occurrence is at an elevation of about 450 feet, about 0.5 mile east-northeast of the center of section 15, T. 30 N., R. 46 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Cr, Ni**Other:** As**Ore minerals:** Chromite**Gangue minerals:** Serpentinite**Geologic description:**

This occurrence is in serpentinitized ultramafic rock of the Jurassic Dishna River ophiolite (Miller, 1990; Miller, Bundtzen, and Gray, 2005). Rubble crop near the base of the hill locally contains disseminated chromite. Grab samples contain up to 30.0 parts per million (ppm) silver, 2,000 ppm nickel, 2,000 ppm chromium, and anomalous arsenic (McGimsey and others, 1988). The chromium and nickel are probably in both spinel (chromite) and in silicate minerals (olivine and pyroxene) of the ultramafic rocks.

Alteration:

Serpentinization.

Age of mineralization:

Probably genetically related to the host rock, the serpentinite of the Jurassic Dishna River ophiolite (Miller, 1990).

Deposit model:

Dunitic Ni-Cu or Podiform Chromite (Cox and Singer, 1986; models 6a and 8b).

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

6a or 8b

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The area was sampled by the U.S. Geological Survey in 1985 (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller, 1990; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, 1990

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/17/2003

Site name(s): Unnamed (head of Caribou Creek)**Site type:** Occurrence**ARDF no.:** ID055**Latitude:** 62.5284**Quadrangle:** ID C-4**Longitude:** 157.8609**Location description and accuracy:**

This occurrence is on a small but prominent knob, hill 877, on an unnamed fork of Caribou Creek. The occurrence is at an elevation of about 700 feet, about 0.5 mile west to west-southwest of the center of section 8, T. 28 N., R. 46 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Bi, Sn**Other:** As, Au, Cu**Ore minerals:** Iron oxide**Gangue minerals:****Geologic description:**

This occurrence consists of altered, iron-oxide-stained hornfels near a biotite-bearing, fine grained intrusion. The intrusion has been radiometrically dated as 70.2 Ma (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The mineralized body is of uncertain size and orientation. One grab sample of mineralization rock contained 2,000 parts per billion (ppb) silver, 850 parts per million (ppm) arsenic, 200 ppm copper, 52 ppm bismuth, 30 ppm tin, and 50 ppb gold (McGimsey and others, 1988).

Alteration:

Iron oxide staining.

Age of mineralization:

Undated; the nearby intrusion is 70.2 Ma (Miller and Bundtzen, 1994).

Deposit model:

Sn-polymetallic deposit or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The area was sampled by the Alaska Division of Geological and Geophysical Surveys and U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (south of upper Caribou Creek)**Site type:** Occurrence**ARDF no.:** ID056**Latitude:** 62.5097**Quadrangle:** ID C-4**Longitude:** 157.8609**Location description and accuracy:**

This occurrence is 0.2 mile southeast of hill 1,850 on a north-facing knob in the headwaters of Caribou Creek. The occurrence is at an elevation of about 1,600 feet in the SW1/4 SW1/4 section 18, T. 28 N., R. 46 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Bi, Sn**Other:** Ag, As, Pb, Sb, Zn**Ore minerals:****Gangue minerals:** Calcite, chlorite, tourmaline**Geologic description:**

This occurrence is a zone of extensive tourmaline-calcite-chlorite alteration in intermediate dikes that intrude shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The occurrence is of uncertain size and orientation. Grab samples contain up to 200 parts per million (ppm) tin, 500 ppm zinc, 500 ppm antimony, 480 ppm arsenic, 200 ppm lead, 46 ppm bismuth, and 1,000 parts per billion (ppb) silver (McGimsey and others, 1988).

Alteration:

Development of tourmaline-chlorite-calcite greisen.

Age of mineralization:

Unknown; the dikes that intrude the Upper Cretaceous Kuskokwim Group in the area are undated.

Deposit model:

Sn-polymetallic deposit or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The occurrence was sampled by the U.S. Geological Survey in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (southwest of VABM Caribou)**Site type:** Occurrence**ARDF no.:** ID057**Latitude:** 62.5160**Quadrangle:** ID C-4**Longitude:** 157.8243**Location description and accuracy:**

This occurrence is near the crest of an east-west trending ridge between the Otter and Caribou Creeks. It is about 1.5 mile southwest of triangulation station Caribou at an elevation of about 1,950 feet, and about 0.3 mile west of the center of section 16, T. 28 N., R. 46 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au, Sb**Other:** As, Nb**Ore minerals:** Unspecified sulfides**Gangue minerals:** Quartz**Geologic description:**

This occurrence consists of iron-oxide-stained quartz veinlets in sandstone and in quartz-healed sandstone breccia of the Upper Cretaceous, Kuskokwim Group, that is cut by a granite-porphyry dike (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Sulfides are present but were not identified. The size and orientation of the mineralized zone is uncertain. Grab samples contained up to 1,200 parts per billion (ppb) silver, 200 ppb gold, 290 parts per million (ppm) antimony, 130 ppm arsenic, and 50 ppm niobium (McGimsey and others, 1988).

Alteration:**Age of mineralization:**

Unknown; the granite-porphyry dike at the occurrence has been dated at 52.8 Ma (Miller and Bundtzen, 1994).

Deposit model:

Sn-polymetallic deposit or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (west of North Fork Otter Creek)**Site type:** Occurrence**ARDF no.:** ID058**Latitude:** 62.5609**Quadrangle:** ID C-4**Longitude:** 157.7497**Location description and accuracy:**

This occurrence is on a prominent, northeast-trending ridge that separates the North Fork of Otter Creek from the headwaters of Moose Creek. The occurrence is about 2.5 miles north-northeast of triangulation station 'Caribou' and about 1,000 feet east of the center of section 32, T. 29 N., R. 45 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Sb**Other:****Ore minerals:****Gangue minerals:** Quartz**Geologic description:**

A composite grab sample of apparently unmineralized, moderately sorted sandstone of the Upper Cretaceous, Kuskokwim Group contained 76 parts per million antimony (McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The source of the elevated antimony is an enigma.

Alteration:

None.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

Locality equivalent to #72 of Miller, Bundtzen, and Gray (2005), Table 1.

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 6/27/2006

Site name(s): Unnamed (head of North Fork Otter Creek)**Site type:** Occurrence**ARDF no.:** ID059**Latitude:** 62.5844**Quadrangle:** ID C-4**Longitude:** 157.6997**Location description and accuracy:**

This occurrence is on a steep, northeast-trending ridge that separates the headwaters of Otter Creek from the South Fork of Moose Creek. The occurrence is at an elevation of about 1,500 feet, about 1.1 mile north-east of hill 1853, and about 1.6 miles south-southwest of 1976, in the southwest part of section 22, T. 29 N., R. 45 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Sb**Other:** As**Ore minerals:****Gangue minerals:****Geologic description:**

A composite sample of apparently unmineralized sandstone of the Upper Cretaceous, Kuskokwim Group contained 92 parts per million (ppm) antimony and 20 ppm arsenic (McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005).

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:**

Samples were collected by the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

Locality equivalent to #73 of Miller, Bundtzen, and Gray (2005), Table 1.

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 6/27/2006

Site name(s): Unnamed (near VABM Hickey)**Site type:** Occurrence**ARDF no.:** ID060**Latitude:** 62.6612**Quadrangle:** ID C-4**Longitude:** 157.6319**Location description and accuracy:**

This occurrence is about 600 feet east of VABM Hickey at an elevation of about 2,150 feet. The occurrence is near the center of section 25, T. 30 N., R. 45 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg, Sb**Other:** As**Ore minerals:** Iron oxide**Gangue minerals:****Geologic description:**

This occurrence is a brecciated, iron-stained sandstone of the Upper Cretaceous, Kuskokwim Group that contains quartz veins (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Samples of the iron-stained breccia zones with quartz veins contained 70 parts per million (ppm) antimony, 850 parts per billion (ppb) mercury, and 50 ppm arsenic (McGimsey and others, 1988).

Alteration:**Age of mineralization:****Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The Alaska Division of Geological and Geophysical Surveys and U.S. Geological Survey sampled the site in 1984 and 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (north of South Fork of Otter Creek)**Site type:** Occurrence**ARDF no.:** ID061**Latitude:** 62.5230**Quadrangle:** ID C-4**Longitude:** 157.6313**Location description and accuracy:**

This occurrence is at an elevation of about 1,500 feet, north of the center of the South Fork of Otter Creek. The occurrence is about 0.3 mile west of hill 2039 in about the center of the north boundary of section 16, T. 28 N., R. 45 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** As**Other:** Hg**Ore minerals:****Gangue minerals:** Carbonate minerals, quartz**Geologic description:**

This occurrence is an altered zone in an intermediate to mafic dike that cuts calcareous sandstone of the Upper Cretaceous Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The dike has been altered to silica-carbonate rock. One grab sample contained 470 parts per million (ppm) arsenic and 820 parts per billion (ppb) mercury (McGimsey and others, 1988).

Alteration:

Silica-carbonate alteration of mafic dike.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the Alaska Division of Geological and Geophysical Surveys and the U. S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (north of upper South Fork, Otter Creek)**Site type:** Prospect**ARDF no.:** ID062**Latitude:** 62.5487**Quadrangle:** ID C-4**Longitude:** 157.6010**Location description and accuracy:**

This prospect is at an elevation of about 1,700 feet in a saddle on an irregular-shaped ridge between the head of the Dishna River and the head of the North Fork of Otter Creek. The prospect is about 1.1 mile north of hill 1861 and 1.4 mile west of hill 2208 and near the center of the N1/2 section 3, T. 28 N., R. 45 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Cu**Other:** As, Hg**Ore minerals:** Iron oxide**Gangue minerals:** Carbonate minerals, quartz**Geologic description:**

This prospect is in an area of pronounced gossan development associated with silica-carbonate-altered mafic dikes that cut sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Several prospect pits explored three pods of iron oxide gossan. The total length of gossan is about 160 feet. Grab samples of gossan contain up to 340 parts per billion (ppb) mercury, 60 parts per million (ppm) arsenic, 100 ppm copper, and a trace of silver (McGimsey and others, 1988).

Alteration:

Silica-carbonate alteration of mafic dikes.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the Alaska Division of Geological and Geophysical Surveys and the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (upper South Fork, Otter Creek)**Site type:** Occurrence**ARDF no.:** ID063**Latitude:** 62.5451**Quadrangle:** ID C-4**Longitude:** 157.5714**Location description and accuracy:**

This occurrence is on a southwest-facing ridge that overlooks the head of the North Fork of Otter Creek. It is about 1.3 mile northeast of hill 1861 and 0.8 mile west-northwest of hill 1953. The prospect is at an elevation of about 1,700 feet near the center of section 2, T. 28 N., R. 45 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au**Other:** As, Hg, Sb, Zn**Ore minerals:** Iron oxide, unspecified sulfides**Gangue minerals:** Carbonate minerals, quartz**Geologic description:**

This occurrence is part of a gossan about a mile long that is developed on sulfide-bearing sandstone and siltstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The gossan contains zones of quartz veinlets, silica-carbonate alteration in altered mafic dikes, and iron-oxide-cemented sandstone breccias. The orientation of the zone is uncertain. Grab samples contain up to 200 parts per billion (ppb) gold, 1,000 ppb silver, 1,900 parts per million (ppm) arsenic, 3,300 ppb mercury, 116 ppm antimony, and 300 ppm zinc (McGimsey and others, 1988).

Alteration:

Silica-carbonate alteration in mafic dikes.

Age of mineralization:

Unknown; altered dikes have not been dated.

Deposit model:

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

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

25a?

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the Alaska Division of Geological and Geophysical Surveys and the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Dishna River**Site type:** Prospect**ARDF no.:** ID064**Latitude:** 62.5856**Quadrangle:** ID C-4**Longitude:** 157.5206**Location description and accuracy:**

This prospect is on a knob along a ridge overlooking the headwaters of the Dishna River. It is about 0.5 mile southwest of hill 1528, about 0.8 mile northeast of hill 1803, and about 0.5 mile west-southwest of the center of section 22, T. 29 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au, Sb**Other:** Ag, As, Hg**Ore minerals:** Arsenopyrite, gold, stibnite**Gangue minerals:** Quartz**Geologic description:**

This prospect consists of brecciated, pod-shaped, quartz-sulfide veins that cut sheared shale and sandstone of the Upper Cretaceous. Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The rocks are sericitized and alunite has been reported (Don Harris, oral communication, 1983). Numerous slickensides in the wall rock suggests that the prospect occurs along a major, high-angle, fault. Individual brecciated veins strike N05E to N05W and dip steeply to vertically. Mineralization consists of sulfide-bearing masses in quartz that locally contain up to 25 percent stibnite and 3-5 percent arsenopyrite (Bundtzen and Miller, 1997). At least three individual veins have been recognized over a total width of about 20 feet. Caved and overgrown prospect pits were dug before World War II. The area has long been regarded as having economic potential and the prospect is a plausible source for placer gold and cinnabar found in the Dishna River (Don Harris, oral communication, 1983).

Eighteen chip-channel samples were taken at uniform intervals along the largest vein for about 460 feet. The samples average 2.46 parts per million (ppm) gold, 5,200 ppm antimony, and 4,500 ppm arsenic (Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The highest grade sample contained 11.0 ppm gold, more than 1.00 percent antimony, more than 1.00 percent arsenic, more than 10.0 ppm mercury, and 1.0 ppm silver. Based on the surface sampling, Bundtzen and Miller (1997) estimated a resource of about 41,000 tons of material that averages 2.46 ppm gold and 0.52 percent antimony.

Alteration:

The host rocks are sericitized and alunite has been reported.

Age of mineralization:**Deposit model:**

Simple Antimony deposit (Cox and Singer, 1986; model 27d).

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

27d

Production Status: Undetermined.

Site Status: Inactive

Workings/exploration:

Caved and overgrown prospect pits were dug before World War II. The area was mapped and sampled by the U.S. Geological Survey and the Alaska Division of Geological and Geophysical Surveys in 1986.

Production notes:

Not determined; possibly small production from old pits.

Reserves:

Based on the surface sampling, Bundtzen and Miller (1997) estimated a resource of about 41,000 tons of material that averages 2.46 ppm gold and 0.52 percent antimony.

Additional comments:

Locality equivalent to #74 of Miller, Bundtzen, and Gray (2005), Table 1.

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Miller, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 6/27/2006

Site name(s): Unnamed (upper Dishna River)**Site type:** Occurrence**ARDF no.:** ID065**Latitude:** 62.6303**Quadrangle:** ID C-3**Longitude:** 157.4778**Location description and accuracy:**

This occurrence lies on an isolated, north-south trending ridge in the upper Dishna River basin. The locality lies 0.2 mile south-southwest of Hill 1340, southwest of the center of section 2, T. 29 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:****Ore minerals:** Cinnabar (?)**Gangue minerals:****Geologic description:**

Altered sandstone and shale of the Upper Cretaceous Kuskokwim Group. A grab sample yielded 2.9 ppm Hg, but no ore minerals were observed. A small northeast-trending felsic dike lies 0.7 mile north of the sample site.

Alteration:**Age of mineralization:****Deposit model:**

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

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

25a (?)

Production Status: Undetermined.**Site Status:** Inactive**Workings/exploration:****Production notes:****Reserves:****Additional comments:**

Locality equivalent to #75 of Miller, Bundtzen, and Gray (2005), Table 1.

References:

McGimsey and others, 1988; Bundtzen, Laird, and Lockwood, 1988; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 6/27/2006

Site name(s): Unnamed (east of Dishna River)**Site type:** Occurrence**ARDF no.:** ID066**Latitude:** 62.7459**Quadrangle:** ID C-3**Longitude:** 157.4382**Location description and accuracy:**

This occurrence is at an elevation of about 1,200 feet on a north-trending bluff overlooking the Dishna River. It is about 0.8 mile northwest of hill 1224 and about 0.4 mile northwest of the southeast corner of section 25, T. 31 N., R. 43 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Hg**Ore minerals:****Gangue minerals:** Quartz**Geologic description:**

This occurrence is a pervasive, silicified zone in an altered dike of intermediate composition that cuts shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller, and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). No size or orientation information is available. One sample collected contained 200 parts per billion (ppb) gold and 280 ppb mercury (Bundtzen, Laird, and Lockwood, 1988).

Alteration:

Silicification.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The Alaska Division of Geological and Geophysical Surveys sampled this occurrence in 1983 (Bundtzen, Laird, and Lockwood, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (head of Montana Creek)**Site type:** Occurrence**ARDF no.:** ID067**Latitude:** 62.5623**Quadrangle:** ID C-3**Longitude:** 157.3720**Location description and accuracy:**

This occurrence is at an elevation of about 2,100 feet, about 1.5 mile north-northwest of Camelback Mountain. It is about 0.3 mile east-northeast of the center of section 32, T. 29 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:****Ore minerals:****Gangue minerals:** Carbonate minerals, quartz**Geologic description:**

This occurrence is an altered zone in sandstone and shale of the Upper Cretaceous Kuskokwim Group adjacent to a mafic dike that has been altered to silica and carbonate minerals (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997). One sample of altered mafic dike contained 2,900 parts per billion mercury (McGimsey and others, 1988; Miller, Bundtzen, and Gray, 2005).

Alteration:

Silica-carbonate alteration of dike.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

The site was sampled by the Alaska Division of Geological and Geophysical Surveys in 1983 (McGimsey and others, 1988; Miller, Bundtzen, and Gray, 2005).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Bundtzen and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (southwest flank of Camelback Mountain)**Site type:** Occurrence**ARDF no.:** ID068**Latitude:** 62.5430**Quadrangle:** ID C-3**Longitude:** 157.3600**Location description and accuracy:**

This occurrence is about 0.4 mile west of the top of Camelback Mountain at an elevation of about 2,000 feet. It is about 0.4 mile southwest of the center of section 1, T. 28 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Cu**Other:** Fe, Mn, Zn**Ore minerals:** Chalcopyrite, pyrrhotite**Gangue minerals:****Geologic description:**

This occurrence is a vein of semi-massive pyrrhotite in hornfels adjacent to the Camelback Mountain intrusion. This olivine bearing monzonite intrusion has been dated at 73.2 Ma (Bundtzen and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Traces of chalcopyrite occur in the pyrrhotite. The orientation or length of the vein is uncertain. One grab sample of the pyrrhotite vein contained 2,600 parts per billion (ppb) silver, 891 parts per million (ppm) copper, 1.68 percent manganese, 304 ppm zinc, and 28.00 percent iron (Bundtzen, Laird, and Lockwood, 1988).

Alteration:**Age of mineralization:**

Undated; the nearby Camelback Mountain intrusion is 73.2 Ma (Bundtzen and others, 1988).

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:**

Surface samples were collected by the Alaska Division of Geological and Geophysical Surveys in 1983 (Bundtzen, Laird, and Lockwood, 1988).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (upper Bonanza Creek)**Site type:** Occurrence**ARDF no.:** ID069**Latitude:** 62.5192**Quadrangle:** ID C-3**Longitude:** 157.3541**Location description and accuracy:**

This occurrence is on a steep bluff overlooking the east fork of Montana Creek, about 1.8 mile south of Camelback Mountain. The occurrence is at an elevation of about 1,000 feet, about 0.2 mile northwest of the center of section 13, T. 28 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag**Other:** Fe**Ore minerals:** Goethite, pyrite**Gangue minerals:****Geologic description:**

This occurrence is a prominent, reddish-brown, goethite-rich gossan developed on pyrite-rich shale of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and others, 1988; Miller, Bundtzen, and Gray, 2005). The east-west striking gossan is at least 10 feet thick and can be traced laterally for about 320 feet. A grab sample contained only slightly anomalous silver (100 ppb), mercury (300 ppb) and iron (5.88 percent), and no other metals in anomalous concentration (Bundtzen, Laird, and Lockwood, 1988).

Alteration:

Pyrite oxidized to goethite.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface investigations were done by the Alaska Division of Geological and Geophysical Surveys in 1983 (Bundtzen and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (north side of Camelback Mountain)**Site type:** Occurrence**ARDF no.:** ID070**Latitude:** 62.5501**Quadrangle:** ID C-3**Longitude:** 157.3515**Location description and accuracy:**

This occurrence is about 0.4 mile north-northwest of the top of Camelback Mountain at an elevation of about 2,100 feet. It is about 0.3 mile north of the center of section 1, T. 28 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:** Ag**Ore minerals:** Iron oxide**Gangue minerals:****Geologic description:**

This occurrence is a zone of iron-stained shale in the hornfels aureole of the 73.2 Ma, Camelback Mountain intrusion (Bundtzen and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The mineralized shale is about 15 meter thick as inferred from rubble crop. One grab sample contained 5,100 parts per billion (ppb) mercury and 100 ppb silver (Bundtzen, Laird, and Lockwood, 1988).

Alteration:

Iron oxidation.

Age of mineralization:

Undated; probably related to the nearby Camelback Mountain intrusion that is 73.2 Ma (Bundtzen, Laird, and Lockwood, 1988).

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the Alaska Division of Geological and Geophysical Surveys in 1983 (Bundtzen, Laird, and Lockwood, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (ridge north of Camelback Mountain)**Site type:** Occurrence**ARDF no.:** ID071**Latitude:** 62.5588**Quadrangle:** ID C-3**Longitude:** 157.3471**Location description and accuracy:**

This occurrence is at an elevation of about 2,400 feet, about 1.1 mile north of Camelback Mountain. It is about 0.1 mile southeast of the center of section 33, T. 29 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au**Other:** As, Cu, Hg, Zn**Ore minerals:** Pyrite, unidentified sulfosalt mineral**Gangue minerals:** Quartz**Geologic description:**

This occurrence is along a faulted contact between monzonite of the Camelback Mountain intrusion and sandstone and shale of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen and Gray, 2004). The olivine-biotite monzonite on Camelback Mountain has been dated at 73.2 Ma (Bundtzen, Laird, and Lockwood, 1988). The mineralized zone contains quartz, pyrite, a gray sulfosalt, possibly tennantite, and oxidation minerals after the sulfides. Grab samples contain up to 200 parts per billion (ppb) gold, 2,900 ppb silver, 210 parts per million (ppm) copper, 349 ppm zinc, 127 ppm arsenic, and 3,000 ppb mercury (Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988).

Alteration:

None identified.

Age of mineralization:

Unknown; the Camelback Mountain intrusion is 73.2 Ma (Bundtzen, Laird, and Lockwood, 1988).

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:**

The occurrence was sampled by Alaska Division of Geological and Geophysical Surveys and the U.S. Geological Survey in the 1980s (Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Bundtzen and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (northeast of Camelback Mountain)**Site type:** Prospect**ARDF no.:** ID072**Latitude:** 62.5668**Quadrangle:** ID C-3**Longitude:** 157.3266**Location description and accuracy:**

This prospect is about 1.7 mile north-northeast of Camelback Mountain on a broad summit of a northeast-trending ridge. The occurrence is at an elevation of about 2,100 feet, about 0.5 mile north-northwest of the center of section 34, T. 29 N., R. 43 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, As**Other:** Cd, Ni, Pb, Sb, Zn**Ore minerals:** Arsenopyrite, pyrite**Gangue minerals:** Quartz**Geologic description:**

This prospect consists of a zone of quartz-sulfide veins with gradational boundaries in hornfels. The occurrence is adjacent to a small monzonite body that intrudes both the Upper Cretaceous, Kuskokwim Group and andesitic flows of the Iditarod volcanics (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The size of the deposit is unknown. One grab sample of chips from a quartz-sulfide vein contained 12.0 parts per million (ppm) silver, 15.00 percent iron, 710 ppm arsenic, 600 ppm zinc, 500 ppm lead, 70 ppm antimony, 4,200 parts per billion (ppb) mercury, 35 ppm cadmium, and 300 ppm nickel (McGimsey and others, 1988).

Alteration:

Silicification.

Age of mineralization:

Unknown; the Camelback Mountain intrusion about a mile to the south is 73.2 Ma (Bundtzen, Laird, and Lockwood, 1988).

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:**

The area was sampled by the U.S. Geological Survey in the 1980s (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Bundtzen and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (east of Guggenheim Creek)**Site type:** Occurrence**ARDF no.:** ID073**Latitude:** 62.6031**Quadrangle:** ID C-3**Longitude:** 157.3259**Location description and accuracy:**

This occurrence is on a north-facing slope of an unnamed fork of Guggenheim Creek. The occurrence is about 4.2 miles north-northeast of the top of Camelback Mountain at an elevation of about 1,300 feet; it is about 0.3 mile west of the center of section 15, T. 29 N., R. 43 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** As, Mo**Other:** Ag, Cr, Cu, Hg, Ni, Sb**Ore minerals:** Unspecified sulfides**Gangue minerals:** Carbonate minerals**Geologic description:**

This occurrence consists of a zone of unknown size that contains disseminated sulfides in an altered, iron-stained, mafic tuff at the base of the Beaver Mountains volcanic field (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller and Bundtzen, 1994, and Miller, Bundtzen, and Gray, 2005). One grab sample contained 100 parts per million (ppm) molybdenum, 500 ppm arsenic, 100 ppm copper, 1,100 parts per billion (ppb) mercury, 50 ppb silver, 30 ppm antimony, 1,000 ppm chromium, and 1,000 ppm nickel (McGimsey and others, 1988). The high values of chromium and nickel probably reflect background values of the mafic tuff. The other anomalous elements probably reflect epigenetic mineralization.

Alteration:

The mafic volcanic rocks have been altered to carbonate minerals and iron oxides.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

The area was sampled by the U.S. Geological Survey in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:**References:**

McGimsey and others, 1988; Bundtzen and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (east of Dishna River)**Site type:** Occurrence**ARDF no.:** ID074**Latitude:** 62.7344**Quadrangle:** ID C-3**Longitude:** 157.3130**Location description and accuracy:**

This occurrence is on the summit of a north-trending ridge about 5 miles east of the Dishna River and 0.7 mile southeast of hill 1335. It is at an elevation of about 1,500 feet, about 0.2 mile east of the center of section 34, T. 31 N., R. 43 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Mn**Other:****Ore minerals:** Pyrolusite**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a pyrolusite-quartz vein in breccia that cuts shale and sandstone of the Upper Cretaceous, Kuskokwim Group, near an altered mafic dike (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One sample of semi-massive pyrolusite in a brecciated quartz vein contained 1.58 percent manganese (Bundtzen, Laird, and Lockwood, 1988). The amount of pyrolusite in the sample suggests that the analysis understates the manganese content of the occurrence.

Alteration:

Mafic dike is altered to silica and carbonate minerals.

Age of mineralization:

Younger than the Upper Cretaceous host rock.

Deposit model:

Pyrolusite in quartz vein.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):**Production Status:** None**Site Status:** Inactive**Workings/exploration:**

The Alaska Division of Geological and Geophysical Surveys sampled this occurrence in 1983 (Bundtzen, Laird, and Lockwood, 1988).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen, Laird, and Lockwood, 1988; Bundtzen and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (between upper Moore and Guggenheim Creeks)**Site type:** Occurrence**ARDF no.:** ID075**Latitude:** 62.5969**Quadrangle:** ID C-3**Longitude:** 157.2779**Location description and accuracy:**

This occurrence is at an elevation of about 2,200 feet on a gentle, north-facing slope of a ridge that extends northeast from the top of Camelback Mountain. The occurrence is about 4.3 miles northeast of Camelback Mountain and about 0.6 mile southeast of the center of section 14, T. 29 N., R.43 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Sb**Other:****Ore minerals:****Gangue minerals:** Quartz**Geologic description:**

This occurrence is a thin, steeply dipping, N20E- trending quartz vein of uncertain length that cuts olivine-bearing basalt of the Upper Cretaceous to early Tertiary, Beaver Mountains volcanic field (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1988; Miller, Bundtzen, and Gray, 2005). One grab sample of the quartz vein contained 200 parts per million (ppm) antimony (McGimsey and others, 1988).

Alteration:**Age of mineralization:****Deposit model:**

Simple antimony vein (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 area was sampled by the Alaska Division of Geological and Geophysical Surveys and the U.S. Geological Survey in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Bundtzen and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (northwest of upper Deadwood Creek)**Site type:** Occurrence**ARDF no.:** ID076**Latitude:** 62.7091**Quadrangle:** ID C-3**Longitude:** 157.2763**Location description and accuracy:**

This occurrence is near hill 1776 on a southeast-trending ridge about 0.7 mile northwest of the sharp bend at the head of Deadwood Creek . It is at an elevation of about 1,750 feet, about 0.4 mile northeast of the center of section 11, T. 30 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** As, Hg**Ore minerals:** Iron oxide**Gangue minerals:** Quartz**Geologic description:**

This occurrence consists of a series of thin quartz veins in an iron-oxide-stained, sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The quartz veins are near a N50E-striking mafic dike that cuts the Kuskokwim Group. One grab sample of the quartz veins contained 200 parts per billion (ppb) gold, 1,500 ppb mercury, and 99 parts per million (ppm) arsenic (Bundtzen, Laird, and Lockwood, 1988).

Alteration:

Silicification.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The Alaska Division of Geological and Geophysical surveys sampled this occurrence in 1983 (Bundtzen, Laird, and Lockwood, 1988).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (southwest of St. Patricks Creek)**Site type:** Occurrence**ARDF no.:** ID077**Latitude:** 62.6526**Quadrangle:** ID C-3**Longitude:** 157.2689**Location description and accuracy:**

This occurrence is about 2.0 miles southeast of the mouth of St. Patrick Creek and 0.7 mile southwest of hill 1655. It is at an elevation of about 1,550 feet, about 0.5 mile northwest of the center of section 36, T. 30 N., R. 43 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg**Ore minerals:** Pyrite**Gangue minerals:****Geologic description:**

This occurrence is in an iron-stained chert breccia, possibly in a fault sliver of the Innoko Terrane (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The northeast-trending shear zone in the chert contains minor pyrite. No other information is available. One grab sample contained 200 parts per billion (ppb) gold, 200 ppb silver, and 2,500 ppb mercury (Bundtzen, Laird, and Lockwood, 1988).

Alteration:

Iron staining.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The Alaska Division of Geological and Geophysical surveys sampled this occurrence in 1983 (Bundtzen, Laird, and Lockwood, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Deadwood Creek**Site type:** Prospect**ARDF no.:** ID078**Latitude:** 62.7062**Quadrangle:** ID C-3**Longitude:** 157.2440**Location description and accuracy:**

The Deadwood Creek placer deposit extends for about 1 mile northeast of the sharp bend at the head of Deadwood Creek about 5 miles above its mouth. The placer is at elevation of about 1,300 feet and extends diagonally across the E1/2 section 12, T. 30 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag**Ore minerals:** Gold**Gangue minerals:****Geologic description:**

The Deadwood Creek prospect is an unexploited placer gold prospect with shallow overburden that was discovered in the 1930s but never mined (Toivo Rosander and Don Harris, oral communication, 1983). Fine-grained placer gold occurs in fluvial gravel layers, 3 to 10 feet thick, that are covered by 6 to 10 feet of overburden. The placer paystreak as outlined by churn drilling covers an area about 500 feet wide and a mile long. The gold-bearing paystreak is in alluvium of uncertain age (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Placer gold has also been found in nearby Maybe Creek (ID083). In the early 1980s, a trail was constructed from Moore Creek (ID084) to bring mining equipment to the site and an airstrip was constructed.

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes; small**Site Status:** Inactive**Workings/exploration:**

The Deadwood Creek placer deposit was evaluated with a churn drill prior to World War II (Toivo Rosander and Don Harris, oral communication, 1983). In the early 1980s, a trail was constructed from Moore Creek (ID084) to bring mining equipment to the site and an airstrip was constructed.

Production notes:

Small amounts of placer gold were recovered during pit testing and during churn drilling (Toivo Rosander and Don Harris, oral communication, 1983).

Reserves:

Not determined, but the placer was thought to be economic in the 1980s.

Additional comments:**References:**

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (south of head of St. Patricks Creek)**Site type:** Prospect**ARDF no.:** ID079**Latitude:** 62.6482**Quadrangle:** ID C-3**Longitude:** 157.2078**Location description and accuracy:**

This occurrence is at an elevation of about 1,350 feet in upper St. Patricks Creek. It is about 0.4 mile northeast of the center of section 31, T. 30 N., R. 43 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:****Ore minerals:** Gold**Gangue minerals:****Geologic description:**

The rocks in the vicinity of this placer occurrence are iron-stained, mafic volcanic rocks of the Beaver Mountains volcanic field (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The volcanic rocks contain thin quartz veins in joints and shear zones. Small amounts of placer gold were recovered from stream gravels here prior to 1970. No other information is available.

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes; small**Site Status:** Inactive**Workings/exploration:**

A small amount of placer gold was recovered during prospecting, probably before 1970 (Don Harris, oral communication, 1982).

Production notes:

A small amount of placer gold was recovered in a test pit before 1970 (Don Harris, oral communication, 1982).

Reserves:

Additional comments:

References:

Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Maybe Creek**Site type:** Occurrence**ARDF no.:** ID080**Latitude:** 62.7092**Quadrangle:** ID C-3**Longitude:** 157.1730**Location description and accuracy:**

This placer occurrence is on Maybe Creek about one and a half miles below its head. The coordinates are at a location where gold was panned at an elevation of about 1,450 feet in the NW1/4 NW1/4, section 9, T. 30 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg, W**Ore minerals:** Chromite, cinnabar, gold, magnesiochromite, polybasite?, scheelite**Gangue minerals:****Geologic description:**

Maybe Creek drains an area underlain by a monzonite pluton of Upper Cretaceous age (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The creek heads into a glacial cirque which indicates that the drainage basin was glaciated in Pleistocene time. The placer occurrence is in shallow, coarse, fluvial gravels along about 0.6 mile of upper Maybe Creek from about 1,450 to 1,800 feet in elevation. Up to 10 grains of fine gold per pan were found at several sites in this portion of the creek. The grade and volume are unknown. The principle heavy heavy minerals identified in panned concentrates include gold, cinnabar, polybasite (?), scheelite, chromite, and magnesiochromite (Bundtzen, Cox, and Veach, 1987).

Alteration:**Age of mineralization:**

Probably Late Quaternary.

Deposit model:

Placer Au deposit (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:**

Surface sampling was conducted by both the Alaska Division of Geological and Geophysical Surveys and the U.S. Geological Survey in the 1980s (Bundtzen, Cox and Veach, 1987; Bennett and others, 1988).

Production notes:

Reserves:**Additional comments:**

The name Maybe Creek suggests that the placer resource was known to early prospectors.

References:

Bundtzen, Cox, and Veach, 1987; Bundtzen, Laird, and Lockwood, 1988; Bennett and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Broken Shovel**Site type:** Prospect**ARDF no.:** ID081**Latitude:** 62.6148**Quadrangle:** ID C-3**Longitude:** 157.1711**Location description and accuracy:**

The Broken Shovel prospect is about 0.3 mile southeast of hill 2225 and 1.2 mile northwest of the Moore Creek placer mine (ID084). It is at an elevation of about 1,700 feet, about 0.3 mile southwest of the center of section 9, T. 29 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au**Other:** As, Cu, Pb, Sb, Zn**Ore minerals:** Arsenopyrite, gold, lead-antimony sulfosalt, scheelite, tetrahedrite**Gangue minerals:** Dolomite, quartz, tourmaline**Geologic description:**

The Broken Shovel prospect is a N20E-trending, steeply dipping quartz-dolomite-sulfide vein in medium-grained monzonite of the Upper Cretaceous, Moore Creek pluton (Bundtzen, Laird, and Lockwood, 1988; Miller, Bundtzen, and Gray, 2005). The pluton has been dated as 68.9 Ma (Miller and Bundtzen, 1994). The Broken Shovel vein, as defined in prospect trenches and rubble, is about 5 feet thick and can be traced along strike for about 650 feet. Both walls of the vein are sericitized and a pocket of tourmaline is exposed near the southwest end of the vein (Bundtzen, Laird, and Lockwood, 1988). Grab and chip-channel samples contain up to 555 parts per million (ppm) silver, 1,600 parts per billion (ppb) gold, 4,860 ppm copper, 1,430 ppm lead, 760 ppm zinc, 5,500 ppm arsenic, and 2,400 ppm antimony (Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988). Arsenopyrite, scheelite, visible gold, and lead-antimony sulfosalts have been identified in both hand specimen and by microprobe by microprobe analysis which suggests that gold and tungsten values may be understated in the chemical analyses of the samples.

The Broken Shovel prospect has been investigated intermittently since the 1930s by placer miners from Moore Creek, notably Elmer Keturi and Jules Stuver, who prospected the lode in the 1940s and 1950s (Don Harris oral communication, 1983). When the prospect was examined in 1983 by the Alaska Division of Geological and Geophysical Surveys, it had been explored by both modern bulldozer cuts and much older hand-dug prospect pits (Bundtzen, Laird, and Lockwood, 1988).

Based on numerous chip-channel surface samples, the Broken Shovel prospect contains an inferred resource of about 16,000 tons of material with about 150.0 ppm silver, and about 1.0 percent combined base metals (Bundtzen, Laird, and Lockwood, 1988). The average gold grade estimate was not determined.

Alteration:

The rocks adjacent to the vein have been altered to sericite, dolomite, and tourmaline.

Age of mineralization:

Unknown; the Moore Creek pluton that hosts the vein is 68.9 Ma (Bundtzen, Laird, and Lockwood, 1988).

Deposit model:

Sn-polymetallic deposit or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Active?**Workings/exploration:**

The Broken Shovel prospect has been investigated intermittently since the 1930s by placer miners from Moore Creek, notably Elmer Keturi and Jules Stuver, who prospected the lode in the 1940s and 1950s (Don Harris oral communication, 1983). When the prospect was examined in 1983 by the Alaska Division of Geological and Geophysical Surveys, it had been explored by both modern bulldozer cuts and much older hand-dug prospect pits (Bundtzen, Laird, and Lockwood, 1988). The U.S. Geological Survey also investigated the prospect in 1985 (McGimsey and others, 1988).

Production notes:**Reserves:**

Based on numerous chip-channel surface samples, the Broken Shovel prospect contains an inferred resource of about 16,000 tons of material with about 150.0 ppm silver, and about 1.0 percent combined base metals (Bundtzen, Laird, and Lockwood, 1988). The average gold grade estimate was not determined.

Additional comments:**References:**

McGimsey and others, 1988; Bundtzen and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record**Reporter(s):** T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)**Last report date:** 5/19/2003

Site name(s): Willow Creek**Site type:** Prospect**ARDF no.:** ID082**Latitude:** 62.6253**Quadrangle:** ID C-3**Longitude:** 157.1665**Location description and accuracy:**

The Willow Creek placer prospect is on a south-facing slope about 2.0 miles southeast of VABM Willow at an elevation of from about 1,200 to 1,500 feet. An approximate location is in the SW1/4 SW1/4, section 4, T. 29 N., R. 42 W., of the Seward Meridian.

Commodities:**Main:** Au**Other:****Ore minerals:** Chromite, cinnabar, gold, magnetite**Gangue minerals:****Geologic description:**

Alluvial and residual placers on the hillside north of Willow creek are known from an elevation of about 1,200 to 1,500 feet where they were explored in 1958 (Don Harris, oral communication, 1983). No size or grade information is available. The prospect area is underlain by monzonite and the placer is possibly a residual placer over a lode deposit in the monzonite (Miller, Bundtzen, and Gray, 2005). Panned concentrates collected at the site contain gold, chromite, magnetite, and cinnabar (Bundtzen, Cox, and Veach, 1987; Bundtzen, Laird, and Lockwood, 1988).

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

Placer Au deposit (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:**

Alluvial and residual placers on the hillside north of Willow creek are known from an elevation of about 1,200 to 1,500 feet where they were explored in 1958 (Don Harris, oral communication, 1983). No size or grade information is available. Panned concentrates were collected in the 1980's by the Alaska Division of Geological and Geophysical Surveys and the U.S. Geological Survey (Bundtzen, Cox, and Veach, 1987; Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Bundtzen, Cox, and Veach, 1987; Bundtzen, Laird, and Lockwood, 1988; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (south of the head of Maybe Creek)**Site type:** Occurrence**ARDF no.:** ID083**Latitude:** 62.6906**Quadrangle:** ID C-3**Longitude:** 157.1586**Location description and accuracy:**

This occurrence is at an elevation of about 2,900 feet, near the summit of a high ridge at the head of Maybe Creek. It is about 0.3 mile north-northeast of hill 2920 and about 0.2 mile east of the center of section 16, T. 30 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Pb**Other:** As, Hg**Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence consists of hornfels rubble and float near the contact of monzonite of the Late Cretaceous, Maybe Creek pluton and sandstone of the Upper Cretaceous, Kuskokwim Group (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). A sample of hornfels contained 850 parts per billion (ppb) silver, 200 parts per million (ppm) lead, 9,500 ppb mercury, and 60 ppm arsenic (McGimsey and others, 1988).

Alteration:

Associated with hornfels near monzonite pluton.

Age of mineralization:

Possibly related to the Late Cretaceous, Maybe Creek pluton which is 68.3 Ma (Bundtzen, Laird, and Lockwood, 1988).

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:**

The area was sampled by the U.S. Geological Survey in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Moore Creek**Site type:** Mine**ARDF no.:** ID084**Latitude:** 62.6006**Quadrangle:** ID C-3**Longitude:** 157.1379**Location description and accuracy:**

The Moore Creek Mine is shown on the USGS 1:63,360-scale topographic map. The coordinates are at the center of the mine in the SW1/4, section 15, T. 29 N., R. 42 W., of the Seward Meridian. The location is accurate. The Moore Creek mine is locality 37 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Cr, Hg, Ti, W, Zr**Ore minerals:** Chromite, cinnabar, gold, magnetite, scheelite, silver, tetrahedrite**Gangue minerals:** Zircon**Geologic description:**

The Moore Creek Mine is a placer gold deposit that has worked several ages of ancestral terrace gravels as well as modern stream alluvium. The paystreak, as defined by exploration and mining, is about 2 miles long and 300 to 1,300 feet wide. The fluvial pay gravels, which are composed of rocks of local derivation range from 12 to 20 feet thick and are overlain by 5 to 7 feet of overburden. The principal heavy minerals identified in concentrates include native gold, cinnabar, scheelite, native silver, tetrahedrite, chromite, magnetite, and zircon (Mertie, 1936; Bundtzen and others, 1987, 1988; McGimsey and others, 1988). Concentrates from mining contain up to 35.00 percent chromite, i.e., a low grade chrome resource. A mineral separate of screened, minus-28-mesh material from a 100-kilogram, bulk sample of gravel contained 2,300 parts per million (ppm) chromium, 5,200 ppm titanium, 70 parts per billion (ppb) palladium, 200 ppm nickel, and 8.25 percent iron (Bundtzen, Laird, and Lockwood, 1988). The gold fineness averages about 758, which is low as compared to other deposits in the Innoko or Iditarod districts (Smith, 1941 [B 910]). Gold nuggets up to 19 ounces in weight have been found in the deposit.

The high chromium content of the placer concentrates is somewhat enigmatic as there are no known masses of ultramafic rock in the area. The source for the gold, silver, tungsten and mercury minerals is probably a mineralized monzonite intrusion and its contact zones about 1.2 mile to the northwest and upstream of the placer deposit (see Broken Shovel lode, ID081). The northeast-trending Iditarod-Nixon Fork fault forms the southern structural boundary of the Moore Creek pluton and Bundtzen, Laird, and Lockwood (1988) have postulated that the Late Tertiary to Pleistocene placer deposits at Moore Creek may have been successively offset right-laterally by transcurrent fault movement and the oldest placers occur southwest of the pluton.

From 1911 to 1986, at least 53,990 ounces of gold and 12,520 ounces silver have been recovered from the Moore Creek placer deposit (Bundtzen and others, 1988; Miller, Bundtzen, and Gray, 2005). About 1,383 ounces of gold and 64 ounces of silver have been produced from nearby Nevada Gulch, mainly from 1911 to 1929.

Alteration:**Age of mineralization:**

Not dated; however, older terrace deposits are inferred to be Late Tertiary to early Pleistocene, based on similarities with other dated deposits in Interior Alaska (Hopkins and others, 1971). Pleistocene fossils (mammoth and horse bones) in the overburden were dated at 36,000 BP with radiocarbon methods (Jeff Kline written communication, 1986).

Deposit model:

Placer Au deposit (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:

Gold was discovered on Nevada Gulch, a short tributary of Moore Creek in 1910 (Maddren, 1911) and the Discovery claim on Moore Creek was staked in 1911 (Mertie, 1936). Shallow deposits were worked by opencut scraper and hand methods in the first 20 years of operation. In 1913, some ground was being prepared for a dredge; however, a dredge never operated on Moore Creek. In 1927, a Northwest dragline, one of the first in southwest Alaska (Smith, 1931) was brought into the district for exploration, development, and mining.

By the 1930s, mechanized placer mines equipped with draglines and bulldozers dominated activities in the district. The dragline stacked tailings in regular, linear tailing piles up to 6 meters high down the valley of Moore Creek. In the mid-1930s, the USSR&M company initiated a churn drill program in Moore Creek basin with the idea of developing ground for a large-scale dredging operation (Smith, 1937). Large scale mechanized mining was nearly continuous until Statehood and then intermittent through 1986. Small scale exploration and development activities continued through 2001.

Production notes:

From 1911 to 1986, at least 53,990 ounces of gold and 12,520 ounces of silver have been produced from the Moore Creek Mine (Bundtzen and others, 1988; Miller, Bundtzen, and Gray, 2005). About 1,383 ounces of gold and 64 ounces of silver have been produced from nearby Nevada Gulch, mainly from 1911 to 1929. Beginning in the early 1930s, Gus Uotila, Charlie Uotila, John Ogriz, and Elmer Keturi operated the first bulldozer-based placer mine and established Moore Creek Mining Company. More than 70 percent of the total historic production occurred from the mid 1930s to about 1955, when a highly successful dragline/bulldozer plant operated by Elmer Keturi and Jules Stuver mined the deposit. Annual production ranged from 2,000 to 6,500 ounces of placer gold throughout the 1930s and the 1950s (unpublished U.S. Mint records). From 1933 to 1937, the Moore Creek Mining Company was the largest producer of gold in the Iditarod District (Smith, 1936, 1936, 1941 [B 926-A]). The best year of production was 1937 when 6,500 ounces of placer gold was produced. Moore Creek Mining Company also found abundant cinnabar during mine operations (Joesting, 1942). Work in the 1980s concentrated on recovering coarse nuggets from tailing piles.

Reserves:

Not determined. Early dragline operations did not have nugget collectors and coarse nuggets have been found in tailings in recent years.

Additional comments:**References:**

Maddren, 1911; Smith, 1933; Smith, 1936; Smith, 1937 (B 880-A); Smith, 1938; Smith, 1941 (B 926-A); Mertie, 1936; Joesting, 1942; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; McGimsey and others, 1988; Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (southeast of VABM Willow)**Site type:** Occurrence**ARDF no.:** ID085**Latitude:** 62.6383**Quadrangle:** ID C-3**Longitude:** 157.1339**Location description and accuracy:**

This occurrence is at an elevation of about 2,200 feet about 0.8 mile southeast of triangulation station Willow and 0.3 mile west-southwest of hill 2175. It is about 0.5 mile north of the center of section 3, T. 29 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** W**Ore minerals:** Pyrite**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a north-south trending, 4-inch-thick, iron-stained, quartz-sulfide vein in augite-rich basalt of the Upper Cretaceous and early Tertiary, Iditarod volcanics (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1988). About 2.0 percent pyrite is found on the hanging wall of the quartz vein. The site was prospected by several old pits in previous years and the vein reportedly contained gold (Don Harris, oral communication, 1983). One grab sample contained 3.0 parts per million (ppm) tungsten, 474 ppm chromium, 111 ppm nickel, and 1,130 ppm manganese, but no gold (Bundtzen, Laird, and Lockwood, 1988). The high chrome and nickel values probably reflect background values in the mafic volcanic rocks.

Alteration:

None noted.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

The site was prospected by several old pits in previous years and the vein reportedly contained gold (Don Harris, oral communication, 1983). Surface samples were collected by Alaska Division of Geological and Geophysical Surveys in 1982 (Bundtzen Laird, and Lockwood, 1988).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1988; Miller and Bundtzen, 1994.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Fourth of July Creek**Site type:** Mine**ARDF no.:** ID086**Latitude:** 62.6546**Quadrangle:** ID C-3**Longitude:** 157.1187**Location description and accuracy:**

The Fourth of July Creek placer mine is in the upper portion of Fourth of July Creek between about 1,250 and 1,450 feet in elevation. The coordinates are at the midpoint of the deposit in the SE1/4 SE1/4 section 27, T. 30 N., R. 42 W., of the Seward Meridian. The location is accurate. The placer is locality 38 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Cr, Hg, W**Ore minerals:** Chromite, cinnabar, gold, magnetite, mercury, polybasite, scheelite, silver, tetrahedrite**Gangue minerals:** Magnetite**Geologic description:**

The Fourth of July Creek placer deposit extends for about 2.5 miles along the creek from an elevation of from 1,250 and 1,450 feet in elevation. At the upper end of the auriferous zone, the pay gravel overlies altered dacite of the Beaver Mountains volcanic field (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The lower end of the paystreak overlies shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Bundtzen, Laird, and Lockwood, 1988). The auriferous gravel ranges from about 6 to 25 feet thick and it is overlain by about 10 feet of overburden. The gold varies from 853 to 899 fine (Bundtzen, Cox, and Veach, 1987). The heavy minerals identified in concentrates include native mercury, cinnabar, scheelite, native silver, tetrahedrite, polybasite, magnetite, and chromite. One sample of heavy-mineral concentrate contained 24.8 percent chromite. During 1982 and 1983, 45 ounces of gold were recovered in mine tests by Magnuson Mining Company (Bundtzen, Laird, and Lockwood, 1988). Water was a problem during test mining in 1982 and the bedrock and the stream gradient may play key roles in future exploration and mining. The placer contains a significant amounts of chromite; concentrates were tested by the U.S. Bureau of Mines for platinum minerals but they were found to only contain about 60 ppb palladium (Bundtzen, Cox, and Veach, 1987).

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

The Fourth of July Creek placer deposit was churn drilled in 1937 by the USSR&M Company (Smith, 1939 [B 910-A]). It was trenched by Magnuson Mining Company in 1982 and 1983 (Bundtzen and others, 1988). Surface samples were also collected by the U.S. Geological Survey in 1985 (McGimsey and others, 1988).

Production notes:

Placer gold in Fourth of July Creek was first noted in 1911 (Brooks, 1912), but the only production that has been documented is from 1982 and 1983 when 45 ounces gold were recovered during mine tests by Magnuson Mining Company (Bundtzen, Laird, and Lockwood, 1988). Water was a problem during test mining in 1982 and the bedrock and the stream gradient may play key roles in future exploration and mining.

Reserves:

None documented, but gold resources are likely (Miller, Bundtzen, and Gray, 2005).

Additional comments:

References:

Brooks, 1912; Smith, 1939 (B 910-A); Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (east of Moore Creek placer camp)**Site type:** Occurrence**ARDF no.:** ID087**Latitude:** 62.5988**Quadrangle:** ID C-3**Longitude:** 157.1058**Location description and accuracy:**

This occurrence is at an elevation of about 1,000 feet on a south-facing bluff along Moore Creek, about 300 meters downstream from the end of the placer tailings on Moore Creek. The occurrence is in SW1/4 section 14, T. 29 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag**Other:** Cu**Ore minerals:****Gangue minerals:****Geologic description:**

The rocks at this occurrence are unaltered, shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Bundtzen Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). A sample collected to establish the background metal content of the rocks in the area contained 150 parts per million (ppm) copper, and 2,000 parts per billion (ppb) silver (McGimsey and others (1988).

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:**

The area was sampled by the U.S. Geological Survey in 1983 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (head of Moose Creek)**Site type:** Occurrence**ARDF no.:** ID088**Latitude:** 62.7162**Quadrangle:** ID C-3**Longitude:** 157.0861**Location description and accuracy:**

This occurrence is at an elevation of about 1,550 feet on a spur overlooking the head of Moose Creek . It is about 0.7 mile southeast of hill 2110 and about 0.5 mile east-southeast of the center of section 2, T. 30 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag**Other:** Hg, Pb**Ore minerals:** Iron oxide**Gangue minerals:** Chalcedony**Geologic description:**

This occurrence is in an extensive zone of strong silicification and red, iron-oxide gossan in altered tuff near the base of the Beaver Mountains volcanic field which is part of the the Iditarod Volcanics (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1988). The silica alteration is notable for its light blue chalcedony. The strong red gossan probably developed by oxidation of unknown sulfide minerals. Samples from the altered tuff contained up to 5.1 parts per million (ppm) silver, 76 ppm lead, and 5,000 parts per billion (ppb) mercury (Bundtzen, Laird, and Lockwood, 1988). Similar mineralization can be found over an area about 2 miles by 2 miles in size at the head of Moose Creek.

Alteration:

Silicification with development of much chalcedony.

Age of mineralization:**Deposit model:**

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

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

22c?

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The area was sampled by the Alaska Division of Geological and Geophysical Surveys in 1982. (Bundtzen, Laird, and Lockwood, 1988).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Laird, and Lockwood, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (head of Fourth of July Creek)**Site type:** Occurrence**ARDF no.:** ID089**Latitude:** 62.6927**Quadrangle:** ID C-3**Longitude:** 157.0831**Location description and accuracy:**

This occurrence is at an elevation of about 2,100 feet near a saddle that separates Fourth of July Creek on the south from Moose Creek on the north. The occurrence is about 0.3 mile southeast of hill 2350 and about 0.5 mile west-northwest of the center of section 13, T. 30 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg**Ore minerals:****Gangue minerals:** Quartz**Geologic description:**

The occurrence consists of a swarm of quartz veins in an altered zone of the Iditarod volcanics (Miller and Bundtzen, 1988; Bundtzen, Laird, and Lockwood, 1988; Miller, Bundtzen, and Gray, 2005). One grab sample of mineralization contained 1,400 parts per billion (ppb) gold, 200 ppb silver, and more than 10.0 parts per million (ppm) mercury (McGimsey and others, 1988).

Alteration:

Alteration of volcanic rocks to clay.

Age of mineralization:**Deposit model:**

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

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

22c?

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the the U.S. Geological Survey in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:**References:**

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1988; McGimsey and others, 1988; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (between George River and Moose Creek)**Site type:** Occurrence**ARDF no.:** ID090**Latitude:** 62.5343**Quadrangle:** ID C-3**Longitude:** 157.0802**Location description and accuracy:**

This occurrence is on an isolated knob, hill 1560, between the George River and Moore Creek. The occurrence is near the center of the NW 1/4, section 9, T. 2 8N., R. 42 W., of Seward Meridian. The location is accurate.

Commodities:**Main:** Ag**Other:****Ore minerals:****Gangue minerals:** Biotite**Geologic description:**

This occurrence is in a intensely altered zone with secondary biotite in a small hypabyssal intrusion of intermediate composition and with a pilotaxitic texture. The plug intrudes shale and sandstone strata of the Upper Cretaceous, Kuskokwim Group (Bundtzen and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One sample of altered rock with biotite contained 1,000 parts per billion silver (McGimsey and others, 1988).

Alteration:

Strong zone of secondary biotite in intrusion.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey in 1983 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (above head of Moose Creek)**Site type:** Occurrence**ARDF no.:** ID091**Latitude:** 62.7197**Quadrangle:** ID C-3**Longitude:** 157.0579**Location description and accuracy:**

This occurrence is at an elevation of about 2,050 feet on a saddle that separates two forks of Moose Creek. The occurrence is about 0.7 mile northwest of hill 2581 and about 0.4 mile east of the center of section 1, T. 30 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Hg**Other:** As, Sb**Ore minerals:****Gangue minerals:** Quartz (var. chalcedony)**Geologic description:**

This occurrence contains two types of mineralization: 1) an iron-oxide-stained quartz breccia zone in altered tuff of the Beaver Mountains volcanic field; and 2) sheeted quartz veins in beds of altered sandstone in the Beaver Mountains volcanic field (Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The size of the occurrence is unknown. Grab samples contained up to 200 parts per billion (ppb) silver, 7,000 ppb mercury, 110 parts per million (ppm) arsenic, and 32 ppm antimony (Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988).

Alteration:

Silicification with introduction of chalcedony and development of iron oxides. alteration.

Age of mineralization:**Deposit model:**

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

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

22c?

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Surface sampling was conducted by the Alaska Division of Geological and Geophysical Surveys and the U.S. Geological Survey in the 1980s (Bundtzen, Laird, and Lockwood, 1988; McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

Bundtzen, Laird, and Lockwood, 1988; Miller and Bundtzen, 1988; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (west head of Beaver Creek)**Site type:** Occurrence**ARDF no.:** ID092**Latitude:** 62.6885**Quadrangle:** ID C-1**Longitude:** 156.3727**Location description and accuracy:**

This occurrence is about 650 feet south of hill 1325 at the western head of Beaver Creek. The occurrence is near the center of the SE1/4, section 15, T. 30 N., R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** As**Other:** Hg, Sb**Ore minerals:****Gangue minerals:** White mica (var. sericite)**Geologic description:**

This occurrence consists of a sericitized zone in a granite-porphyry intrusion that cuts shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Samples from the altered zone contained up to 200 parts per million (ppm) arsenic, 28 ppm antimony, and 2,200 parts per billion (ppb) mercury (McGimsey and others, 1988).

Alteration:

Granite porphyry is altered to sericite.

Age of mineralization:

Unknown; the granite porphyry that hosts the altered zone is undated.

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface sampling was conducted by the U.S. Geological Survey in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (north of hill 2170)**Site type:** Occurrence**ARDF no.:** ID093**Latitude:** 62.7432**Quadrangle:** ID C-1**Longitude:** 156.2343**Location description and accuracy:**

This occurrence is at an elevation of about 1,600 feet about 1.0 mile north of hill 2170. It is about 0.3 mile northeast of the southwest corner of section 28, T. 31 N. R. 37 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:** As**Ore minerals:** Pyrite**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a pyrite-quartz-bearing shear zone about 65 feet thick that occurs at the contact of a small granite porphyry intrusion with biotite hornfels (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The rocks in the vicinity are mainly fine grained intrusive rocks and a large hornfels aureole; this suggests a large underlying intrusive body (Miller and Bundtzen, 1994). The mineralized shear zone can be traced for about a mile to the northeast. Grab samples collected along the zone contain 1,000 parts per million (ppm) mercury (D. Obolewicz, written communication, 1981). Other samples contain up to 500 parts ppm arsenic but no gold (McGimsey and others, 1988).

Alteration:

Sericite.

Age of mineralization:

Unknown; the nearby intrusion is undated (Miller and Bundtzen, 1994).

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:**

The mineralized shear zone was sampled by Anaconda Minerals in 1981 (D. Obolewicz, written communication, 1981 and the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (north bank of Beaver Creek)**Site type:** Occurrence**ARDF no.:** ID094**Latitude:** 62.6682**Quadrangle:** ID C-1**Longitude:** 156.1836**Location description and accuracy:**

This occurrence is at an elevation of about 800 feet on a steep bluff about 0.5 mile north of Beaver Creek. It is about 1.0 mile southwest of hill 1170, about 0.8 mile east-southeast of hill 985, and about 0.2 mile west of the northeast corner of section 27, T. 30 N., R. 37 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg, W**Other:** As, Cr, Pb, Zn**Ore minerals:** Unspecified sulfides**Gangue minerals:** Quartz**Geologic description:**

This occurrence consists of quartz stringers in an altered felsic(?) dike that cuts shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Grab samples contain up to 1.00 percent arsenic, more than 10.0 parts per million (ppm) mercury, 200 ppm tungsten, 100 ppm lead, 1,000 ppm chromium, and 120 ppm zinc (McGimsey and others, 1988).

Alteration:

Silicification.

Age of mineralization:

Unknown; the dike is undated.

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:**

The site was sampled by the U.S. Geological Survey in 1984 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Unnamed (north bank of Beaver Creek)**Site type:** Occurrence**ARDF no.:** ID095**Latitude:** 62.6736**Quadrangle:** ID C-1**Longitude:** 156.1276**Location description and accuracy:**

This occurrence is near hill 740 on a bluff about 0.5 mile north of Beaver Creek. It is about 0.2 mile southeast of the center of section 24, T. 30 N., R. 37 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:****Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is a prominent iron-stained zone of unknown extent in a quartz porphyry dike that intrudes shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). No size or structural information is available. One grab sample contained 2,200 parts per billion (ppb) mercury (McGimsey and others, 1988).

Alteration:

Prominent iron-oxide staining.

Age of mineralization:

Unknown; the dike is undated.

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

The site was sampled by the U.S. Geological Survey in 1984 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 5/18/2003

Site name(s): Black River**Site type:** Occurrence**ARDF no.:** ID096**Latitude:** 62.5925**Quadrangle:** ID C-1**Longitude:** 156.0077**Location description and accuracy:**

This placer occurrence is somewhat arbitrarily placed on the Black River at an elevation of about 350 feet, i.e., just within the the Iditarod C-1 quadrangle of the USGS. This is about 10 miles upstream from the mouth of the Black River in the McGrath quadrangle. The location is uncertain and based on old hearsay.

Commodities:**Main:** Au**Other:****Ore minerals:****Gangue minerals:****Geologic description:**

This placer occurrence is based on a report that George Fredericks, a trader at Georgetown on the Kuskokwim River, was given by an unidentified Athabaskan Indian in 1914. The Indian said that placer gold had been found on the Black River about 10 miles from its mouth by Russian explorers in 1844 (Brown, 1983; Berry, 1973). However, there is no mention of such a discovery in the journals of the Russian explorer Lieutenant Zagoskin who visited this region about this time (Michael, 1967) and there is no other information about the deposit.

Alteration:**Age of mineralization:****Deposit model:**

Placer Au deposit (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:

Michael, 1976; Berry, 1973; Brown, 1983.

Primary reference: Brown, 1983

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Unnamed (north of Reindeer River)**Site type:** Occurrence**ARDF no.:** ID097**Latitude:** 62.3853**Quadrangle:** ID B-6**Longitude:** 158.9604**Location description and accuracy:**

This occurrence is near the top of hill 680, about 5 miles north of the Reindeer River. The occurrence is near the center of section 32, T. 27 N., R. 52 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** As**Other:** Ag, Au, Hg, Sb**Ore minerals:** Hematite**Gangue minerals:****Geologic description:**

This occurrence is a zone of intense iron-oxide alteration in sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). As exposed in rubble, veins of secondary hematite of uncertain extent and orientation crosscut the sandstone beds. Grab samples of the hematite-rich veins contain up to 150 parts per million arsenic, and trace amounts of antimony, mercury, silver, and gold (McGimsey and others, 1988).

Alteration:

Secondary hematite and intense iron oxide staining.

Age of mineralization:**Deposit model:**

Hematite veins in sandstone.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):**Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey in 1985 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/20/2003

Site name(s): Unnamed (northwest valley wall of Reindeer River)**Site type:** Occurrence**ARDF no.:** ID098**Latitude:** 62.3230**Quadrangle:** ID B-6**Longitude:** 158.9361**Location description and accuracy:**

This occurrence is on a steep, south-facing bluff along the Reindeer River. The occurrence is at an elevation of about 300 feet, about 0.4 mile southeast of hill 610, and about 0.5 mile southwest of the center of section 21, T. 26 N., R. 52 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:****Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is a grab sample of rhyolitic tuff from the Upper Cretaceous or early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The sample contained 1,200 parts per billion (ppb) mercury (McGimsey and others, 1988).

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:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (north of Reindeer River)**Site type:** Occurrence**ARDF no.:** ID099**Latitude:** 62.3664**Quadrangle:** ID B-6**Longitude:** 158.7194**Location description and accuracy:**

This occurrence is in a saddle along an east-west trending ridge about 2.5 miles north of the Reindeer River. It is at an elevation of about 650 feet, about 0.6 mile northeast of hill 710, and about 0.5 mile southwest of the center of section 3, T. 26 N., R. 51 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Sb**Ore minerals:****Gangue minerals:** Hematite**Geologic description:**

This occurrence consists of hematite veinlets in a dacite flow of the Upper Cretaceous or early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The size and orientation of the occurrence are uncertain. One grab sample of mineralization contained 50 parts per billion (ppb) gold and 18 parts per million (ppm) antimony (McGimsey and others, 1988).

Alteration:

Deposition of hematite and silicification.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (north of Reindeer River)**Site type:** Occurrence**ARDF no.:** ID100**Latitude:** 62.3672**Quadrangle:** ID B-6**Longitude:** 158.6493**Location description and accuracy:**

This occurrence is at the top of hill 1025 on a low east-west-trending ridge about 2 miles north of the Reindeer River. The occurrence is in the SE1/4 section 1, T. 26 N., R. 51 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Sn**Other:****Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is based on a grab sample of a devitrified rhyodacite or andesite of the Upper Cretaceous or early Tertiary, Yetna River volcanic field (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The grab sample contained 100 parts per million (ppm) tin (McGimsey and others, 1988).

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:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and

Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (northeast shoulder of Swinging Dome)**Site type:** Occurrence**ARDF no.:** ID101**Latitude:** 62.3390**Quadrangle:** ID B-5**Longitude:** 158.2518**Location description and accuracy:**

This occurrence is at an elevation of about 850 feet on the northeast slope of Swinging Dome about 0.8 mile northeast of its summit. The occurrence is about 0.3 mile south-southwest of the center of section 18, T. 26 N., R. 48 W., Seward Meridian. The location is accurate.

Commodities:**Main:** Sb, Sn**Other:** As, B**Ore minerals:** Unspecified sulfides**Gangue minerals:** Quartz, tourmaline**Geologic description:**

This occurrence is a sulfide and tourmaline-bearing silicified zone at the contact between a Tertiary intrusive body and hornfels derived from the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and others, 1992; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The Swinging Dome intrusive is 60.9 Ma. Disseminated sulfides locally make up to 10 percent of the silicified zones. Several felsic dikes intrude the contact zone. One grab sample of mineralization contained 20 parts per million (ppm) tin, 20 ppm antimony, 40 ppm arsenic, and 2,000 ppm boron (McGimsey and others, 1988; Bundtzen and others, 1992).

Alteration:

Tourmaline and silicification in contact zone.

Age of mineralization:

Unknown; the Swinging Dome intrusion that may be related to the deposit is 60.9 Ma (Miller and Bundtzen, 1994).

Deposit model:

Possibly Sn-polymetallic deposit model or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988; Bundtzen and others, 1992).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Willow Creek**Site type:** Mine**ARDF no.:** ID102**Latitude:** 62.3751**Quadrangle:** ID B-5**Longitude:** 158.0692**Location description and accuracy:**

Willow Creek has been placer mined for about 2.5 miles below the mouth of Happy Creek. The coordinates are at the midpoint of the mine which is at the label 'placer mine' on the USGS 1:63,360-scale topographic map. The workings are centered in about the middle of the NW1/4 section 6, T. 26 N., R. 48 W., of the Seward Meridian. The location is accurate. The Willow Creek Mine is locality 24 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Ag, Au**Other:** Cr, Hg, Sn, U, W, Zr**Ore minerals:** Chromite, cinnabar, gold, ilmenite, magnetite**Gangue minerals:** Zircon**Geologic description:**

The Willow Creek Mine is developed on an auriferous paystreak in the valley of modern Willow Creek. It could be the extension of the Happy Creek placer (ID103), although the lower Happy Creek placer is lower grade and the two deposits may not be continuous (John Fullerton, oral communication, 1986).

The bedrock under most of the Willow Creek placer is shale and sandstone of the Upper Cretaceous. Kuskokwim Group. Willow Creek is aligned along a northeast trending lineament that is interpreted to be a high angle fault. A dike swarm nearly parallel to the fault lends credence to this interpretation (Bundtzen and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005).

The paystreak in Willow Creek starts at the mouth of Happy Creek. The overburden increases from about 12 feet thick at that point to about 25 feet thick at the southwest end of the paystreak (Mertie, 1936; John Fullerton, oral communication, 1986). The principal heavy minerals in concentrates are abundant zircon, cinnabar, magnetite, ilmenite, and chromite (Cobb, 1976 [OFR 76-576]; Bundtzen Cox, and Veach, 1987; Bundtzen and others, 1992). The gold averages 874 fine, the same as the gold on the Willow bench (ID105). The pay zones in Lower Willow Creek were lower grade than either Happy Creek or the Willow bench. The placer deposits on lower Willow Creek are largely mined out. However, the paystreak deepens downstream, suggesting that the cutoff is economic rather than abrupt.

Mineralized gold-bearing stockwork quartz veins in intrusive rocks on Chicken Mountain could be the lode source for the gold and heavy minerals on Willow Creek (Bundtzen and others, 1992). However, there are few monzonite cobbles in the Lower Willow Creek paystreak; this may, however, reflect the considerable distance from distance from Chicken Mountain that would tend to break down the granitic material (Mertie, 1936). The dike swarm exposed at the head of the creek also may be a source of the placer gold in Willow Creek.

Based on examination of published and unpublished records, Bundtzen and others (1992) estimated that Willow Creek and the Willow bench (ID105) produced at least 41,948 ounces of gold and 5,033 ounces of silver, mainly from 1910 to 1986.

Alteration:

Age of mineralization:

The Willow Creek placer is probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes**Site Status:** Probably inactive**Workings/exploration:**

Gold was discovered on Willow Creek early in the 20th Century, and part of the creek was explored by test pits and drifts in 1910 (Maddren, 1911). An early claimant was Frank G. Manley who also developed placer claims in Flat Creek. A steam-powered dragline began to operate in 1915, the first to be used in the district (Brooks, 1916). Manley worked the claims at intervals into the 1920s. In about 1933, Manley leased the claims to the Iditarod Mining Company of W. E. Dunkle and Partners Mines of New York who erected a large dragline in 1935, after the creek was redrilled under the supervision of Ben Bromberg. It was necessary to construct a long bedrock drain and to bring water to the field (Hawley, 2003). The project failed in 1936 or 1937 partly because of low-grade gold values and frozen ground. However, the development led to the successful mining of Willow Creek by the Fullerton brothers from the 1960s to the 1980s.

Production notes:

Based on examination of published and unpublished records, Bundtzen and others (1992) estimated that Willow Creek and the Willow bench (ID105) produced at least 41,948 ounces of gold and 5,033 ounces of silver, mainly from 1910 to 1986.

Reserves:

The placer deposits on lower Willow Creek are largely mined out. However, the paystreak deepens downstream, suggesting that the cutoff is probably economic rather than abrupt.

Additional comments:**References:**

Maddren, 1911; Brooks, 1916; Mertie, 1936; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen and others, 1987; Bundtzen and others, 1988; Bundtzen and others, 1992; Hawley, 2003; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Mertie, 1936; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Happy Creek**Site type:** Mine**ARDF no.:** ID103**Latitude:** 62.3815**Quadrangle:** ID B-5**Longitude:** 158.0298**Location description and accuracy:**

The Happy Creek Mine includes the entire length of Happy Creek, a west-flowing, 3-mile-long stream that begins on the west flank of Chicken Mountain and drains into Willow Creek. The coordinates are for the center of the stream which is at an elevation of about 600 feet in about the center of the S1/2 section 32, T. 27 N., R. 47 W., of the Seward Meridian. The location is accurate. Happy Creek is locality 25 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Cr, Hg, Sn, Th, U, W, Zr**Ore minerals:** Cassiterite, chromite, cinnabar, gold, ilmenite, lead-antimony sulfosalts, magnetite, monazite, realgar, scheelite**Gangue minerals:** Fluorapatite, zircon**Geologic description:**

The Happy Creek alluvial placer deposit is on the western flank of Chicken Mountain in the Iditarod mining district (Bundtzen and others, 1992). The placer deposit consists of both ancestral fluvial gravels on terraces and alluvial placer gravels in and near modern Happy Creek (Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The upper Happy Creek alluvial placer is transitional into residual placer deposits on the Upgrade, Trail, and other claims (ID107) on the steep west flank of Chicken Mountain.

Rich placer deposits mined early in the 20th Century were in discontinuous layers of sand and gravel on weathered bedrock underneath about 5 to 16 feet of unconsolidated colluvium and alluvium. The gold was fine-grained, little worn, and often showed crystal faces (Maddren, 1911). In later years, miners mined 12 to 32 feet of the poorly consolidated bedrock below the alluvium. In the 1970s, most of the gold recovered by the Fullerton brothers was about 200 mesh in size and was in nearly equant grains.

In addition to native gold, the heavy minerals found in concentrate from Happy Creek include chromite, ilmenite, magnetite, zircon, cinnabar, fluorapatite, scheelite, argentiferous Pb-Sb sulfosalts, monazite, realgar, and probably cassiterite (Cobb, 1974 and 1976 [OFR 76-576]; Bundtzen and others, 1987). Zircon-rich concentrate from Happy Creek contained up to 7,300 parts per million (ppm) uranium and 130 ppm thorium (White and Killeen, 1953). The gold is from 862 to 884 fine. The mineralized gold-bearing quartz stockwork in intrusive rocks on Chicken Mountain are almost certainly the lode source of the gold mined in the placers of Happy Creek (Cobb, 1974; Bundtzen and others, 1992).

Based on examination of published and unpublished records, Bundtzen and others (1992) estimated that Happy Creek produced at least 127,486 ounces of gold and 17,210 ounces of silver, mainly from 1910 to 1984.

Alteration:**Age of mineralization:**

Probably Tertiary and Quaternary, by analogy with other placer deposits in Interior Alaska (Hopkins and

others, 1971).

Deposit model:

Placer Au deposit (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:

Gold was first mined on the Summit claim in upper Happy Creek in August and September of 1910 (Maddren, 1911). Mining was by hand methods. The creek was mined nearly continuously from 1910 until 1966. A shortage of water and problems in mining the deeply weathered granite bedrock led operators to temporarily abandon the creek in the 1920s. In about 1929, Happy Creek was leased to the partnership of Andrew Olson, Tony Lindstrom, and Alex Palmgren who successfully mined it using a dragline feeding an elevated sluice box. Over the years, the size of the draglines increased. Olson and partners mined with a 1.5 cubic yard dragline; in 1970s, the Fullerton brothers mined with a 4.0 cubic yard dragline in the 1980s. In 1967, the U.S. Bureau of Mines in cooperation with the USGS drilled shallow auger holes in upper Happy Creek to test residual placers and explore for disseminated lode mineralization at the head of Happy Creek (Kimball, 1969).

Production notes:

Placer gold was produced nearly continuous from 1910 to about 1967; production resumed in 1975 and continued until 1984 (John and Richard Fullerton, oral communication, 1986). No production has been recorded since 1984. Production at the head of the creek was from residual or semi-residual deposits; the bedrock there consists of granitic slabs and disintegrated monzonite gneiss (Cobb, 1974 and 1976 [OFR 76-576]). Production from fluvial gravels dominate in the lower end of the creek. The Fullerton Mining Company operated by John and Richard Fullerton conducted a highly successful mining operation from 1975 to 1984 and accounted for a significant percentage of total gold output. They used a portable elevated sluice box was fed by a large dragline.

Based on examination of published and unpublished records, Bundtzen and others (1992) estimated that Happy Creek produced at least 127,486 ounces of gold and 17,210 ounces of silver, mainly from 1910 to 1984.

Reserves:**Additional comments:****References:**

Maddren, 1911; White and Killeen, 1953; Kimball, 1969; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/20/2003

Site name(s): Flat Creek; Marietta**Site type:** Mines**ARDF no.:** ID104**Latitude:** 62.4251**Quadrangle:** ID B-5**Longitude:** 158.0059**Location description and accuracy:**

Several mines were developed along Flat Creek, an 5-mile-long tributary of Otter Creek, in the Iditarod District. The coordinates are at the midpoint of the placered ground in about the center of the south half of section 16, T. 27 N., R. 47 W., of the Seward Meridian. Flat Creek is locality 30 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, As, Cr, Hg, Sn, U, Zr**Ore minerals:** Cassiterite, chromite, cinnabar, gold, ilmenite, lead-antimony sulfosalts, magnetite, monazite, scheelite**Gangue minerals:****Geologic description:**

The placer mines along Flat Creek produced the largest amount of gold in the Iditarod mining district and they were some of the richest placer mines in Alaska (Bundtzen and others, 1992). Flat Creek flows about 5 miles from the northwest slopes of Chicken Mountain to Otter Creek. Placer deposits along Flat Creek consist of: 1) rich ancestral pay channels on the east flank of Chicken Mountain and at the Marietta bench near the head of the creek; 2) limited but rich fluvial to residual placers on the steep northwest slopes of Chicken Mountain (i.e., ID107); and 3) lower grade but regionally more extensive deposits in Pleistocene to Holocene stream alluvium along the entire course of Flat Creek (Mertie, 1936; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The auriferous gravel along most of Flat Creek is 6 to 10 feet thick and overlain by 10 to 13 feet of overburden. Permafrost was intermittently present, mainly on the benches.

In addition to gold, the heavy minerals in concentrates include zircon, magnetite, ilmenite, chromite, cinnabar, fluorapatite, scheelite, stibnite, monazite, and traces of cassiterite (Cobb, 1974; Cobb, 1976 [OFR 76-576]; Bundtzen, Cox, and Veach, 1987). The gold fineness averaged about 864. The gold was shotty and coarse; grains average 1-2 grams in size and gold nuggets are scarce. The largest gold nugget known weighed 1.6 ounces.

A dredge was operated from 1912 to 1918 by the Yukon Gold Company; it mined 4.8 million cubic yards of material that averaged 0.060 ounce of gold per cubic yard. The dredge began digging on the Marietta claim and reportedly recovered 4,000 ounces of gold on its first day of operation (John Miscovich, oral communication, 2002). Subsequently, local, rich concentrations of gold were worked with scrapers and hand methods. Based on both published and unpublished records, Kimball (1969) estimated that Flat Creek alone produced at least 477,039 ounces gold. An additional 354,210 ounces of gold was produced from a combination of Otter and Flat Creeks. Thus Flat Creek probably produced a total of about 650,000 ounces of gold from 1909 to 1992 (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005).

Alteration:

Decomposition of monzonitic bedrock to guss.

Age of mineralization:

Probably Tertiary and Quaternary by analogy with other placer deposits in Interior Alaska (Hopkins and others, 1971).

Deposit model:

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

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

39a

Production Status: Yes; large

Site Status: Active

Workings/exploration:

Exploration on Flat Creek has taken place mainly by churn drilling and opencuts preliminary to mining which took place continuously from 1910 to 1940s (Cobb, 1976 [OFR 76-576]). Most of the placer gold was mined with open-cut methods; there was very little drifting (Mertie, 1936). In higher areas on the Marietta bench and on Chicken Mountain, snow fences were constructed before 1920 to trap water for sluicing since there was no regular stream sources of water (Smith, 1917).

From 1912 to 1918, much of the Flat Creek was worked by a large, bucket line stacker dredge operated by the Yukon Gold Company (YGC). The YGC dredge worked both virgin auriferous gravel and placer tailings that had been mined previously by small surface mines at the head of the creek. In 1941 and 1942, the North American Dredging Company operated a smaller dredge near the mouth of Flat creek and exploited part of a rich eastern bench missed by the Yukon Gold Company dredge (Bundtzen and others, 1992). After WW II, the mining on Flat creek consisted of re-mining tailings and small fractions of unmined gravel using bulldozers and draglines (John and Richard Fullerton, oral communication, 1986).

Production notes:

Based on both published and unpublished records, Kimball (1969) estimated that Flat Creek alone produced at least 477,039 ounces gold. An additional 354,210 ounces of gold was produced from a combination of Otter and Flat Creeks. Thus Flat Creek probably produced a total of about 650,000 ounces of gold from 1909 to 1992 (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005). The Yukon Gold Company dredge recovered 263,028 ounces of gold from Flat Creek or 20 percent of all the gold mined in the Iditarod district. From the 1930s to 1995, mechanized mining on Flat Creek was conducted by Strandberg and Company, Pat Savage, Flat Creek Placers, Inc., Ken Dahl, Awe Mining Company, and Olson and Company (Richard and Tad Fullerton, oral communication, 1986; Bundtzen and others, 1992).

Reserves:

Flat Creek is largely mined out but some small gold-bearing fractions remain, especially on the eastern bench (Bundtzen and others, 1992).

Additional comments:**References:**

Smith, 1917; Mertie, 1936; Webber and others, 1947; Kimball, 1969; Hopkins and others, 1971; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992; Mertie, 1936

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/21/2003

Site name(s): Willow bench**Site type:** Mine**ARDF no.:** ID105**Latitude:** 62.3631**Quadrangle:** ID B-4**Longitude:** 158.0772**Location description and accuracy:**

The Willow Bench is a terrace deposit east of Willow Creek that has been mined for a distance of about 1.5 miles. The bench is about 0.5 miles southeast of and parallel to the placer mine on Willow Creek (ID102). The center of the Willow Bench placer is near the northeast corner of section 12, T. 26 N., R. 48 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Cr, Hg, Sn, U, W, Zr**Ore minerals:** Chromite, cinnabar, gold, ilmenite, magnetite**Gangue minerals:** Zircon**Geologic description:**

The Willow Bench is probably an ancestral fluvial channel of Willow that is now perched on a bench 65 to 100 feet above modern Willow Creek. The Willow Bench is a reflection of the asymmetry of the Willow Creek basin, which formed due to differing freeze and thaw environments on the northwest versus the southeast slopes (Bundtzen and others, 1992). Auriferous gravels on the Willow Bench are overlain by 25 to 32 feet of organic-rich, frozen muck. Based on churn drilling, the auriferous gravel deposit is 10 to 12 feet thick, 150 to 650 feet wide, and can be traced for nearly 2.5 miles. Air photo analysis summarized in Bundtzen and others (1992) suggest that the pay channel may extend further to the southwest and southeast in other ancestral channels of Willow Creek before spilling into Bonanza Creek.

In addition to gold, the principal heavy minerals in concentrates include zircon, cinnabar, chromite, magnetite, and ilmenite, (Cobb, 1976 [OFR 76-576]; Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992). The gold averages 874 fine, about 10 points richer than Happy Creek (ID104).

The source of the placer gold and heavy minerals on the Willow bench is probably auriferous stockwork veins in intrusive rocks on Chicken Mountain (Bundtzen and others, 1992). There are few monzonite cobbles in the Willow bench paystreak, possibly reflecting its considerable distance from Chicken Mountain (Mertie, 1936). Mertie and Harrington (1924) believed that placer gold in the Willow Bench was derived from a different lode source than Chicken Mountain. Alternatively, the dike swarm exposed at the head of the Willow Creek Mine might be the source of the placer gold in the Willow bench deposit.

Based on examination of published and unpublished records, Bundtzen and others (1992) estimated that Willow Creek and the Willow bench (ID105) produced at least 41,948 ounces of gold and 5,033 ounces of silver, mainly from 1910 to 1986.

Alteration:**Age of mineralization:**

Mammoth and horse remains from overburden on the Willow bench yielded radiocarbon ages of about 28,000 years BP (J.T. Kline, unpublished data, 1986). The ancestral Willow bench auriferous fluvial deposits are believed to be Late Tertiary in age, analogous to other similar placers in Interior Alaska (Hopkins and others, 1971).

Deposit model:

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

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

39a

Production Status: Yes**Site Status:** Probably inactive**Workings/exploration:**

The Willow bench mine was discovered in 1910 and is possibly the deposit described as the Haggerty Bench (Maddren, 1911). The bench deposit was originally mined by ground sluicing about 12 feet of overburden. The ground was reported to have about \$1.25 of gold per bedrock foot (with gold at \$20.67 per ounce). Due to the thick, frozen nature of the overburden, the Willow Bench was mined for many years by hydraulic mining. In the early 1980s, Flat Creek Placers, Inc. (John and Richard Fullerton), planned to remove the overburden in preparation for a large scale mine. However, their company was unable to obtain permits from the U.S. Environmental Protection Agency (EPA) for hydraulic removal of overburden and the project was discontinued in 1986. No mining has occurred since.

Production notes:

Based on examination of published and unpublished records, Bundtzen and others (1992) estimated that Willow Creek and the Willow bench (ID105) produced at least 41,948 ounces of gold and 5,033 ounces of silver, mainly from 1910 to 1986.

Reserves:

There may be additional placer gold resources in extensions of the Willow bench to the southwest and southeast.

Additional comments:**References:**

Maddren, 1911; Mertie and Harrington, 1916; Mertie, 1936; Hopkins and others, 1971; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (near Flat Airstrip)**Site type:** Occurrence**ARDF no.:** ID106**Latitude:** 62.4536**Quadrangle:** ID B-4**Longitude:** 157.9887**Location description and accuracy:**

This occurrence is in the Otter Creek valley under the Flat airstrip which is about 0.7 mile east of the center of Flat. It is in the SE1/4 SE1/4, section 4, T. 27 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:****Ore minerals:** Cinnabar**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a series of cinnabar-quartz veins. According to Ken Dahl (oral communication, 1984), the North American Dredging Company dredged thin but high grade cinnabar-quartz veins during mining here. There was a consistent north-trending orientation to the mineralized zone, but the dip of the veins is unknown (Bundtzen and others, 1992). The site is currently covered by the Flat airstrip. However, clasts of high- grade cinnabar-quartz vein material were noted in dredge tailing piles essentially where Ken Dahl estimated the location of the vein (T.K. Bundtzen, unpublished field data, 1985).

Alteration:**Age of mineralization:****Deposit model:**

Hot springs Hg? (Cox and Singer, 1986; model 27a).

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

27a?

Production Status: None**Site Status:** Inactive**Workings/exploration:**

According to Ken Dahl (oral communication, 1984), the North American Dredging Company dredged thin but high grade cinnabar-quartz veins during mining here. The site is currently covered by the Flat airstrip. However, clasts of high- grade cinnabar-quartz vein material were noted in dredge tailing piles essentially where Ken Dahl estimated the location of the veins (T.K. Bundtzen, unpublished field data, 1985).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/21/2003

Site name(s): Idaho; Upgrade; Wildcat; Trail**Site type:** Mines**ARDF no.:** ID107**Latitude:** 62.3886**Quadrangle:** ID B-4**Longitude:** 157.9842**Location description and accuracy:**

The Idaho and the adjacent Upgrade, Wildcat, and Trail Mines are a group of claims on the north and west facing slopes of Chicken Mountain. The mines are centered about 0.7 mile west-northwest of the top of Chicken Mountain in the NE 1/4, section 33, T. 27 N., R. 47 W., of the Seward Meridian; on the north, they are transitional to the placer mines on Flat Creek (ID104). The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg**Ore minerals:** Chromite, cinnabar, ilmenite, magnetite**Gangue minerals:** Quartz, tourmaline, zircon**Geologic description:**

The Idaho, Upgrade, Wildcat, and Trail Mines produced gold from alluvial, residual, and semi-residual placer deposits on the steep northwest slopes of Chicken Mountain at the head of Flat Creek (ID104). The placers were mined from the early 20th Century to World War II but they were most productive before about 1930. During mining, it was difficult to distinguish the original overburden (Mertie, 1936, p. 204-205) and most of the gold was in weathered granitic bedrock gruss. Locally the granite was covered by about 6 feet of organic-rich muck lying directly on auriferous bedrock. According to assays reported by Mertie (1936), gold at the Upgrade claim was 844 fine and gold downslope on the Wildcat claims was 884 fine; Mertie attributed the difference to the bedrock sources rather than selective removal of silver during formation of the placers.

The Idaho claims were in operation when visited by Mertie (1933). The mine then was on two paystreaks, one of which was inferred to be the upper extension of Flat Creek (ID104). Overburden ranged from 8 to 20 feet thick and was mostly angular to sand-like granitic material, with little true alluvium. The value of the ground was stated to be about 30 cents per bedrock foot. The gold that was recovered had an average fineness of 856 and was extremely fine-grained; it was accompanied by cinnabar, which was not abundant.

These claims include the Idaho lode prospect at the very top of Flat Creek (Bundtzen and others, 1992). Samples collected from exposed quartz-sulfide veins contained up to 52.0 parts per million (ppm) gold, 1,600 ppm arsenic, 470 ppm antimony, and 110 ppm bismuth. Quartz-tourmaline clots are present in the walls of the veins.

Based on examination of published and unpublished records, Bundtzen and others (1992) estimated that the Upgrade, Idaho, Wildcat, and related claims produced 76,400 ounces of placer gold from 1910 to 1930.

Alteration:

The monzonite bedrock is altered to gruss; quartz-tourmaline alteration in walls of Idaho lode.

Age of mineralization:

The placer deposits are probably Quaternary; the lodes are undated.

Deposit model:

Placer Au deposit (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:

The Upgrade claims were extensively developed by David Strandberg and associates in about 1915 at about the time Flat Creek (ID104) was being extensively mined. The mines were in production when visited by Mertie in 1933 (Mertie, 1936). Exploration on the Idaho, Upgrade, Wildcat, and Alpha claim groups has taken place mainly by churn drilling and open cut preliminary to mining which was nearly continuous from 1910 to 1940s (Cobb, 1976 [OFR 76-576]). Snow fences were constructed prior to 1920 to trap water for sluicing since there was no regular stream sources of water (Smith, 1917). In 1967, the Bureau of Mines auger drilled the area (Kimball, 1969). Ken Dahl worked the Idaho claim during the early 1980s (T. K. Bundtzen, unpublished field data, 1984-86).

Production notes:

Based on examination of published and unpublished records, Bundtzen and others (1992) estimated that the Upgrade, Idaho, Wildcat, and related claims produced 76,400 ounces of residual placer gold from 1910 to 1930.

Reserves:

None known; thought to be largely mined out (Bundtzen and others, 1992).

Additional comments:

References:

Smith, 1917; Mertie, 1936; Kimball, 1969; Cobb, 1974; Cobb, 1976 (OFR 76-576); Bundtzen and others, 1992.

Primary reference: Bundtzen and others, 1992; Mertie, 1936

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/20/2003

Site name(s): Upper Chicken Creek**Site type:** Mine**ARDF no.:** ID108**Latitude:** 62.3768**Quadrangle:** ID B-4**Longitude:** 157.9766**Location description and accuracy:**

This placer and a lode deposit in it are at the head of Chicken Creek, a south flowing tributary of Bonanza Creek. The tailings from the workings are shown on the USGS 1:63,360-scale topographic map. The center of the workings is about 0.8 mile southwest of the top of Chicken Mountain at an elevation of about 1,500 feet. The placer is in the NW1/4 section 3, T. 27 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Bi, Cd, Cu, Hg, Pb, Sb**Ore minerals:** Chalcopyrite, cinnabar, gold, silver-bearing sulfosalts, stibnite**Gangue minerals:** Dolomite, quartz, zircon**Geologic description:**

This site on Upper Chicken Creek includes both a lode deposit and a residual placer over it. The lode deposit is a quartz stockworks in monzonite of the Chicken Mountain pluton which is 68.7-70.9 Ma (Bundtzen and others, 1992). Two sets of steeply dipping quartz veins in the stockworks strike N30-40E and N45-55W; a minor set is nearly horizontal. The orientations suggest that the veins are controlled by an orthogonal joint set in the monzonite (Bundtzen and others, 1992; Miller and Bundtzen, 1994, and Miller, Bundtzen, and Gray, 2005). The veins are associated with tourmaline and secondary biotite in the monzonite. The quartz veins in the stockworks contain native gold, stibnite, silver-bearing sulfosalts, cinnabar, and minor chalcopyrite (Bundtzen and others, 1992).

The quartz stockworks is the source of a residual placer above it. When visited by Mertie (1936) in 1933, miners, who had been mining here since 1924, were working a 500-foot-wide residual placer deposit. Most of the gold occurred in a 3- to 6-foot thick zone of monzonite sand at the base of a 20- to 30-foot thick layer of decomposed monzonite. Small amounts of gold occurred in the gruss overburden. The gold was fine-grained, angular, and nearly equidimensional. The largest nugget weighed about 1/2 ounce. The fineness of the gold as reported by the miners was 862 based on assays of five samples collected in 1929. The residual placer was mined nearly concurrently with the Idaho, and Upgrade deposits at the head of Flat Creek (ID107). The heavy minerals in the placer are essentially those found in the lode (Bundtzen, Cox, and Veach, 1987). Heavy mineral concentrates from Chicken Creek locally were also radioactive, probably from concentrations of uranium and thorium in zircon (White and Killeen, 1953). Placer concentrates mined in the late 1950s contained 53.3 percent mercury, 500 parts per million (ppm) antimony, and 16.1 ppm silver (Maloney, 1962). Production from the placer in upper Chicken Creek is combined with that of lower Chicken Creek (ID112).

Alteration:

Tourmaline and quartz are in the veins; the monzonite is altered to secondary biotite.

Age of mineralization:

Unknown; the Chicken Mountain pluton is 68.7 - 70.9 Ma (Bundtzen and others, 1992).

Deposit model:

Porphyry Cu-Au and Au placer (Cox and Singer, 1986; models 20c and 39a).

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

20c and 39a

Production Status: Yes**Site Status:** Active**Workings/exploration:**

The lode gold deposit in upper Chicken Creek and the residual placer above it was known by 1912 (Eakin, 1914). Mining commenced soon afterward; extensive open cut mining occurred between 1915 and World War II, including a mining operation that lasted from at least 1924 until 1933 (Mertie, 1936; Cobb, 1976 [OFR 76-576]). Production from upper Chicken Creek is combined with that of lower Chicken Creek (ID112). The U.S. Bureau Mines tested the disseminated deposits in upper Chicken Creek with shallow auger holes (Kimball, 1969). Rock samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s and released in Bull (1988) and Bundtzen and others (1992).

Production notes:

Production from upper Chicken is combined with that of Lower Chicken Creek (ID112).

Reserves:**Additional comments:****References:**

Eakin, 1914; Mertie, 1936; White and Killeen, 1953; Maloney, 1962; Kimball, 1969; Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bull, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Mertie, 1936; Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Chicken Mountain**Site type:** Prospect**ARDF no.:** ID109**Latitude:** 62.3858**Quadrangle:** ID B-4**Longitude:** 157.9727**Location description and accuracy:**

This prospect is centered about 0.1 mile south of the top of Chicken Mountain, and includes most of section 34 T. 27 N., R. 47 W., of the Seward Meridian. The prospect area includes the summit of Chicken Mountain and its north-facing slopes.

Commodities:**Main:** Au**Other:** Ag, As, Bi, Cu, Hg, Mo, Nb, Sb, Ta, W

Ore minerals: Arsenian-pyrite, arsenopyrite, chalcopyrite, cinnabar, gold, ilmenorutile, molybdenite, silver-bearing sulfosalts, stibnite

Gangue minerals: Ankerite, dolomite, quartz

Geologic description:

The flat cryoplanation surface covering the south-facing slopes of Chicken Mountain is underlain by a crudely north-south-oriented, irregularly defined zone of thin, stockwork-like auriferous quartz veins and veinlets that cut the Chicken Mountain pluton (Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The veins are in syenite, monzonite, and quartz monzonite in the cupola of the Chicken Mountain pluton beneath a roof pendant of thermally altered andesite and basalt. Earlier alkali gabbro and monzodiorite intrusive are present, but do not appear to host the auriferous mineralization. The Chicken Mountain pluton has been radiometrically dated at 68.7-70.9 Ma (Bundtzen and others, 1992). North of Chicken Mountain, auriferous northeast-trending quartz veinlets are present in hornfels derived from andesite that caps a monzonite phase of the pluton. This northern mineralized area has been referred to as the Golden Apex Zone (see Ventures Resources, Inc. website at <http://www.venturesresource.com>).

The quartz veinlets in the intrusive rocks contain up to 5 percent of ore minerals including stibnite, cinnabar, arsenopyrite, chalcopyrite, ilmenorutile, molybdenite, silver-bearing sulfosalts, arsenian-pyrite, and free gold. Dolomite and ankerite breccias were formed at the same time as sulfide deposition. Bundtzen and others (1992) proposed a model of a progressive mesothermal-to-epithermal hydrothermal mineralization associated with a vertical temperature zonation. Epithermal gold-antimony-mercury mineralization crosscut older mesothermal copper-molybdenum, arsenic-copper, and tantalum-tungsten zones (Bundtzen and others, 1992).

Surface and drill data suggest that the mineralization south of the summit of Chicken Mountain is at least 1,000 feet by 2,500 feet in size and extends to a depth of at least 800 feet. Based on a drill program from 1987 to 1989, Victor Hollister (oral communication, 1992) estimated that the Chicken Mountain lode contained 16.0 million tonnes of material with 0.04 ounces of gold per ton, 1.3 ounces of silver per ton, and substantial quantities of copper, molybdenum, and antimony.

Beginning in 1997, Ventures Resources, Inc. initiated a core drilling program on the Chicken Mountain lode, and as well carried out soil and rock chip survey throughout the district. High grade gold mineralization was found in drill intercepts on Chicken Mountain. Intercepts include 4.6 feet with 6.18 ounces of gold per ton and 4.9 feet with 2.9 ounces of gold per ton. Their soil sampling program indicated that an area about 12,500 feet by 2,250 feet in size has gold values that ranged from 100 to more than 1,000 parts per

billion (ppb) gold. Samples from the Golden Apex zone in the north mineralized area contained up to 0.85 ounce of gold per ton (Ventures Resources, Inc.; <http://www.venturesresource.com>).

Alteration:

Carbonate alteration with ankerite and dolomite in the veins; potassic alteration in the granitic rocks.

Age of mineralization:

Unknown; the mineralization is possibly contemporaneous with the emplacement of the Chicken Mountain pluton that has been dated at 68.7 to 70.9 Ma (Bundtzen and others, 1992).

Deposit model:

Porphyry Cu-Au (Cox and Singer, 1986; model 20c).

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

20c

Production Status: None

Site Status: Active

Workings/exploration:

Lode mineralization on Chicken Mountain has been known for many years (Maddren, 1911; Mertie and Harrington 1916; Mertie; 1936). In the 1960s, the U.S. Bureau of Mines trenched parts of the deposit and conducted an auger drilling program in the soils and regolith above the bedrock (Maloney, 1962; Kimball, 1969). In 1975, Resource Associates of Alaska collected additional soil samples and drilled a few shallow holes (Ed Chipp, oral communication, 1985). The U.S. Geological Survey and the Alaska Division of Geological Surveys investigated the area from 1984 to 1988. Bull (1988) conducted trace element studies of the area in 1984 and 1985. From 1987 to 1990, Fairbanks Gold Mining Inc. and Galactic Resources, Inc. did some trenching and drilled seven holes that totaled about 5,000 feet; the results of some of their work is summarized in Bundtzen and others (1992). In 1997, Ventures Resources, Inc. initiated a core drilling program on the Chicken Mountain lode and did soil and rock chip surveys throughout the district.

Production notes:

None recorded.

Reserves:

Based on a drill program from 1987 to 1989, Victor Hollister (oral communication, 1992) estimated that the Chicken Mountain lode contained 16.0 million tonnes of material with 0.04 ounces of gold per ton, 1.3 ounces of silver per ton, and substantial quantities of copper, molybdenum, and antimony. This estimate is probably conservative.

Additional comments:**References:**

Maddren, 1911; Mertie and Harrington, 1916; Mertie, 1936; Maloney, 1962; Kimball, 1969; Bundtzen, Cox, and Veach, 1987; Bull, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (southwest of Discovery)**Site type:** Prospect**ARDF no.:** ID110**Latitude:** 62.4285**Quadrangle:** ID B-4**Longitude:** 157.9679**Location description and accuracy:**

This prospect is at an elevation of about 1,300 feet on the eastern flank of a north-trending ridge; it is about 2.0 miles southwest of Discovery Camp on Otter Creek, about 0.4 mile northeast of hill 1565, and near the center of section 15, T. 27 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au**Other:** As, Hg, W**Ore minerals:** Iron oxide**Gangue minerals:** Quartz**Geologic description:**

This prospect consists of an iron-oxide-stained quartz vein in hornfels derived from the Upper Cretaceous, Kuskokwim Group (Bundtzen and others, 1992; Miller, Bundtzen and Gray, 2004). The vein was explored with a small drift which has since caved. Float on the surface indicated that the quartz vein is at least 12 inches thick; no sulfides were recognized. Some of the quartz contains visible gold. One grab sample of rubble of the quartz vein contained 11.0 parts per million (ppm) gold, 7.0 ppm silver, 340 ppm arsenic, 50 ppm tungsten, and 140 parts per billion (ppb) mercury (McGimsey and others, 1988; Bundtzen and others, 1992).

Alteration:

Iron oxide staining.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: Undetermined.**Site Status:** Inactive**Workings/exploration:**

A drift, now caved, and small pit explored the prospect. About 20 tons of mineralized rock occur on the dump. The prospect was sampled by the US. Geological Survey and the Alaska Division of Geological and Geophysical Surveys (McGimsey and others, 1988; Bundtzen and others, 1992).

Production notes:

Probably none.

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/21/2003

Site name(s): Otter Creek**Site type:** Mines**ARDF no.:** ID111**Latitude:** 62.4514**Quadrangle:** ID B-4**Longitude:** 157.9648**Location description and accuracy:**

Otter Creek has been mined for about 4 miles by several mining operations. The area that has been placered is up to 0.8 mile wide. The coordinates are at about the center of the area that has been mined; it is 0.3 mile west of the northeast corner of section 10, T. 27 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au**Other:** As, Cr, Hg, Sb, Sn, U, Zr**Ore minerals:** Arsenopyrite, cassiterite, chromite, cinnabar, gold, ilmenite, lead-antimony sulfosalts, magnetite, scheelite, stibnite**Gangue minerals:** Fluorapatite, monazite, zircon**Geologic description:**

Otter Creek is the second largest producer of placer gold in the Iditarod district; the largest is Flat Creek (ID104), one of its tributaries (Bundtzen and others, 1992). The placers in Otter Creek has been mined for about 4 miles; the deposit averages about 0.5 mile wide and reaches a maximum width of about 0.8 mile at its lower end near Flat. The gold occurs in both ancestral terrace gravels and modern alluvial gravels. The auriferous gravels begin just upstream from the confluence of Granite and Otter Creeks and continue west to a point about 1 mile below the junction of Otter and Flat Creeks.

Many workers, including Mertie (1936) and Bundtzen and others (1992), believe that most of the placer gold and associated heavy minerals in the fluvial gravels of Otter Creek are derived from: 1) gold lodes on Chicken Mountain, the gold being transported down Flat Creek (ID108 and ID109); 2) lodes in upper Otter Creek (ID106, ID110, and ID115); and 3) lodes in the Granite Creek area (ID116, ID118, ID121, and ID122). Some gold-bearing veins also occur in the bedrock below the auriferous gravel of Otter Creek; an example is the gold-bearing stibnite veins near the mouth of Glen Gulch (ID114).

The gold from Otter Creek varies from 822 to 891 fine. The fineness decreases downstream, suggesting sources for the gold on Otter Creek (Bundtzen and others, 1992). In addition to gold, the principal heavy minerals include arsenopyrite, cinnabar, fluorapatite, scheelite, argentiferous Pb-Sb sulfosalts, monazite, cassiterite, magnetite, ilmenite, chromite, stibnite, and radioactive zircon (Mertie, 1936; White and Killeen, 1953; Cobb, 1976 [OFR 76-576]). Elevated PGEs also have been detected in heavy mineral concentrates (Bundtzen, Cox, and Veach, 1987).

Gold on Otter Creek was discovered in upper Otter Creek on Christmas Day, 1908, by John Beaton and William Dikeman (Maddren 1910, 1911). A rush ensued in 1910 and within a year, there were large scraper plants and underground drift mines in operation on Otter Creek. Otter Creek was drilled by the Yukon Gold Company in 1913. Subsequently the composite placer deposit has been dredged and mined by backhoe and dragline and, in a few places, with drift mines (Mertie, 1936). Exploration and development on Otter Creek was almost continuous between 1910 to the early 1960s (Cobb, 1976 [OFR 76-576]). Mining was greatly affected by distribution of permafrost. The ground was thawed within 100 meters of the present channel of Otter Creek, probably due to the active thaw bulb of the active water channel. The rest of the Otter Creek valley was frozen and required thawing. Overburden was removed hydraulically.

From 1914-1966, two bucketline dredging companies and predecessor companies mined Otter Creek: 1) the Riley Investment Company dredge; and 2) the North American Dredging Company dredge (Bundtzen and others, 1992). After 1958, the Riley Dredge could only mine thawed ground near Otter Creek as thaw field development had become too costly. From 1966 to 1990, mining on Otter creek consisted of re-mining tailings and fractions of unmined ground using bulldozer, dragline, and excavator equipment.

Production from Otter Creek was 235,721 ounces of gold and 30,628 ounces of silver from 1910 to 1966 (Kimball, 1966). Another 354,210 ounces of gold was produced from Otter and Flat Creeks. Otter Creek is estimated to have produced a grand total of about 417,000 ounces of gold from 1910 to present (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005).

Alteration:**Age of mineralization:**

Probably Tertiary and Quaternary by analogy with other placer deposits in Interior Alaska (Hopkins and others, 1971).

Deposit model:

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

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

39a

Production Status: Yes**Site Status:** Active**Workings/exploration:**

Gold was discovered in upper Otter Creek on Christmas Day, 1908, by John Beaton and William Dikeman (Madden 1910, 1911). A rush ensued in 1910 and within a year, there were large scraper plants and underground drift mines in operation. Otter Creek was drilled by the Yukon Gold Company in 1913. Subsequently the placer deposit was dredged and mined by backhoe and dragline and, in a few places, with drift mines (Mertie, 1936). Peter Miscovich introduced bulldozer, backhoe mining on the creek in the 1930s. The backhoe could dig deeply into bedrock, and pay extended many feet into bedrock. Miscovich also developed the hydraulic lift or gravel elevator, which was used by other operators in the Iditarod district from the 1920s to the 1950s (Harold Stranberg, oral commun., 2001). Exploration and development on Otter Creek was almost continuous between 1910 to the early 1960s (Cobb, 1976 [OFR 76-576]). Mining was greatly affected by distribution of permafrost. Ground was thawed within 300 feet of Otter Creek, probably due to the active thaw bulb of the active water channel. The rest of the Otter Creek valley was frozen and required thawing. Overburden was removed hydraulically.

From 1914 to 1966, two bucketline dredging companies and their predecessor companies mined Otter Creek: 1) the Riley Investment Company dredge; and 2) the North American Dredging Company dredge (Bundtzen and others, 1992). After 1958, the Riley Dredge could only mine thawed ground near Otter Creek thawing had become too expensive. From 1966 to 1990, mining on Otter creek consisted of re-mining tailings and fractions of unmined ground using bulldozer, dragline, and excavator equipment.

Production notes:

Otter Creek has produced 235,721 ounces of gold and 30,628 ounces of silver from 1910 to 1966 (Kimball, 1966). An additional 354,210 ounces of gold was produced from a combination of Otter and Flat Creeks. Otter Creek is estimated to have produced a total of about 417,000 ounces of gold from 1910 to present (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005).

The North American Dredging Company and Riley Investment Company dredges produced 291,972 ounces of gold from 1914 to 1966, or about 21.0 percent of the total for the Iditarod district and 70.0 percent of the total for Otter Creek. Small scale operations on Otter Creek have been dominated by Miscovich and Sons, Inc. and later by the Otter Creek Dredging Company (a John Miscovich family operation) that produced gold through 1992.

Reserves:

Much of the paystreak on Otter Creek has been mined. However, according to John Miscovich and Richard Fullerton (oral communication, 1986), the lower end of the placer below the townsite of Flat, which has never been mined, contains about 100,000 ounces of gold in ground that averages about 0.1 ounce per cubic yard. This estimate was calculated from the results of a churn drilling program conducted in the 1940s and 1950s.

Additional comments:**References:**

Maddren, 1910; Maddren, 1911; Mertie, 1936; White and Killeen, 1953; Kimball, 1969; Hopkins and others, 1971; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992; Mertie, 1936

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/21/2003

Site name(s): Lower Chicken Creek**Site type:** Mine**ARDF no.:** ID112**Latitude:** 62.3468**Quadrangle:** ID B-4**Longitude:** 157.9616**Location description and accuracy:**

The lower Chicken Creek placer mine extends for about 2 miles above its mouth. The coordinates are at the midpoint of the deposit in the NE1/4 section 15, T. 26 N., R. 47 W., of the Seward Meridian. The location is accurate. Lower Chicken Creek is locality 27 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Cr, Hg**Ore minerals:** Chromite, cinnabar, gold, ilmenite**Gangue minerals:** Zircon**Geologic description:**

The gold-bearing gravel in the modern stream channel of Chicken Creek and alluvial fans that feed into it are derived from the erosion of the Chicken Mountain lode deposit (ID109) and reworking of residual gold placers on the southern flank of Chicken Mountain. A landslide dams the valley of Chicken Creek valley at an elevation of about 800 feet and separates this placer from the upper Chicken Creek placer (ID108) (Bundtzen and others, 1992; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005).

Bedrock in lower Chicken Creek is mainly sandstone and argillite of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994). When the site was visited by Mertie in 1933 (Mertie, 1936), the placer cut was 12 to 30 feet deep and exposed 10 to 30 feet of gravel that included cobbles of sedimentary rocks up to 3 feet in diameter. The depth to bedrock at the mouth of the creek was 90 feet (Mertie, 1936, p. 215). In addition to gold, the principal heavy minerals include cinnabar, chromite, ilmenite, and zircon. The gold varies from 850 to 870 fine and averages 861 fine (Bundtzen, Cox, and Veach, 1987).

Based on past production records, Bundtzen and others (1992) estimated that lower Chicken Creek produced at least 24,800 ounces of gold and 3,174 ounces of silver from 1912 to 1985. The production records from 1940 to 1980 are not available.

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes

Site Status: Active

Workings/exploration:

Exploration and mining on lower Chicken Creek began in 1911 and the deposit was drilled in 1912 (Eakin, 1914). The deposit was probably mined nearly continuously from 1913 until World War II. Early drift mining later gave way to open cut mining methods and large-scale hydraulic removal of overburden (Mertie, 1936). Much of the modern mechanized mining on Chicken Creek was carried out by Flat Creek Placers, Inc. mainly in the 1950s and 1960s, using a dragline and bulldozer. Richard Wilmarth began mining the property in the mid-1990s.

Production notes:

Based on past production records, Bundtzen and others (1992) estimated that lower Chicken Creek produced at least 24,800 ounces of gold and 3,174 ounces of silver from 1912 to 1985. The production records from 1940 to 1980 are not available.

Reserves:

Some low grade gold resources occur in deep ground near the mouth of Chicken Creek (John Fullerton, oral communication, 1986).

Additional comments:

References:

Eakin, 1914; Mertie, 1936; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Mertie, 1936

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Black Creek**Site type:** Mine**ARDF no.:** ID113**Latitude:** 62.4379**Quadrangle:** ID B-4**Longitude:** 157.9372**Location description and accuracy:**

Black Creek has been placed for its entire length of about 1.6 miles. The coordinates are at the mid-point of the deposit about 0.5 mile north-northeast of the center of section 14, T. 27 N., R. 47 W., of the Seward Meridian. The location is accurate. Black Creek is locality 31 of Cobb (1972 [MF 363]).

Commodities:**Main:** Au**Other:** Ag, Cr, Hg, Nb, Sn, Pt, W**Ore minerals:** Arsenopyrite, argentopyrite, cassiterite, chromite, cinnabar, gold, ilmenite, ilmenorutile, magnetite, scheelite**Gangue minerals:** Zircon**Geologic description:**

Black Creek is a narrow, 1.5-mile-long stream that enters Otter Creek near Discovery camp. The creek dissects an altered monzodiorite pluton and its associated hornfels which are probably the source of much of the placer gold and heavy minerals in the Black Creek placer. The auriferous fluvial gravels varied from 10 to 12 feet thick; they were overlain by 6 to 16 feet of overburden (Mertie, 1936; Cobb, 1976 [OFR 76-576]). In addition to gold, the principal heavy minerals identified in concentrates include arsenopyrite, argentopyrite, cassiterite, cinnabar, ilmenorutile, scheelite, chromite, ilmenite, magnetite, and zircon. The gold fineness averages 819; this is significantly lower than the fineness of the gold from other gold placers in the Iditarod district (for example ID104 and ID111). Samples of concentrates collected in 1981 contained 6.51 percent tungsten, 470 parts per million (ppm) niobium, 3.35 percent chromium, 1,300 parts per billion (ppb) platinum, and 1,433 ppm lead (Bundtzen, Cox, and Veach, 1987).

Open cuts were first used to mine Black Creek in 1910. From 1911 to 1915, gravel near the mouth of Black Creek was drift mined as the overburden was too thick to remove using simple excavation techniques (Mertie, 1936). From 1916 to 1918, The Union Construction Company (later North American Dredging Company) mined from the mouth of Black Creek to a point two-thirds of the way up the creek. Otter Creek Dredging Company (John Miscovich) mined from the late 1970s to 1981 near the mouth of Black Gulch and Glen Gulch with backhoe and bulldozer. There has been no mining since 1981.

From 1910 to 1981, 27,925 ounces of gold was produced from Black Creek (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005). From 1916 to 1918, the Union Construction Company dredge alone produced 22,125 ounces of gold, or nearly 80 percent of the gold produced from Black Creek.

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

Placer Au deposit (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:**

Open cuts were first used to mine Black Creek in 1910. From 1911 to 1915, gravel near the mouth of Black Creek, was drift mined as the overburden was too thick to remove using simple excavation techniques (Mertie, 1936). From 1916 to 1918, The Union Construction Company (later North American Dredging Company) mined from the mouth of Black Creek to a point two-thirds of the way up the creek. Otter Creek Dredging Company (John Miscovich) mined from the late 1970s to 1981 near the mouth of Black Gulch and Glen Gulch with backhoe and bulldozer. There has been no mining since 1981.

Production notes:

From 1910 to 1981, 27,925 ounces of gold was produced from Black Creek (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005). From 1916 to 1918, the Union Construction Company dredge alone produced 22,125 ounces of gold, or nearly 80 percent of the gold produced from Black Creek.

Reserves:**Additional comments:****References:**

Mertie, 1936; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Cox and Singer, 1986; Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Mertie, 1936; Bundtzen and others, 1992**Reporter(s):** T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)**Last report date:** 5/21/2003

Site name(s): Glenn Gulch; Mohawk**Site type:** Prospect**ARDF no.:** ID114**Latitude:** 62.4496**Quadrangle:** ID B-4**Longitude:** 157.9266**Location description and accuracy:**

This prospect is south of Otter Creek valley about 0.4 mile east of the mouth of Black Creek. It is at an elevation of about 480 feet, about 0.6 mile northeast of the center of section 11, T. 27 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au, Sb**Other:** Bi, Cu, Hg, Pb, W, Zn**Ore minerals:** Arsenopyrite, diaphorite, kermesite, stibnite**Gangue minerals:** Quartz**Geologic description:**

The Glen Gulch prospect is a steeply-inclined quartz-sulfide vein that is exposed in the Otter Creek placer mine (ID111). The lode consists of sulfide-quartz mineralization in a N5-8E steeply dipping shear zone that cuts monzonite of the 68.7 Ma, Black Creek stock (Bundtzen and others, 1992; Miller and Bundtzen, 1994). The zone can be traced along strike for about 180 feet where it is buried under placer tailings on one end and under vegetation on the other. Major stibnite and arsenopyrite are readily identified in the field. Microprobe studies by Bundtzen and others (1992) also indicates the presence of the silver-antimony-lead sulfosalt, diaphorite, as well as kermesite, and two other unidentifiable silver sulfosalt minerals (Bart Cannon, oral communication, 1991). The mineralization formed during multiple hydrothermal events. Early arsenopyrite is brecciated and cut by stibnite and diaphorite. Brooks (1916) also identified minor cinnabar. Chip and channel samples from the vein contain up to 8.6 parts per million (ppm) gold, 1,019 ppm silver, 36.7 percent antimony, 2,101 ppm copper, 999 ppm lead, more than 2,000 ppm arsenic, 15 ppm bismuth, 135 ppm tungsten, more than 5.0 ppm mercury, and 516 ppm zinc (Bundtzen and others, 1992).

Alteration:

Silicification.

Age of mineralization:

Unknown; the Black Creek stock that hosts the vein is 68.9 Ma (Bundtzen and others, 1992).

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:

The Glenn Gulch prospect was first described by Brooks (1916), and later by Mertie and Harrington (1924), who referred to the prospect as the Mohawk Lode. The U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys mapped and sampled the site in 1988 (Bundtzen and others, 1992).

Production notes:

No lode production; the gold mined from placers above the lode is included with Otter Creek placer mine (ID111).

Reserves:**Additional comments:****References:**

Brooks, 1916; Mertie and Harrington, 1924; Bundtzen and others, 1992; Miller and Bundtzen, 1994.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Golden Horn**Site type:** Mine**ARDF no.:** ID115**Latitude:** 62.4472**Quadrangle:** ID B-4**Longitude:** 157.9224**Location description and accuracy:**

The Golden Horn Mine is at an elevation of about 450 feet, about 0.5 mile southeast of Discovery Camp on Otter Creek. It is about 0.6 mile west-northwest of the center of section 12, T. 27 N., R. 47 W., of the Seward Meridian. The location is accurate. Cobb included the Golden Horn with other nearby lode prospects as locality 11 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au, W**Other:** Ag, As, Hg, Sb**Ore minerals:** Arsenopyrite, chalcopyrite, cinnabar, gold, lead-antimony sulfosalts, scheelite, sphalerite, stibnite**Gangue minerals:** Dolomite, quartz, tourmaline**Geologic description:**

The Golden Horn deposit consists of a set of quartz-sulfide veins that contain free gold, arsenopyrite, chalcopyrite, cinnabar, lead-antimony sulfosalts, stibnite, sphalerite, and scheelite. The veins are in a zone that strikes N20-35E and dips steeply to vertically. The veins occur in irregularly distributed, quartz-filled shear zones in the Black Creek monzodiorite near its contact with shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Mertie, 1936; Bull, 1988; Bundtzen and others, 1992). Secondary biotite in the Black Creek pluton has been dated at 63.0 Ma; this may also be the age of the hydrothermal mineralization as well as the age of emplacement of the intrusion (Bundtzen and others, 1992; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The system of veins varies from 10 to 100 feet thick and can be traced for about 650 feet along strikes. There are several other similar veins nearby including the Minnie Gulch and Mohawk prospects (Bundtzen and others, 1992).

The Golden Horn deposit was discovered in 1921 by Rasmus Nielson; he sank a 50-foot shaft and drove 200 feet of drifts. Later, John Warren drove a 130-foot shaft. The deposit was mined by the Golden Horn Mining Company of W.E. Dunkle and Partners Mines of New York in late 1934 and 1935. By 1938, the underground workings totaled about 1,800 feet in four levels of drifts, two shafts, and several crosscuts (Bundtzen and others, 1992). From 1977 to 1981, WGM, Inc., Union Carbide, and others drilled several diamond core and RC holes at the mine (but the total footage is not available). In 1984, Bull (1988) completed a University of Alaska masters thesis on the property based partly on studies of core from previous exploration work. During the 1980s to early 1990s, John Miscovich sluiced the upper zone of the vein system using hydraulic mining techniques and recovered free gold and gold-bearing, sulfide-scheelite concentrates. In 1988, Bundtzen and Miller produced a detailed geologic sketch of the Golden Horn prospect, which had been stripped by John Miscovich for mining purposes, and collected a number of chip-channel samples (Bundtzen and others, 1992). From 1997 to 2000, WGM Inc. carried out exploration work on the property.

From 1922 to 1937, about 2,707 ounces of gold, 2,620 ounces of silver, 9,337 pounds of lead and 518 pounds of zinc were produced from the Golden Horn Mine. Based on examination of published and unpublished surface and subsurface exploration data, Bundtzen and others (1992) estimated that the Golden Horn deposit contained a minimum, inferred resource of 148,000 tons of material that contains 0.35 ounces of

gold per ton and 75 ounces of silver per ton.

Alteration:

The alteration in and near the veins is marked by tourmaline and chlorite; abundant secondary biotite in host pluton.

Age of mineralization:

Secondary biotite in the host pluton is 63.0 Ma; this is possibly the age of the mineralization.

Deposit model:

Polymetallic vein or Porphyry Au-Cu (Cox and Singer, 1986; models 22c and 20a).

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

22c or 20a

Production Status: Yes

Site Status: Active

Workings/exploration:

The Golden Horn deposit was discovered in 1921 by Rasmus Nielson; he sank a 50-foot shaft and drove 200 feet of drifts. Later, John Warren drove a 130-foot shaft. The deposit was mined by the Golden Horn Mining Company of W.E. Dunkle and Partners Mines of New York in late 1934 and 1935. The principal vein averaged about 12 inches thick; it had sufficient grade to sustain a mining width of about 5 feet. The wall rocks of the veins were gold bearing, probably averaging about 0.2 ounce of gold per ton. Some narrow zones contained as much as 45 ounces of gold per ton and hand sorted material shipped to the U.S. Mint contained about 6 ounces of gold per ton. Mining conditions were, however, difficult and the operation did not remain profitable, especially since a 25 percent royalty had to be paid to the owners of the mine (John Miscovich, oral communication, 2002). The ore was not milled before shipping and a stockpile of probably several thousand tons of material remain that contain about an ounce of gold per ton. By 1938, the underground workings totaled about 1,800 feet in four levels of drifts, two shafts, and several crosscuts (Bundtzen and others, 1992).

From 1977 to 1981, WGM, Inc., Union Carbide, and others drilled several diamond core and RC holes at the mine (but the total footage is not available). In 1984, Bull (1988) completed a University of Alaska masters thesis on the property based partly on studies of core from previous exploration work. During the 1980s to early 1990s, John Miscovich sluiced the upper zone of the vein system using hydraulic mining techniques and recovered free gold and gold-bearing, sulfide-scheelite concentrates. In 1988, Bundtzen and Miller produced a detailed geologic sketch of the Golden Horn prospect, which had been stripped by John Miscovich for mining purposes, and collected a number of chip-channel samples (Bundtzen and others, 1992). From 1997 to 2000, WGM Inc. carried out exploration work on the property.

Production notes:

The richest ore was mined on several underground levels beginning in 1922 and continued intermittently until about 1937. The main period of mining was in 1934 and 1935 by the Golden Horn Mining Co. The last ore shipment was in late 1937 (Maloney, 1962). From 1922 to 1937, about 2,707 ounces of gold, 2,620 ounces of silver, 9,337 pounds of lead and 518 pounds of zinc were produced from the Golden Horn Mine (Bundtzen and others, 1992). Free gold, and auriferous sulfide and scheelite concentrates were recovered and shipped to buyers intermittently from the 1980s to early 1990s by Miscovich Mining Company (John Miscovich oral communication, 1992).

Reserves:

Based on examination of published and unpublished surface and subsurface exploration data, Bundtzen and others (1992) estimated that the Gold Horn deposit contained a minimum, inferred resource of 148,000 tons of material that contains 0.35 ounces of gold per ton and 75 ounces of silver per ton.

Additional comments:

References:

Mertie, 1936; Maloney, 1962; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bull, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bull, 1988; Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/21/2003

Site name(s): Golden Ground (Neilson) Prospect**Site type:** Prospect**ARDF no.:** ID116**Latitude:** 62.4889**Quadrangle:** ID B-4**Longitude:** 157.9116**Location description and accuracy:**

The Golden Ground or Neilson prospect is at an elevation of about 1,750 feet in a nearly flat saddle on the flank of a steep west-facing hill at the head of Granite Creek. The prospect is about 2.6 miles north-northeast of Discovery camp on Otter Creek and about 0.1 mile northwest of the center of section 25, T. 28 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Au**Other:** As, Bi, Cd, Cu, Hg, Pb, Sb, W, Zn**Ore minerals:** Arsenopyrite, galena, pyrite, scheelite, sulfosalts**Gangue minerals:** Quartz**Geologic description:**

The Golden Ground or Neilson prospect is a thin, north-trending, steeply dipping, quartz-sulfide vein associated with a swarm of veinlets that cut augite basalt that forms a roof pendant overlying a monzodiorite stock. The stock has been dated as 70.5 Ma (Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The vein varies from 0.4 to 2 inches thick and has been explored by two adits with 50 to 60 feet of drift (Holzheimer, 1926). The thin quartz veins contain megascopic grains of arsenopyrite, galena, scheelite, and pyrite. Grab samples contain up to 50.0 parts per million (ppm) gold, 2,000 ppm silver, 2.00 percent lead, 1.00 percent antimony, 5,000 ppm copper, 2,000 ppm tungsten, 1,000 ppm zinc, more than 1.00 percent arsenic, 300 ppm cadmium, 40 ppm bismuth, and more than 10.0 ppm mercury (McGimsey and others, 1988). The high silver, copper, lead, arsenic, and antimony, values suggest that unidentified sulfosalt minerals are also present. One sample contained the highest silver value known from the Iditarod quadrangle.

Alteration:**Age of mineralization:**

Undated; the nearby monzodiorite pluton is 70.6 Ma (Bundtzen and others, 1992).

Deposit model:

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

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

22c

Production Status: Undetermined.**Site Status:** Inactive**Workings/exploration:**

Lode prospecting in this area was reported by Brooks (1914). The Golden Ground vein was possibly discovered or developed by Rasmus Neilson, a Danish geologist who discovered the Golden Horn vein (ID115). The prospect was explored with 50 to 60 feet of drifts before 1926 (Holzheimer, 1926). Additional lode activity was reported in the area by Mertie (1936). Surface samples were collected by the Alaska Division of Geological and Geophysical Surveys and U.S. Geological Survey in the 1980s (McGimsey and others, 1988; Bundtzen and others, 1992). An exploration tunnel that was caved by 1933 and described by Cobb (1976 [OFR 76-576]) as the Malemute Gulch lode may be this prospect.

Production notes:

According to John Miscovich (oral communication, 2002) a small amount of high-grade gold ore from the Golden Ground prospect may have been included with production from the Golden Horn Mine (ID115).

Reserves:**Additional comments:****References:**

Brooks, 1914; Holzheimer, 1926; Mertie, 1936; Cobb, 1976 (OFR 76-576); McGimsey and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Prince Creek**Site type:** Mine**ARDF no.:** ID117**Latitude:** 62.3554**Quadrangle:** ID B-4**Longitude:** 157.9116**Location description and accuracy:**

Prince Creek flows southeast from Chicken Mountain to Bonanza Creek. Most of the mining took place in two sections. The upper section is about 1 mile long and is centered in the SW1/4 SE1/4 section 2, T. 26 N., R. 47 W., of the Seward Meridian. The lower section extends for about a mile above its mouth. The two productive sections were described as localities 28 and 29 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]). The coordinates are at about the middle of the lower workings about 0.2 mile southwest of the center of section 12, T. 26 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg, Zr**Ore minerals:** Chromite, cinnabar, gold, ilmenite, stibnite**Gangue minerals:** Garnet, zircon**Geologic description:**

The Prince Creek placer deposit extends for about 3 miles in modern alluvium and several levels of ancestral terraces that are developed on its asymmetrical east bank. The stream heads on the southeast flank of Chicken Mountain and lode deposits there are probably the source of the gold. The ancestral Prince Creek channel was beheaded by Chicken Creek in Tertiary time. Hence, placer gold and heavy minerals from both Prince and Chicken Creeks have been eroded from the same lode sources on Chicken Mountain (ID107 and ID109) (Bundtzen, Cox, and Veach, 1987, Bundtzen and others, 1992; Miller and Bundtzen, 1994). In addition to gold, the principal heavy minerals in concentrates include cinnabar, which is locally very abundant, chromite, ilmenite, zircon, and garnet (Maloney, 1962; Bundtzen, Cox, and Veach, 1987). The garnet only appears in the lowest end of the paystreak where the stream bisects a garnetiferous granite-porphry sill (Bundtzen and others, 1992). The gold fineness varies from 838 to 886; the bench placers have the highest fineness.

The upper section of Prince Creek was mined in 1932 and 1933 (Mertie, 1936). The rocks in the vicinity are banded argillite of the Upper Cretaceous, Kuskokwim Group. The gold-bearing material was mainly monzonite-rich sand overlain by 20 to 30 feet of overburden. Harry Agoff mined on the creek from the 1920s to the early 1950s. His son Alvin Agoff mined on Prince Creek from the late 1950s to about 1990 (Bundtzen and others, 1992). Based on unpublished and published sources, Bundtzen and others (1992) estimated that at least 33,864 ounces of gold and 3,979 ounces of silver were produced from 1913 to 1990.

Alteration:**Age of mineralization:**

Unknown; the older bench placers may be Late Tertiary in age and the modern stream placers are probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes**Site Status:** Active**Workings/exploration:**

Exploration and mining on Prince Creek began in 1913. In 1932 and 1933, upper Prince Creek was mined near the discovery claim (Mertie, 1936). The eastern benches were first developed in the 1930s. Early drift mining of bench placers later gave way to open cut mining methods that relied on large scale hydraulic removal of the overburden (Mertie, 1936). Harry Agoff mined on the creek from the 1920s to the early 1950s. His son Alvin Agoff mined on Prince Creek from the late 1950s to about 1990 (Bundtzen and others, 1992).

Production notes:

Based on unpublished and published sources, Bundtzen and others (1992) estimated that at least 33,864 ounces of gold and 3,979 ounces of silver were produced from 1913 to 1990.

Reserves:

An unidentified placer gold resource probably is present in the eastern bench deposits of Prince Creek.

Additional comments:**References:**

Mertie, 1936; Maloney, 1962; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992; this record**Reporter(s):** T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)**Last report date:** 5/24/2003

Site name(s): Malemute Gulch (Pup)**Site type:** Mine and prospect**ARDF no.:** ID118**Latitude:** 62.4590**Quadrangle:** ID B-4**Longitude:** 157.9109**Location description and accuracy:**

The Malemute Gulch Mine and prospect are on the north side of Otter Creek about 1 mile northeast of Discovery camp. The mouth of the gulch is at an elevation of 400 feet in the SE1/4 section 1, T. 27 N., R. 47 W., of the Seward Meridian. Malemute Gulch or Pup is locality 32 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** As, Hg**Ore minerals:** Arsenopyrite, cinnabar, gold (lode), cassiterite, chromite, ferberite, realgar, scheelite (placer)**Gangue minerals:** Allanite, calcite, quartz (lode), zircon (placer)**Geologic description:**

This record includes both a lode and a placer deposit in what is locally called Malemute Gulch. The lode deposit consists of a N15-25E, steeply dipping quartz-calcite-sulfide vein that contains arsenopyrite, cinnabar, and a considerable amount of gold (Mertie, 1936; Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005). A 70-foot drift, now caved, explored the deposit. Mertie (1936) first suggested that the Malemute Gulch lode is on the projection of the Golden Horn veins (ID115) exposed about 0.6 mile to the southwest.

A formerly productive, residual placer deposit overlies the lode. The gold fineness in the placer averages 832 (Bundtzen, Cox, and Veach, 1987; Smith, 1941 [B 910]). The placer concentrates contained scheelite, chromite, ferberite, realgar, cinnabar, allanite, zircon, and cassiterite. From 1912 to 1952, the placer produced 1,907 ounces of gold and 241 ounces of silver (Miller, Bundtzen, and Gray, 2005). The placer concentrates contained up to 1.80 percent W₃, 500 parts per million antimony, and 1.76 percent mercury as cinnabar (Maloney, 1962).

Alteration:**Age of mineralization:**

The placer deposit is probably Quaternary. The lode deposit may be 63.0 Ma by analogy with the Golden Horn Mine (ID115).

Deposit model:

Polymetallic vein or Porphyry Au-Cu for the lode; also a placer gold deposit (Cox and Singer, 1986; models 22c or 20a and 39a).

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

22c or 20a and 39a

Production Status: Yes

Site Status: Inactive

Workings/exploration:

A 70-foot drift, now caved, explored the lode deposit. The overlying placer deposit was intermittently mined by open-cut mining methods from 1912 to 1952. It is not clear where the caved adit is in respect to the placer deposit. Mertie (1936) indicated a lode prospect '100 yds' below Malemute Gulch. Maloney (1962) stated that the caved adit was 400 feet west of the gulch. A caved adit that T.K. Bundtzen visited was within the area that was placer mined.

Production notes:

From 1912 to 1952, the placer produced 1,907 ounces of gold and 241 ounces of silver (Miller, Bundtzen, and Gray, 2005). The placer concentrates contained up to 1.80 percent W03, 500 parts per million antimony, and 1.76 percent mercury as cinnabar (Maloney, 1962).

Reserves:

Additional comments:

References:

Mertie, 1936; Smith, 1941 (B 910-C); Maloney, 1962; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Mertie, 1936

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/21/2003

Site name(s): Unnamed (on lower Prince Creek)**Site type:** Occurrence**ARDF no.:** ID119**Latitude:** 62.3499**Quadrangle:** ID B-4**Longitude:** 157.9089**Location description and accuracy:**

This lode occurrence is exposed in a placer cut on Prince Creek, at an elevation of about 400 feet. It is near the center of the south boundary of section 12, T. 26 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Bi, Hg, W**Ore minerals:** Cinnabar, scheelite**Gangue minerals:** Quartz**Geologic description:**

This occurrence consists of two quartz-sulfide veinlets in and adjacent to a 6-foot-thick monzonite dike that intrudes hornfels derived from the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994). The two veinlets average about 1 inch thick, strike N20E and dip 75SE. Their length is unknown as exposures were limited to the placer cut. Cinnabar and scheelite were noted in one vein (T.K. Bundtzen, unpublished field data, 1984). One grab sample contained 3,400 parts per billion (ppb) gold, 10.0 parts per million (ppm) silver, 1,380 ppm tungsten, 78 ppm bismuth, and 820 ppb mercury (McGimsey and others, 1988; Bundtzen and others, 1992).

Alteration:**Age of mineralization:****Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988; Bundtzen and others, 1992).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Slate Creek**Site type:** Mine**ARDF no.:** ID120**Latitude:** 62.4150**Quadrangle:** ID B-4**Longitude:** 157.9031**Location description and accuracy:**

The Slate Creek Mine is actually composed of two separated placer deposits in the basin of Slate Creek, a tributary of Otter Creek. The eastern placer extends for about 2.2 miles in the main valley of Slate Creek (as labeled on the USGS topographic map). Its center is at an elevation of about 500 feet and it extends through the E1/2 of section 24, T. 27 N., R. 47 W., of the Seward Meridian. The coordinates above are the center of the eastern placer. The other placer is about a half mile to the west. It extends for about 1.2 mile through the SE1/4 of section 23 and the NE1/4 of section 24, T. 27 N., R. 47 W., of the Seward Meridian. The main (east) Slate Creek deposit is locality 35 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Hg, W**Ore minerals:** Cinnabar, gold, scheelite**Gangue minerals:****Geologic description:**

The Slate Creek Mine consists of two separated, north-trending, paystreaks in the Slate Creek valley, a tributary of Otter Creek. The western paystreak is an ancestral channel of Slate Creek that is perched about 250 feet vertically above the modern stream. The western paystreak is about 1.2 mile long and about 320 feet wide. The eastern paystreak, which follows the modern channel of Slate Creek, is about 2.2 miles long and about 250 feet wide. The eastern paystreak lies wholly on slate and sandstone of the Cretaceous Kuskokwim Group; the western paystreak lies in part on volcanic and plutonic rocks of the Upper Cretaceous, Chicken Mountain volcano-plutonic complex (Bundtzen and Miller, 1997). Placer gold was found in the lower 10 feet of gravel with little gold on or in bedrock (Cobb, 1976 [OFR 76-576]). A panned concentrate sample contained 8.5 ounces of gold per ton, 2.6 ounces of silver per ton, 0.03 percent tungsten, 0.28 percent mercury (Maloney, 1962).

From 1915 to 1952, Slate Creek produced 3,483 ounces of gold and 592 ounces of silver (Miller, Bundtzen, and Gray, 2005). Slate Creek has lower grade gold values compared to other placers in the Iditarod district and mining was not always profitable.

Alteration:**Age of mineralization:**

Probably Tertiary and Quaternary by analogy with other placer deposits in Interior Alaska (Hopkins and others, 1971).

Deposit model:

Placer Au deposit (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:**

There was open cut placer mining on Slate Creek from 1915 to 1962 (Cobb, 1976 [OFR 76-576]; Bundtzen and others, 1992).

Production notes:

From 1915 to 1952, Slate Creek produced 3,483 ounces of gold and 592 ounces of silver (Miller, Bundtzen, and Gray, 2005). Peter Miscovich mined here from 1924 to 1931 with an operation that featured a hydraulic lift. Gus Uotila and John Ogriz initiated bulldozer mining of the paystreak in 1932 and continued intermittently until 1952. 1921 and continued until about 1925. Slate Creek has lower grade gold values compared to other placers in the Iditarod district and mining was not always profitable.

Reserves:**Additional comments:****References:**

Maloney, 1962; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cobb, 1976 (OFR 76-576); this record**Reporter(s):** T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)**Last report date:** 5/21/2003

Site name(s): Unnamed (north of Discovery Camp)**Site type:** Occurrence**ARDF no.:** ID121**Latitude:** 62.4884**Quadrangle:** ID B-4**Longitude:** 157.9003**Location description and accuracy:**

This occurrence is at the top of a prominent, north-trending peak about 2.7 mile north-northeast of Discovery Camp on Otter Creek. The occurrence is at an elevation of about 2,200 feet and about 0.3 mile east of the center of section 25, T. 28 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, As, Hg, Sb, W**Ore minerals:** Iron oxide**Gangue minerals:** Quartz, tourmaline**Geologic description:**

This occurrence consists of iron-oxide-stained rubble of a quartz vein of unknown extent. The vein is in an aureole of hornfels that overlies an intrusion exposed to the west at the Golden Ground prospect (ID116). The mineralized rubble also contains fragments of brecciated, hornfelsed sandstone with tourmaline rosettes (Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The prospect was developed by one trench that is now sloughed and overgrown. Grab samples of mineralized rubble contain up to 1,000 parts per billion (ppb) gold, 1,000 ppb silver, 650 parts per million (ppm) antimony, more than 2,000 ppm arsenic, 2,000 ppm boron, 50 ppm tungsten, and more than 10.0 ppm mercury (McGimsey and others, 1988). The high boron value probably reflects the presence of tourmaline.

Alteration:

Tourmaline-mica greisen is developed in the hornfels.

Age of mineralization:

Undated; probably related to a nearby intrusion that is 70.6 Ma (Bundtzen and others, 1992).

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 trench cut prior to 1986 explored the mineralized area. The area was sampled by the U.S. Geological Survey in 1986 (McGimsey and others, 1988; Bundtzen and others, 1992).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: McGimsey and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Granite Creek**Site type:** Mine**ARDF no.:** ID122**Latitude:** 62.4647**Quadrangle:** ID B-4**Longitude:** 157.9000**Location description and accuracy:**

About 0.8 miles in the middle portion of Granite Creek has been mined and the workings are shown on the USGS 1:63,360-scale topographic map. The center of the workings is at an elevation of about 600 feet in the SE1/4, section 36, T. 28 N., R. 47 W., of the Seward Meridian. The location is accurate. Granite Creek is locality 32 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, As, Cr, Hg, W**Ore minerals:** Arsenopyrite, chromite, cinnabar, gold, ilmenite, scheelite**Gangue minerals:****Geologic description:**

Placer gold has been mined on Granite Creek since 1910 (Mertie, 1936). The deposit developed where the creek dissects mineralized volcanic and plutonic rocks north of Otter Creek (Bundtzen and others, 1992). The gold fineness averages 854 (Mertie, 1936). Heavy minerals identified in concentrates include gold, arsenopyrite, cinnabar, scheelite, chromite, and ilmenite (Mertie, 1936; Bundtzen, Cox and Veach, 1987). The placer gold was very fine grained and shotty; about 1.5 feet of bedrock was dug up to recover the gold (Cobb, 1976 [OFR 76-576]). Granite Creek has produced at least 4,750 ounces of gold and 636 ounces of silver since the early 20th century (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005). These production estimates derived from incomplete mint records are probably conservative.

Alteration:**Age of mineralization:**

Unknown; probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes**Site Status:** Active?**Workings/exploration:**

Mining began on Granite Creek in 1908 using scrapers working in open cuts; the most extensive mining took place between 1924 and 1940 (Cobb, 1976 [OFR 76-576]).

Production notes:

Granite Creek has produced at least 4,750 ounces of gold and 636 ounces of silver since the early 20th century (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005). These production estimates derived from incomplete mint records are probably conservative.

Reserves:**Additional comments:****References:**

Mertie, 1936; Kimball, 1969; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); McGimsey and others, 1988; Bundtzen and others, 1992; Morgan, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (northwest of upper Otter Creek)**Site type:** Occurrence**ARDF no.:** ID123**Latitude:** 62.4974**Quadrangle:** ID B-4**Longitude:** 157.8611**Location description and accuracy:**

This occurrence is in a saddle of a northeast-trending ridge about 4 miles northeast of Discovery camp on Otter Creek and 0.2 mile northeast of hill 1807. The occurrence is at an elevation of about 1,700 feet near the southwest corner of section 20, T. 28 N., R. 46 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Pb**Other:** As, Bi, Cd, Cu, Sb, Sn, Zn**Ore minerals:** Iron oxide**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a zone of quartz stringers in heavily iron-oxide-stained sandstone of the Upper Cretaceous, Kuskokwim Group. The quartz stringers are next to a quartz-feldspar porphyry dike (Bundtzen and others, 1992). The dike trends northeast along the ridge. Grab samples contained up to 200 parts per million (ppm) silver, 2.00 percent lead, more than 2,000 ppm antimony, 2,000 ppm zinc, 200 ppm copper, 50 ppm tin, 1,600 ppm arsenic, 100 ppm cadmium, and 18 ppm bismuth (McGimsey and others, 1988; Bundtzen and others, 1992). The primary sulfides are entirely oxidized, but the original primary minerals probably included galena or a lead sulfosalt and sphalerite.

Alteration:

Intense iron-oxide staining.

Age of mineralization:

Undated; a nearby intrusion is 70.5 Ma (Bundtzen and others, 1992).

Deposit model:

Sn-polymetallic deposit or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1986 (McGimsey and others, 1988; Bundtzen and others, 1992).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (north bank of Bonanza Creek)**Site type:** Occurrence**ARDF no.:** ID124**Latitude:** 62.3564**Quadrangle:** ID B-4**Longitude:** 157.8272**Location description and accuracy:**

This occurrence is exposed on a small bluff on the north side of Bonanza Creek, about 2.0 miles northeast of the mouth of First Chance Creek. It is about 0.3 mil west-southwest of the center of section 9, T. 26 N., R. 46 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Sb**Other:** Ag, As, Au, Pb**Ore minerals:** Stibnite**Gangue minerals:** Quartz**Geologic description:**

This prospect is a stibnite-quartz vein up to 3 feet thick near a granite porphyry dike or sill that is similar to the sill at the occurrences about a half mile to the northeast (ID124) (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005). The rocks in the area are shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994). The orientation of the vein is uncertain. Masses of stibnite up to 1 inch thick were noted in the quartz gangue of the vein but no other sulfides were identified. Grab samples contained more than 1.00 percent antimony, 1.0 part per million (ppm) silver, 300 ppm lead, 120 ppm arsenic, and a trace of gold (McGimsey and others, 1988).

Alteration:

Silicification.

Age of mineralization:**Deposit model:**

Simple Sb vein (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:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (north bank of Bonanza Creek)**Site type:** Occurrence**ARDF no.:** ID125**Latitude:** 62.3588**Quadrangle:** ID B-4**Longitude:** 157.8141**Location description and accuracy:**

This occurrence is at the base of a small bluff on the north side of Bonanza Creek, about 2.5 miles northeast of the mouth of First Chance Creek. The prospect is adjacent to Bonanza Creek. The prospect is near the center of section 9, T. 26 N., R. 46 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Hg**Ore minerals:****Gangue minerals:** Quartz**Geologic description:**

This occurrence is a stockworks of quartz veinlets in a granite-porphyry sill that outcrops along the north bank of Bonanza Creek, 2.5 miles northeast of the mouth of First Chance creek. The zone of veinlets is 3-6 feet thick and can only be seen in outcrops along the stream. Some silicification was noted in other areas of the outcrop (Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Grab samples contained up to 2,900 parts per billion (ppb) gold and 1,700 ppb mercury (McGimsey and others, 1988).

Alteration:

Silicification.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and others, 1992

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (84MSL146)**Site type:** Occurrence**ARDF no.:** ID126**Latitude:** 62.3634**Quadrangle:** ID B-4**Longitude:** 157.6056**Location description and accuracy:**

This occurrence is on a northeast-trending ridge between Ruby Creek and Moose Creek. The occurrences is at an elevation of about 1,650 feet, about 0.7 mile southeast of hill 1949, and about 0.5 mile north-northwest of the center of section 10, T. 26 N., R. 45 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg, Sb**Other:** As, Cr**Ore minerals:** Unspecified sulfides**Gangue minerals:** Calcite, quartz**Geologic description:**

This occurrence is a zone of quartz-calcite veins in an altered silica-carbonate dike. A prospect pit, now partly sloughed, was sunk on the dike (Bundtzen and others, 1992; Miller, Bundtzen, and Gray, 2005). One grab sample of the altered dike contained 54 parts per million (ppm) antimony, 900 parts per billion mercury, 100 ppm arsenic, and 1,000 ppm chromium (McGimsey and others, 1988). The silica-carbonate alteration and the elevated chromium content suggests that the dike was originally of mafic or ultramafic composition.

Alteration:

Silica-carbonate alteration of dike.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Bundtzen and others, 1992; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (south of Beaver Creek)**Site type:** Occurrence**ARDF no.:** ID127**Latitude:** 62.3923**Quadrangle:** ID B-3**Longitude:** 157.3680**Location description and accuracy:**

This occurrence is on a northeast-trending ridge about 1.2 mile south of Beaver Creek, a tributary of the George River. The occurrence is on hill 1815 in the NE1/4 NE1/4 section 35, T. 27 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Hg**Ore minerals:****Gangue minerals:** Quartz**Geologic description:**

This occurrence is a silicified breccia of unknown extent and orientation in sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One grab sample of silicified breccia contained 50 parts per billion (ppb) gold and 1,400 ppb mercury (McGimsey and others, 1988).

Alteration:

Silicification of sandstone.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Surface samples were collected by the Alaska Division of Geological and Geophysical Surveys in 1984 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (north of Beaver Creek)**Site type:** Occurrence**ARDF no.:** ID128**Latitude:** 62.4351**Quadrangle:** ID B-3**Longitude:** 157.3356**Location description and accuracy:**

This occurrence is on a north-trending ridge about 3 kilometers north of Beaver Creek, a tributary of the George River. The occurrence is at an elevation of about 1,400 feet, about 0.2 mile south-southwest of hill 1445 and near the northwest corner of section 18, T. 27 N., R. 43 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Mn**Other:** Hg, Mo**Ore minerals:** Pyrolusite**Gangue minerals:****Geologic description:**

This occurrence is an extensive pyrolusite-bearing bed or layer in sandstone, shale and volcanoclastic conglomerate of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The blue-gray zone of semi-massive pyrolusite is about 3 feet thick and can be traced for about 1,000 feet along strike. Grab samples of the sandstone with pyrolusite contained more than 0.5 percent manganese, 240 parts per billion (ppb) mercury, and 10.0 parts per million (ppm) molybdenum (McGimsey and others, 1988).

Alteration:**Age of mineralization:**

Late Cretaceous?

Deposit model:

Probably sedimentary Mn (Cox and Singer, 1986; model 34b).

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

34b

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and the Alaska Division of Geological and Geophysical Surveys in 1984 (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (southwest of Beaver Creek)**Site type:** Occurrence**ARDF no.:** ID129**Latitude:** 62.3955**Quadrangle:** ID B-3**Longitude:** 157.2947**Location description and accuracy:**

This occurrence is at an elevation of about 700 feet in a minor tributary to upper Beaver Creek. The occurrence is on the south side of Beaver Creek about 5 miles above its mouth. It is in the SE1/4 SW1/4 section 29, T. 27 N., R. 43 W., of the Seward Meridian.

Commodities:**Main:** Au**Other:****Ore minerals:** Gold**Gangue minerals:****Geologic description:**

This previously undescribed placer occurrence is in an unnamed gulch about 5 miles upstream from the mouth of Beaver Creek. The rocks in the vicinity are shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The nonmagnetic fraction of a concentrate panned from stream alluvium contained visible grains of gold (Bennett and others, 1988).

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

Placer Au deposit (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:**

Samples were collected by the U.S. Geological Survey in 1985 (Bennett and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Bennett and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bennett and others, 1988; Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Bismarck Creek**Site type:** Prospect**ARDF no.:** ID130**Latitude:** 62.4233**Quadrangle:** ID B-3**Longitude:** 157.0246**Location description and accuracy:**

This prospect is on an east-west trending ridge on the divide between the Bismarck and Eldorado Creek, both tributaries of the George River. The prospect is at an elevation of about 2,200 feet about 0.2 mile southwest of hill 2475 near the southwest corner of section 14, T. 27 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Sn**Other:** As, Cd, Cu, F, In, Pb, Zn**Ore minerals:** Cassiterite, iron oxide**Gangue minerals:** Anatase, axinite, quartz, tourmaline**Geologic description:**

This prospect is an east to northeast-trending stockworks of oxidized quartz veins and veinlets that contains cassiterite, axinite, and tourmaline in hornfels derived from the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997). The deposit is within a 1.7 by 2 mile aureole of hornfels. The area is cut by north-northeast striking faults, one of which apparently controls the course of Bismarck Creek.

The mineralized zone can be traced in rubble for more than 1,000 feet and varies from 6 to 100 feet wide. The sulfides have been completely oxidized leaving behind a heavy residue of reddish to orange gossan. Black cassiterite has been confirmed in polished sections from the zone. The deposit is associated with brecciated blocks of altered sandstone and siltstone floating in a matrix of quartz and gossan (Bundtzen and Miller, 1997). No intrusive rocks have been identified at the site; however, a large area centered on VABM 2424 is underlain by biotite-pyroxene hornfels that suggests a buried pluton here (Miller and Bundtzen, 1994).

Chip-channel samples contain up to 2.80 percent tin, 63 parts per million (ppm) silver, 590 ppm copper, 4,600 ppm lead, more than 1.00 percent zinc, 1,100 ppm arsenic, and 310 ppm antimony (Bundtzen and Miller, 1997; McGimsey and others, 1988). Selected samples also contained up to 118 ppm indium (Miller, Bundtzen, and Gray, 2005). Based on extensive surface sampling, Bundtzen and Miller (1997) estimated that this prospect near Bismarck Creek contains an inferred resource of about 550,000 tons of material that contain 0.14 percent tin, 50.0 ppm silver, and about 0.75 percent combined base metals.

Alteration:

Axinite-tourmaline-quartz 'greisen'.

Age of mineralization:**Deposit model:**

Sn-polymetallic vein or polymetallic vein (Cox and Singer, 1986; models 20b and 22c).

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

20b or 22c

Production Status: None

Site Status: Inactive

Workings/exploration:

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s. Bundtzen and Miller (1997) provide a geologic sketch and analyses from the prospect.

Production notes:

Reserves:

Based on extensive surface sampling, Bundtzen and Miller (1997) estimated that this prospect near Bismarck Creek contains an inferred resource of about 550,000 tons of material that contain 0.14 percent tin, 50.0 ppm silver, and about 0.75 percent combined base metals.

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Miller, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (head of Bismarck Creek)**Site type:** Occurrence**ARDF no.:** ID131**Latitude:** 62.4163**Quadrangle:** ID B-2**Longitude:** 157.0098**Location description and accuracy:**

This occurrence is at an elevation of about 2,300 feet, about 0.6 mile east of the Bismarck Creek prospect (ID130). It is about 0.6 mile south-southeast of hill 2475 and near the center of section 23, T. 27 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Cu**Other:** Ag, As, Sb**Ore minerals:** Iron oxide**Gangue minerals:****Geologic description:**

This occurrence is a gossan of unknown size and orientation. Any original sulfides have been completely oxidized. The gossan is at the edge of a large area of hornfels derived from the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). One grab sample of gossan from the occurrence contained 500 parts per million (ppm) copper, 140 ppm antimony, 500 ppb silver, and 20 ppm arsenic (McGimsey and others, 1988).

Alteration:

Pervasive oxidation.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Granite Creek (Pup)**Site type:** Mine**ARDF no.:** ID132**Latitude:** 62.3562**Quadrangle:** ID B-2**Longitude:** 156.9829**Location description and accuracy:**

The Granite Pup Mine is along a short, unnamed, 1.5-mile-long tributary to upper Granite Creek. The coordinates are for the midpoint of the placer which is about 0.2 mile north-northeast of hill 917 and about 0.2 mile south of the center of section 12, T. 26N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg, Sb, Sn**Ore minerals:** Cassiterite, cinnabar, gold, ilmenite, pyrite, stibnite**Gangue minerals:** Garnet, zircon**Geologic description:**

The Granite Pup placer is a shallow fluvial deposit in an unnamed tributary of Granite Creek. The paystreak which is about 1 miles long, occurs in gravel 3 to 6 feet thick that is overlain by 6 to 12 feet of organic muck (Bundtzen, Miller, and Laird, 1986). The paystreak ranges from at least 32 to 130 feet wide. The source of some of the placer gold and associated heavy minerals is an east-west-trending, granite porphyry dike swarm that cuts shale and sandstone of the Upper Cretaceous, Kuskokwim Group. The Wyrick Sb-Au lode (ID133) is adjacent to this placer deposit and may be the source of the gold in the placer (Bundtzen, Miller, and Laird, 1986).

The average grade of the placer was about 0.024 ounce of gold per cubic yard (L.E. Wyrick, oral communication, 1987). The principal heavy minerals identified in concentrates include ilmenite, zircon, cinnabar, garnet, cassiterite, stibnite, and pyrite (Bundtzen, Cox, and Veach, 1987). The gold fineness ranges from 838 to 871; there are at least two distinct populations of gold suggesting that there is more than one lode source for the placer deposit.

The Granite Pup placer was found in 1924 by William Duffy. By 1925, Duffy and others drift-mined along the lower end of the paystreak for a distance of about 1,300 feet. Small scale underground mining took place into the 1930s but ceased by 1935. In 1979, Jack Hayden produced small quantities of placer gold using a suction dredge. From 1984 to 1990, L. E. Wyrick assembled a mechanized mining plant; he sluiced the deposit and produced most of the gold credited to Granite Pup. JR Mining Corporation explored the placer deposit with heavy equipment in 1994. Thirty-two pits were dug along ten lines. This work indicates that an estimated 1,600 ounces of placer gold is contained in approximately 41,212 cubic yards of gravel, mainly at the lower end of the creek (Glavinovich and Morgan, 1994).

Miller, Bundtzen, and Gray (2005) estimated that 3,250 ounces of gold and 400 ounces of silver were produced from 1924 to 1990.

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes

Site Status: Active?

Workings/exploration:

The Granite Pup deposit was discovered by William Duffy in 1924. By 1925, Duffy and others drift-mined along the lower end of the paystreak for a distance of about 1,300 feet. Small scale underground mining took place into the 1930s but ceased by 1935. Unpublished mint records indicate that 156 oz gold and 21 oz silver were produced on Granite Pup prior to 1935; these are probably conservative estimates (Bundtzen and others, 1986). In 1979, Jack Hayden a small quantity of placer gold using a suction dredge. From 1984 to 1990, L. E. Wyrick assembled a mechanized mining plant; he sluiced the deposit and produced most of the gold credited to Granite Pup. Morgan (1992) and Glavinovich and Morgan (1994) conducted exploration and mine feasibility analyses for Granite Pup and the Granite Creek placer system.

Production notes:

Miller, Bundtzen, and Gray (2005) estimated that 3,250 ounces of gold and 400 ounces of silver were produced from 1924 to 1990.

Reserves:

JR Mining Corporation explored the placer deposit with heavy equipment in 1994. Thirty-two pits were dug along ten lines. This work indicates that an estimated 1,600 ounces of placer gold is contained in approximately 41,212 cubic yards of gravel, mainly at the lower end of the creek (Glavinovich and Morgan, 1994).

Additional comments:

References:

Bundtzen, Miller, and Laird, 1986; Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Miller, and Laird, 1986

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Wyrick**Site type:** Prospect**ARDF no.:** ID133**Latitude:** 62.3552**Quadrangle:** ID B-2**Longitude:** 156.9811**Location description and accuracy:**

The Wyrick prospect is at the approximate center of the Granite Pup placer deposit (ID132). The prospect is about 0.2 mile north-northeast of hill 917 and about 0.2 mile south of the center of section 12, T. 26 N., R. 42 W., of the Seward Meridian. The location of the prospect is accurate.

Commodities:**Main:** Au, Sb**Other:** Ag, Hg, Pb**Ore minerals:** Kermesite, pyrite, stibiconite, stibnite**Gangue minerals:** Quartz**Geologic description:**

The Wyrick prospect consists of quartz-stibnite gash veins that cut shale and sandstone of the Upper Cretaceous, Kuskokwim Group and an Upper Cretaceous granite-porphyry dike (Bundtzen, Miller, and Laird, 1986; Miller and Bundtzen, 1994). Five individual gash veins of quartz that contain stibnite, pyrite, and the secondary antimony minerals kermesite and stibiconite are found in shear zones and along the sides of the granite-porphyry dikes. The veins strike N85E and dip steeply to vertically. Most of the veins are from 1 to 12 inches thick but one mineralized shear zone is about 20 feet thick. This zone can be traced along strike for about 65 feet where it is covered by soil and vegetation. Stibnite occurs as radiating crystals up to 3 inches long and an inch wide. Chip-channel samples of the mineralized zone contained from 0.55 to 30.9 percent antimony, up to 700 parts per billion (ppb) gold, and 4,000 ppb silver. Detailed sampling indicates that the large shear zone contains 2.4 to 3.1 tons of antimony per vertical foot (Bundtzen, Miller, and Laird, 1986).

Alteration:

Yellow-brown unidentified clay alteration.

Age of mineralization:

Unknown; a nearby intrusion has a $^{40}\text{K}/^{40}\text{Ar}$ age of 71.1 Ma (Miller and Bundtzen, 1994).

Deposit model:

Simple Sb veins (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 Wyrick Lode was discovered in 1984 when L.E. Wyrick was digging a bedrock drain for his placer mine. Another bedrock drain about 50 feet east exposed an extension of the mineralization. Battle Mountain Mining Company explored the property in the late 1980s, and drilled one diamond core hole (Szumigala, 1993). Results of that investigation are confidential. Paul Glavinovich and William Morgan completed an investigation of the Wyrick prospect and surrounding area in 1994 (Glavinovich and Morgan, 1994). From 1996-1997, Placer Dome Exploration flew an aeromagnetic survey over the Upper Granite Creek area, including the Wyrick Lode area. Results of that survey have not been publicly released (L.E. Wyrick, oral communication, 2003).

Production notes:

Reserves:

Detailed sampling indicates that the large shear zone contains 2.4 to 3.1 tons of antimony per vertical foot (Bundtzen, Miller, and Laird, 1986).

Additional comments:

References:

Bundtzen, Miller, and Laird, 1986; Szumigala, 1993; Glavinovich and Morgan, 1994; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Miller, and Laird, 1986

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (west of the head of Little Waldren Fork)**Site type:** Occurrence**ARDF no.:** ID134**Latitude:** 62.4279**Quadrangle:** ID B-2**Longitude:** 156.9740**Location description and accuracy:**

This occurrence is at an elevation of about 2,300 feet on a prominent east-west-trending ridge. It is about 0.5 mile east of hill 2424 and about 0.3 mile southeast of the center of section 13, T. 27 N., R. 42 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Sn, Zn**Other:** As, Cd, Cu, Sb**Ore minerals:** Iron oxide**Gangue minerals:** Axinite, quartz**Geologic description:**

This occurrence consists of 0.4- to 1.2-inch-thick quartz-axinite veins in hornfels derived from shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, Miller, and Gray, 2004). The area is cut by faults that strike northeast. The veins are oxidized to iron oxide gossan from unknown sulfide minerals. The gossan forms as clots and isolated masses an inch or more long. The geologic map of the similar prospect at the head of Bismarck Creek (ID130) includes this prospect (Bundtzen and Miller, 1997). Grab samples of mineralization contained up to 50.0 parts per million (ppm) silver, 100 ppm arsenic, 72 ppm cadmium, 150 ppm copper, 60 ppm antimony, 150 ppm tin, and 0.70 percent zinc (McGimsey and others, 1988).

Alteration:

Development of axinite-quartz greisen; pervasive oxidization to gossan.

Age of mineralization:**Deposit model:**

Sn-polymetallic vein or Polymetallic vein (Cox and Singer, 1986; models 20b and 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (southwest of upper Granite Creek)**Site type:** Prospect**ARDF no.:** ID135**Latitude:** 62.3645**Quadrangle:** ID B-2**Longitude:** 156.9514**Location description and accuracy:**

This prospect is at an elevation of about 1,100 feet on a flat terrace east of the head of Granite Creek. It is about 0.7 mile southwest of hill 1235 and near the center of the north boundary of section 7, T. 26 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, As, Hg, Sb**Ore minerals:** Stibnite**Gangue minerals:** Calcite, quartz**Geologic description:**

This prospect consists of a series of shear zones associated with thin quartz-sulfide veinlets in a light-colored granitic rock of alaskite composition and quartz-calcite veins in sandstone (Bundtzen, Miller, and Laird, 1986; Miller and Bundtzen, 1994, and Miller, Bundtzen, and Gray, 2005). The alaskite forms two dikes, each about 30 feet thick, with thin, 0.4- to 1-inch-thick quartz-sulfide veins on fractures and joints. The dikes strike N82-88E and are vertical. Quartz-calcite veins occur in sandstone adjacent to the dike rocks. The dikes are part of the same dike swarm that hosts gold-antimony mineralization at the Wyrick lode (ID133). Grab samples of mineralization contained 500 parts per billion (ppb) silver, 48 parts per million (ppm) antimony, 560 ppb mercury, and 40 ppm arsenic. Although gold was not detected in these samples, fine gold was panned from an exploration trench (L.E. Wyrick, oral communication, 1986; Bundtzen, Miller, and Laird, 1986).

Alteration:**Age of mineralization:**

Unknown; a nearby intrusion has a 40K/40Ar age of 71.1 Ma (Miller and Bundtzen, 1994).

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:**

Prospect pits were sunk on the property sometime before 1984. In 1985, L.E. Wyrick cut a 160-foot-long trench, which was sampled by Bundtzen, Miller, and Laird (1986). Battle Mountain Mining Company ex-

plored the area in the 1980s (Szumigala, 1993).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen, Miller, and Laird, 1986; Szumigala, 1993; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Miller, and Laird, 1986

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (southeast of upper Granite Creek)**Site type:** Occurrence**ARDF no.:** ID136**Latitude:** 62.3475**Quadrangle:** ID B-2**Longitude:** 156.9446**Location description and accuracy:**

This occurrence is at an elevation of about 1,400 feet on a northeast-facing knob overlooking Granite Creek. It is about 0.9 mile north of hill 1620 and about 0.3 mile north-northeast of the center of section 18, T. 26 N., R. 41 W., Seward Meridian. The location is accurate.

Commodities:**Main:** Bi, Cu**Other:** Ag, As**Ore minerals:** Iron oxide, pyrite**Gangue minerals:****Geologic description:**

This occurrence is a discontinuous gossan of iron oxides in an aureole of hornfelsed sandstone of the Upper Cretaceous, Kuskokwim Group (Bundtzen, Miller, and Laird, 1986; Miller and Bundtzen, 1994). Disseminated pyrite was noted. Small bodies of quartz monzonite cut the hornfels near the mineralized zone. No size or structural information is available. One grab sample contained 460 parts per million (ppm) arsenic, 500 ppm copper, 10.0 ppm bismuth, and 1,000 parts per billion silver (McGimsey and others, 1988).

Alteration:**Age of mineralization:****Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1984 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Bundtzen, Miller, and Laird, 1986; McGimsey and others, 1988; Szumigala, 1993; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Munther Creek**Site type:** Prospect**ARDF no.:** ID137**Latitude:** 62.3185**Quadrangle:** ID B-2**Longitude:** 156.9390**Location description and accuracy:**

Munther Creek is a southeast-flowing tributary of the East Fork of the George River. The Munther Creek placer extends for about 0.7 mile along upper Munther Creek. The center of the placer is at an elevation of about 900 feet, about 0.5 mile northeast of the center of section 30, T. 26 N., R. 41 W., of the Seward Meridian. The location is approximate.

Commodities:**Main:** Au**Other:****Ore minerals:** Gold**Gangue minerals:****Geologic description:**

The upper 0.7 mile of Munther Creek was prospected for placer gold for a number of years before World War II (Tony Gularte, oral communication, 1986). The creek drains the eastern edge of a quartz monzonite-hornfels complex at the head of Granite Pup (ID132) to the northwest (Bundtzen, Miller, and Laird, 1986; Miller and Bundtzen (1994; Miller, Bundtzen, and Gray, 2005). Fine grained placer gold was panned from several prospects along Munther Creek in the 1920s and 1930s. There may have been minor gold production during exploration (Tony Gularte, oral communication, 1986).

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

Placer Au deposit (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:**

The upper 0.7 mile of Munther Creek was prospected for placer gold during the 1920s and 1930s (Tony Gularte, oral communication, 1986).

Production notes:

There may have been minor gold production during exploration before World War II (Tony Gularte, oral

communication, 1986).

Reserves:

None.

Additional comments:**References:**

Bundtzen, Miller, and Laird, 1986; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (near hill 1630)**Site type:** Occurrence**ARDF no.:** ID138**Latitude:** 62.3535**Quadrangle:** ID B-2**Longitude:** 156.9333**Location description and accuracy:**

This occurrence is near the top of hill 1630 on a ridge separating Granite Creek from the Little East Fork of George River. The occurrence is about 0.5 mile southwest of the center of section 8, T. 26 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Cu, Zn**Other:** Ag, Bi, Cd**Ore minerals:****Gangue minerals:** Epidote, quartz, tourmaline**Geologic description:**

This occurrence consists of a system of quartz-tourmaline-epidote veins in hornfels at the southern contact of a small, biotite-quartz-monzonite stock. The stock has been dated as 71.1 Ma (Bundtzen, Miller, and Laird, 1986). Major oxide data for the intrusion are given in Miller and Bundtzen (1994). The mineralized veins occupy vertical joints that strike about N40E and N44W. The size of the occurrence is uncertain. Grab samples of mineralization contain up to 860 parts per million (ppm) zinc, 300 ppm copper, 2,000 parts per billion silver, 5.1 ppm cadmium, and 10 ppm bismuth (McGimsey and others, 1988).

Alteration:

Development of epidote-quartz-tourmaline greisen.

Age of mineralization:

Undated; the quartz monzonite stock that hosts the mineralization has been dated as 71.1 Ma (Bundtzen, Miller, and Laird, 1986).

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:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1984 (McGimsey and others, 1988). Placer Dome Exploration flew an aeromagnetic survey over the Upper Granite Creek area including the prospect area in 1996. Results of that survey have not been released (L.E. Wyrick, oral communication, 2003).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen, Miller, and Laird, 1986; McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (south of hill 1735)**Site type:** Occurrence**ARDF no.:** ID139**Latitude:** 62.3660**Quadrangle:** ID B-2**Longitude:** 156.9318**Location description and accuracy:**

This occurrence is about 0.3 mile south of hill 1735, near the divide between head of Granite Creek and the Little East Fork of George River. The occurrence is at an elevation of about 1,400 feet, near the southwest corner of section 5, T. 26 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Sn**Other:** As, B, Cu, Hg, Pb, Sb, Zn**Ore minerals:** Limonite, unspecified sulfides**Gangue minerals:** Quartz, sericite, tourmaline**Geologic description:**

This occurrence is a quartz breccia zone with limonite and tourmaline in hornfelsed sandstone of the Upper Cretaceous, Kuskokwim Group, adjacent to a small body of biotite quartz monzonite. The mineralized breccia covers an area about 160 by 500 feet in area that is oriented northeast. The monzonite contains a stockworks of numerous small quartz-tourmaline-sericite veins. The quartz monzonite is undated, but a similar intrusive body exposed about 0.3 mile to the south has a 40K/40Ar age of 71.1 Ma (Bundtzen, Miller, and Laird, 1986; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Grab samples of mineralization contained up to 1,000 parts per million (ppm) tin, 1,000 parts per billion (ppb) silver, 500 ppm copper, 350 ppm zinc, 100 ppm lead, 160 ppm arsenic, 54 ppm antimony, and 1,200 ppb mercury (McGimsey and others, 1988).

Alteration:

Development of quartz-tourmaline-sericite greisen; iron-oxide alteration.

Age of mineralization:

Undated; a similar intrusive of quartz monzonite exposed about 500 meters to the south has a 40K/40Ar age of 71.1 Ma (Bundtzen, Miller, and Laird, 1986; Miller and Bundtzen, 1994).

Deposit model:

Sn-polymetallic deposit or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysi-

cal Surveys in the 1980s (McGimsey and others, 1988). Battle Mountain Mining Company explored the occurrence in the late 1980s and drilled one diamond-drill hole; the results are confidential (Szumigala, 1993) Placer Dome U S flew an aeromagnetic survey over the Upper Granite Creek area but that survey has not been publicly released (L.E. Wyrick, oral communication, 2003).

Production notes:

Reserves:

Additional comments:

References:

Bundtzen, Miller, and Laird, 1986; McGimsey and others, 1988; Szumigala, 1993; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen, Miller, and Laird, 1986

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (east of head of Granite Creek)**Site type:** Occurrence**ARDF no.:** ID140**Latitude:** 62.3824**Quadrangle:** ID B-2**Longitude:** 156.9100**Location description and accuracy:**

This occurrence is on a broad northeast-trending ridge east of the head of Granite Creek on the divide that separates it from the East Fork of the George River. The occurrence is at an elevation of about 1,250 feet, about 0.5 mile northwest of hill 1440, and about 0.5 mile southeast of the center of section 32, T. 27 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Sn**Other:** Ag, As, Cd, Zn**Ore minerals:****Gangue minerals:** Axinite, quartz**Geologic description:**

This occurrence consists of quartz-axinite veins and veinlets in hornfels derived from the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The size and extent of the occurrence is uncertain. Grab samples of mineralization contain up to 1,000 parts per million (ppm) tin, 5.0 ppm silver, 400 ppm zinc, 2.2 ppm cadmium, and 130 ppm arsenic (McGimsey and others, 1988).

Alteration:

Development of axinite-quartz greisen.

Age of mineralization:**Deposit model:**

Sn-polymetallic vein or Polymetallic vein (Cox and Singer, 1986; models 20b and 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

The mineralization is similar to that at the Bismarck Creek prospect (ID130).

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (southwest of Granite Mountain)**Site type:** Occurrence**ARDF no.:** ID141**Latitude:** 62.2796**Quadrangle:** ID B-2**Longitude:** 156.8352**Location description and accuracy:**

This occurrence is at an elevation of about 1,250 feet, about 5 miles southwest of the summit of Granite Mountain on a northeast-trending ridge. It is about 0.8 mile east-northeast of hill 1265 and about 0.6 mile south-southwest of the center of section 2, T. 25 N., R. 41 W., Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Cu**Other:** As, B, Bi, Fe, Sb**Ore minerals:** Iron oxide**Gangue minerals:****Geologic description:**

This occurrence is a mineralized zone of uncertain size and orientation in iron-oxide-bearing hornfels derived from sandstone of the Upper Cretaceous, Kuskokwim Group; the hornfels is associated with a swarm of monzonite dikes (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). One grab sample of mineralization contained 2,000 parts per billion (ppb) silver, 500 parts per million (ppm) copper, 600 ppm arsenic, 50 ppm antimony, 150 ppm lead, 3.0 ppm bismuth, 20.00 percent iron, and more than 2,000 ppm boron (McGimsey and others, 1988). The iron oxides are probably an oxidation product of sulfides; the high boron content suggests that tourmaline or axinite may be present in the altered sandstone.

Alteration:

Iron oxide alteration.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (southwest flank of Granite Mountain)**Site type:** Occurrence**ARDF no.:** ID142**Latitude:** 62.2950**Quadrangle:** ID B-2**Longitude:** 156.8176**Location description and accuracy:**

This occurrence is on the southwest end of Granite Mountain at an elevation of about 1,200 feet. It is about 1.1 mile southwest of hill 1640 and 0.5 mile southeast of the center of section 35, T. 26 N., R. 41 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** As, Sb**Other:** Fe, Hg**Ore minerals:** Iron oxide, pyrrhotite**Gangue minerals:****Geologic description:**

This occurrence is heavily iron-oxide-stained sandstone with semi-massive pyrrhotite lenses an inch or so thick. The sandstone is part of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One grab sample contained 390 parts per million (ppm) antimony, 850 ppm arsenic, 900 parts per billion mercury, and more than 20.00 percent iron (McGimsey and others, 1988).

Alteration:

Iron oxide 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:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (east of Little Waldren Fork)**Site type:** Occurrence**ARDF no.:** ID143**Latitude:** 62.4827**Quadrangle:** ID B-2**Longitude:** 156.7885**Location description and accuracy:**

This occurrence is on an elongate, northwest-trending ridge about 2 miles east of the Little Waldren Fork of the Takotna River. The occurrence is at an elevation of about 1,400 feet. It is about 0.1 mile west of hill 1456 in the SE1/4 SE1/4, section 25, T. 28 N., R. 41 W., Seward Meridian. The location is accurate.

Commodities:**Main:** Fe, Sb**Other:** As, Ni, Zn**Ore minerals:** Hematite**Gangue minerals:****Geologic description:**

This occurrence consists of a zone of secondary hematite in a heavily iron-oxide-stained, sericitically altered sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The hematite zone is up to 6 feet thick and is of uncertain length and orientation. A grab sample contained more than 20.00 percent iron, 200 parts per million (ppm) antimony, 100 ppm arsenic, 180 ppm zinc, and 100 ppm nickel (McGimsey and others, 1988).

Alteration:

Sericitic alteration of sandstone.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (southwest Granite Mountain)**Site type:** Occurrence**ARDF no.:** ID144**Latitude:** 62.3121**Quadrangle:** ID B-2**Longitude:** 156.7526**Location description and accuracy:**

This occurrence is about 1.4 mile southwest of the peak 2923, the top of Granite Mountain, at an elevation of about 2,300 feet. It is about 0.5 mile east-southeast of the center of section 30, T. 26 N., R. 40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Sn**Other:** As, B, Bi, Pb, Sb**Ore minerals:** Cassiterite**Gangue minerals:** Tourmaline**Geologic description:**

This occurrence consists of a extensive zone of cassiterite-bearing, tourmaline-axinite greisen that may be a southwest extension of the similar occurrence to the northeast (ID146) (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Tourmaline-rich quartz porphyry and brecciated tourmaline-axinite-cemented hornfels occurs in the cupola zone of the 62.6 Ma, Granite Mountain pluton (Miller and Bundtzen, 1994). Bundtzen and Miller (1997) identified disseminated cassiterite in one sample; however, no sulfides or sulfosalts were observed. Grab samples of mineralization contained up to 300 parts per million (ppm) tin, 7,000 parts per billion (ppb) silver, 500 ppm lead, 54 ppm antimony, 100 ppm arsenic, 54 ppm bismuth, and more than 2,000 ppm boron (McGimsey and others, 1988).

Alteration:

Development of tourmaline-axinite greisen.

Age of mineralization:

Undated; probably related to the nearby Granite Mountain pluton that has an age of 62.6 Ma (Bundtzen and Miller, 1997).

Deposit model:

Sn-polymetallic deposit (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1984 (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (east of Little Waldren Fork)**Site type:** Occurrence**ARDF no.:** ID145**Latitude:** 62.4677**Quadrangle:** ID B-2**Longitude:** 156.7441**Location description and accuracy:**

This occurrence is on an northwest-trending ridge about 5 miles east of the Little Waldren Fork of the Takotna River. The occurrence is at an elevation of about 1,600 feet, about 0.3 mile north of hill 1790. The occurrence is about 0.6 mile southwest of the center of section 32, T. 28 N., R. 40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg, Sb**Other:** As**Ore minerals:** Iron oxide**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a zone of iron-oxide-stained sandstone breccia that is locally healed by quartz (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The mineralized zone is of uncertain size and orientation. A prospect pit explored a similar breccia zone about 0.6 mile east of this occurrence; however, we did not sample it. One grab sample of sandstone breccia contained 420 parts per billion (ppb) mercury, 20 parts per million (ppm) antimony, and 20 ppm arsenic (McGimsey and others, 1988).

Alteration:

Iron oxide staining.

Age of mineralization:**Deposit model:**

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

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

22c?

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/19/2003

Site name(s): Unnamed (near hill 2825 on Granite Mountain)**Site type:** Occurrence**ARDF no.:** ID146**Latitude:** 62.3180**Quadrangle:** ID B-2**Longitude:** 156.7324**Location description and accuracy:**

This occurrence is at an elevation of about 2,600 feet, about 0.7 mile southwest of peak 2923, the top of Granite Mountain. It is about 0.3 mile north of the center of section 29, T. 26 N., R. 40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Sn**Other:** As, Au, Bi, Sb**Ore minerals:** Gray sulfides**Gangue minerals:** Anatase, axinite, quartz, tourmaline**Geologic description:**

This occurrence, also referred to as the Granite Mountain prospect (Bundtzen and Miller, 1997) consists of several sizable bodies of metasomatic axinite, anatase, and tourmaline at the contact between the Granite Mountain pluton and hornfelsed rocks derived from the Upper cretaceous Kuskokwim Group. The occurrence includes: 1) zones of tourmaline-bearing sheeted veins, 2) tourmaline-cemented breccias in hornfels; and 3) axinite-tourmaline-sulfide replacement bodies in both intrusive rocks and in hornfels. The nearby Granite Mountain pluton has a $^{40}\text{K}/^{40}\text{Ar}$ age of 62.6 Ma (Bundtzen and Miller, 1997).

One large area of boron-rich tourmaline-axinite-anatase greisen is 1,300 feet long, about 50 feet wide, and cylindrical in cross section; it may contain 5.5 million tons of boron-enriched material of unknown grade. This zone also contains disseminated gray sulfide minerals. Grab samples from the occurrence contained 100 parts per million (ppm) tin, 500 parts per billion (ppb) silver, 50 ppb gold, 9.0 ppm bismuth, 28 ppm antimony, 80 ppm arsenic, and more than 2,000 ppm boron (McGimsey and others, 1988; Bundtzen and Miller, 1997).

Alteration:

Development of axinite-tourmaline-quartz greisen.

Age of mineralization:

The nearby Granite Mountain pluton has a $^{40}\text{K}/^{40}\text{Ar}$ age of 62.6 Ma (Bundtzen and Miller, 1997).

Deposit model:

Sn-polymetallic deposit or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive

Workings/exploration:

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1984 (McGimsey and others, 1988; Bundtzen and Miller, 1997).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bundtzen and Miller, 1997

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/24/2003

Site name(s): Unnamed (on south-flowing tributary of Moose Creek)**Site type:** Occurrence**ARDF no.:** ID147**Latitude:** 62.2891**Quadrangle:** ID B-2**Longitude:** 156.7274**Location description and accuracy:**

This occurrence is at an elevation of about 1,150 feet in a unnamed creek that flows south from Granite Mountain. The occurrence is about 0.8 mile east-southeast of hill 2210 and about 0.3 mile northeast of the center of section 5, T. 25 N., R. 40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:****Ore minerals:** Gold**Gangue minerals:****Geologic description:**

Visible gold was found in a nonmagnetic, heavy mineral concentrate collected in an unnamed creek flowing south from Granite Mountain. The rocks in the vicinity are hornfels derived from the Upper Cretaceous, Kuskokwim Group, and granitic rocks from the Cretaceous Granite Mountain pluton (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005).

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

Placer Au deposit (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:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (Bennett and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Bennett and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bennett and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (near hill 2380 south of summit of Granite Mountain)**Site type:** Occurrence**ARDF no.:** ID148**Latitude:** 62.3008**Quadrangle:** ID B-2**Longitude:** 156.7141**Location description and accuracy:**

This occurrence is about 650 feet east of hill 2380 on a southern side of Granite Mountain. The occurrence is at an elevation of about 2,100 feet, about 0.4 mile west of the center of section 33, T. 26 N., R. 40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Pb**Other:** B, Sb, Sn**Ore minerals:****Gangue minerals:** Tourmaline**Geologic description:**

This occurrence is a irregular zone of tourmaline-rich quartz monzonite in the border phase of the 62.6 Ma, Granite Mountain pluton (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The size and orientation of the mineralized body is uncertain. One grab sample contained 1,500 parts per billion (ppb) silver, 200 parts per million (ppm) lead, 15 ppm tin, 12 ppm antimony, and more than 2,000 ppm boron (McGimsey and others, 1988).

Alteration:

Tourmaline in quartz monzonite.

Age of mineralization:

Unknown; possibly related to the nearby Granite Mountain pluton that has a $^{40}\text{K}/^{40}\text{Ar}$ age of 62.6 Ma (Miller and Bundtzen, 1994).

Deposit model:

Sn-polymetallic deposit (Cox and Singer, 1986; model 20b).

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

20b

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1984 (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (southeast of summit of Granite Mountain)**Site type:** Occurrence**ARDF no.:** ID149**Latitude:** 62.3112**Quadrangle:** ID B-2**Longitude:** 156.7035**Location description and accuracy:**

This occurrence is on the southeast slope of Granite Mountain at an elevation of about 1,600 feet. It is about 0.9 mile south-southeast of peak 2923, the top of Granite Mountain, and about 0.2 mile south of the center of section 28, T. 26 N., R. 40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** As, Bi, Zn**Other:** Fe, Hg, Sb**Ore minerals:** Hematite, limonite**Gangue minerals:****Geologic description:**

This occurrence consists of a hematite-bearing, breccia zone of unknown size and orientation in shale and sandstone of the Upper Cretaceous Kuskokwim Group. It is about a mile southeast of the edge of the Granite Mountain pluton (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997, and Bundtzen, Miller, and Gray, 2004). A grab sample of mineralization contained 450 parts per million (ppm) zinc, more than 10 ppm mercury, 400 ppm arsenic, 7.0 ppm bismuth, 22 ppm antimony, and 15.00 percent iron (McGimsey and others, 1988).

Alteration:

Hematite.

Age of mineralization:

Unknown; the nearby Granite Mountain pluton has a 40K/40Ar age of 62.6 Ma Bundtzen and Miller, 1997).

Deposit model:

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1986 (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (southerly tributary of upper Black Creek)**Site type:** Occurrence**ARDF no.:** ID150**Latitude:** 62.4896**Quadrangle:** ID B-1**Longitude:** 156.2369**Location description and accuracy:**

This occurrence is along a tributary of the Black River at an elevation of about 650 feet. It is about 3.2 miles north of VABM 2073/Hiblac and about 0.1 mile northeast of the center of section 25, T. 28 N., R. 38 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Hg**Other:** As, Sb**Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is of an apparently barren sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). A grab sample was taken for background metal values; it contained 460 parts per billion (ppb) mercury, 30 parts per million (ppm) arsenic, 20 ppm antimony, and 100 ppb silver (McGimsey and others, 1988).

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:**

Samples were collected by the U.S. Geological Survey in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);
and C.C. Hawley (Hawley Resource Group)

Last report date: 5/20/2003

Site name(s): Unnamed (near hill 1265)**Site type:** Occurrence**ARDF no.:** ID151**Latitude:** 62.3922**Quadrangle:** ID B-1**Longitude:** 156.1699**Location description and accuracy:**

This occurrence is near hill 1265 on an northwest-trending ridge about 2 miles west of the Kuskokwim River. The occurrence is about 0.5 mile northeast of the center of section 32, T. 27 N., R. 37 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Sn**Other:** As, Cd, Hg, Zn**Ore minerals:** Hematite**Gangue minerals:** Quartz, tourmaline**Geologic description:**

This occurrence is a zone of thin quartz veinlets with small tourmaline grains in a distinctively reddish colored, hematite-bearing sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994). The sandstone strikes N42W and dips 50SW. The individual quartz veinlets are about one-eighth of an inch thick but there is no information on the overall size of the zone of quartz veinlets. A grab sample contained 150 parts per million (ppm) tin, 500 parts per billion (ppb) silver, 900 ppm zinc, 20 ppm arsenic, 960 ppb mercury, 1.9 ppm cadmium, and 2,000 ppm boron (McGimsey and others, 1988).

Alteration:

Development of hematite and tourmaline.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/23/2003

Site name(s): Unnamed (head of American Creek)**Site type:** Occurrence**ARDF no.:** ID152**Latitude:** 62.0579**Quadrangle:** ID A-6**Longitude:** 158.9965**Location description and accuracy:**

This occurrence is at an elevation of about 1,300 feet on a sharp, northeast-trending ridge. It is about 3.6 miles southwest of the top of Mosquito Mountain and about 0.3 mile southwest of the northeast corner of section 28, T. 23 N., R. 53 W., of the Seward meridian. The location is accurate.

Commodities:**Main:** Ag, Cu, Zn**Other:** As, Bi, Fe, Sb**Ore minerals:** Goethite**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a iron oxide gossan formed by the oxidization of undetermined sulfide minerals; the gossan is in hornfels developed in siltstone and siliceous sandstone of the Upper Cretaceous, Kuskokwim Group (Cady and others, 1955; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Several pods of iron-oxide-rich gossan were sampled. The samples contained up to 700 parts per billion (ppb) silver, 640 parts per million (ppm) zinc, 500 ppm copper, 110 ppm antimony, 6.0 ppm bismuth, 40 ppm arsenic, and 20.00 percent iron (McGimsey and others, 1988).

Alteration:

Gossan developed.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1985 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Cady and others, 1955; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (on Mosquito Mountain)**Site type:** Occurrence**ARDF no.:** ID153**Latitude:** 62.0834**Quadrangle:** ID A-6**Longitude:** 158.8976**Location description and accuracy:**

This occurrence is about 0.3 mile southeast of the summit of Mosquito Mountain at an elevation of about 2,100 feet. It is at about the center of the east boundary of section 13, T. 23 N., R. 53 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag**Other:** As, Hg, Sb**Ore minerals:** Iron oxide**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a zone of heavily iron-oxide-stained altered hornfels derived from the Upper Cretaceous Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The rocks on Mosquito Mountain are a tuff-rich, clastic unit altered to hornfels that is cut by numerous intermediate sills; this suggests the presence of a nearby or buried intrusion (Miller and Bundtzen, 1994). The altered zone is of uncertain size and orientation. Grab samples of altered gossan contained up to 700 parts per billion (ppb) silver, 50 parts per million (ppm) arsenic, 38 ppm antimony, and 1,400 ppb mercury (McGimsey and others, 1988).

Alteration:

Iron oxide gossan.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (on hill 860 north of American Creek)**Site type:** Occurrence**ARDF no.:** ID154**Latitude:** 62.0334**Quadrangle:** ID A-6**Longitude:** 158.8761**Location description and accuracy:**

This occurrence is about 300 feet south of hill 860 which is about 1.5 miles northwest of the mouth of American Creek on the Iditarod River. The occurrence is near the center of the S1/2 SE1/4 section 31, T. 23 N., R. 52 W., Seward Meridian. The location is approximate.

Commodities:**Main:** As, Zn**Other:** Ag, Fe, Hg, Sb**Ore minerals:** Undetermined sulfides**Gangue minerals:** Quartz**Geologic description:**

This occurrence is a zone of iron-oxide-rich sandstone in shale and sandstone of the Upper Cretaceous, Kuskokwim Group (Cady and others, 1955; Miller and Bundtzen, 1994). The mineralized zones contains thin quartz veinlets and trace amounts of undetermined sulfide minerals (Miller, Bundtzen, and Gray, 2005). One sample contained 200 parts per million (ppm) zinc, 400 ppm arsenic, 42 ppm antimony, 500 parts per billion (ppb) mercury, 50 ppb silver, and 20.00 percent iron (McGimsey and others, 1988).

Alteration:

Formation of iron oxides and silicification.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

Cady and others, 1955; McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): American Creek**Site type:** Prospect**ARDF no.:** ID155**Latitude:** 62.0183**Quadrangle:** ID A-6**Longitude:** 158.8564**Location description and accuracy:**

American Creek is a southeast-flowing tributary of the Iditarod River south of Mosquito Mountain. The coordinates are near the mouth of the creek in the SW1/4 section 5, T. 22 N., R. 52 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:****Ore minerals:** Gold**Gangue minerals:****Geologic description:**

The modern fluvial gravels near the mouth of American Creek are from 160 to 320 feet wide. The non-magnetic fraction of a heavy mineral concentrate from a sample collected by the U.S. Geological Survey contained visible gold grains (Bennett and others, 1988). The sources of the placer gold may be the lode deposits in the drainage of American Creek (ID152 to ID154).

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

Placer Au deposit (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 U.S. Geological Survey collected samples in the area in the 1980s (Bennett and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

Bennett and others, 1988; Miller, Bundtzen, and Gray, 2005.

Primary reference: Bennett and others, 1988

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Little Creek**Site type:** Mine**ARDF no.:** ID156**Latitude:** 62.0182**Quadrangle:** ID A-6**Longitude:** 158.6898**Location description and accuracy:**

This gold placer extends for a mile or more along Little Creek, a north-flowing tributary of the Iditarod River. The coordinates are at the center of the deposit which is at an elevation of about 400 feet, about 0.6 mile south-southeast of the center of section 6, T. 23 N., R. 52 W., of the Seward Meridian. Little Creek is locality 15 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Hg**Ore minerals:** Cinnabar, gold**Gangue minerals:****Geologic description:**

The Little Creek Mine is a placer gold-cinnabar deposit in a short tributary of the Iditarod River. The placer is a shallow deposit with 10 to 16 feet of gravel that is overlain by 3 to 10 feet of overburden. The deposit occurs entirely in the modern flood plain of Little Creek; no terrace deposits have been identified. The rocks in upper end of the placer are sandstone of the Upper Cretaceous, Kuskokwim Group. The lower part of the placer is underlain by the Iditarod volcanics (Miller and Bundtzen, 1994). The principal heavy minerals are fine-grained gold and locally abundant cinnabar. The gravels also contain abundant rounded fragments of vein quartz (Cady and others, 1955). Some gold has been mined during the exploration of the deposit, but there has been no mechanized mining on a significant scale (Spencer Lyman, oral communication, 1986; Morris Hofseth, oral communication, 1990).

Alteration:**Age of mineralization:**

Probably Quaternary.

Deposit model:

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

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

39a

Production Status: Yes; small**Site Status:** Inactive**Workings/exploration:**

Placer gold was discovered on Little Creek in 1910 (Maddren, 1911). According to Maddren (1915), gravel from holes sunk to bedrock contained 1 or 2 cents in gold per bedrock foot but there had been no

production. According to Cady and others (1955), test shafts were sunk about 13 feet to bedrock. Cady reported that samples assayed from a few cents to \$1.00 per bedrock foot and that the grade of the deposit is consistent.

Production notes:

Production may have occurred during exploration but there has never been any major mechanized mining on Little Creek (Spencer Lyman, oral communication, 1986; Morris Hofseth, oral communication, 1990).

Reserves:

Undetermined.

Additional comments:

References:

Maddren, 1911; Maddren, 1915; Cady and others, 1955; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cady and others, 1955; Cobb, 1976 (OFR 76-576)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (north of Return Creek)**Site type:** Occurrence**ARDF no.:** ID157**Latitude:** 62.0514**Quadrangle:** ID A-6**Longitude:** 158.5064**Location description and accuracy:**

This occurrence is on a ridge about 0.4 mile north of Return Creek, a tributary of Montana Creek. The occurrence is at an elevation of about 950 feet; it is about 0.2 mile east-northeast of hill 904 and 0.3 mile southeast of the center of section 30, T. 23 N., R. 50 W., of the Seward Meridian. The location is approximate.

Commodities:**Main:** Hg, Sb**Other:** As**Ore minerals:** Iron oxide**Gangue minerals:** Carbonate, quartz**Geologic description:**

This occurrence consists of quartz-carbonate veins in reddish-orange, iron-oxide-stained volcanic flows and tuffs of the Iditarod volcanics (Miller and Bundtzen, 1988). Locally the volcanic rocks are cut by thin altered felsic dikes (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). As seen in rubble crop, the individual quartz-carbonate veins are up to 4 inches thick. There are shallow prospect pits adjacent to the quartz-carbonate veins. A grab sample of the vein material contained 930 parts per billion (ppb) mercury, 110 parts per million (ppm) arsenic, and 10 ppm antimony (McGimsey and others, 1988).

Alteration:

Iron oxide alteration of volcanic rocks.

Age of mineralization:**Deposit model:**

Quartz-carbonate veins.

Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):**Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): DeCourcy Mountain**Site type:** Mine**ARDF no.:** ID158**Latitude:** 62.0623**Quadrangle:** ID A-5**Longitude:** 158.4579**Location description and accuracy:**

The DeCourcy Mountain Mine is at the head of Return Creek about 2 miles south of DeCourcy Mountain. The mine is shown on the USGS A-5, 1:63,360-scale topographic map. It is the NW1/4 section 28 and SW1/4 section 21, T. 23 N., R. 50 W., of the Seward Meridian. The DeCoursey Mountain mine is locality 1 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]). Note that the mine is spelled 'DeCourcy' on the A-5 topographic map, but is spelled 'DeCoursey' in some published literature.

Commodities:**Main:** Hg**Other:** Ag, As, Au, Sb**Ore minerals:** Arsenopyrite, cervantite, cinnabar, stibnite**Gangue minerals:** Carbonate minerals, clay minerals, quartz (var. chalcedony)**Geologic description:**

The DeCourcy Mountain Mine is one of the best studied lode deposits in the Iditarod quadrangle (Webber, 1944; Webber and others, 1947; Cady and others, 1955; Malone, 1962; Sainsbury and MacKevett, 1965). The rocks in the vicinity are shale and sandstone of the Upper Cretaceous, Kuskokwim Group that are cut by mafic sills and dikes. The mafic intrusions have been largely altered to a distinctive silica-carbonate rock that weathers bright yellow-orange. Major cinnabar and stibnite, minor arsenopyrite, and secondary cervantite occur in a gangue of fine-grained quartz, and carbonate and clay minerals in lenses, veins, and stockworks that cut the sedimentary and mafic intrusive rocks (Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The sulfide minerals also occur in quartz cemented breccias. The veins and breccias generally strike N17E to N22E and dip steeply to vertically. Several of the veins have been identified by name including the 'A' Vein, the 'DeCourcy Orebody', the 'Upper' or 'Top' Vein, and the 'Retort' orebody. The A-vein, about 1,000 feet southeast of the DeCourcy vein, strikes north-northwest and, and dips steeply in sedimentary rocks adjacent to a mafic sill. According to Webber (1944), the ore bodies occur over a horizontal distance of about 1,800 feet through a vertical range of about 400 feet. The deposit was discovered in 1910, staked in 1919, and mined intermittently from 1921 to 1949.

The ore as mined contained as much as 32.68 percent mercury and 0.86 percent antimony (Webber, 1944). Gray and others (1997) speculated that epithermal gold-silver deposits could be underneath the mercury-antimony mineralization. Resource Associates of Alaska, Inc. assayed portions of drill holes on the DeCourcy Mountain deposit for gold and silver but did not find elevated values of either (Jennings, 1975). Grab samples collected by the U.S. Geological Survey and Calista Corporation in the 1980s contained up to 650 parts per billion (ppb) silver, 200 parts per million (ppm) arsenic, 1.00 percent antimony, and 400 ppb gold in addition to abundant mercury (McGimsey and others, 1988; Bruce Hickock, oral commun., 1990).

Malone (1962) estimated that through 1949, the DeCourcy Mountain orebodies produced 1,500 flasks of mercury from about 2,480 of ore, an average grade of about 2.29 percent mercury. The overall grade of processed ore was often higher; for example, the ore mined underground by R.F. Lyman from 1943 and 1944 averaged about 3.00 percent mercury (Webber, 1944).

Alteration:

Strong silica-carbonate alteration in mafic dikes.

Age of mineralization:

Unknown; an altered mafic dike near the base of DeCourcy Mountain which is thought to be a feeder for the Iditarod Volcanics has a $40\text{K}/40\text{Ar}$ age of 76.7 Ma (Miller and Bundtzen, 1994).

Deposit model:

Either a Hot Springs Hg-Sb or Silica-Carbonate Hg-Sb deposit (Cox and Singer, 1986; models models 27a or 27c).

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

27a or 27c

Production Status: Yes**Site Status:** Inactive**Workings/exploration:**

The DeCourcy Mountain mercury deposit was discovered by Matt DeCourcy in 1910 and staked by him in 1919 (Cady and others, 1955). From 1921 to 1932, the Linfors adits were driven. The deposit was mined underground from 1942 to 1949 by R.F. Lyman of the the DeCourcy Mountain Mining Company. There has been no mining since but from 1953 to 1957, the deposit was explored with 2,600 feet of diamond drilling under a contract between the Defense Minerals Exploration Administration (DMEA) and De-Courcy Mountain Mining Company (Sainsbury and MacKevett, 1965). By 1961, the DeCourcy Mountain Mine was inactive though held by Alaska Mines and Minerals Company, which then operated the Red Devil Mine in the Sleetmute quadrangle. By the end of 1957, there was 1,370 feet of underground working in four adits, about 3,300 feet of trenching, and numerous prospect pits. Detailed descriptions of the ore bodies, including geologic maps, are provided in both Cady and others (1955) and Sainsbury and MacKevett (1965). There was additional sampling by the U.S. Geological Survey and the Calista Corporation in the 1980s (McGimsey and others, 1988; Bruce Hickock, oral communication, 1990).

Production notes:

In 1921, the Thrift Mining Company installed a 4-tube retort and recovered an unknown amount of mercury (Cady and others, 1955). From 1924 to 1926, C.F. Linfors retorted ore from the 'Upper' or 'Top' vein but production was believed to be modest (Webber, 1944). In 1927, John and Harry Brink relocated the claims and mined the deposits on a small scale. From 1921 to 1932, about 157 flasks were produced (Joesting, 1942). In 1942, R.F. Lyman produced 80 flasks of mercury from surface float. From 1943 to 1944, about 720 flasks were produced and additional ore was stockpiled (Webber and others, 1947). By 1949, an additional 400 flasks were produced by the DeCourcy Mountain Mining Company. Based on examination of published and unpublished data, Malone (1962) estimated that through 1949--the last year of production, the DeCourcy Mountain orebodies produced 1,500 flasks of mercury from about 2,480 tons of ore, an average grade of about 2.29 percent mercury. The grade of the ore was often higher; for example, the ore mined underground by R.F. Lyman from 1943 and 1944 averaged about 3.00 percent mercury (Webber, 1944).

Reserves:

According to Webber (1944), the reserves that remained at the end of 1944 included about 7,000 tons of indicated ore that averaged 1.61 percent mercury and 7,600 tons of inferred ore that averaged 1.57 percent mercury. Subtracting the ore mined by the DeCourcy Mountain Mining Company through 1949, there may be about 4,600 flasks of mercury that remain in material with an average grade of about 1.6 percent.

Additional comments:**References:**

Joesting, 1942; Webber, 1944; Webber and others, 1947; Cady and others, 1955; Malone, 1962; White and Robertson, 1962; Sainsbury and MacKevett, 1965; Cobb, 1972 (MF 363); Jennings, 1975; Cobb, 1976 (OFR 76-576); McGimsey and others, 1988; Wells and Ghiorso, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Gray and others, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cady and others, 1955; this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Yousure; Yushur**Site type:** Prospect**ARDF no.:** ID159**Latitude:** 62.2192**Quadrangle:** ID A-5**Longitude:** 158.4129**Location description and accuracy:**

The Yousure prospect is at an elevation of about 500 feet, on the steep, west-facing slope, on the east side of the Iditarod River. The prospect is in the very northwest corner of section 32, T. 25 N., R. 49 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg, Sb**Other:** As, Ba, W**Ore minerals:** Cinnabar, scheelite, stibnite**Gangue minerals:** Quartz**Geologic description:**

The Yousure prospect is a swarm of north to northeast-trending, quartz-sulfide veins and veinlets that cuts black shale and siltstone of the Upper Cretaceous, Kuskokwim Group, and a mafic dike altered to silica-carbonate minerals (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The individual quartz-sulfide veins and veinlets vary from 0.4 to 1 inch thick; the zone they occur in is about 100 feet wide and can be traced for about 160 feet. Deep red cinnabar crystals up to about 5 millimeters in diameter are locally abundant in the quartz vein. Grab samples contain up to 15.0 percent cinnabar and 5.0 percent stibnite. Grains of yellow scheelite were identified in one sample. Grab samples of mineralization contained more than 1.0 percent mercury, 0.46 percent antimony, more than 1.0 percent arsenic, 50 parts per million (ppm) tungsten, and 5,000 ppm barium (McGimsey and others, 1988).

Alteration:

Silica-carbonate alteration of mafic dikes; silicification.

Age of mineralization:

Undated.

Deposit model:

Either hot spring Hg or Silicate-carbonate Hg deposit (Cox and Singer, 1986; models 27a or 27c).

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

27a or 27c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

The Yousure prospect was discovered by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1985 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

White and Robertson, 1962; Wells and Ghorso, 1988; McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Gray and others, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (north of upper Smith Creek)**Site type:** Occurrence**ARDF no.:** ID160**Latitude:** 62.1522**Quadrangle:** ID A-5**Longitude:** 158.3730**Location description and accuracy:**

This occurrence is on the crest of a low northeast-trending ridge that is northwest of the head of Smith Creek. It is near hill 1170 and about 0.6 mile west-southwest of the center of section 24, T. 24 N., R. 50 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Sb**Other:** Cu, Mo**Ore minerals:****Gangue minerals:** Carbonate minerals, sericite**Geologic description:**

This occurrence consists of a zone of hydrothermally altered olivine-bearing, basaltic andesite of the Iditarod volcanics (Miller and Bundtzen, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The alteration which is marked by sericite and carbonate minerals occurs along N35E-striking cleavage planes that dip about 42NW. The size of the zone is uncertain. One grab sample of mineralization contained 240 parts per million (ppm) antimony, 100 ppm copper, and 7.0 ppm molybdenum (McGimsey and others, 1988).

Alteration:

Alteration marked by sericite and carbonate minerals.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1985 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (on hill 1355 west of Donlin Creek)**Site type:** Occurrence**ARDF no.:** ID161**Latitude:** 62.0675**Quadrangle:** ID A-5**Longitude:** 158.2562**Location description and accuracy:**

This occurrence is on hill 1355, slightly more than 1 mile west of Crooked Creek; in the SE1/4 of section 21, T. 23 N., R. 49 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Hg**Other:** As, Sb, Zn**Ore minerals:****Gangue minerals:** Quartz**Geologic description:**

This occurrence is a zone of quartz veins in iron-oxide-coated sandstone of the Upper Cretaceous, Kuskokwim Group, lesser iron-oxide stained lithic tuff, and small felsic dikes that cut the sedimentary rocks (Cady and others, 1955; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). A grab sample of sandstone contains elevated As and Sb. The tuff contains elevated As (20 ppm), Sb (18 ppm), and Zn (110 ppm). A grab sample of felsic dike contains 2.3 ppm Hg. The quartz vein material contains 0.94 ppm Hg. A blue-green mineral identified by x-ray diffraction to be dickite(?) (analyst Elizabeth Bailey, USGS) coats some of the fracture surfaces (McGimsey and others, 1988).

Alteration:

Alteration marked by clay (dickite) and iron oxides.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988). Westgold prospected the area for gold from 1988 to 1990, and Placer Dome Exploration conducted detailed rock chip and soil surveys of the area from 1995 to 1999. More recently, Novagold Resources has collected surface samples from the general area. The results of these investigations are not known.

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Donlin Bench**Site type:** Mine**ARDF no.:** ID162**Latitude:** 62.0497**Quadrangle:** ID A-5**Longitude:** 158.2362**Location description and accuracy:**

The Donlin Bench placer is an alluvial terrace exposed along the east banks of upper Crooked Creek and Donlin Creek. It extends for 15 miles from Omega Gulch to the headwaters of Donlin Creek (Cady and others, 1955). However, only the portion between the mouth of Omega Gulch and the mouth of Quartz Gulch had sufficient gold to constitute an economic placer. The coordinates are at about the center of the portion that has been mined; the center is near the mouth of Lewis Gulch, about 0.3 miles southeast of the center of section 27, T. 23 N., R. 49 W. of the Seward Meridian. The Donlin Bench above Dome Creek is locality 22 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Hg, Sn, W**Ore minerals:** Cassiterite, cinnabar, gold, magnetite, scheelite**Gangue minerals:** Garnet, quartz**Geologic description:**

The Donlin Bench placer is in an ancestral alluvial terrace of Late Tertiary age that is on the east banks of Upper Crooked and Donlin Creeks. Paleocurrent data collected in mine cuts and aerial photographic interpretation indicate that at one time, probably in Tertiary time, Donlin and Upper Crooked Creek flowed north into the Iditarod River (Bundtzen, unpublished data, 1984). Subsequent tilting reversed the drainage which resulted in the present southerly stream course of Donlin and Crooked Creeks (Cady and others, 1955; Bundtzen and Miller, 1997). This ancestral channel which was first named the Donlin Bench by Cady and others (1955) is gold bearing for much of its length and it extends for a distance of about 15 kilometers from the mouth of Omega Gulch to the head of Donlin Creek. Only about 6 kilometers of the ancestral stream contained enough placer gold to be mined, and most of the gold was produced where side gulches crossed the alluvial terrace and further concentrated the gold in the Donlin Bench into economic placers. These mines are on Lewis Gulch (ID163), Queen Gulch (ID164), Ruby Gulch (ID165), Snow Gulch (ID166), and Quartz Gulch (ID168).

The rocks in the vicinity are mainly shale and graywacke of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994). A prominent dike swarm that is related to the Donlin Creek deposit lode (ID167) parallels the Donlin Bench for a considerable distance. In addition to gold, the principal heavy minerals in the Donlin Bench are cassiterite, scheelite, garnet, and magnetite (Cobb, 1976 [OFR 76-576]; Bundtzen, Cox, and Veach, 1987). Sulfide minerals are sparse probably because of weathering and oxidation in the relatively old gravels of the Donlin Bench.

The gold production summarized here came from both the ancestral terrace gravels and more modern alluvial deposits along Crooked Creek between Lewis and Queen Gulches. Unpublished mint records indicate that the Donlin Bench above Omega Gulch produced 4,170 ounces of gold and 119 ounces of silver from 1911 to 1956.

Alteration:

The bedrock is more deeply weathered on Donlin Bench than in nearby auriferous gulches.

Age of mineralization:

The Donlin Bench is probably Late Tertiary.

Deposit model:

Placer Au deposit (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 found on Donlin Creek in 1909 and production commenced in 1910 (Maddren, 1911).

From 1910 to 1914, most of the mining in the area took place on Quartz, Snow, and Ruby Gulches (which are described separately) but there was some on the Donlin Bench (Maddren (1915). Small scale mining in open cuts continued on the Donlin Bench until 1956 (Cobb, 1974; Cobb, 1976 [OFR 76-576]).

Production notes:

Unpublished mint records indicate that the Donlin Bench above Omega Gulch produced 4,170 ounces of gold and 119 ounces of silver from 1911 to 1956.

Reserves:**Additional comments:****References:**

Maddren, 1911; Maddren, 1915; Cady and others, 1955; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cady and others, 1955; Cobb (OFR 76-576)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Lewis Gulch**Site type:** Mine**ARDF no.:** ID163**Latitude:** 62.0494**Quadrangle:** ID A-5**Longitude:** 158.2243**Location description and accuracy:**

The Lewis Gulch placer extends for about 0.6 mile above its mouth on Crooked Creek. The center of the placer is about 0.3 mile above its mouth and about 0.6 mile southeast of the center of section 27, T. 23 N., R. 49 W., of the Seward Meridian. The location is accurate. Lewis Gulch is locality 17 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Hg**Ore minerals:** Arsenopyrite, cinnabar, gold, ilmenite, monazite, stibnite**Gangue minerals:** Garnet**Geologic description:**

The Lewis Gulch mine is a placer deposit near the intersection of Lewis Gulch and the ancestral 'Donlin Creek' alluvial terrace that developed on the southeast flank of modern Donlin and Crooked Creeks. According to Cady and others (1955) and Bundtzen and Miller (1997), Donlin Creek originally flowed northeast into the Iditarod River. After regional tilting, the drainage reversed direction and Donlin and Crooked Creeks subsequently flowed into the Kuskokwim River. In Lewis Gulch, low grade auriferous gravel deposits in the ancestral channel were reworked to form locally rich placer gold deposits. This ancestral bench is probably Late Tertiary in age.

The gold-bearing fluvial gravels in Lewis Creek extend for about 0.6 mile. The gravel is from 15 to 65 feet thick. The gold was distributed irregularly; some gravel was rich and some was almost barren. The principal heavy minerals identified in concentrates are cinnabar, stibnite, arsenopyrite, garnet, ilmenite, and monazite (Bundtzen, Cox, and Veach, 1987). The source of the placer gold is probably the Donlin Creek lode prospect (ID167), which is at the head of Lewis Gulch (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997). Unpublished U.S. Mint data indicate that Lewis Gulch produced 6,039 ounces gold from 1918 to 1939 (Miller, Bundtzen, and Gray, 2005).

Alteration:**Age of mineralization:**

The alluvium in modern Lewis Gulch is probably Quaternary; the ancestral terrace is probably Late Tertiary.

Deposit model:

Placer Au deposit (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:

Gold was first found on Lewis Gulch in 1910 (Maddren, 1911). Most mining since has been from small scale open cuts (Cobb, 1972 [MF 363]; Cobb, 1973; Cobb, 1976 [OFR 76-576]).

Production notes:

Production began on Lewis Gulch in 1911, and continued intermittently on a small scale at least through the early 1950s (Brooks, 1912; Cady and others, 1955). Unpublished Mint data indicate that Lewis Gulch produced 6,039 ounces of gold from 1918 to 1939 (Bundtzen, Cox, and Veach, 1987; Miller, Bundtzen, and Gray, 2005).

Reserves:

Additional comments:

References:

Maddren, 1911; Brooks, 1912; Cady and others, 1955; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Queen Gulch**Site type:** Mine**ARDF no.:** ID164**Latitude:** 62.0587**Quadrangle:** ID A-5**Longitude:** 158.2152**Location description and accuracy:**

This placer mine is on Queen Gulch, a northwest-flowing tributary of Crooked Creek. The coordinates are near the mouth of the gulch, about 0.5 mile northwest of the center of section 26, T. 23 N., R. 49 W., of the Seward Meridian. The location is accurate. Queen Gulch is locality 18 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, As, Hg, Sn**Ore minerals:** Arsenopyrite, cassiterite, cinnabar, gold, magnetite**Gangue minerals:** Garnet, zircon**Geologic description:**

Queen Gulch is a 2-mile-long tributary of Crooked Creek. The placer deposit is near the intersection of Queen Gulch and the ancestral 'Donlin Creek' alluvial terrace that developed on the southeast flank of modern Donlin and Crooked Creeks. According to Cady and others (1955) and Bundtzen and Miller (1997), Donlin Creek flowed northeast into the Iditarod River. After regional tilting, the drainage reversed direction and Donlin and Crooked Creeks flowed into the Kuskokwim River. In Queen Gulch, low grade auriferous gravel deposits in the ancestral channel were reworked to form locally rich placer gold deposits. This ancestral bench is probably Late Tertiary in age.

The Queen Gulch deposit is about 0.6 mile long. The gravel in it varies from 15 to 65 feet thick. The distribution of the gold in the placer is erratic; some areas were completely barren while other were rich. The source of the placer gold is probably the Donlin Creek lode gold deposit (ID167), which is at the head of Queen Gulch (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997). The principal heavy minerals identified in concentrates of from the mine include cinnabar, stibnite, arsenopyrite, garnet, magnetite, and trace amounts of cassiterite (Cobb, 1967 [OFR 76-576]; Bundtzen, Cox, and Veach, 1987). Production from Queen Gulch was combined with the production from Donlin Creek.

Alteration:**Age of mineralization:**

The alluvium in modern Queen Gulch is probably Quaternary; the ancestral terrace is probably Late Tertiary.

Deposit model:

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

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

39a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

The Queen Gulch placer deposit was discovered in 1910 (Maddren, 1911; Brooks, 1912). There has been some small scale, open-cut placer mining on Queen Gulch (Cobb, 1973).

Production notes:

Production from Queen Gulch was combined with the production from Donlin Creek.

Reserves:

None.

Additional comments:

References:

Maddren, 1911; Brooks, 1912; Cady and others, 1955; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cobb, 1976 (OFR 76-576); this record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Ruby Gulch**Site type:** Mine**ARDF no.:** ID165**Latitude:** 62.0670**Quadrangle:** ID A-5**Longitude:** 158.2146**Location description and accuracy:**

This old placer mine on Ruby Gulch which flows into Crooked Creek; the mouth of Ruby Gulch is about 800 feet upstream from the mouth of Queen Gulch (ID164). The placer deposit in Ruby Gulch is at an elevation of about 400 feet, about 0.3 mile southwest of the center of section 23, T. 23 N., R. 49 W., Seward Meridian. The location is accurate. Ruby Gulch is locality 19 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, As, Hg, Sn, W**Ore minerals:** Arsenian-pyrite, arsenopyrite, cassiterite, cinnabar, gold, magnetite, scheelite, stibnite**Gangue minerals:****Geologic description:**

The Ruby Gulch placer deposit is in a small stream that flows across the lower slopes of the ridge separating Snow Gulch (ID166) and Queen Gulch (ID164). The placer formed where Ruby Gulch intersects the ancestral 'Donlin Creek' alluvial terrace. According to Cady and others (1955) and Bundtzen and Miller (1997), Donlin Creek originally flowed northeast into the Iditarod River. After regional tilting, the drainage reversed direction and Donlin and Crooked Creeks flowed into the Kuskokwim River. In Ruby Gulch, low grade auriferous gravel deposits in the ancestral channel were reworked to form locally rich gold placers. The placer in Ruby Gulch is about 1,600 feet long; the gold-bearing gravel varies from about 16 to 50 feet thick. In addition to gold, the principal heavy minerals identified in concentrates include gold-bearing arsenopyrite, cinnabar, cassiterite, arsenian-pyrite, scheelite, stibnite, and magnetite (Bundtzen, Cox, and Veach, 1987). Seven samples of gold from Ruby Gulch varied from 902 to 910 fine (Smith, 1941 [B 910]; Cobb, 1972 [MF 363]; Cobb, 1976 [OFR 76-576]). The placer gold in Ruby Gulch probably originated in the Donlin Creek lode deposit which is just southeast of Ruby Gulch (ID167) (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997). Unpublished mint records indicate that Ruby Gulch produced about 145 ounces of gold in 1911.

Alteration:**Age of mineralization:**

The alluvium in modern Ruby Gulch is probably Quaternary; the ancestral terrace is probably Late Tertiary.

Deposit model:

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

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

39a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

The Ruby Gulch placer deposit was discovered in 1910 and was mined by open-cut methods (Maddren, 1911, 1915; Brooks, 1912; Cobb, 1974). The only production that is recorded was in 1911.

Production notes:

Unpublished mint records indicate that Ruby Gulch produced 145 ounces of gold in 1911.

Reserves:

Additional comments:

References:

Maddren, 1911; Maddren, 1915; Brooks, 1912; Smith, 1941 (B 910-C); Cady and others, 1955; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cobb (OFR 76-576)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Snow Gulch**Site type:** Mine**ARDF no.:** ID166**Latitude:** 62.0766**Quadrangle:** ID A-5**Longitude:** 158.1960**Location description and accuracy:**

Snow Gulch is a 4-mile-long, northwest-flowing tributary of Donlin Creek. About 1.2 mile of lower Snow Gulch has been mined or is known to be gold-bearing. The coordinates are near its mouth where the richest placers are found. This location is at an elevation of about 500 feet, about 0.7 mile southeast of the center of section 14, T. 23 N., R. 49 W., of the Seward Meridian. The location is accurate. The Snow Gulch placer mine is locality 20 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, As, Sb, Sn, Th, U, W**Ore minerals:** Arsenopyrite, cassiterite, gold, magnetite, monazite, scheelite, stibnite**Gangue minerals:** Calcite, garnet**Geologic description:**

Snow Gulch has been the principal placer-gold producer in the Donlin Creek district. The richest segment of the creek is about 0.5 mile long, just above the mouth of the creek; however, about 1.2 mile of the creek has good gold prospects (Maddren, 1915). The most productive zone along the creek was at the intersection of Snow Gulch and the ancestral 'Donlin Creek' terrace or bench deposit. According to Cady and others (1955) and Bundtzen and Miller (1997), Donlin Creek originally flowed northeast into the Iditarod River. After regional tilting, the drainage reversed direction and Donlin and Crooked Creeks flowed into the Kuskokwim River. In Snow Gulch, low grade auriferous gravel deposits in the ancestral channel were reworked to form locally rich gold placers. The paystreaks in Snow Gulch also extend for about 2,000 feet to both the northeast and southwest along the the Donlin terrace deposits. As pointed out by Maddren (1915), this productive section of the creek also the beginning of the abundant igneous intrusions upstream in the valley of the gulch.

The gravel in Snow Gulch varies from 16 to 50 feet thick. The gold is distributed irregularly on the bedrock at the base of the terrace. The pay zones locally contain between 0.12 to 0.2 ounces of gold per cubic yard (Spencer Lyman, oral commun., 1984). In addition to gold, the principal heavy minerals identified in the placer concentrates are auriferous arsenopyrite, arsenian pyrite, garnet, cassiterite, calcite, scheelite, stibnite, magnetite, and monazite. The concentrates are radioactive; the radioactivity is probably caused by U and Th and their daughter products in monazite (Bundtzen, Cox, and Veach, 1987). Garnet is abundant; it is likely derived from the swarm of granitic dikes and sills in the area. The gold varies from 802 to 930 fine and averages 927 fine; silver and mercury are the major trace metals in the gold (Smith, 1941 [B910]; Bundtzen, Cox, and Veach, 1987; T.K. Bundtzen, unpublished laboratory data, 1994). In 1983, a 9.8 ounce gold nugget was recovered from Snow Gulch (Spencer Lyman, oral communication, 1984).

Unpublished mint records and more recent production estimates indicate that Snow Gulch has produced 8,238 ounces of gold and 605 ounces of silver from 1910 to 1992. Much of the gold was produced from 1983 to 1992 by Lyman Resources of Alaska, Inc. Some additional production may be included with the production from Donlin Creek and Crooked Creek.

Alteration:

Age of mineralization:

The alluvium in modern Snow Gulch is probably Quaternary; the ancestral terrace is probably Late Tertiary.

Deposit model:

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

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

39a

Production Status: Yes

Site Status: Active

Workings/exploration:

Gold was found on Snow Gulch in 1909 and economic placers were found in 1910 (Brooks, 1912; Maddren, 1915). The deposit was mined mainly by open-cut methods (Cobb, 1974). The largest post World War II production began in 1983 when Lyman Resources of Alaska, Inc. began open-cut mining with bulldozer and dragline; they produced substantial amounts of gold intermittently through 1992.

Production notes:

Unpublished mint records and more recent production estimates indicate that Snow Gulch has produced 8,238 ounces of gold and 605 ounces of silver from 1910 to 1992. Production was more-or-less continuous on a small scale through World War II. Some additional production may be included with the production from Donlin Creek and Crooked Creek. Lyman Resources of Alaska, Inc. accounted for a considerable percentage of the total production from Snow Gulch as a result of their mining from 1983 to 1992.

Reserves:**Additional comments:****References:**

Maddren, 1911; Maddren, 1915; Brooks, 1912; Smith, 1941 (B 910-C); Cady and others, 1955; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cobb, 1976 (OFR 76-576)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Donlin Creek**Site type:** Prospect**ARDF no.:** ID167**Latitude:** 62.0542**Quadrangle:** ID A-5**Longitude:** 158.1843**Location description and accuracy:**

The Donlin Creek lode is a northeast-trending area about 1.2 miles wide and 5 miles long on the ridge east of Crooked Creek. The coordinates are at an area that is being considered as an open pit. That location is at an elevation of about 1,100 feet, about 1.4 mile east-southeast of the mouth of Queen Gulch and about 0.2 mile west of the center of section 25, T. 23 N., R. 49 W., of the Seward Meridian. Note: This deposit is distinct from the several placers in the vicinity of Crooked Creek and Donlin Creek and over the years, 'Donlin Creek' has been used to refer to both one or more of these placers and this lode.

Commodities:**Main:** Au**Other:** Ag, As, Be, Cd, Cu, Hg, Mo, Pb, Sb, Sn, W, Zn**Ore minerals:** Arsenian pyrite, arsenic (native), arsenopyrite, cassiterite, chalcopyrite, cinnabar, covellite, galena, marcasite, molybdenite, pyrite, pyrrhotite, realgar, sphalerite, stibnite, scheelite**Gangue minerals:** Carbonate minerals, garnet, quartz**Geologic description:**

The Donlin Creek lode is Alaska's largest gold deposit, with more than 22.9 million ounces of gold in measured, indicated, and inferred resources (Novagold press release, January 28, 2002; Placer Dome Exploration press release, May 4, 2003). The deposit is in an elongate, northeast-trending mineralized area about 1.2 mile wide and 3 miles long that runs along the ridge east of Crooked Creek at the heads of Lewis, Queen, Ruby, and Snow Gulches. As currently developed, the main area of mineralization is about 6,500 feet long, trends east-west, and is about 3,200 feet wide. Individual centers of mineralization have been designated 'South Lewis', 'North Lewis', 'Vortex', '400', 'Richelieu', and 'Acma'.

The rocks in the area are calcareous shale and graywacke of the Upper Cretaceous, Kuskokwim Group. These detrital rocks strike west-northwest and dip 10-50 SW; they are cut by dikes and sills of several ages. Mafic sills that are extensively altered to quartz-carbonate rock are cut by at least four subtypes of younger rhyodacite to granite-porphyry sills and dikes. A major northeast-striking dike swarm cuts west-northwest-striking sills and dikes on the ridge crest between Lewis and American Creeks. Late northeast and north-west-striking, high-angle faults appear to offset the mineralized zones (Miller and Bundtzen, 1994; Vaillancourt, 2002; St. George, 2004).

The deposit is best developed in the felsic dikes and sills, and lesser so in the graywacke, particularly where north-northeast striking fault zones intersect the favorable felsic intrusion and graywacke host rocks. The ore minerals are primarily gold-bearing arsenopyrite and arsenian pyrite which are disseminated in the felsic igneous rocks and in veins and networks of veinlets in the igneous and sedimentary rocks. The veins and veinlets consist of quartz and carbonate gangue, with gold and several ore minerals. The gold occurs mainly in the lattice of the arsenopyrite (St. George, 2003). In addition to the arsenopyrite, pyrite, and stibnite which are the dominant ore minerals, minor chalcopyrite, cinnabar, cassiterite, covellite, galena, marcasite, molybdenite, native arsenic, pyrrhotite, sphalerite, scheelite, and the alteration products of sulfides also occur. The gangue and alteration minerals include crystalline and chalcedonic quartz, carbonate minerals, and dickite. The garnet and high tin values in some of the granite porphyry dikes indicate that at least part of the intrusive suite is peraluminous.

Based on crosscutting relationships, the altered mafic dikes were intruded first, followed by the intermediate and felsic dikes. Despite the intensity of intrusive activity, there is little thermal alteration of host rocks, i.e., the development of hornfels, as compared to similar-sized intrusive centers in other areas of the Kuskokwim mineral belt (Bundtzen and Miller, 1997). Miller and Bundtzen (1994) report that the felsic dikes vary in age from 65.1 to 70.9 Ma. More recent age dating summarized in Szumigala, Dodd, and Arribas (2000) and Ebert and others (2000) give similar radiometric ages.

According to Szumigala, Dodd, and Arribas (2000), the gold mineralization is in disseminated sulfides, sulfide veins, and in quartz-carbonate-sulfide veining in sericitically-altered igneous rocks. There is a positive correlation between high fracture density, alteration, and the amount of gold. Ore shoots at Donlin Creek are developed in dilatant zones along normal faults where the faults steepened in felsic intrusions and graywacke. Fluid inclusion, and ore and alteration mineral assemblage data indicate that pervasive sericitization developed under a lower mesothermal regime, but some of the ore probably was epithermal (Bundtzen and Miller, 1997; Szumigala, Dodd, and Arribas, 2000).

The occurrence of gold in the intrusive rocks at the Donlin Creek deposit was recognized as early as 1912 (Madden, 1915). There was increasing more thorough work in the 1980's when a joint effort by Alaska Earth Sciences and the Calista Corporation suggested that the Donlin Creek deposit could be an important bulk-mineable gold deposit. Trenching and drilling done by Westgold from 1988 to 1990 identified seven ore bodies that contained about 392,090 ounces of gold (Retherford and McAtee, 1994). Placer Dome US conducted exploration from 1995 to 2000 and announced that the Donlin Creek deposit contained about 11 million ounces of gold (Swainbank and others, 2002). Placer Dome's first exploration phase at the Donlin Creek deposit ended in 2000. Later in 2000, Novagold Resources Inc. signed agreements with Placer Dome Exploration and Calista Corporation, who owns the deposit, to acquire a 70 percent interest in the Donlin Creek deposit by spending \$10 million to explore the deposit over a ten year period (Swainbank and others, 2002). Novagold fulfilled the exploration commitment during 2001 and 2002. In the spring of 2003, after reviewing the results of the two-year Novagold exploration program, Placer Dome Exploration reacquired a majority interest in the project by agreeing to spend \$30 million on further exploration and to complete a feasibility study of the project (February, 2003 Press release, Novagold Resources, Inc.). Exploration at the Donlin Creek gold deposit is in progress as of March 2004.

By the end of 2001, the deposit had been explored by about 287,000 feet of diamond core drilling in 361 holes, about 43,700 feet of reverse-circulation drilling in 117 hole, and 7,000 feet of trenches (Novagold Press release, January 28, 2002). The total measured and indicated reserves are 115 million tons of material with 0.1 ounces of gold per ton, or about 10.0 million ounces of gold. The total inferred reserves and resources are 142 tons of material with 0.1 ounce of gold per ton, or about 12.9 million ounces of gold.

Alteration:

The alteration is marked by sericite, illite, kaolinite, dickite, carbonate minerals, and pyrite (Szumigala, Dodd, and Arribas, 2000).

Age of mineralization:

The felsic intrusions at Donlin Creek have 40K/40Ar ages of from 65.1 to 70.9 Ma (Miller and Bundtzen, 1994).

Deposit model:

Porphyry gold-copper deposit; (Cox and Singer, 1986; model 20c); possibly the porphyry gold type deposit of Hollister (1992); or the peraluminous granite, porphyry gold-polymetallic type deposit of Bundtzen and Miller (1997).

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

20c

Production Status: None**Site Status:** Active**Workings/exploration:**

The occurrence of gold in the intrusive rocks at the Donlin Creek deposit were recognized as early as 1912 (Maddren, 1915). Cady and others (1955) reported that lode gold occurrences exposed between Queen and Snow Gulches contained stibnite and up to a half ounce of gold per ton. During the 1950s, Robert F. Lyman trenched the Snow Gulch stibnite-gold prospect.

In 1974, Resource Associates of Alaska, Inc. on behalf of the Calista Corporation, carried out surface investigations including some trenching in the Donlin Creek dike swarm. This firm detected high gold values in a soil survey and recommended that an induced polarization survey and a drill program be conducted on the property (Muntzert and others, 1975). In 1984, Bundtzen and Miller mapped and sampled trenches at Snow Gulch; the samples yielded up to 0.35 ounce of gold per ton, 7,000 ppm arsenic, 70 ppm tin, and several percent antimony (Bundtzen and Miller, 1997). In the mid-1980s, Rob Retherford, Bruce Hickok, Tom Turner, and Toni Hinderman of Alaska Earth Sciences, Inc. and Calista Corporation investigated the pervasive presence of gold-rich arsenopyrite at Snow Gulch and other areas, and suggested that the Donlin Creek dike swarm could be an important bulk-mineable gold deposit.

Trenching and drilling done by Westgold from 1988 to 1990 indicated that seven ore bodies in the Donlin intrusive swarm contained 4.26 million tons of material with a grade of 0.09 ounces of gold per ton, or about 392,090 ounces of gold (Retherford and McAtee, 1994). Placer Dome US conducted exploration from 1995 to 2000 and announced that the Donlin Creek deposit contained about 11 million ounces of gold (Swainbank and others, 2002). Placer Dome's first phase of exploration phase at the Donlin Creek deposit ended in 2000. Later in 2000, Novagold Resources Inc. signed agreements with Placer Dome Exploration and Calista Corporation, who owns the deposit, to acquire a 70 percent interest in the Donlin Creek deposit by spending \$10 million in exploration over a ten year period (Swainbank and others, 2002). Novagold fulfilled the exploration commitment during 2001 and 2002. In the spring of 2003, after reviewing the results of the two-year Novagold exploration program, Placer Dome Exploration reacquired a majority interest in the project by agreeing to spend \$30 million on further exploration and complete a feasibility study of the project (February, 2003 Press release, Novagold Resources, Inc.). Exploration at the Donlin Creek gold deposit is in progress as of March 2004.

Production notes:**Reserves:**

By the end of 2001, the total measured and indicated reserves were 115 million tons of material with 0.1 ounces of gold per ton, or about 10.0 million ounces of gold. The total inferred reserves and resources are 142 million tons of material with 0.1 ounce of gold per ton, or about 12.9 million ounces of gold. The total of 22.9 million ounces of gold rank this in the top 30 gold deposits known in the world (Novagold Press release, January 28, 2002). The bulk of the reserve is in the Lewis, 400, Acma, and Richelieu ore bodies. This total does not include reserve estimates for the Snow and Far Side deposits. Based on earlier work by Westgold, the Snow deposit contains 44,000 ounces of gold with an average grade of 0.10 ounce of gold per ton (Retherford and others, 1989). The Far Side deposit contains 38,400 ounces of gold of unstated grade.

Additional comments:

If one restores the 54 miles of right lateral offset along the Iditarod-Nixon Fork fault, the Donlin Creek dike and sill swarm correlates with the Ganes-Yankee dike and sill swarm and nearby deposits (ID024, ID028, ID035, and ID039) in the Ganes Creek-Yankee Creek areas in the Innoko district in the northern Iditarod Quadrangle (Miller and Bundtzen, 1988).

References:

Maddren, 1915; Cady and others, 1955; Muntzert and others, 1975; Retherford and others, 1989; Retherford and McAtee, 1994; Miller and Bundtzen, 1994; Szumigala, 1993; Szumigala, 1996; Bundtzen and Miller, 1997; Gray and others, 1997; McCoy and others, 1997; McCoy and others, 1999; Ebert and others, 2000; Szumigala, Dodd, and Arribas, 2000; Hart and others, 2002; Bundtzen and Flanigan, 2002; Vaillincourt, 2002; St. George, 2003; Miller, Bundtzen, and Gray, 2005.

Primary reference: Szumigala, Dodd, and Arribas, 2000

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey);

and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Quartz Gulch**Site type:** Mine**ARDF no.:** ID168**Latitude:** 62.0810**Quadrangle:** ID A-5**Longitude:** 158.1817**Location description and accuracy:**

Quartz Gulch is a west-flowing stream that empties into Donlin Creek above Snow Gulch (ID166). The coordinates are near the mouth of Quartz Gulch at the site of the placer mining. The deposit is at an elevation of about 500 feet, about 0.2 mile southwest of the center of section 13, T. 23 N., R. 49 W., of the Seward Meridian. The location is accurate. The Quartz Gulch placer mine is locality 21 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, As, Sb, Sn, Th, U, W**Ore minerals:** Arsenopyrite, cassiterite, cinnabar, gold, magnetite, monazite, scheelite, stibnite**Gangue minerals:** Garnet, quartz**Geologic description:**

The Quartz Gulch Mine is a placer deposit near the mouth of Quartz Gulch. The gold-bearing gravels in Quartz Gulch are restricted to an 2,500-foot-section of the gulch that intersects the ancestral, Late Tertiary terrace along the south side of Donlin Creek. According to Cady and others (1955) and Bundtzen and Miller (1997), Donlin Creek originally flowed northeast into the Iditarod River basin. After regional tilting, the drainage reversed and Donlin flowed into the Kuskokwim River basin. After the reversal, low grade gold placers in the Donlin Bench (ID162) were reconcentrated along Quartz Gulch, locally upgrading them to a commercial deposit. The gravel in Quartz Gulch varies from 10 to 50 feet thick and the gold is irregularly distributed on the bedrock (Cobb, 1974; Cobb, 1976 [OFR 76-576]). In addition to gold, the principle heavy minerals identified in placer concentrates are gold-bearing arsenopyrite, cassiterite, cinnabar, monazite, scheelite, stibnite and garnet. The rocks in vicinity of Quartz Gulch are mainly sandstone and shale of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005).

Unpublished mint records indicate that Quartz Gulch produced at least 1,968 ounces of gold and 14 ounces of silver from 1911 to 1914. Later production is included with that of the Donlin Bench (ID162).

Alteration:**Age of mineralization:**

The alluvium in modern Quartz Gulch is probably Quaternary; the ancestral terrace is probably Late Tertiary.

Deposit model:

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

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

39a

Production Status: Yes; small

Site Status: Inactive

Workings/exploration:

Placer gold was found on Quartz Gulch in 1909 and production began in 1910 (Maddren, 1911). From 1910 to 1914, all of the mining and exploration activities in the area of Donlin Creek were mainly on Quartz, Snow, and Ruby Gulches (Maddren, 1915). In 1912, \$29,000 in gold was mined on the No. 1 claim on Quartz Gulch. Most of this was produced in the summer from open cuts in gravel about 6 feet deep; the remainder was produced in the winter from drift mines that worked gravel 20 to 24 feet thick. Only about \$6,000 more was mined in 1913 and 1914. Some mining continued to 1940, mainly in open cuts (Cobb, 1974).

Production notes:

From 1911 to 1914, Quartz Gulch was the largest gold producer in the Donlin Creek district. Unpublished mint records indicate that production was at least 1,968 ounces of gold and 14.0 ounces of silver during that time. Later production is included with that of the Donlin Bench (ID162).

Reserves:

Additional comments:

References:

Maddren, 1911; Maddren, 1915; Cady and others, 1955; Cobb, 1972 (MF 363); Cobb, 1974; Cobb, 1976 (OFR 76-576); Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: Cobb, 1976 (OFR 76-576)

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Dome**Site type:** Prospect**ARDF no.:** ID169**Latitude:** 62.0738**Quadrangle:** ID A-5**Longitude:** 158.1562**Location description and accuracy:**

The Dome prospect is on hill 1234 which is southwest of Dome Creek and northwest of Quartz Gulch; in the NW1/4 of section 19, T. 23 N., R. 48 W., of the Seward Meridian. Cobb (1972 [MF 363]; 1976 [OFR 76-576]).

Commodities:**Main:** Au, Cu**Other:** Ag, As, Bi, Hg, Sn**Ore minerals:** Arsenopyrite, chalcopyrite, magnetite**Gangue minerals:** Quartz**Geologic description:**

The Dome prospect is on a large, generally untested, gold anomaly in soils at the northeast end of the Donlin Creek swarm of dikes and sills. Quartz-sulfide veins and veinlets cut granite porphyry and quartz-feldspar porphyry dikes and sills as well as hornfels derived from the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Szumigala, Dodd, and Arribas, 2000). The greater extent of hornfels here relative to its general absence near the Donlin Creek lode (ID167) suggests that a larger intrusion might underlie this area. Quartz-feldspar porphyry and igneous breccias were identified in drill core (McCoy and others, 1999).

Gold appears to be associated with widespread arsenopyrite (McCoy and others, 1999). Chalcopyrite occurs sparsely. Samples by the U.S. Geological Survey and by the Alaska Division of Geological and Geophysical Surveys in the early 1980s contained up to 1.0 parts per million (ppm) silver, 5.1 ppm mercury, 70 ppm tin, 3.0 ppm bismuth, and 1,000 ppm arsenic in addition to gold (McGimsey and others, 1988). Szumigala, Dodd, and Arribas (2000) believe that the intrusive and sediment-hosted, gold and copper mineralization represent a porphyry-type deposit. They also report fluid inclusion temperatures of 400 degrees C which suggests a magmatic source for the hydrothermal fluids and further supports the idea of porphyry-type mineralization here.

Alteration:

Development of secondary biotite and sericite.

Age of mineralization:

The mineralization is 65.0 Ma based on 40K/40Ar age date reported by Miller and Bundtzen (1994).

Deposit model:

Porphyry gold-copper deposit; (Cox and Singer, 1986; model 20c); possibly the porphyry gold type deposit of Hollister (1992); or the peraluminous granite, porphyry gold-polymetallic type deposit of Bundtzen and Miller (1997).

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

20c

Production Status: None

Site Status: Active

Workings/exploration:

The prospect was sampled by the U.S. Geological Survey and by the Alaska Division of Geological and Geophysical Surveys in the early 1980s (McGimsey and others, 1988). Westgold explored the Dome prospect from 1988 to 1990 but did not drill it (Retherford and McAtee, 1994). Placer Dome drilled the prospect in 1996 and 1997 but the total footage has not been released (McCoy and others, 1997).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Retherford and McAtee, 1994; Bundtzen and Miller, 1997; McCoy and others, 1997; McCoy and others, 1999; Szumigala, Dodd, and Arribas, 2000; Miller, Bundtzen, and Gray, 2005.

Primary reference: Szumigala, Dodd, and Arribas, 2000

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/26/2003

Site name(s): Unnamed (northeast Granite Mountain)**Site type:** Occurrence**ARDF no.:** ID170**Latitude:** 62.3540**Quadrangle:** ID A-5**Longitude:** 156.6893**Location description and accuracy:**

This occurrence is on the north end of Granite Mountain at an elevation of about 1,800 feet. It is about 0.8 mile north of hill 2555 and about 0.6 mile east-southeast of the center of section 9, T. 26 N., R. 40 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Pb**Other:** As, Bi, Sb**Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is at the north end of Granite Mountain about 0.6 mile north of the hornfels aureole of the Granite Mountain pluton. The rocks in the area are sandstone and shale of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). This occurrence is based on a grab sample of what was originally considered to be barren Kuskokwim Group sedimentary rocks. The grab sample contained 500 parts per billion (ppb) silver, 200 parts per million (ppm) lead, 10.0 ppm bismuth, 100 ppm arsenic, and 12 ppm antimony (McGimsey and others, 1988).

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:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (south of Little Eldorado Creek)**Site type:** Occurrence**ARDF no.:** ID171**Latitude:** 62.1733**Quadrangle:** ID A-4**Longitude:** 157.9695**Location description and accuracy:**

This occurrence is on a low saddle west of the head of Little Eldorado Creek at an elevation of about 1,050 feet. It is about 0.7 mile north-northwest of hill 1533 and about 0.3 mile north-northwest of the center of section 18, T. 24 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Zn**Other:** Hg**Ore minerals:****Gangue minerals:** Quartz, sericite**Geologic description:**

This occurrence is a zone of sericitized granite porphyry that contains quartz veinlets with envelopes of iron-stained alteration. The small granite porphyry body cuts sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). A grab sample of mineralization contained 240 parts per million (ppm) zinc and 1,800 parts per billion (ppb) mercury (McGimsey and others, 1988).

Alteration:

Sericitic alteration of granite porphyry; veinlets have envelopes of iron oxide alteration.

Age of mineralization:**Deposit model:**

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

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

22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:**

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (upper Little Eldorado Creek)**Site type:** Occurrence**ARDF no.:** ID172**Latitude:** 62.2045**Quadrangle:** ID A-4**Longitude:** 157.9550**Location description and accuracy:**

This occurrence is on a steep, east-facing bluff on the west side of Little Eldorado Creek. The occurrence is at an elevation of about 700 feet; it is about 0.8 mile north-northeast of hill 1013 and about 0.6 mile northeast of the center of section 6, T. 24 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** As**Other:****Ore minerals:****Gangue minerals:****Geologic description:**

This occurrence is based on a grab sample from what was thought to be a barren granite-porphyry plug that cuts sandstone of the Upper Cretaceous, Kuskokwim Group (Miller, Bundtzen, and Gray, 2005). The granite porphyry plug is 71.5 Ma (Miller and Bundtzen, 1994). The grab sample contained 700 parts per million (ppm) arsenic (McGimsey and others, 1988).

Alteration:**Age of mineralization:**

Unknown; based on a sample from a granite-porphyry plug that has a 40K/40Ar age of 71.5 Ma (Miller and Bundtzen, 1994).

Deposit model:**Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

A sample was collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1984 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:**

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (east tributary of Little Eldorado Creek)**Site type:** Occurrence**ARDF no.:** ID173**Latitude:** 62.2337**Quadrangle:** ID A-4**Longitude:** 157.9401**Location description and accuracy:**

This occurrence is on a south facing bluff overlooking an unnamed east fork of Little Eldorado Creek. It is about 3.5 miles west of VABM 1918/Widgeon and about 0.5 mile north of the center of section 26, T. 25 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg**Ore minerals:** Iron oxide**Gangue minerals:** Sericite**Geologic description:**

This occurrence consists of a zone of iron-staining and sericite alteration in a small granite intrusion that intrudes flysch of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). One grab sample of weak mineralization contained 50 parts per billion (ppb) gold, 1,800 ppb mercury, and 100 ppb silver (McGimsey and others, 1988).

Alteration:

Sericitic alternation and iron staining.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (upper Little Eldorado Creek)**Site type:** Occurrence**ARDF no.:** ID174**Latitude:** 62.1816**Quadrangle:** ID A-4**Longitude:** 157.9279**Location description and accuracy:**

This occurrence is at an elevation of about 1,100 feet on top of a small ridge that separates the two head-water tributaries of Little Eldorado Creek. The occurrence is about 1.2 mile south of hill 1132 and 0.3 mile southeast of the center of section 8, T. 24 N., R. 47 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Hg**Ore minerals:** Iron oxide**Gangue minerals:** Sericite**Geologic description:**

This occurrence consists of an iron stained, sericitized zone in a granite porphyry plug which intrudes sandstone of the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). The altered zone is of uncertain size and orientation. One sample of mineralization contained 50 parts per billion (ppb) gold and 1,300 ppb mercury (McGimsey and others, 1988).

Alteration:

Sericitic alteration of granite porphyry; iron oxide staining.

Age of mineralization:**Deposit model:****Deposit model number (After Cox and Singer, 1986 or Bliss, 1992):****Production Status:** None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in 1986 (McGimsey and others, 1988).

Production notes:**Reserves:****Additional comments:****References:**

McGimsey and others, 1988; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: Miller, Bundtzen, and Gray, 2005

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (west of Julian Creek)**Site type:** Occurrence**ARDF no.:** ID175**Latitude:** 62.2187**Quadrangle:** ID A-3**Longitude:** 157.4041**Location description and accuracy:**

This occurrence is on hill 1390 on the spur that trends northwest between Spruce and Julian Creeks. It is about 0.6 mile northeast of the center of section 34, T. 25 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Ag, Sn**Other:** As, Bi, Cd, Sb**Ore minerals:** Arsenopyrite**Gangue minerals:** Quartz, sericite**Geologic description:**

This occurrence consists of arsenopyrite-bearing quartz veinlets in a sericitically altered, granodiorite intrusion in flysch of the the Upper Cretaceous, Kuskokwim Group (Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005). The intrusion has a 40K/40Ar age of 70.1 Ma. The quartz veinlets occur in an area about 130 feet square. Grab samples of the veins contained up to 10.0 parts per million (ppm) silver, 100 ppm tin, more than 2,000 ppm arsenic, 11.0 ppm bismuth, 3.3 ppm cadmium, and 12 ppm antimony (McGimsey and others, 1988). The mineralized zone is a possible source of the placer gold in Julian (ID177) and Spruce (ID176) Creeks.

Alteration:

Sericitic alteration of granodiorite.

Age of mineralization:

Unknown; the host intrusion has a 40K/40Ar age of 70.1 Ma (Miller and Bundtzen, 1994).

Deposit model:

Sn-polymetallic deposit or Polymetallic vein (Cox and Singer, 1986; model 20b or 22c).

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

20b or 22c

Production Status: None**Site Status:** Inactive**Workings/exploration:**

Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988).

Production notes:

Reserves:

Additional comments:

References:

McGimsey and others, 1988; Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Spruce Creek**Site type:** Mine**ARDF no.:** ID176**Latitude:** 62.1968**Quadrangle:** ID A-3**Longitude:** 157.3967**Location description and accuracy:**

Spruce Creek is not shown on the current USGS topographic map but it is well known. It is about a mile southwest of and parallel to Julian Creek (ID177). Spruce Creek has been mined for about a mile above its mouth. The coordinates are at the center of the placer which is about 0.5 mile above its mouth and about 0.5 mile west-southwest of the center of section 5, T. 24N., R. 44W. Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Hg**Ore minerals:** Cinnabar, gold, ilmenite, magnetite**Gangue minerals:****Geologic description:**

The Spruce Creek placer mine is a moderately shallow, but narrow, muck-covered, placer gold deposit. The lower mile of the creek has been mined. The paystreak is about 30 to 60 feet wide and is overlain by about 12 to 20 feet of organic muck (L.E. Wyrick, oral communication, 1986; T.K. Bundtzen, unpublished field data, 1986; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). In addition to gold and abundant cinnabar, ilmenite, garnet, and magnetite have been identified in concentrates. The gold averages 897 fine (Bundtzen, Cox, and Veach, 1987). A plausible lode source for the placer gold is a granodioritic pluton at the head of the creek. A local source for the cinnabar is suggested by the angular fragments of this relatively friable mineral that are found in abundance in the placer concentrates.

Placer gold was found in Spruce Creek in 1911 (Brooks, 1912) but most of the exploration began in 1979 when L.E. Wyrick trenched and drilled the placer. Stripping began in 1980 and mining took place from late 1980 to 1983. The mechanized mining was unprofitable due to the narrowness of the creek, the thick overburden, and the marginal amount of gold in the paystreak (L.E. Wyrick, oral communication, 1986). About 274 ounces of gold was produced.

Alteration:**Age of mineralization:**

Undated, but probably Quaternary.

Deposit model:

Placer Au deposit (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 found in Spruce Creek in 1911 (Brooks, 1912) but most of the exploration began in 1979 when L.E. Wyrick trenched and drilled the placer. Stripping began in 1980 and mining took place from late 1980 to 1983. The mechanized mining was unprofitable due to the narrowness of the creek, the thick overburden, and the marginal amount of gold in the paystreak (L.E. Wyrick, oral communication, 1986).

Production notes:

Gold was discovered in 1911 (Brooks, 1912). About 274 ounces of gold was produced prior to 1984 but mainly from 1981 to 1983 (L.E. Wyrick, oral commun., 1986).

Reserves:

There could be still be gold in the gravel under thick overburden in the upper end of the creek (L.E. Wyrick, oral communication, 1986).

Additional comments:

References:

Brooks, 1912; Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Julian Creek**Site type:** Mine**ARDF no.:** ID177**Latitude:** 62.2054**Quadrangle:** ID A-3**Longitude:** 157.3727**Location description and accuracy:**

Julian Creek is a tributary of the George River; the lower 2 miles has been placer mined. The coordinates are at the center of the mine at an elevation of about 400 feet near the northeast corner of section 5, T. 24 N., R. 44 W., of the Seward Meridian. The location is accurate. The Julian Creek placer is locality 36 of Cobb (1972 [MF 363]); also described in Cobb (1976 [OFR 76-576]).

Commodities:**Main:** Au**Other:** Ag, Ba, Cr, Hg, Sb, Sn, Th**Ore minerals:** Barite, cassiterite, chromite, cinnabar, gold, magnesiochromite, monazite, pyrite, stibnite**Gangue minerals:** Garnet, zircon**Geologic description:**

The Julian Creek mine is a small but rich, shallow placer-gold deposit. The rocks in the area are sandstone and slate of the Upper Cretaceous, Kuskokwim Group that are cut by several narrow, porphyritic granite dikes (White and Killeen, 1953). Shallow gold-bearing gravels occur in Quaternary stream alluvium and on a low benches on the north side of the creek. The paystreak ranges from 60 to 220 feet wide and extends from the mouth of the creek to an elevation of about 550 feet. Most of the overburden which reaches a maximum thickness of about 10 feet is hill-slope colluvium (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005).

In addition to gold, the principal heavy minerals are abundant pyrite, radioactive monazite, barite, garnet, cassiterite, zircon, cinnabar, chromite, magnesiochromite, and stibnite (Bundtzen, Cox, and Veach, 1987). The gold is 657 to 840 fine and silver is the main element in the gold. The placer gravels mined before to World War II were relatively rich; they averaged about 0.08 to 0.12 ounces of gold per cubic yard (Larry Wilmarth, oral communication, 1984). The cassiterite found in concentrates may have been derived from tin-bearing zones identified in the unnamed occurrence to the northeast (ID175). A sample of the concentrates studied by White and Killeen (1953) contained about 80 percent pyrite, 10 percent rock minerals, 5 percent garnet, and 5 percent monazite; it was radioactive (0.03 percent eU). The radioactivity is probably due to thorium in monazite. The abundance of pyrite suggests a nearby source for some of the material.

Cady and others (1953) noted the presence of hypabyssal, albite rhyolite intrusives at Julian Creek and proposed that they were of early Tertiary age; they also compared the rhyolite at Julian Creek to similar rocks in the Donlin Creek area and they proposed a genetic relation between the rhyolite and the placer gold deposits of both areas.

Based on published and unpublished data, Miller, Bundtzen, and Gray (2005) estimated that Julian Creek has produced at least 11,600 ounces of gold and 1,650 ounces of silver from 1911 to 1993, the last year of recorded production.

Alteration:**Age of mineralization:**

The placer in the modern stream is probably Quaternary; the bench placers might be Late Tertiary by anal-

ogy with similar deposits elsewhere in Interior Alaska (Hopkins and others, 1971).

Deposit model:

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

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

39a

Production Status: Yes

Site Status: Active?

Workings/exploration:

The Julian Creek placer deposit was discovered in 1910 and production began in 1911 (Maddren, 1911; Brooks, 1912). The deposit was mined intermittently from 1911 to 1939 (Mertie, 1936; Smith, 1941 [B 926A) and then from 1979 to 1993 (Miller, Bundtzen, and Gray, 2005). Most mining has been by open-cut methods using bulldozer and draglines from 1932 to 1939 and from 1979 to 1993. The Wilmarth family was the principal operator on the creek from 1979 to 1993.

Production notes:

Based on published and unpublished data, Miller, Bundtzen, and Gray (2005) estimated that Julian Creek has produced at least 11,600 ounces of gold and 1,650 ounces of silver from 1911 to 1993, the last year of recorded production.

Reserves:

The deposit is largely mined out, but auriferous fractions may remain.

Additional comments:**References:**

Maddren, 1911; Brooks, 1912; Mertie, 1936; Smith, 1941 (B 926-A); White and Killeen, 1953; Cady and others, 1955; Hopkins and others, 1971; Cobb, 1972 (MF 363); Cobb, 1976 (OFR 76-576); Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Michigan Creek Bench**Site type:** Mine**ARDF no.:** ID178**Latitude:** 62.2394**Quadrangle:** ID A-3**Longitude:** 157.3454**Location description and accuracy:**

The Michigan Bench placer mine is near the mouth of a minor north-flowing tributary of Michigan Creek. The mine is about 1.3 mile west-northwest of the mouth of Michigan Creek at an elevation of about 500 feet. It is about 0.3 mile southeast of the center of section 24, T. 25 N., R. 44 W., of the Seward Meridian. The location is accurate.

Commodities:**Main:** Au**Other:** Ag, Hg**Ore minerals:** Cinnabar, gold, magnetite**Gangue minerals:** Garnet**Geologic description:**

The Michigan Bench is a small placer mine near the mouth of a small north-flowing, unnamed tributary of Michigan Creek. The deposit is on a terrace that probably represents an ancestral alluvial fan at the base of the small gulch that flows northeast at the mine. The gulch drains an area underlain by a swarm of granite porphyry and granodiorite dikes and sills exposed at the heads of Julian (ID177) and Spruce Creeks (ID176) (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). In addition to gold, the principal heavy minerals in concentrate include cinnabar, garnet, and magnetite (Bundtzen, Cox, and Veach, 1987). The garnets are probably derived from garnetiferous granite-porphyry intrusions identified during geologic mapping southwest of the mine (Miller and Bundtzen, 1994). The Michigan Bench produced 125 ounces of gold during the early 1980s (Miller, Bundtzen, and Gray, 2005).

Alteration:

None.

Age of mineralization:**Deposit model:**

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

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

39a

Production Status: Yes; small**Site Status:** Inactive**Workings/exploration:**

Placer gold was located on Michigan Creek in 1911 (Brooks, 1912). Samples were collected by the U. S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (Bundtzen,

Cox, and Veach, 1987).

Production notes:

The Michigan Bench produced 125 ounces of gold during the early 1980s (Miller, Bundtzen, and Gray, 2005).

Reserves:

Additional comments:

References:

Brooks, 1912; Bundtzen, Cox, and Veach, 1987; Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

Site name(s): Unnamed (east of George River)**Site type:** Prospect**ARDF no.:** ID179**Latitude:** 62.2409**Quadrangle:** ID A-3**Longitude:** 157.1993**Location description and accuracy:**

This prospect is at an elevation of about 950 feet, about 0.2 mile northeast of the top of hill 1265, a prominent feature about 3.5 miles east-northeast of the mouth of Michigan Creek. It is about 0.2 mile southwest of the center of section 23, T. 25N., R. 43W., Seward Meridian. The location is accurate.

Commodities:**Main:** Au, Sb**Other:** As, Hg, Mo, Sn, W**Ore minerals:** Goethite, hematite, stibnite**Gangue minerals:** Quartz**Geologic description:**

This prospect consists of a sulfide- and hematite-bearing breccia in hornfels derived from the Upper Cretaceous, Kuskokwim Group. The prospect is adjacent to a small granite-porphyry intrusion (Miller and Bundtzen, 1994; Miller, Bundtzen, and Gray, 2005). Breccias with fragments of both sedimentary and volcanic rocks exist, which suggest that remnants of a volcanic field are also present. The granite porphyry has a 40K/40Ar age of 71.3 Ma (Miller and Bundtzen, 1994).

The sulfide breccia covers an area at least 1,000 feet by 1,000 feet in area. The best mineralization occurs in the creek at the east side of the deposit, where stibnite-quartz gash veins cut hornfels. Other areas contain quartz breccia with masses of goethite produced by the oxidization of sulfide minerals. Grab samples of mineralization contain up to 250 parts per million (ppb) gold, 1.00 percent antimony, 200 parts per million (ppm) tin, 200 ppm tungsten, more than 14.0 ppm mercury, 5.0 ppm molybdenum, 610 ppm arsenic, and 20.00 percent iron. (McGimsey and others, 1988).

Alteration:

Iron oxide alteration.

Age of mineralization:

Unknown; the intrusion adjacent to the hornfels that hosts the deposit has a 40K/40Ar age of 71.3 Ma (Miller and Bundtzen, 1994).

Deposit model:

Polymetallic vein (Cox and Singer, 1986; model 22c); or peraluminous granite porphyry gold-polymetallic type of Bundtzen and Miller (1997).

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

22c

Production Status: None**Site Status:** Inactive

Workings/exploration:

The stibnite-quartz gash veins exposed at creek level was first noticed by the helicopter pilot David Blair in 1985. Samples were collected by the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys in the 1980s (McGimsey and others, 1988). In 1996, Ventures Resources, Inc. acquired Alaska State prospecting sites over the prospect and continued to explore the site through 2003.

Production notes:**Reserves:****Additional comments:****References:**

Miller and Bundtzen, 1994; Bundtzen and Miller, 1997; McGimsey and others, 1988; Miller, Bundtzen, and Gray, 2005.

Primary reference: This record

Reporter(s): T.K. Bundtzen (Pacific Rim Geological Consulting, Inc.), M.L. Miller (U.S. Geological Survey); and C.C. Hawley (Hawley Resource Group)

Last report date: 5/25/2003

References

- Bennett, G.J., Gray, J.E., and Taylor, C.D., 1988, Mineralogy and sample locality map of non-magnetic heavy mineral concentrate samples, Iditarod quadrangle, Alaska: U.S. Geological Survey Open-File Report 88-32, 37 p, 1 sheet, scale 1:250,000.
- Berg, H.C., and Cobb, E.H., 1967, Metalliferous lode deposits of Alaska: U.S. Geological Survey Bulletin 1246, 254 p.
- Berger, V.I., 1993, Descriptive and grade and tonnage model for gold-antimony deposits: U.S. Geological Survey Open-File Report 93-194, 24 p.
- Berry, M.J., 1973, A history of mining on the Kenai Peninsula: Alaska Northwest Publishing Company, 214 p.
- Brooks, A.H., 1912, The mining industry in 1911: U.S. Geological Survey Bulletin 520, p. 17-44.
- Brooks, A.H., 1914, The Alaska mineral industry in 1913: U.S. Geological Survey Bulletin 592, p. 45-74.
- Brooks, 1916, Antimony deposits of Alaska: U.S. Geological Survey Bulletin 649, 74 p.
- Brooks, A.H., 1922, The Alaskan mineral industry in 1920: U.S. Geological Survey Bulletin 722, p. 7-67.
- Brown, C.M., 1983, Alaska's Kuskokwim River region, a history: U. S. Bureau of Land Management Draft History Summary, 141 p.
- Bull, K.F., 1988, Genesis of the Golden Horn and related mineralization in the Flat Creek area, Alaska: Fairbanks, University of Alaska M.Sc. thesis, 300 p.
- Bundtzen, T.K., 1980, Multiple glaciation in the Beaver Mountains, western interior Alaska, *in* Short notes on Alaskan geology 1979-1980: Alaska Division of Geological and Geophysical Surveys Geologic Report 63, p. 11-19.
- Bundtzen, T.K., 1980, Geological guides to heavy mineral placers, *in* Second annual conference on Alaskan Placer Mining—Focus on Gold: University of Alaska Mineral Industry Research Laboratory, p. 21-44.
- Bundtzen, T.K., 1999, Alaska Resource Data File (ARDF), McGrath quadrangle: U.S. Geological Survey Open-File Report 99-357, 199 p.
- Bundtzen, T.K., Bouley, B.A., Noyes, H.J., and Nokleberg, W.J., 2000, Regional metallogensis of central Alaska: Society of Mining, Metallurgy, and Exploration Annual Meeting, Salt Lake City, Utah, February 28-March 1, 2000, p.1-29.
- Bundtzen, T.K., Cox, B.C., and Veach, N.C., 1987, Heavy mineral provenance studies in the Iditarod and Innoko districts, western Alaska, *in*, Vassiliou, A.H., Hausen, D.M., and Carson, D.J.T., eds., Process Mineralogy VII: The Metallurgical Society, Warrendale, Pennsylvania, p.221-246.
- Bundtzen, T.K., and Flanigan, Brian, 2002, Anatomy of giants—The Tintina gold province, Alaska Yukon Region, North America, *in* Anatomy of giants short course: Society of Economic Geologists Global Exploration 2002--Integrated Methods for Discovery, Denver, Colorado, April 11-12, 2002 (CD ROM).
- Bundtzen, T.K., Green, C.B., Deagen, J.R., and Daniels, C.L., 1987, Alaska's mineral industry in 1986, Alaska Division of Geological and Geophysical Surveys Special Report 40, 68 p.
- Bundtzen, T.K., and Laird, G.M., 1980, Geology of the upper Innoko River area, western-interior Alaska: Alaska Division of Geological and Geophysical Survey Open- File Report 134, 34 p. 1 sheet, scale 1:63,360.

- Bundtzen, T.K., and Laird, G.M., 1982, Geologic map of the Iditarod D-2 and eastern D-3 quadrangles, Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 72, 1 sheet, scale 1:63,360.
- Bundtzen, T.K., and Laird, G.M., 1983, Geologic map of the Iditarod D-1 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 78, 1 sheet, scale 1:63,360.
- Bundtzen, T.K., Laird, G.M., and Lockwood, M.S., 1988, Geologic map of the Iditarod C-3 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Professional Report 96, 13 pages, 1 sheet, scale 1:63,360.
- Bundtzen, T.K., and Miller, M.L., 1997, Precious metals associated with Late Cretaceous-early Tertiary igneous rocks of southwest Alaska, in Goldfarb, R.J., and Miller, L.D., eds., Mineral Deposits of Alaska: Economic Geology Monograph 9, p. 241-286.
- Bundtzen, T.K., Miller, M.L., Bull, K.F., and Laird, G.M., 1988, Geology and mineral resources of Iditarod mining district, Iditarod B-4 and eastern B-5 quadrangles, west-central Alaska: Alaska Division of Geological and Geophysical Surveys Public Data File Report 88-19, 45 p., 1 sheet, scale 1:63,360 scale (largely superseded by DGGs Geologic Report 97, Bundtzen and others, 1992).
- Bundtzen, T.K., Miller, M.L., and Laird, G.M., 1986, Prospect examination of the Wyrick placer/lode system, Granite Creek, Iditarod-George mining district, Iditarod B-2 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Public Data File Report 86-29, 10 p., 1 sheet, scale 1:200.
- Bundtzen, T.K., Miller, M.L., Laird, G.M., and Bull, K.F., 1992, Geology and mineral resources of the Iditarod mining district, Iditarod B-4 and eastern B-5 quadrangles, southwestern Alaska: Alaska Division of Geological and Geophysical Surveys Professional Report 97, 48 p., 2 sheets, scales 1:63,360 and 1:500.
- Bundtzen, T.K., Swainbank, R.C., Clough, A.H., Henning, M.W., and Charlie, K.M., 1996, Alaska's mineral Industry, 1995: Alaska Division of Geological and Geophysical Surveys Special Report 50, 72 p.
- Cady, W.H., Wallace, R.E., Hoare, J.M., and Webber, E.J., 1955, The central Kuskokwim region, Alaska: U.S. Geological Survey Professional Paper 268, 132 p.
- Cobb, E.H., 1972, Metallic mineral resources map of the Iditarod quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-363, scale 1:250,000.
- Cobb, E.H., 1974, Placer deposits of Alaska: U.S. Geological Survey Bulletin 1374, 213 pages.
- Cobb, E.H., 1976, Summary of references to mineral occurrences (other than mineral fuels and construction materials) in the Iditarod and Ophir quadrangles, Alaska: U.S. Geological Survey Open File Report 76-576, 101 p.
- Cox, D.P., and Singer, D.A., eds., 1986, Mineral deposit models: U.S. Geological Survey Bulletin 1693, 279 p.
- Eakin, H.M., 1913, Gold placers of the Innoko-Iditarod region, Alaska: U.S. Geological Survey Bulletin 542, p. 293-303.
- Eakin, H.M., 1914, The Iditarod-Ruby region, Alaska: U.S. Geological Survey Bulletin 578, 45 p.
- Ebert, S., Miller, L.D., Petsel, S., Dodd, S., and Kowalczyk, 2000, Geology, mineralization, and exploration at the Donlin Creek project, southwestern Alaska: British Columbia and Yukon Chamber of Mines Special Volume 2, p. 99-114.
- Galey, J., Retherford, R., Ellis, W., Harris, R., Deane, S., and Hinderman, T., 2002, 2001 Annual report, Takotna

- village block: Lakewood, Colorado, North Star Exploration, Inc., AR-01-Takotna, to Doyon Limited: 29 p. 9 sheets and 4 appendices.
- Glavinovich, P.S., and Morgan, W.A., 1994, Report of placer testing, Wyrick Claims, Granite Creek, Alaska, for JR Mining Corporation: Unpublished report of L.E. Wyrick, 45 p.
- Gray, J.E., Gent, C.A., Snee, C.W., and Wilson, F.H., 1997, Epithermal mercury-Antimony and Gold-Bearing Vein Lodes of Southwest Alaska: in Goldfarb, R.J., and Miller, L.D., eds., Mineral Deposits of Alaska: Economic Geology Monograph 9, p. 287-305.
- Hart, C.J.R., McCoy, D.T., Goldfarb, R.J., Smith, M., Roberts, P., Hulstein, R., Bakke, A.A., and Bundtzen, T. K., 2002, Geology, exploration, and discovery in the Tintina gold province, Alaska and Yukon, *in* Integrated methods for discovery: Global exploration in 21st Century: Society of Economic Geologists Special Publication 9, p.241-274.
- Hawley, Charles C., 2003, Wesley Earl Dunkle, Alaska's Flying Miner: University of Alaska Press, 380 p.
- Hinderman, T., Retherford, R., Bull, K.F., Vanderpool, T., and Bundtzen, T.K., 1999, 1998 annual report, Takotna village block: Lakewood, Colorado, North Star Exploration, Inc., AR-98-Takotna, to Doyon Limited, 57 pages, 4 sheets and 3 appendices.
- Hollister, V.F., 1992, On a proposed plutonic porphyry gold deposit model: Nonrenewable Resources, vol. 1, p. 293-302.
- Holzheimer, F.W., 1926, Lode mining activity in Otter Creek, Iditarod district, Alaska: Alaska Territorial Department of Mines Report MR 73-1, 7 p.
- Hopkins, D.M., Matthews, J.V., Wolfe, J.A., and Silberman, M.L., 1971, A Pliocene flora and insect fauna from the Bering Sea region: Paleoecology, vol. 9, p. 211-231.
- Jennings, D., 1975, Mineral resource evaluation for Calista Corporation—final report of exploration activities during 1975: Fairbanks, Alaska, Resource Associates of Alaska, Inc. unpublished report, 14 p.
- Joesting, H.R., 1942, Strategic mineral occurrences in interior Alaska: Alaska Department of Mines Pamphlet, 46 p.
- Kimball, A.L., 1969, Reconnaissance sampling of decomposed monzonite for gold near Flat, Alaska: U.S. Bureau of Mines Open File Report 6-69, 39 p.
- Maddren, A.G., 1910, The Innoko gold placer district, Alaska: U.S. Geological Survey Bulletin 410, 87 p.
- Maddren, A.G., 1911, Gold placer mining developments in the Innoko-Iditarod region: U.S. Geological Survey Bulletin 480, p. 236-270.
- Maddren, A.G., 1915, Gold placers in the lower Kuskokwim River region with a note on copper in the Russian Mountains: U.S. Geological Survey Bulletin 622, p. 292-360.
- Malone, Kevin, 1962, Mercury occurrences in Alaska: U.S. Bureau of Mines Circular 8131, 57 p.
- Maloney, R.P., 1962, Investigation of mercury-antimony deposits near Flat, Yukon River region, Alaska: U.S. Bureau of Mines Report of Investigations RI 5991, 44 p.
- McCoy, D.T., Dodd, S.P., Arribas, A. Jr., Miller, M.L., Goldfarb, R.J., and Szumigala, D.J., 1999, Geology and geochemistry of the Donlin Creek gold deposit, southwest Alaska: Geological Society of America Abstracts with Programs, v. 31, no. 6, p. A-78.

- McCoy, D.T., Newberry, R.J., Layer, P.W., DiMarchi, J.J., Bakke, A.A., Masterman, J.S., and Minehane, D.L., 1997, Plutonic-Related Gold Deposits of Interior Alaska, in, Goldfarb, R.J., and Miller, L.D., eds., *Mineral Deposits of Alaska: Economic Geology Monograph 9*, p. 191-241.
- McGimsey, R.G., Miller, M.L., and Arbogast, B.F., 1988, Paper version of analytical results, and sample locality map for rock samples from the Iditarod quadrangle, Alaska: U.S. Geological Survey Open File Report 88-421-A, 109 p.; 1 sheet, scale 1:250,000.
- Mertie, J.B. Jr., 1936, Mineral deposits of the Ruby-Kuskokwim region, Alaska: U.S. Geological Survey Bulletin 864C, p. 115-245.
- Mertie, J.B. Jr., and Harrington, G.L., 1916, Mineral resources of the Ruby-Kuskokwim region, Alaska: U.S. Geological Survey Bulletin 642, p.223-266.
- Mertie, J.B. Jr., and Harrington, G.L., 1924, The Ruby-Kuskokwim region, Alaska: U.S. Geological Survey Bulletin 754, 129 p.
- Michael, H.N., editor, 1976, Lieutenant Zagoskin's Travels in Russian America, 1842-1844: Arctic Institute of North America Anthropology of the North Series No. 7, University of Toronto Press, 358 p.
- Miller, M.L., 1990, Mafic and ultramafic rocks of the Dishna River area, north central Iditarod quadrangle, west-central Alaska: U.S. Geological Survey Bulletin 1946, p. 44-50.
- Miller, M.L., and Bundtzen, T.K., 1988, Right lateral offset solution for the Iditarod-Nixon Fork fault, western Alaska: U.S. Geological Survey Circular 1016, p. 99-103.
- Miller, M.L., and Bundtzen, T.K., 1994, Generalized geologic map of the Iditarod quadrangle, Alaska showing potassium-argon, major oxide, trace element, fossil, paleocurrent, and archeological sample localities: U.S. Geological Survey Miscellaneous Field Studies Map MF-2219-A, 48 pages; 1 sheet, scale 1:250,000.
- Miller, M.L., Bundtzen, T.K., and Gray, J.E., 2005, Mineral resource assessment of the Iditarod quadrangle, west-central Alaska: U.S. Geological Survey Miscellaneous Field Studies MF-2219-B, pamphlet, 1 sheet, scale 1:250,000.
- Morgan, W., 1992, Synopsis of Granite Creek placer operation, Granite Creek, Iditarod quadrangle, central Alaska, unpublished company report for L.E., and Marilyn Wyrick, 22 p.
- Muntzert, J., Haverslew, R.E., Hirst, P.E., Knaebel, J., and Heiner, L.E., 1975, Land and mineral resource evaluation for Calista Corporation-final report of exploration activities during 1974: Fairbanks, Alaska, Resource Associates of Alaska, Inc. unpublished report, p. 20-22.
- Obolewicz, D.B., 1981, Tatalina Mountain and Ganes Creek prospects, in, Alaska Mineral exploration summary for 1981: Anchorage, Alaska, unpublished Anaconda Copper Company domestic metals exploration program report, p. 31-36.
- Retherford, R.M., Graff, P., and Hinderman, Toni, 1989, Donlin Creek project (Alaska) 1989 exploration program final report: Anchorage, Alaska, unpublished Western Gold Exploration and Mining Company Ltd. report, 186 p.
- Retherford, R.M., and McAtee, June, 1994, Donlin Creek property, southwest Alaska: Anchorage, Calista Corporation Land Department unpublished report, 27 p., one sheet, scale 1:10,000
- Sainsbury, C.L., and MacKevett, E.M., Jr., 1965, Quicksilver deposits of southwestern Alaska: U.S. Geological Survey Bulletin 1187, 89 p.

- Smith, S.S., 1917, The mining industry in the Alaskan Territory during the calendar year 1915: U.S. Bureau of Mines Bulletin 142, 66 p.
- Smith, P.S., 1930, The Mineral industry of Alaska in 1928: U.S. Geological Survey Bulletin 813-A, p. 1-72.
- Smith, P.S., 1932, The mineral industry of Alaska in 1929: U.S. Geological Survey Bulletin 824-A, p. 1-81.
- Smith, P.S., 1933, The mineral industry of Alaska in 1931: U.S. Geological Survey Bulletin 844-A, p. 1-82.
- Smith, P.S., 1934, The mineral industry of Alaska in 1932: U.S. Geological Survey Bulletin 857-A, p. 1-91.
- Smith, P.S., 1934, The mineral industry of Alaska in 1933: U.S. Geological Survey Bulletin 864-A, p. 1-94.
- Smith, P.S., 1936, The mineral industry of Alaska in 1934: U.S. Geological Survey Bulletin 868-A, p. 1-91.
- Smith, P.S., 1937, The mineral industry of Alaska in 1935: U.S. Geological Survey Bulletin 880-A, p. 1-95.
- Smith, P.S., 1938, The mineral industry of Alaska in 1936: U.S. Geological Survey Bulletin 897-A, p. 1-107.
- Smith, P.S., 1939, The mineral industry of Alaska in 1937: U.S. Geological Survey Bulletin 910-A, p. 1-113.
- Smith, P.S., 1939, The mineral industry of Alaska in 1938: U.S. Geological Survey Bulletin 917-A, p. 1-113.
- Smith, P.S., 1941, Fineness of gold from Alaskan placers: U.S. Geological Survey Bulletin 910-C, p. 147-272.
- Smith, P.S., 1941, The mineral Industry of Alaska in 1939: U.S. Geological Survey Bulletin 926-A, p. 1-106.
- Smith, P.S., 1942, The mineral industry of Alaska in 1940: U.S. Geological Survey Bulletin 933-A, p. 1-102.
- St. George, P., 1998, Progress report for 1997, Ganes Creek project A326, southwest Alaska: Anchorage, Alaska, unpublished Placer Dome Exploration report, 13 pages, plus plates and appendices.
- St. George, P., 2003, Donlin Creek--Alaska's development of one of the world's largest gold deposits (abs.): 2003 Cordilleran Exploration Round-up, Yukon and British Columbia Chamber of Mines, Vancouver, British Columbia, Canada, p 50.
- Stewart, B.D., 1947 Report of the commissioner of mines for the biennium ended December 31, 1946: Alaska Territorial Department of Mines Biennial Report, 50 p.
- Swainbank, R.C., Szumigala, D.J., Henning, M.W., and Pillifant, F.M., 2002, Alaska's mineral industry, 2001: Alaska Division of Geological and Geophysical Surveys Special Report 56, 65 p.
- Szumigala, D.J., 1993, Gold mineralization related to Cretaceous-Tertiary magmatism in the Kuskokwim Mountains of west-central and southwestern Alaska: Los Angeles, University of California Ph.D. dissertation, 300 p.
- Szumigala, D.J., 1996, Gold mineralization related to Cretaceous-Tertiary magmatism in west-central Alaska—A geochemical model and prospecting guide for the Kuskokwim region: Geological Society of Nevada Symposium Proceedings, p. 1317-1340.
- Szumigala, D.J., Dodd, S.P., and Arribas, A. Jr., 2000, Geology and gold mineralization at the Donlin Creek prospects, southwestern Alaska: Alaska Division of Geological and Geophysical Surveys Professional Report 119, p. 91-115.
- Veillancourt, P., 2002, Novagold Resources, Inc.: Elephant Country in Alaska: Union Securities Research Re-

- port, 27 p.
- Webber, W.J., 1944, DeCourcy Mountain mercury deposit, Iditarod district, Alaska: U.S. Bureau of Mines War Minerals Report 233, 13 p.
- Webber, W.J., Bjorklund, S.C., Rutledge, F.A., Thomas, B.I., and Wright, W.S., 1947, Mercury deposits of southwestern Alaska: U.S. Bureau of Mines Report of Investigations 4065, 57 p.
- Wedow, H. Jr., White, M.G., and Moxham, R.M., 1952, Interim report on an appraisal of the uranium possibilities of Alaska: U.S. Geological Survey Open-File Report 51, 123 p.
- Wells, J.T., and Ghiorso, M.S., 1988, Rock alteration, mercury transport, and metal deposition at Sulphur Bank, California: *Economic Geology*, vol. 83, p. 606-618.
- White, M.G., and Killeen, P.L., 1953, Reconnaissance for radioactive deposits in the lower Yukon-Kuskokwim highlands region, Alaska: U.S. Geological Survey Circular 255, 18 p.
- White, D. E., and Robinson, C. E., 1962, Sulphur Bank, California, a major hot spring quicksilver deposit, *in* Engel, A.E.J., James, H.L., and Leonard, B.F., eds., *Petrologic studies: A volume in honor of A.F. Buddington*: Boulder, Colorado, Geological Society of America p. 397-428.
- Wimmler, 1927, Placer mining methods and costs in Alaska: U.S. Bureau of Mines Bulletin 259, 236 p.